



Ministry for the
Environment
Manatū Mō Te Taiao

Our clean green image: What's it worth?



Valuing New Zealand's clean green image

Imagine that you live in Asia, or Britain or perhaps the US. You have driven home through the smog to your cramped apartment, and as you eat your dinner you see on TV images of snow-capped mountains reflected in crystal-clear unpolluted lakes. Cows graze in lush green pastures, native birds sing in the forests, waves thunder onto deserted beaches, and happy healthy people are having fun. It is New Zealand, and it looks like paradise. So you think to yourself, I want to eat food that comes from there. I want to go there on my holiday.

This is the vision, the impetus behind much of the way New Zealand markets itself to the international community. We are clean and green so people want to eat what we produce, experience our unspoilt environment. We know that. Or do we? Is this really what makes people buy New Zealand? Are we sure? Does our clean green image influence all those buying our food? Or just a few? And does it really matter to people who are thinking about a holiday?



Answering these questions is important to New Zealand's future. The Government needs hard evidence on which to decide the role it should play in promoting sustainable development. The Government needs to know how big the economic opportunities are which our environment supports. In effect, we need to put a dollar value on our clean green image.

In early 2001 the Ministry for the Environment commissioned PA Consulting Group to estimate this value. The study has looked at whether we are as clean and green as we think we are, and surveyed key export customers to gauge how much our environmental image influences their purchasing decisions. The results provide quantitative evidence about the extent to which consumers in our export markets choose to visit us or buy our products on the basis of our image. They complement the findings of *Green Market Signals*, an earlier qualitative analysis.



Putting a price on paradise

How do you put a price on our clean green image? No one can do this definitively, but the study's approach was to do this by concentrating on three export sectors:

- dairy products
- tourism
- organic foods.

The reasons for the first two are obvious. Agriculture is New Zealand's single largest earner of export dollars, and the dairy sector is the largest agricultural export earner (around \$5 billion in the year ended June 2000). Tourism is a fast-growing sector with enormous potential and a similar size to dairying. In both sectors it's obvious that the environment is a factor.

In contrast, organic food is a relatively small export earner. It was included because organic food has shown rapid growth, particularly in Europe and the US, and also because of its current high public profile. Also, organic production is fast becoming a major marketing trend in the UK and Europe, where food scares are making consumers much more conscious of what they eat.

Is the environment valuable?

The results of surveys of a selection of New Zealand's key export customers indicate that our clean green image does have a significant export value – our environmental image is a key driver of the value of goods and services in the international market place.

This quantitative evidence backs up other evidence on the environmental contribution to export value:

- export sectors recognise the need to promote New Zealand's image as a producer of food in a natural environment, and to develop appropriate environmental standards for production, processing, packaging and storage
- many consumers are buying organic produce because of concerns about food safety
- tourists are attracted to New Zealand because of the "real nature experience" and have high expectations about scenery and landscape.



What were consumers asked?

Key customers were selected from within these three sectors.

The dairy survey was conducted at three supermarkets in Kuala Lumpur, Malaysia, and the results were used to generalise to similar markets in Asia, Africa, India and the Middle East. Consumers were shown images representing a clean green New Zealand, and images portraying New Zealand with a degraded environment. They were then asked if they would continue buying New Zealand dairy products under these worsened perceptions. For the tourism survey, international visitors from our top five inbound tourist markets (Australia, Korea, the US and UK, and Japan) were shown similar types of images and asked how it would affect their length of stay.

The organic food survey was a little different. Two large wholesalers (Organic Foods, the largest organic food supplier in the UK) and Worldwide Fruit (the sole distributor of ENZA fresh produce in the UK) were asked how their buying would be affected by two possible genetic modification policy scenarios in New Zealand: (i) allowing limited field test of genetically modified (GM) crops for research purposes; and (ii) allowing uncontrolled release of GM crops in New Zealand. The focus was on fresh organic produce, because currently it accounts for 80% of New Zealand organic exports.

A brief summary of the results is given in the blue panel.

Research findings

Dairy sector

If New Zealand's environment was perceived as being degraded, on average the consumers surveyed would purchase 54% less consumer products.

The actual loss in revenue would depend on how much of the lost product could be redirected to products and markets where environmental image plays a less important role, so the potential annual loss would vary between:

- \$241 million (all lost product redirected), and
- \$569 million (none of the lost product redirected).

Tourism

The extent of change in purchasing behaviour (measured by change in length of stay) varied by country. Under worsened environmental perceptions, tourists in New Zealand would alter their stay by an average of, for example:

- Australia – 48% reduction
- Japan – 79% reduction
- Korea – 77% reduction.

The annual loss to New Zealand from the five markets covered in the survey of tourists would be between NZ\$530 million and NZ\$938 million (depending on whether lost wages and GST effects are taken into account).

Organic produce

Buyers were presented with two scenarios: New Zealand allowing (a) limited field test of GM crops for research and (b) uncontrolled releases of GM crops.

In the short term New Zealand's organic sector would not be affected by allowing field tests of GM crops for research, although in the long term buyers would probably shift to other sources.

Adopting a policy of uncontrolled release would see New Zealand almost certainly suffer immediate losses, with buyers either stopping or substantially decreasing purchases.

Note: the valuations are estimates only and are subject to a number of assumptions. While these uncertainties may have been of concern if the changes in purchase behaviour were relatively small, the size of the impact is such that uncertainties do little to undermine the significance of the result.



What does it mean?

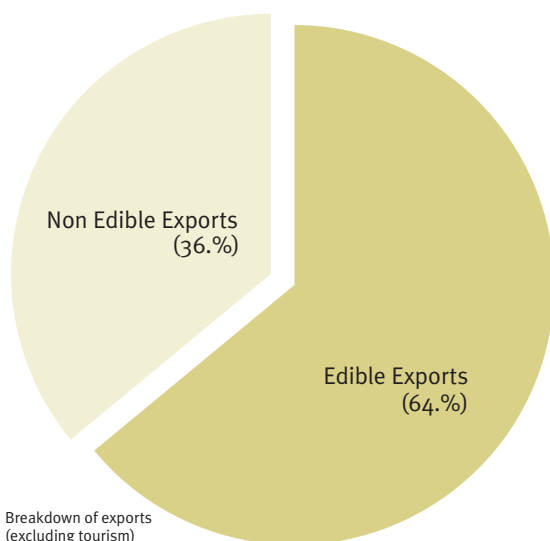
The findings provide supporting evidence for what we already suspected:

- that if New Zealand were to lose its clean green image, it would have an enormous effect on the New Zealand economy. For one thing, we could lose an edge in many of the prime markets where consumers are careful about what they eat. And, although the surveys covered only dairy products and organic foods, a lot of other products that New Zealand exports in fact get eaten, so the effects of a tarnished environmental image could extend to all of these sectors. Taking these sectors into account, our clean green image is likely to be worth hundreds of millions, and possibly billions of dollars per year.



Do we really need to worry, though? It has been argued, especially in the context of the GM debate, that New Zealand is not as clean and green as we like to believe. That, for example, we use traditional agricultural techniques that put stresses on the environment and cause pollutants to enter the food chain. That our image is just that, a marketing ploy.

In fact, the report does show that the crucial link is between image and export value, and that image is separate from the reality of the state of the environment. That means we have a buffer, a period during which our environment could degrade without it necessarily affecting our image and therefore our exports. This is precisely the danger. All the indications are that in a world of increasingly health-conscious consumers, sooner or later we would lose our clean green image if the environmental reality were to fall behind. And it would be very hard to regain – harder, perhaps, than restoring the environment itself.



The implications for New Zealand

New Zealand is, in fact, relatively clean and green by world standards, but we are vulnerable – there are environmental problems that are serious enough to potentially undermine the sustainability of the value of New Zealand's exports attributable to its environmental image. Areas of concern include:

- poor and deteriorating air quality in two of our major cities – Auckland and Christchurch
- erosion on steeper landscapes and the visual impact of some land-use practices
- degraded freshwater quality, especially from intensive agricultural land use
- a degraded marine environment in estuaries and harbours near main population centres.

There is, therefore, a real risk that the export value created or supported by New Zealand's current environmental image could be lost if we do not actively deal with the problems that threaten the image.

The report shows that our clean green image has real dollar value for our major export markets. This underlines the economic as well as the environmental importance of effective environmental management, including quality regulation. The Resource Management Act and the Hazardous Substances and New Organisms Act provide for sustainable environmental management in New Zealand.



The findings underline the importance of the positive actions that have already been undertaken in the primary production sector (such as developing environmental and quality management systems, food safety systems and encouraging best practice), and the support offered through the Sustainable Management Fund and the Sustainable Farming Fund.

The findings also underline the significance and economic benefit of initiatives such as developing a sustainable development strategy, a waste minimisation strategy, and policy work on triple bottom line reporting. But this report highlights that more action may be needed from Government and the private sector to promote cost-effective business and community efforts to improve environmental performance.

Positioning New Zealand to take maximum advantage of its clean green image, and underpinning that image with a clean green reality, will not only benefit New Zealanders' quality of life directly, but will have clear long-term economic benefits.

The full report, *Valuing our Clean Green Image*, is available from the Ministry's website, www.mfe.govt.nz

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Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

EXECUTIVE SUMMARY

New Zealand's environment is valuable, not only for its own sake but also for its ability to add value to the goods and services New Zealand sells in the international market place. Although there is a great deal of qualitative evidence to suggest that New Zealand's environmental image is an important driver of export value, there is very little in the way of supporting quantitative data. This report sets out to address that issue by developing some insights into the size of the value key export industries may be extracting from New Zealand's clean green image in some of the more important export markets.

APPROACH AND METHODOLOGY

The diverse nature of New Zealand's exports, coupled with the large number of markets to which New Zealand's exports are directed, means that the task of compiling a comprehensive valuation of New Zealand's environmental image is, from a practical perspective, impossible.

This means that it is necessary to be selective in directing the analytical effort; it is important to determine in which markets and which industries it is most instructive to explore the link between environmental quality and export value. In addressing this issue we undertook two preliminary pieces of analysis.

The first was an "export sector scan". In this part of the analysis, we considered the sectors and markets in which New Zealand's export revenues are earned and the qualitative evidence for the value being enhanced by New Zealand's environmental image.

The second part of the analysis consisted of an "environmental scan". Here we considered the areas of the New Zealand environment under pressure and the potential for environmental degradation to flow through into the value obtained from our key exports.

These two pieces of preliminary analysis, coupled with input from the Ministry for the Environment with respect to how the insights developed from the analysis might inform current policy work, helped narrow the focus of the study to a more manageable size.

A contingent valuation methodology was then employed to determine the impact on the export sector under consideration. Essentially, this involved the determination through surveys of how the purchasing behaviour of key participants in the value chain might change under varying assumptions of New Zealand's environmental quality.

OVERVIEW OF NEW ZEALAND'S EXPORT SECTOR

As a small open economy, New Zealand is heavily dependent on its export industries. Agriculture is the single largest earner, regularly contributing over \$20 billion to the Gross National Product. Key subsectors are meat, dairy, horticulture and organic food. New Zealand's top five export markets (in terms of revenue earned) for the year ended June 2000 were Australia, the USA, Japan, the UK and Korea. These markets combined, accounted for almost 60% of revenue earned from exports.

Tourism makes a large contribution to the New Zealand economy in terms of foreign exchange earnings as well as Goods and Services Tax. It is a fast growing sector with enormous potential and of similar size to the dairy industry. New Zealand's top tourism markets are Australia, the USA, Japan, the UK and Korea, although there are some fast growing markets in both South East Asia and Central Europe. New Zealand is perceived by Asian, European and North American tourists, as an "Eden-like" escape. Tourism New Zealand has taken advantage of these perceptions in presenting New Zealand to these countries, with its marketing strategy hinging on New Zealand's clean environment.

The dairy sector is New Zealand's largest agricultural export earner. Ninety to ninety-five percent of production is exported. For the year ended June 2000, earnings from dairy exports were close to NZ\$5 billion. New Zealand's dairy exports consist of milk powders, butter, cheese and casein-related products, with the USA, Japan and the UK being the largest single markets for New Zealand dairy products. The New Zealand Dairy Board, which currently manages most of the dairy industry's marketing, uses New Zealand's environment as a major marketing tool, regularly emphasising New Zealand's use of open pastures all year round for cattle to graze on.

For the year ended June 2000, *the meat sector* represented over a fifth of New Zealand's revenue from exports. Major meat exports are lamb and beef. The New Zealand region is synonymous with the former, thanks to careful marketing strategies, which capitalise on New Zealand's environmental image. The USA is the major destination for New Zealand beef, although Asian markets are growing in significance. Since the onset of various food-related scares, the global meat industry has come under increasing pressure to review its processing and production techniques. New Zealand is in the unique position of relating its temperate climate and clean environment to food safety.

The Organic Food Sector currently plays a relatively minor role in terms of overall contribution to export revenue. However, it has shown considerable growth, particularly in Europe and the USA. Organics is becoming a major marketing trend in Europe (particularly Britain), where food scares have made consumers much more conscious of what they eat. In New Zealand, the organic industry is sustained not only by smaller independent farmers, but also by major players such as Heinz Watties and Zespri. The organic sector has almost certainly gained momentum from outbreaks of BSE, E. Coli and listeria to name a few, but also through the genetic modification (GM) debate, which has been a frequent headliner in recent times. The GM debate poses an interesting dilemma for the agricultural sector. Total avoidance of genetic modification may result in New Zealand being left behind in the "technological revolution", while embracing it could lead to loss of crucial markets that currently view New Zealand as clean and green, with environmental integrity.

OVERVIEW OF ENVIRONMENTAL QUALITY

By world standards, New Zealand enjoys relatively high levels of environmental quality. In the main, this can be attributed to a low population density resulting in relatively benign environmental pressures. However, there are clearly some areas showing signs of stress which could (potentially) impact on New Zealand's international environmental image.

The *air quality* indicators suggest very high standards of air quality throughout much of the country during much of the time. However, there are localised areas of concern. For example, levels of pollutants associated with motor vehicle emissions are steadily increasing in the Auckland region and little progress is being made in reducing the incidence of winter time smog in Christchurch. In the rural sector, drift from agricultural

sprays is causing localised areas of concern. Possible connections with New Zealand export industries include the tourism industry with respect to urban air quality and New Zealand's organic export products with respect to drift from agricultural sprays.

New Zealand's *land and landscape* have been altered dramatically since the time of human occupation with pasture and, more recently, exotic forestry replacing areas previously covered in indigenous forest and grassland. Associated with the change in land use are two environmental issues which could conceivably impact on the value of New Zealand's exports. First, the susceptibility of New Zealand's steeper landscapes to erosion and the visual impact of some of New Zealand's current land-use practices (such as the logging of exotic forests) may compromise the credibility of images used to sell New Zealand as a tourist destination. Second, the possibility of contaminated sites in New Zealand's rural areas resulting in chemical residues in exported food and beverages may pose a threat to any value created by New Zealand's international environmental image.

While the more remote parts of New Zealand have some of the finest *freshwater* in the world, many of the lowland water ways are under threat – principally from non-point sources in the guise of organic matter, nutrients and sediment washing into waterways or nitrates leaching into groundwater. By far and away the largest source of pressure on water quality is pastoral agriculture (particularly dairy) directly related to the high stock levels.¹ There is also evidence to suggest that (some of) New Zealand's groundwater resources (including geothermal) are being exploited at unsustainable rates. It is possible that this in turn could impact on the tourism industry. In addition, the environmental impacts of dairy farming on water quality in rural areas may have an impact on the purchase behaviour of environmentally conscious consumers (including tourists).

From the limited data available, it appears that the quality of the *coastal marine environment* is of a high standard. However, as with the other components of the environment discussed above, there are localised areas of concern – particularly with respect to estuaries and harbours near the main population centres. Contaminants include non-biodegradable litter and heavy metals (zinc, copper and lead) washed into the coastal marine environment via stormwater systems. The most plausible link with New Zealand's export trade comes in terms of litter insofar as this may affect marine life prominent in New Zealand's eco-tourism industry and the visual amenity of the coastline.

Monitoring the levels of *waste* generated in New Zealand can provide an indication of emerging pressures on environmental quality in New Zealand and thus an early warning sign of pending environmental degradation (or the need for preventative action). The evidence available from the Auckland region shows that, although the levels of recycling are increasing, this is not sufficient to slow the increase in volumes of waste being directed to the region's landfills. Although this pattern is not so evident in other parts of the country, the possibility of leachate from landfill reaching waterways and elements of the hazardous waste stream have the potential to impact on environmental quality across the country. It is possible that New Zealand's waste stream could pose a threat to the tourism industry (if the waste stream is allowed to degrade the quality of marine and freshwater resources) and/or the agricultural and horticultural sectors (for example, if the hazardous waste stream results in chemical residues being found in food exports).

¹ Note that high stock levels do not necessarily imply poor environmental management. There is evidence to suggest that there are farms with high stock levels in New Zealand, which have good environmental performance, and farms with low stock levels, which do not.

FOCUS OF THE VALUATION EFFORT

The results of the export and environmental sector scans suggested three areas in which it would be particularly interesting to focus the valuation effort, namely:

- the relationship between the value obtained in emerging markets for New Zealand's added value dairy products and the impacts poor farm management might have on the rural environment;
- the relationship between environmental quality generally and the in-bound tourism sector; and
- the relationship between various policy positions with respect to the release of genetically modified organisms and the value obtained from the exports of organic produce to the United Kingdom.

The first two areas were chosen because of the size and importance of the sector to the New Zealand economy and because of the extent to which the sectors rely on New Zealand's environmental image to market their goods and services. The third area was selected because of its currency as a policy issue and because of the recent spectacular growth in exports of organic produce.

In the first two areas, we focused our empirical work on the end consumer – Malaysian buyers of New Zealand dairy produce, and tourists from Australia, USA, UK, Japan and Korea. However, with respect to the export of organic food to the United Kingdom, it was considered more useful to target the wholesale buyers of New Zealand organic produce. (Typically, the UK retailers use their own house brands in selling produce; the UK consumer is mostly unaware of the country of origin of organic produce).

VALUATION RESULTS

The surveys targeting the end-consumer (dairy and in-bound tourism) both revealed that if perceptions about New Zealand's environmental image worsened in our key overseas markets, we would see two distinct types of consumers emerging: those who do not change their purchasing behaviour at all and those who completely change their behaviour by not buying any New Zealand product. While the latter group is the dominant one, there does appear to be a significant proportion for whom environmental value is not a driver in their purchasing decisions. This is certainly true for tourists that travel to New Zealand on business or to visit friends and family.

A short summary of the key results from the three sectors analysed follows:

A. Dairy

The dairy survey was conducted at three supermarkets in Kuala Lumpur, Malaysia. The results were used to generalise to similar markets in Asia and the AIME (Africa, India and the Middle East) region. The extent of the loss to the dairy sector depends on its ability to redirect product lost from its consumer markets in Asia and AIME (due to worsened environmental perceptions) to potential ingredients markets world-wide, and also on the relative profitability of the consumer business compared to the ingredients business. Losses in the short-term would be substantially higher than those in the long-term due to the cost structure of the dairy industry. In the short-term, despite loss in volume, the level of infrastructure and labour would remain similar, implying a reduced revenue with costs comparable to the status quo (and hence a higher loss). In the long-term, however,

infrastructure and labour costs will gradually reduce thereby abating the loss from worsened perceptions.

For the purposes of this investigation, we first estimated revenue lost from the Asia and AIME markets due to a perceived change in New Zealand’s environment. In the worst case scenario, where the New Zealand dairy industry is unable to redirect any “lost” product to its ingredients markets, the loss in revenue was estimated to be \$569 million. This is equivalent to 14.3% of revenues earned from dairy exports (excluding caseins and caseinates) for the year ended June 2000.

Due to the lack of detailed information on profits earned by the dairy industry, we conducted a simple heuristic analysis of profit by assuming that the total surplus earned by the NZDB was a linear combination of profits from added value products and profits from the ingredients business. While this was a rather simplistic representation of the dairy industry’s profit structure, it gave us some idea of the magnitude of loss in profit.

Loss in profit is summarised in the table below.

Table 1: Loss in profit to dairy sector under worsened environmental perceptions

Profit Scenario	Percentage of Lost Product Redirected (%)	Loss in Profit
Added Value and Ingredients Equally Profitable	100	\$0
Added Value and Ingredients Equally Profitable	0	\$19 million
Added Value twice as profitable as Ingredients	100	\$16 million
Added Value twice as profitable as Ingredients	0	\$31 million
Added Value ten times as profitable as Ingredients	100	\$55 million
Added Value ten times as profitable as Ingredients	0	\$61 million

B. Organics

The loss to the organic sector depends on consumer and retail politics in our key overseas markets. The UK was an interesting example to analyse, in that it is a country where relatively few individuals wield a considerable amount of influence on the retail and wholesale trade. Two wholesalers (Organic Farmfoods and Worldwide Fruit) were interviewed in this part of the investigation. While this is a small sample, it is worth noting that Organic Farmfoods is the largest organic food supplier in the UK and is a key player in the British organic industry. The latter is the sole distributor of ENZA fresh produce in the UK. The key results from the organic sector surveys indicated that New Zealand would almost certainly lose business in the UK in the event that New Zealand embraces GM technology. In the event of GM trials for research purposes, it appeared that while some wholesalers may not cut off New Zealand supply in the short-term, they may start looking for alternate sources of supply. In the event of uncontrolled release of GM crops in New Zealand, we would almost certainly suffer immediate heavy losses in volumes exported.

The valuation for the organic sector involved analysing survey results for Organic Farmfoods and Worldwide Fruit individually. Due to the small size of the sample, aggregating results would have yielded estimates with very large uncertainties. Due to the lack of information on costs incurred (as well as profits earned) by the organic sector,

it was necessary for us to conduct a profit analysis using a heuristic approach (as was the case in the dairy sector valuation). Loss in profit was evaluated under various profit margins (or the percentage of revenue attributable to profit).

The worst case scenario for the organic sector was one under which New Zealand allows uncontrolled release of GMOs. Under such a scenario, both wholesalers indicated that they would decrease or sever demand for New Zealand produce. **Error! Reference source not found.** illustrates profit lost under the uncontrolled release scenario with no price change.

Table 2: Loss in profit due to uncontrolled release of GMOs

Wholesaler	Fruit	% Decrease in Volume due to Uncontrolled Release of GMOs	Loss in Profit at Profit Margin = 5%	Loss in Profit at Profit Margin = 10%	Loss in Profit at Profit Margin = 20%
Organic Farmfoods	Kiwifruit	100	\$356,400	\$712,800	\$1,425,600
Organic Farmfoods	Apples	100	\$355,520	\$710,500	\$1,421,000
Worldwide Fruit	Kiwifruit	50	\$29,700	\$59,400	\$118,800
Worldwide Fruit	Apples	50	\$109,620	\$219,240	\$438,480

C. Inbound tourism

The inbound tourism survey targeted departing tourists (at Auckland International Airport) from Australia, the USA, UK, Japan and Korea. The change in tourist purchasing behaviour under worsened environmental perceptions depended to a large extent on the country that the tourist came from, coupled with the purpose of their visit. Australians exhibited the lowest percentage change in length of stay under worsened perceptions, while tourists from the Japanese and Korean market had the largest percentage change in length of stay.

The loss to New Zealand was evaluated on the basis of three different benefit measures all pertaining to direct value added from tourism. The first pertained to loss in “direct value added” plus wages,² due to losses from the five markets under a degraded environment. This first benefit measure yielded a loss of \$780 million. The second benefit measure also took direct value added and wages into account, but also included the effects of GST. Using this second benefit measure, we found that the loss from our top five markets was \$938 million. The third benefit measure was similar to the second, with the exception that it omits the effect of wages (and employment by the tourism industry). This yielded a loss of \$530 million.

² The inclusion of wages in the benefit measure implies that we are assuming that employment is a benefit, rather than a cost associated with tourism.

Table 4: Loss to New Zealand's inbound tourism industry

Benefit Measure	Loss from Top Five Markets
Direct Value Added + Employment	\$780 million
Direct Value Added + Employment + GST	\$938 million
Direct Value Added + GST	\$530 million

The loss to the New Zealand tourism industry was only evaluated for the five markets studied. Had we included the effects of other markets, the loss figures above would have been greater.

CONCLUSIONS

During the course of this investigation, it has become clear that New Zealand's environmental image is indeed a key driver of the value New Zealand is able to obtain for its goods and services in the international market place.

At the qualitative level, there is evidence from previous surveys and analyses to suggest that environmental image is an important contributing factor to the behaviour of purchasers of New Zealand's exports. In addition, many of the key marketers of New Zealand product use New Zealand's image as part of their marketing strategies.

The empirical work done in the context of this study reinforced this assumption and provides some additional insights into the size and nature of the impact.

Needless to say, one has to be extremely careful in attaching undue weight to the figures generated in the course of this work, or in generalising too quickly to the value of New Zealand's environmental image generally. In particular, there are reasons for thinking that the valuation might be too high – or too low.

While these uncertainties might have been a concern if the change in purchase behaviour observed was relatively small, the size of the impact is such that they do little to undermine the significance of the result.

The size of the contribution the environmental image is making to some of our major and emerging export industries, coupled with the degradation in environmental quality in some key areas, suggests that New Zealand runs some risk of losing the value created by its current environmental image.

However, on this issue, it is important to note that the relationship between environmental quality and export value is somewhat indirect in nature. In particular, it is the environmental image that creates the value, not environmental quality *per se*. Furthermore, environmental image and environmental quality may move independently of one another.

Thus it is quite possible that, in the short term at least, New Zealand may be able to maintain at least some of the contribution to environmental value in the face of declining environmental quality. However, it seems unlikely that this could be sustained over the long term. In the long term, one can expect environmental image and environmental quality to track one another. Acceptance of this position would imply a risk averse approach to environmental management.



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The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

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1. INTRODUCTION

1.1 PREAMBLE

Environmental policy is driven not only by a desire to protect the environment for its own sake but also in recognition of the connection between environmental quality and economic and social outcomes. The contribution the environment makes to the value of New Zealand's internationally traded products (including tourism exports) is a case in point.

In order to determine where to direct scarce resources available for environmental protection and enhancement, and how much to allocate to vital investment, it is useful to understand further the nature of these "extrinsic" values¹. For example, if we knew that the absence of heavy metal contamination of New Zealand's soils added considerably to the value of our dairy export products then we might be more inclined to invest in hazardous waste management.

To this end, Stephen Thornton and Sue Paul of the PA Consulting Group and Geoff Kerr of Lincoln University were retained by the Ministry for the Environment to conduct a quantitative investigation into the value New Zealand's clean green image adds to its export receipts.

1.2 STUDY CONTEXT

This project is the second in a series of investigations commissioned by the Ministry for the Environment into the link between New Zealand's export trade and the quality of New Zealand's environment.

The purpose of the project is to build on the qualitative analysis already conducted for the Ministry, by Woodward-Clyde (NZ) Ltd *Key Opportunities and Risks to New Zealand's Export Trade from Green Market Signals* completed in December 1999 under a grant from the Sustainable Management Fund.² In particular, it is to take the analysis further through to a *quantification* of the value attributable to environmental factors.³

The results of the investigation will provide background to the preparation of policy advice in the areas of business and the environment, and sustainable development.

¹ In value theory generally, a distinction is often made between intrinsic value (attributes that are valuable for their own sake) and extrinsic or instrumental value (attributes that are of value because they contribute to some other thing which is itself valuable). Thus in this sense, what is of interest is (a component of) the extrinsic value of New Zealand's environmental quality.

² Woodward-Clyde's report can be downloaded from www.smf.govt.nz/results/6117_final.pdf.

³ This project was funded through the Departmental Contestable Research Pool of MORST.

1.3 APPROACH AND METHODOLOGY

1.3.1 Overview of Approach

In contemplating how best to approach the assignment, we formed the view very quickly that it would be impossible to undertake a comprehensive valuation of New Zealand's "clean green image". There are simply too many export products and services that may benefit from the image. Furthermore, the value derived from New Zealand's environmental image is likely to be specific to the good or service being marketed, and to the export market into which it is being sold.

Having reached this point, the task became one of determining which "couplets" of goods/services and markets should be selected as the subject of the valuation effort. This in turn raised the question of how, precisely, the "couplets" should be selected.

In addressing the question of how best to focus an investigation of the "value" of New Zealand's clean green image, we undertook two pieces of preliminary analysis.

The first was an "export sector scan". In this part of the analysis, we considered the sectors and markets in which New Zealand's export revenues are earned and the qualitative evidence for the value being enhanced by New Zealand's environmental image.

The second part of the analysis consisted of an environmental scan. Here we considered the areas of the New Zealand environment under pressure and the potential for environmental degradation to flow through into the value obtained from our key exports.

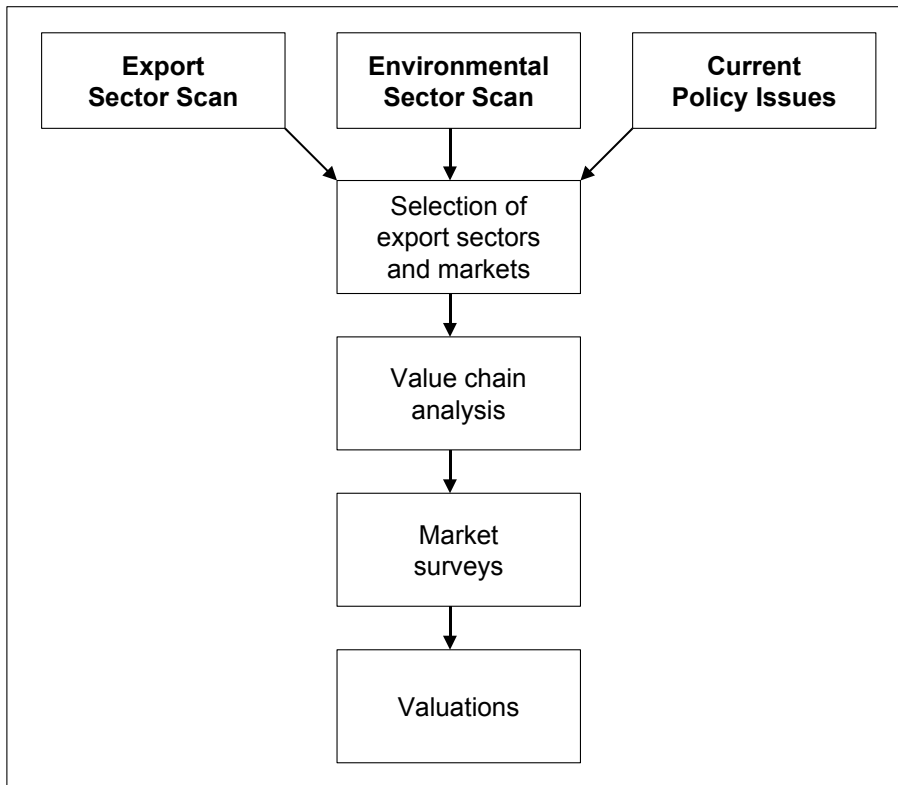
These two pieces of preliminary analysis, coupled with input from the Ministry for the Environment with respect to how the insights developed from the investigation might inform current policy work, helped narrow the focus of the study to three areas in particular, namely:

- the relationship between the value obtained in emerging markets for New Zealand's added value dairy products and the impacts poor farm management might have on the rural environment;
- the relationship between environmental quality generally and the inbound tourism sector; and
- the relationship between various policy positions with respect to the release of genetically modified organisms and the value obtained from the exports of organic produce.

Once the scope of the study had been narrowed to these three areas, a view needed to be formed about where in the value chain, environmental value was being added. This in turn would inform decisions about where to focus the survey effort needed to drive the valuation methodology (see below). In order to answer these questions, we conducted a brief "value chain analysis" for the three "couplets" selected for more detailed study.

Following completion of this preliminary work, the survey work and ultimately the valuation work itself could commence. These components of the work are discussed in more detail in the following section. The approach to the investigation is summarised in **Error! Reference source not found.** below.

Figure 1: Approach to the investigation



1.3.2 Valuation Methodology

The value of New Zealand's clean green image is not something that we can observe unbundled in the market place. Nor is it possible to experiment, in the sense of changing New Zealand's environmental image with a view to measuring the resulting effect. This makes the valuation stage of the analysis somewhat problematic.

In many respects, the task of valuing the impact of New Zealand's clean green image is similar to the valuation of other non-market environmental goods and services. Usually, in the environmental area, non-market valuation is carried out using revealed preference methods such as hedonic pricing and travel cost methods or stated preference methods such as contingent valuation. (A brief overview of non-market valuation methods is contained in Appendix A.)

Of the methods available, we chose the contingent valuation methodology as the most appropriate. In essence, this involves the surveying of market participants with a view to determining how their purchasing behaviour might change if key parameters (in this case, relating to environmental quality) might be varied.

Thus, we measure the value of exports under New Zealand's current environmental image (the status quo), and then the value of exports under an alternative (hypothetical) degraded environmental scenario. Essentially we are measuring the difference in export receipts in the presence and absence of New Zealand's clean green image. This difference gives us an indication of the value of New Zealand's clean green image. The valuation methodology, as applied to this assignment, is discussed in more detail in Chapter 5.

1.4 ORGANISATION OF THIS REPORT

The remainder of the report is organised into five main sections as follows:

- *Chapter 2* contains the results of the export sector scan. It briefly summarises New Zealand's export trade in terms of our highest value exports and major overseas markets. The main products and markets for each sector are discussed, followed by evidence of environmental contribution to export value.
- *Chapter 3* presents the findings from the environmental scan. The chapter concludes with a set of couplets, which associates areas of environmental stress with export sectors that could potentially be affected if these "risk areas" are not adequately managed.
- *Chapter 4* contains the insights developed during the value chain analysis stage. It provides a brief overview of the tourism, dairy and organics sectors, with a view to establishing where in the production-distribution-marketing chain environmental value is being added. This enabled us to focus the survey effort in terms of determining the markets where the survey should be administered, as well as who in particular in the value chain to target.
- *Chapter 5* contains the results of the empirical phase of the investigation. Survey design for each of the three sectors is discussed, along with the location of the survey effort, as well other implementation issues. The chapter also includes a discussion of the contingent valuation methodology used. The results obtained from each of the three sectors are presented.
- *Chapter 6* brings together the conclusions and insights developed during the course of the study.

Relevant export sector data and environmental data, along with the surveys used in the three sectors (and the overview of non-market valuation methodologies mentioned above), have been included in the appendices.



Ministry for the
Environment
Manatū Mō Te Taiao

Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

2. EXPORT SECTOR SCAN

2.1 INTRODUCTION

In this chapter we provide an overview of New Zealand's existing and emerging exports and the markets to which they are directed.

The analysis builds on existing reports and available market intelligence with the intention of forming plausible hypotheses about those couplets of export goods/services and markets where New Zealand's clean green image is most likely to add value.

In conducting this part of the investigation, we consider not only the more established export industries but also the sectors where there is evidence of rapid export growth. In all cases, we bear in mind the plausibility of the hypothesis that environmental factors are adding to the value of the export sector being considered.

The results of this part of the analysis are combined with the conclusions drawn from the parallel exercise considering the state of the New Zealand environment (Chapter **Error! Reference source not found.**) to develop specific proposals for the export sectors and markets which should be the focus of the more detailed quantitative survey work to follow.

The chapter is organised as follows:

- Section 2.2 contains an overview of New Zealand's export sector. It provides an analysis of the major export goods and services, the markets to which these goods and services are directed, along with the emergence of new export sectors that may extract additional value as a consequence of New Zealand's environmental image.
- Sections 2.3 to 2.5 profile in more detail the three largest export areas namely: dairy, tourism, and meat respectively.
- Section 2.6 examines in more detail the organic food sector as an example of an important emergent export sector that may draw value from New Zealand's environmental image.
- Section 2.7 presents a summary of conclusions developed within the chapter.

Note that in focusing on the major export sectors (along with the emerging organic food sector) we have necessarily glossed over other export sectors where environmental quality and/or environmental management systems are likely to be a driver of value. Obvious examples are the export of wood and wood products and the wool sector. For more information on these sectors the reader is referred to a report prepared for the Ministry for the Environment, Woodward-Clyde's "Key Opportunities and Risks to New Zealand's Export Trade from Green Market Signals" report (supported by the Sustainable Management Fund (SMF)).

2.2 OVERVIEW

2.2.1 New Zealand's major export sectors

New Zealand is heavily dependent on overseas trade, with external trade accounting for over half of its Gross Domestic Product. Because of its small population, the loss of an export market means that New Zealand exporters cannot simply redirect product to its domestic market.

Agricultural products and tourism dominate New Zealand's export sector. The former sector is particularly broad, encompassing both pastoral and horticultural products. Over half of New Zealand's exports are agricultural. Agriculture is New Zealand's largest and foremost economic endeavour, regularly contributing more than \$20 billion to the Gross National Product. New Zealand's temperate climate, fertile soil and relative isolation make it ideal for almost every kind of production – from sheep and cattle, to cropping and horticulture.

The agricultural sector's major exports include meat, dairy products, wool and fibre, fish, wood, hides and skins, and many smaller products, which continue to develop niche markets around the world.

Agricultural exports have fallen sharply in recent years as severe droughts from 1997 to 1999 reduced farm production.

The table below shows earnings from New Zealand's various export sectors (excluding tourism) and their major destinations for the year ended June 2000.

Table 1: Revenue from New Zealand's non-tourism exports and their main destinations for the year ended June 2000 (Statistics New Zealand)

Commodity	Export Earnings (NZ\$ million)	% Contribution	Main Destinations
Milk Powder, Butter and Cheese	\$3,975 ¹	24	Japan, USA, Malaysia, UK and Australia
Casein and Caseinates	\$803	5	USA, Japan, Germany and Italy
Meat and Edible Offal	\$3,375	21	USA, UK and Germany
Fish, Crustaceans and Molluscs	\$1,218	8	Japan, USA, Australia and Hong Kong
Fruit and Nuts	\$975	6	Europe
Wool	\$801	5	China, UK, Italy and India
Logs, Wood and Wood Articles	\$2,016	12	Japan, Australia, Korea, USA and Taiwan
Mechanical Machinery	\$1,124	7	Australia and USA
Aluminium and Articles thereof	\$1,116	7	Japan, Korea, Australia, Taiwan and USA
Electrical Machinery	\$830	5	Australia, USA and UK

¹ Note that export earnings from the dairy industry do not include sales from the Dairy Board's joint venture companies that market "non-New Zealand" dairy product.

2. Export Sector Scan

Significant areas of growth within the agricultural sector for the year ended June 2000 were meat, fish and dairy products. Meat exports were up over 19% from 1999 and dairy exports were up 3%. Exports of fruits and vegetables were down almost 7% for the year ended June 2000.²

The increasing significance of tourism as an export earner is evident in Statistics New Zealand's compilation in 2001 of a pilot Tourism Satellite Account (TSA) for the year ended 1997. Statistics New Zealand found that for the year ended 1997 the tourism industry's direct contribution to GDP equalled \$4,197 million or 4.7% of total GDP (compared to the agricultural sector's 6% contribution for the same period). For the year ended March 1999, international tourism brought in \$3,595 million in foreign exchange (excluding airfares). Note that expenditure by international tourists on air passenger transport by New Zealand carriers is excluded for confidentiality reasons, and earnings from foreign exchange are therefore underestimated. It has been estimated that tourism is directly and indirectly responsible for more than \$1 billion of tax revenue per annum.³

2.2.2 New Zealand's major export markets

Australia, USA, Japan, UK and Korea are New Zealand's largest export markets. For the year ended June 2000, all five markets experienced growth. Exports to Australia were up almost 14%, and exports to the US and UK were up 24.3% and 14.8% respectively. Japanese exports were up 17% and exports to Korea were up 32.6%.

Although Australia is New Zealand's largest trading partner in terms of export earnings, the USA, UK and Japan are New Zealand's predominant trading partners with respect to agricultural products. The USA is the main destination for beef exports and casein products. Comparatively, meat exports to Japan are low. Exports to Japan primarily consist of dairy products and seafood. The main exports to the UK are meat, wool and dairy products.

The majority of New Zealand's export promotion to these key markets is carried out by statutory producer marketing boards and by private companies. The New Zealand government also funds export market promotion through TradeNZ, the Trade Development Board. These marketing and promotion boards control almost 80% of New Zealand's agricultural exports and include ENZA (formerly the Apple and Pear Marketing Board), the New Zealand Dairy Board, Zespri (formerly the Kiwifruit Board), Wools of New Zealand (formerly the Wool Board), the Meat Producers' Board and the Game Industry Board. Tourism New Zealand (formerly the New Zealand Tourism Board) is responsible for marketing New Zealand as a tourism destination in our key overseas markets. Various regional tourism operators and private participants assist them in this task.

² Data compiled by the New Zealand Trade Development Board (TradeNZ).

³ Parliamentary Commissioner for the Environment, 2000: "*Setting Course for a Sustainable Future: The Management of New Zealand's Marine Environment*".

2.2.3 Areas of strong export growth

One sector, which has shown strong growth recently, is New Zealand's organic industry. With recent food related scares, the growth of the organic industry has gained momentum worldwide. The global organic industry is currently worth between US\$15 billion and US\$18 billion.⁴ The New Zealand organic food industry experienced a 77% increase in export earnings from organic food during the last financial year. Total revenue for the year ended June 2000 was \$60 million, compared to \$34 million the previous year. The strongest markets for organic produce are Japan and Europe, although the US market is a fast developing one. The European market grew by 159% over this period and the US market by 517%.⁵

Organic foods comprise fresh fruits and vegetables, processed foods and meat and wool. Fresh fruit accounts for almost 80% of organic exports. On its own, fresh fruit (both organic and otherwise) accounted for less than 4% of New Zealand's merchandise exports last year. While organic fruit and vegetable exports have experienced rapid growth, overall, fresh fruit and vegetable exports were down compared to the previous year. However, in the past fresh fruit exports have increased steadily and fresh vegetable exports have remained steady with minor fluctuations.

The horticulture industry covers three sectors of roughly equal value – kiwifruit, apples and other fruits and vegetables. Of the last category, processed vegetables and squash are the largest earners with smaller contributions from pears, peaches, nectarines, avocados, blackcurrants, blueberries, boysenberries and citrus fruits.

New Zealand's major markets for fruit are Europe and Japan. The latter is an important market for kiwifruit and squash. In 1993, Japan began allowing imports of New Zealand apples. Apart from small quantities of Korean apples, Japan had never previously opened its doors to overseas apple exporters.

2.3 DAIRY

2.3.1 Overview of dairy sector exports

The dairy sector is currently New Zealand's single largest export earner, with 90% – 95% of production being exported. Although New Zealand produces a relatively small proportion of the world's total milk, it is far more significant in the world dairy trade. Only 5% of the world production is traded (excluding trade within the European Union). The European Union (EU), New Zealand and Australia provide 38%, 31% and 12% of dairy products traded on world markets respectively. Excluding intra-EU trade, New Zealand is the largest exporter of butter, and the second largest exporter of skimmilk powder, cheese and wholemilk powder.

In the year ended June 2000, dairy products accounted for almost 30% of New Zealand's total non-tourism exports. Earnings from dairy exports for that period were NZ\$4,778 million.

⁴ Ritchie et al (2000), Investigating the Market for Organic Food: Dunedin, New Zealand and the World.

⁵ Organic export statistics were taken from the Organic Producers' Export Group (OPEG) web-site, www.organicnewzealand.org.nz.

2. Export Sector Scan

The four major product groups manufactured by New Zealand dairy factories are: milk powders; cream products such as butter, anhydrous milk-fat and ghee; cheese; and proteins such as casein and caseinates.

The New Zealand dairy industry's major markets vary for different products. Britain and the EU are New Zealand's most valuable market for butter. The primary markets for casein and cheese are the United States, Japan and the EU. New Zealand is the world's largest exporter of casein and caseinate products. New Zealand's most important milk powder markets are in Central and South America and South East Asia.

Figure 1: The major product groups (excluding caseins and caseinates) manufactured by New Zealand dairy factories for export and their respective contributions to export revenue for the year ended June 1999

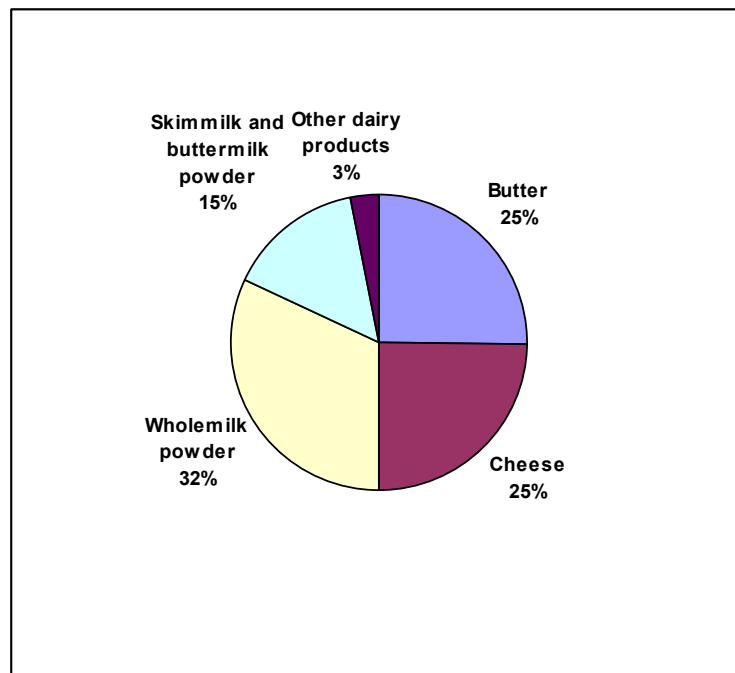


Figure 2: Distribution of New Zealand dairy exports (excluding caseins and caseinates) to New Zealand’s major markets for the year ended June 2000

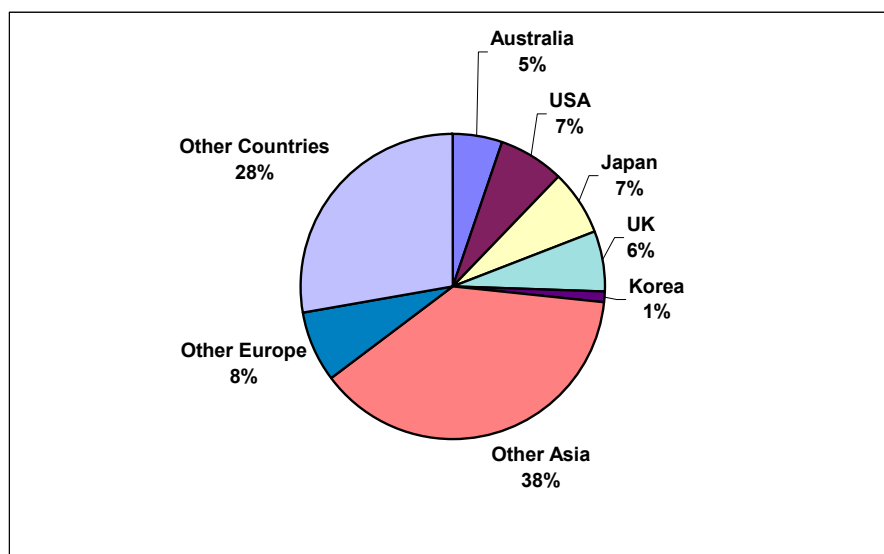


Table 2: Major export markets for New Zealand dairy products for the year ended June 2000

Market	% of Total Dairy Products Exported to Market
Australia	5
Korea	1
Japan	8
United Kingdom	6
USA	15
Other Asia	31
Other Europe	9
Other Countries	25

2.3.2 Evidence of environmental contributions to export value

In Woodward-Clyde’s 1999 report on “green market signals”, the following issues within the food and beverage sector were noted as being prevalent among New Zealand’s major export markets:

- recent food scares leading consumers to question agricultural practices;
- the increase in demand for organic food produced using “environmentally friendly” methods; and
- the presence of genetically modified material in foodstuffs.

With the recent spate of issues affecting basic foodstuffs, European consumers have become more safety conscious. Europe has become an increasingly difficult environment to sell into, with supermarkets being risk averse and imposing technical specifications on importers on behalf of their customers.

2. Export Sector Scan

As British consumers have become more concerned about food safety, Anchor has taken advantage of New Zealand's clean, green image to promote its butter. Their marketing strategy uses the fact that the climate allows New Zealand farmers to keep cows out in the fields all year round rather than having to winter them under cover. The subtext is that New Zealand cows eat grass all the time, rather than being forced to eat other, processed feed.

NEW ZEALAND MILK is a strategic business unit of the New Zealand Dairy Board (NZDB) and controls the marketing of all milk related (consumer) products. It has also taken advantage of New Zealand's clean green image in implementing its marketing strategy. NEW ZEALAND MILK has developed a logo and branding philosophy that captures the energy and vitality of a clean and green country. Its brand positioning is based on consumer preference for NEW ZEALAND MILK products because they represent the pure and natural values of New Zealand.⁶

An example of NEW ZEALAND MILK's marketing strategy can be seen in its efforts to increase market share in the Middle East, against well established Australian and European suppliers of similar products. NEW ZEALAND MILK commissioned the Rendon Group (TRG) to undertake consumer surveys and focus groups. This revealed that the consumer market in the Middle East knew little about New Zealand and less about its dairy products. TRG designed a comprehensive awareness campaign of New Zealand dairy products by linking the environmentally healthy and natural image of New Zealand to its dairy products. The campaign included an integrated media campaign and monthly placement of press releases in the Pan Arab and local newspapers and magazines. Focus groups and survey research held in several countries in the Middle East revealed a dramatic increase in the recognition of New Zealand dairy products and the positive association with these products as more healthy and safer than competing products from the European Community and Australia.⁷

NZMP is another strategic business unit of the NZDB and deals with the marketing of dairy ingredients (i.e. its operations are confined to the commodity market). Both NEW ZEALAND MILK and NZMP (the former more so than the latter)⁸ use the clean green image and New Zealand origin as marketing tools. The maintenance of this clean green image is deemed necessary to retain New Zealand's current market share in the global dairy industry. This means high quality milk, animal health, animal welfare and environmental performance (Barnett and Russell 2000).⁹ Barnett and Russell (2000) also note that the environmental vision of the New Zealand Dairy Industry is to "produce and provide dairy products that are safe for their intended use, by using environmentally sustainable and humane practices which meet agreed international standards".

Barnett and Russell (2000) further noted that the goals of the dairy industry were to:

- measurably reduce negative impacts on the environment arising from dairy farm activities; and
- maintain a profitable and productive industry.

⁶ NEW ZEALAND MILK web-site, www.nzmilk.com

⁷ www.rendon.com/docs/middleeast.html

⁸ While NZMP has used the "clean green" strategy on occasion to promote its product, its main strategy is emphasising that NZMP is a global dairy company with safe product and reliable delivery. The consumer side of the business (NEW ZEALAND MILK) makes use of New Zealand's clean green image far more extensively.

⁹ Barnett and Russell (2000), Clean Green Marketing Issues for the Dairy Industry.

2. Export Sector Scan

To meet these needs, the New Zealand dairy industry has developed the following strategy to identify problems and solutions:

- understand the links between dairy farm practice and impacts on land, water and air;
- develop the scientific basis of an on-farm environmental management quality assurance programme, including indicator systems and management practices to reduce the impacts of farming on land, water and air;
- promote farmer adoption of improved environmental management practices; and
- develop a monitoring programme aimed at measuring and reporting at industry level on-farm management practice and the impact of dairy farming on land, water and air.

In recent years the genetic modification issue has been prominent. In a submission from the NZDB to the Royal Commission on Genetic Modification it was noted that the NZDB did not support “uncontrolled or over-zealous use of GM in agriculture”.¹⁰ The New Zealand dairy industry has an interest in protecting New Zealand’s clean green image and ensuring that no actions are taken to taint its “origin brands”. One of the main issues raised in the submission was the effect such technology could have on New Zealand’s unique ecosystem and its international reputation as a “clean green” country. The dilemma faced by the New Zealand dairy industry is that total avoidance of GM could restrict New Zealand’s performance in the global marketplace. However, at the same time due to the outbreak of food related scares in New Zealand’s major markets, the introduction of the “over-zealous” use of GM is likely to deter consumers.

2.4 THE MEAT SECTOR

2.4.1 Overview of meat sector exports

New Zealand’s red meat industry is a significant food business. For the year ended June 2000, its contribution to total New Zealand exports was surpassed only by the dairy industry. It is heavily export oriented with 92% of lamb meat production, 60% of mutton production and 80% of beef production being marketed overseas.¹¹ For the year ended June 2000 it represented over a fifth of New Zealand’s export earnings. For this period the revenue accrued from meat exports was NZ\$3,375 million.

Chilled products have contributed to New Zealand’s export successes. New Zealand’s businesses have expanded their international marketing presence in all the leading markets including the UK, Middle East, Belgium, Canada, the USA, Germany, Japan and Singapore.

The meat sector can be broken down into beef and veal, lamb, mutton and hogget and venison products. Meat exports are dominated by beef and lamb, both of which are predominantly destined for the USA and Europe. The former accounted for 32% of meat exports (by value) for the year ended June 2000, and the latter for 41% (14% of New Zealand’s meat exports went to the UK).

¹⁰ Royal Commission on Genetic Modification web-site, www.gmcommission.govt.nz

¹¹ New Zealand Red Meat Industry: Strategic Direction (1998).

2. Export Sector Scan

Beef exports are still dominated by frozen beef exports to North America, but other markets are growing in importance. Asian markets, in particular, are looking for young, tender, grass-fed beef. New Zealand produced 570,000 tonnes, or just over 1% of the world production of beef, in 1999. Over 80% of this production was exported, representing over 10% of the world trade in beef.¹²

Both lamb and beef exports have experienced growth over the 1999/2000 period. Lamb exports were up over 13% and beef and veal exports were up almost 29%. Since 1996, lamb exports have surpassed beef exports to become New Zealand's primary meat export. In fact lamb exports have been steadily increasing since 1993. Beef exports, however, were on a steady decline till 1997, when they experienced a sharp increase, coinciding with the BSE scare in Europe. Venison exports remained steady over the 1993/1999 period, although they did experience a 13.2% increase over the 1999/2000 period. Other meat exports have remained steady over the last seven years, with no notable increase or decrease in export level.

2.4.2 Evidence of environmental contributions to export value

Recent food scares (including, in particular, outbreaks of BSE in Europe) have raised concerns among consumers about:

- food safety;
- safe farming methods; and
- animal health and welfare.

In the New Zealand Red Meat Industry's Strategic Report (1998), outbreaks of E.coli in the USA, Japan and Scotland and BSE in Europe were noted as highlighting the importance of food safety issues and "the ease with which a level of consumer trust can be destroyed". It was further concluded that the New Zealand meat industry would achieve a competitive advantage over their competitors and mitigate risk of loss of markets and consumer faith in the safety of their products by:

- highlighting New Zealand's food safety record;
- undertaking on-going and rigorous review of food safety systems for known food safety risks;
- developing scenarios for responding to potential food safety failures in key markets;
- developing and implementing product traceability and quality management systems;
- encouraging "best in class" practices by introduction of benchmark systems; and
- developing new technologies that ensure the microbial, chemical and physical safety of New Zealand meat products.

It was also noted that the public is increasingly concerned that food production and processing is undertaken in an environmentally sensitive manner. New Zealand has a reputation for having natural production methods and environmentally sustainable practices, and exporters can exploit this to gain a competitive edge. Given that the modern consumer expects food producers to comply with stringent environmental standards, it was decided that the industry would promote its competitive advantage to mitigate the impact of potential environmental trade barriers by:

¹² New Zealand Meat Research and Development Council.

2. Export Sector Scan

- developing appropriate environmental standards for meat production, processing, packaging and storage;
- encouraging industry members to apply best environmental practice along the production-marketing value chain; and
- promoting New Zealand's image as a producer of food in a natural production environment.

Emphasising New Zealand's clean green image and "environmentally friendly" farming methods are consequently viewed as appropriate marketing strategies to promote New Zealand product overseas. For example, the slogan used to promote New Zealand beef in Asia is "Far and away the best". The beef promotion in Asia is supported by images of New Zealand's natural environment. The aim is to differentiate New Zealand beef from other producers, emphasising the fact that New Zealand is the ideal place to rear beef. The aim of the campaign is also to appeal to the consumers' concerns over food safety and natural production. Trade fairs and seminars are also used to promote New Zealand beef to Asian consumers.

Similar approaches are taken to promote New Zealand lamb in North America. The New Zealand Lamb Co-operative was established over forty years ago to import New Zealand lamb into North America. Their marketing strategy hinges on New Zealand's pristine environment. The following is a quote taken from their web-site.¹³

"Alpine breezes, pure rainwater and sub-tropical sunshine rain down upon green grass and rich clover pastures. Sheep are free range in this mystical land and are in no need of hormones."

It is also worth noting that the New Zealand name is automatically linked with high quality lamb. In 2000, Agriculture Forestry and Fisheries Australia prepared a report on consumer driven demands on global food chains and its implications for Australia. It was noted that the New Zealand meat industry's marketing strategy had been extremely successful and New Zealand lamb had consequently gained significant overseas market penetration with a widely acknowledged association of quality.

The use of visual imagery is common in promoting New Zealand meat. The Cervena Company Ltd. promotes New Zealand venison products in North America. It was established in 1992 as a subsidiary of the New Zealand Game Industry Board. As a result of restructuring in the New Zealand deer industry, the Cervena Council was established in 1999 as a separate company, entirely independent of the New Zealand Game Industry Board. Its marketing strategy is very similar to that of the New Zealand Lamb Co-operative. Visual imagery and New Zealand's "environmentally friendly" farming methods are emphasised. Take the following quote from their web-site for example:¹⁴

"New Zealand. Close your eyes and what do you see? Rolling green hills, fresh and new? Soaring mountain peaks, capped with snow of pure white? Rivers tumbling down rocky valleys, clear and clean? New Zealand is all this and more. Called by the Maori "The Land of the Long White Cloud", the islands of New Zealand are the first to see the light of each new day. Formed from the mineral-rich flow of ancient volcanoes, New Zealand is an Eden for wildlife and agriculture."

¹³ New Zealand Lamb Co-operative (Inc) web-site, www.nzlamb.com.

¹⁴ Cervena Company Ltd. web-site, www.cervena.com.

The predominant issues in promoting New Zealand meat overseas appear to be food safety and environmentally sustainable production methods. New Zealand's clean green image appears to be crucial in gaining consumer trust, in that environmental cleanliness appears to be associated with the production of safe food in a sustainable fashion.

2.5 THE ORGANIC FOOD SECTOR

2.5.1 Overview

Although the organic food sector is not one of New Zealand's biggest export earners, it is a major growth area. The organic food market has enormous potential both here and overseas. The global organic market is currently worth \$27 billion and may grow almost tenfold to \$200 billion in the next seven years.¹⁵ The Organic Products Exporters Group (OPEG), the industry body for the growing organic export sector, reported a significant increase in the value of organic exports to June 2000. Surveys conducted by TradeNZ indicated that certified organic exports reached over NZ\$60 million for the year 1999/2000. This was a 77% increase on the 1998/1999 figure of \$34.08 million.

Europe is New Zealand's primary destination for organic produce, contributing around 48% of export earnings from this sector for the year ended June 2000. The growth of the European market for New Zealand organic produce is of particular significance, growing from NZ\$18 million to NZ\$28.7 million in the year to June 2000.

Japan is New Zealand's second largest organic export consumer, accounting for 25% of organic export earnings for the same period. In terms of percentage share, Japan is showing a slight decrease, with only 25% of total exports (NZ\$15.1 million), versus 60% two years ago (NZ\$17.5 million). This can be directly attributed to the considerable increase in demand from both Europe and the United States. A further cause for the decline in exports to Japan has been the uncertainty regarding market access and the risk of fumigation of fresh produce. This uncertainty has resulted in a significant decrease in the volume of fresh produce, eg squash, exported to Japan.

The US market accounted for 15% of organic export revenue. It also sharply increased from NZ\$1.3 million the previous year to NZ\$8.02 million for 1999-2000.

Export opportunities in Europe and Japan are bringing about expanding organic production primarily in New Zealand's horticultural sector. New Zealand has only recently entered the world market for organics. The value of total organic production in New Zealand in 1990 was estimated to be NZ\$1.1 million. Export figures for the year ended June 2000 exceed the current industry growth predictions, which would deliver organic exports exceeding NZ\$500 million in six years. Overall world growth in organic markets exceeds 20% per annum – a rate that has been sustained over the last 5 years – making it one of the fastest growing food sectors in the world.¹⁶

¹⁵ Wyatt (2000), Reaching the Big O, *Unlimited Magazine*.

¹⁶ OPEG web-site, www.organicsnewzealand.org.nz/documents/survey2000.htm.

2. Export Sector Scan

Fresh fruit accounted for 79% of organic exports in the year to June 2000. Fresh vegetables, processed foods and meat and wool accounted for 1%, 15% and 2% respectively. Overall, fresh fruit accounts for less than 5% of New Zealand's total export earnings. The marketing of New Zealand horticultural products is controlled by ENZA and Zespri, both of whom are advocates of organically produced fruit. Other advocates for organic produce include Heinz Watties and Fresh-Co, the latter licensed by ENZA.

Heinz Watties is a big player and markets a range of frozen organic vegetables. Sales began in 1990. The company now has more than 50 growers farming 600 hectares of certified organic produce. Japan is its main market followed by the US and South Africa.¹⁷

New Zealand's major markets for fruit are Europe and Japan. The latter is an important market for kiwifruit and squash, and in 1993 started allowing imports of New Zealand apples. Apart from small quantities of Korean apples, Japan had never previously opened its doors to overseas apple exporters.

2.5.2 Evidence of Environmental Contributions to Export Value

In Ritchie et al.'s 2000 paper on the global market for organic food,¹⁸ an analysis of the "organic consumer" was carried out. It was noted that, internationally, the three main motivations for buying organic food related to concerns about:

- personal health
- food safety; and
- the environment.

There were other motivations such as enhanced flavour and freshness as well as ethical concerns over animal welfare, farmers' health, employment in impoverished rural communities and local purchasing. Ritchie et al. also noted that environmental considerations were the highest priority for organic buyers in Europe, to the extent that German consumers will often go beyond questioning how the product was grown and query aspects of production such as manufacturing inputs, energy consumption, packaging and retail practices. American and British consumers seem to be more interested in personal health and food safety issues. In 1999, the UK Soil Association commissioned a survey to investigate the main drivers behind why British consumers purchased organic food.¹⁹ The results are reproduced below.

¹⁷ Wyatt (2000), Reaching the Big O, *Unlimited Magazine*.

¹⁸ Ritchie, Campbell and Sivak (2000), Investigating the Market for Organic Food: Dunedin, New Zealand and the World.

¹⁹ UK Soil Association (1999), The Organic Farming Report 1999.

Table 3: 1999 Survey of reasons UK consumers buy organic food

Statement	Agreeing with statement
Because it is kinder to the environment	28%
Higher animal welfare	24%
Better taste	43%
Healthy/better for you	53%
GM Free	30%

Ritchie et al (2000) also noted that there was an increasing concern about the healthiness of foods in Hong Kong, the Philippines and Taiwan, which was attributable to word of mouth spread by expatriates to local inhabitants.

Food safety issues fuelled by the recent spate of food scares are also responsible for the growing demand for organic food. Japanese consumers are particularly concerned about food safety and quality.²⁰ Despite the fact that New Zealand organic exports to Japan have decreased slightly over the last two years, overall the Japanese market for organic foods has experienced rapid growth, with growth rates estimated at 20% per year in the 1980s, growing from an estimated US\$500 million in 1994 to US\$1.7 billion in 1997 (Saunders 1999). Worries about herbicides and pesticides in food are now paling in comparison to concerns over production and processing techniques and outbreaks of diseases such as salmonella, listeria, E. coli and BSE.

With regard to the production and processing of food, the emergence of genetic engineering (GE) is a particularly important issue. In this area, the organic market has an advantage, in that it is guaranteed to be 100% GE free. British consumer demand for foreign organic produce has been fuelled by food-based health scares and the presence of genetic engineering throughout Europe. As a result, organic supply cannot compete with demand.²¹

Moves by major overseas retailers confirm that the organic food market is becoming increasingly mainstream.²² Sainsbury's in the UK says its turnover in organics has more than doubled, with customers spending more than \$NZ8 million a week. The growing importance of the organics market has been recognised by Sainsbury's, and is reflected in their recent opening of an in-store organic shop, stocking more than 500 lines, and there are plans for even more products, including organic gin and vodka. Tesco's reports organic sales of \$NZ320 million for the year 1999, and anticipated a surplus of \$NZ480 million for the year 2000. Wright (1996)²³ notes that the move towards organic food, however, is not exclusive to the UK. The Danish government predicted that 20% of all food sold would be organic by the year 2000.²⁴ The Danish supermarket chain Irma only stocks organic milk, due to a claimed lack of demand for non-organic milk. The durability of the organic market can be seen in the sales of organic babyfood. Most European supermarkets now stock at least one brand of organic babyfood. The UK producer Baby Organix commands sales of up to 30% of babyfood sales in some UK supermarkets.

²⁰ Ritchie, Campbell and Sivak (2000), Investigating the Market for Organic Food: Dunedin, New Zealand and the World.

²¹ De Boni (July 1999), Organic Apples Prized in the UK, *New Zealand Herald*.

²² Anonymous (2000), The Demand for Organic Food, *Commercial Grower*.

²³ Wright (1996), Europe Goes Organic, *Bio Oko Eco*.

²⁴ This optimistic target has not been attained yet.

2. Export Sector Scan

Of particular interest to New Zealand, which depends heavily on its primary exports, is that about 70% of organic sales in the UK are imported. In 1996 only 0.3% of British farmland was certified as organic. The table below gives the distribution of organic farmland throughout Europe in 2000:

Table 4: Certified and in-conversion land area in Europe 1986-1996 (1000 hectares)

Country	1999	2000
United Kingdom		
Organic retail sales	£390 million	£605 million
Organic and in-conversion land area (ha)	240,000	420,000
Number of organic farms	1,568	2,865
Netherlands		
Organic retail sales	£130 million	£145 million
Organic and in-conversion land area (ha)	20,000	29,000
Number of organic farms	800	1,300
France		
Organic retail sales	£400 million	£500 million
Organic and in-conversion land area (ha)	220,000	320,000
Number of organic farms	6,300	8,300
Denmark		
Organic retail sales	£220 million	£240 million
Organic and in-conversion land area (ha)	98,000	160,000
Number of organic farms	2,100	3,600
Germany		
Organic retail sales	£1.4 billion	£1.6 billion
Organic and in-conversion land area (ha)	430,000	455,000
Number of organic farms	9,300	10,500
Austria		
Organic retail sales	£180 million	£200 million
Organic and in-conversion land area (ha)	345,000	360,000
Number of organic farms	19,200	20,000
Italy		
Organic retail sales	£450 million	£600 million
Organic and in-conversion land area (ha)	830,000	965,000
Number of organic farms	30,000	49,500

Source: Brenman and Howard (2000)²⁵

Although there is a marked increase in the proportion of in-conversion land area in Europe, it is worth noting that converting to organic farming methods usually takes a few

²⁵ Brenman and Howard (2000), Organic Food and Farming Report (2000), *The Soil Association, UK*.

years (organic certification in New Zealand will only be granted if a farmer observes all “organic guidelines” for three years).

Hence, there is the potential for New Zealand organic exporters to make their mark on the British (and other European) organic markets. A low yield of conventional apples from 1997 to 1999 and the inability of ENZA to fulfil orders (in the short-term) to Europe saw British supermarket chains such as Tesco's turning to organic growers.²⁶ ENZA now participates in about 10% of the organic apple industry. Among its organic brands are the Braeburn, Gala, Granny Smith, Fuji and Pacific Rose varieties. Zespri has also capitalised on the increasing demand for organic products, by launching its organic kiwifruit line. In 2000, it was estimated that close to 5% of New Zealand's kiwifruit crop was organic, but the figure is expected to reach 10% by 2005.²⁷ The accessibility (and affordability) of organic product to the consumer, however, is dependent on the supermarkets.

As with other agricultural industries, in organics, New Zealand has a reputation of being a successful and sophisticated marketer. The fact that it has national standards and certification marks accredited by organisations such as the International Federation of Organic Agricultural Movements (IFOAM) and Bio-Gro, an important if not essential feature for successful penetration, places New Zealand some years in advance of Australia in organising its marketing. Additionally, in its export markets, New Zealand presents a clearer image as a ‘natural and green’ country than does Australia.²⁸

With fresh fruit being New Zealand's predominant organic export, it is perhaps not surprising that in 1999 Zespri (then the New Zealand Kiwifruit Marketing Board) announced that it had no GE products for sale and would not support funding for any GE research in the foreseeable future. The decision was most certainly influenced by Japanese and European consumers who guaranteed the Zespri brand of kiwifruit access to their markets as long as they were GE free.

2.6 INBOUND TOURISM

2.6.1 Overview of tourism sector exports

Inbound Tourism is playing an increasingly significant role in the New Zealand economy. Every year the tourism industry contributes over NZ\$5 billion in foreign exchange earnings including NZ\$350 million in Goods and Services Tax. For the year ended March 1999, international tourism brought \$3,595 million in foreign exchange (excluding airfares). It has been estimated that tourism is directly and indirectly responsible for more than \$1 billion of tax revenue per annum.²⁹ The Tourism Satellite Account for the year ended March 1997 found that tourism's direct contribution to GDP equalled \$4,197 million or 4.7% of total GDP.³⁰

New Zealand's main tourism markets are Australia, USA, UK, Japan and the Republic of Korea. Tourist arrivals from both Japan and Korea declined after 1996, although arrivals

²⁶ De Boni (July 1999), Organic Apples Prized in the UK, *New Zealand Herald*.

²⁷ Morrison (2000), Landmark for Zespri, *Export News*.

²⁸ Twyford and Doolan (1998), The International Market for Organic Food.

²⁹ Parliamentary Commissioner for the Environment, 2000: “*Setting Course for a Sustainable Future: The Management of New Zealand's Marine Environment*”.

³⁰ Statistics New Zealand, *Tourism Satellite Account 1997*.

from the latter appear to be recovering since the Asian crisis of 1998. In fact, recent arrivals from Korea appear to have surpassed the highs experienced before the Asian Economic Crisis.

Tourism New Zealand (TNZ, formerly the New Zealand Tourism Board) and Statistics New Zealand undertake an “International Visitors’ Survey” to gain an on-going understanding of tourism expenditure and what contribution the industry makes to the Gross National Product. This survey suggests that expenditure by tourists is rising steadily, with Australian and Japanese tourists contributing the most. The former spent almost NZ\$900 million up to the year ended September 2000, while the latter spent close to NZ\$750 million.

2.6.2 Evidence of environmental contributions to export value

In 1995, TNZ commissioned Colmar Brunton to research product development opportunities in the fast growing North Asian and South East Asian markets.³¹ In 1997, TNZ commissioned a similar study for the North American and Central European markets.³² The purpose of this research was to understand expectations of tourists in these target markets, and strategies to increase their numbers. The findings of this research pertinent to this paper are listed below:

- Asian tourists were mainly attracted to New Zealand for the “real nature experience” it provides. The research indicated that they were attracted to an experience that was both tranquil and relaxing as well as “stunning and expansive”. For older people, especially couples, the emphasis appeared to be on tranquillity and relaxation, whereas with younger visitors the emphasis was more on personal challenges and “extending boundaries”. The research also found that Asian tourists were very keen on experiencing a “real Kiwi lifestyle” that could be best expressed through a pastoral theme.
- For European and North American tourists the total image of New Zealand as a holiday destination and expectations of their experience motivate them to travel here.
- North Americans tend to travel here to take “a vacation and a time out”. They have very high expectations of the scenery and landscape. While Canadians seek “a colourful, contrasting world” and a “fresh experience”, visitors from the USA tend to seek “a unique and spectacular experience”.
- Tourists from the Netherlands and Germany tend to be environmental enthusiasts. While Dutch tourists are enthusiastic about nature they are not precious about it. Their emphasis is on “understanding and appreciating the nature as well as the people”. Visitors from Germany, however, are very staunch with regard to their expectations of the scenery and landscape that has been promised to them. They perceive the environment in Germany to be “damaged” and feel that New Zealanders should respect and appreciate the environment they have. Nature and landscape is the primary motivation for travelling in this case.

³¹ TNZ and Colmar Brunton (1995), Product Development Opportunities for Asian Markets.

³² TNZ and Colmar Brunton (1997), Product Development Opportunities for European and North American Markets.

2. Export Sector Scan

- Visitors from the UK are motivated by a sense of cultural familiarity as well as the perception of New Zealand as a “Garden of Eden”, with a relaxed lifestyle, lush and flourishing forests and fresh fruits and vegetables, which are often not available in the UK. Their expectations are that of an “untouched paradise...refreshing and abundant”.

In 1999 and 2000, market perceptions were tracked by CM Research New Zealand.³³ Markets in North Asia, South East Asia, USA, UK and Central Europe were examined. One of the purposes of this research was to monitor New Zealand’s image in the target markets and assess how perceptions change over time. The research showed that in all these markets, New Zealand was strongly associated with:

- beautiful scenery;
- refreshing and revitalising;
- outdoor lifestyle;
- adventure; and
- time away from it all.

One form of tourism, which is becoming increasingly popular, is “Eco-tourism”.³⁴ This covers a wide range of interests, activities, products, age-groups and services – all based on the concept of the sustainable use of natural resources. International companies like Whale Watch Kaikoura are earning an international reputation for their approach. Research conducted by Ecotours New Zealand³⁵ suggests that eco-tourism appeals to “discerning visitors who want a first-hand experience of the natural environment and local communities”. It caters for travellers with special interests who prefer to be part of the real environment of a place and who want to “forget the tinted windscreens, air-conditioning and diesel-belching buses” and get away from it all. The Tourism Industry Association of New Zealand (TIANZ) is currently developing a quality standard for eco-tourism within New Zealand.

Tourism is one sector in which New Zealand’s clean green image is crucial. It is the cornerstone to marketing New Zealand internationally. Previous research tends to indicate that potential visitors in target markets all appear to have a perception of New Zealand as an unblemished paradise.

2.7 CONCLUSIONS

In the sectors examined in this scan, the perception of consumers in export markets of the quality of New Zealand’s environment appears to have a bearing on the export value of all the products concerned.

³³ TNZ and CM Research New Zealand Ltd., (1999), Market Tracking Research.

³⁴ Eco-tourism is sustainable tourism with a natural area focus, which benefits the environment and communities visited, and fosters environmental and cultural understanding, appreciation and awareness (source: Mohonk Agreement, New York, 2000).

³⁵ Ecotours New Zealand web-site, www.ecotours.co.nz

2. Export Sector Scan

Certainly, in the case of the food and beverage sector (specifically the meat, dairy and organic food sectors) environmental image has a potentially crucial bearing on export value. One major reason for this is the rising concerns about food safety and personal health scares in New Zealand's major export markets. New Zealand products are favourably viewed in terms of food safety and "environmentally friendly" production and processing techniques. This is hardly surprising, given that New Zealand's marketing strategy, especially in the food and beverage sector, hinges on communicating a "clean green" image to its overseas consumers.

Interestingly, the research suggests that there are some subtle differences amongst the different export markets in the attributes of environmental quality considered to be important. For example, there is a suggestion that Dutch and German consumers tend to be conscious of the quality of environment management systems as well as the quality of the environment itself. With American and British consumers, the connection between environmental quality and personal health and food safety is a particularly important one. As noted earlier, Anchor butter took advantage of the perceived link between environment and food safety in their marketing efforts in the UK, by relating its "clean green" pastures to safer production methods. Other companies such as Zespri have also marketed using this strategy. Zespri's company policy was stated as:

"We want environmental integrity and food safety to become synonymous with the Zespri brand and system".³⁶

The tourism sector is also one in which the image of New Zealand's environment is important. The research commissioned by Tourism New Zealand suggests that for Asian, European and North American tourists, New Zealand is a "garden of Eden" type getaway. Their main motivations for undertaking a long haul journey to New Zealand are generally their perceptions of its clean environment and the sense of tranquillity, relaxation or even adventure it implies.

³⁶ NZ Kiwifruit Rejects GE (1999), Sustainable Agriculture Network web-site, www.sare.org/htdocs/hypermail/html-home/33-html/0274.htm.



Ministry for the
Environment
Manatū Mō Te Taiao

Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

3. ENVIRONMENTAL SECTOR SCAN

3.1 INTRODUCTION

In this chapter we provide an overview of the state of New Zealand's environment including an assessment of major environmental risk areas especially insofar as they may relate to the value of New Zealand's exports.

The analysis builds on existing reports along with insights contributed by staff members within the Ministry. In particular, it draws heavily on the 1997 report "The State of New Zealand's Environment", the results being generated within the Ministry's Environmental Performance Indicators (EPI) programme and, to a lesser extent, the 1996 OECD review of New Zealand's environmental performance.

The chapter is organised as follows;

- Section 3.2 provides an overview of the way in which environmental quality is monitored and measured in New Zealand;
- Sections 3.3 to 3.7 profile in more detail the state of key components of New Zealand's environment, namely; air, land, freshwater, and the marine environment along with the pressures posed by the generation of waste; and
- Section 3.8 presents a summary of conclusions.

Appendix C contains a complete list of environmental indicators developed and/or proposed by the Ministry, along with additional environmental statistics not specifically covered in the chapter.¹

3.2 ENVIRONMENTAL QUALITY AND ITS MEASUREMENT

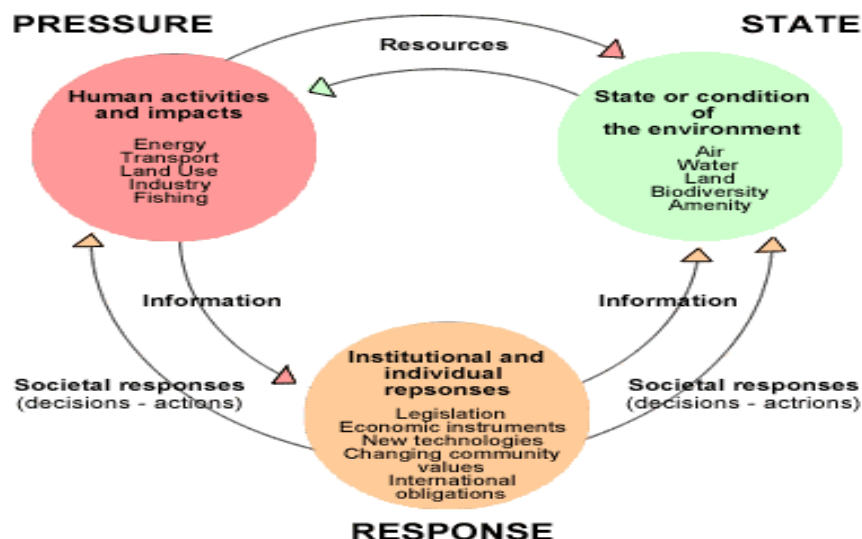
In New Zealand, initiatives aimed at measuring and tracking the state of the environment are being co-ordinated by the Ministry for the Environment within its Environmental Performance Indicators Programme. Like many other countries, the New Zealand environmental indicators programme relies on a model pioneered by the Organisation for Economic Co-operation and Development (OECD) known as the Pressure-State-Response (PSRM) Model.

The PSRM model classifies the indicators into one of three types (pressure, state or response). The model assumes human activities exert pressure on both the quality and the quantity of natural resources. These pressures alter the state, or condition, of the environment, which in turn give rise to human responses (behaviour aimed at reducing, preventing or mitigating undesirable environmental impacts). The responses in turn alter the pressures on the environment. The three indicator types are thus related to one another in a causal framework (see below).²

¹ Note, this scan is intended only to provide a brief synopsis of environmental quality in New Zealand focusing on those areas most closely related to New Zealand's major export industries. Inevitably we have passed over a number of contributory attributes of environmental quality. The state of New Zealand's biodiversity is perhaps the most obvious example. For a more comprehensive assessment of the quality of New Zealand's environment, the reader is referred to, in particular, "The State of New Zealand's Environment" produced by the Ministry for the Environment in 1997.

² From www.environment.govt.nz

Figure 5: The pressure state response characterisation of environmental indicators



In the remainder of this chapter, we focus primarily on *state* indicators under the presumption that these are the indicators that are most likely to have a bearing on the perception of New Zealand’s environmental quality. However, we also provide a brief overview of one of the more important pressure indicators (waste), on the grounds that this pressure indicator is most closely aligned to pending environmental risk. The indicators considered are listed in **Error! Reference source not found.** below.

Table 5: Environmental indicators considered in this report

Indicator Type	Indicator Category
State	Air Land Freshwater The marine environment
Pressure	Waste

3.3 AIR QUALITY

3.3.1 Overview

From the work done to date, it appears that, by world standards, New Zealand generally enjoys very high standards of air quality. This is especially the case in some of the remotest parts of the country where the air is virtually free of contaminants associated with human activities. There is no evidence of phenomena such as acid rain that afflict a number of Northern Hemisphere localities.

In large part this can be attributed to New Zealand’s relatively low population density, the relative lack of heavy industry, and its geographic location – away from other countries.

3. Environmental Sector Scan

The areas most susceptible to poorer air quality tend to be the larger urban centres where wintertime open fires, vehicle emissions and to a lesser extent industrial emissions can combine to create localised areas of concern. A look at the environmental data however (see Appendix C) suggests that even in the urban centres, the air quality looks acceptable – at least by current standards. It is really only in Christchurch (where the local geography plays a part) that urban air quality becomes a cause for concern – and then only occasionally. However, there are signs of emerging concern. The monitoring data shows that Auckland levels of pollutants associated with motor vehicle emissions (particularly CO and NO₂) are on the increase. In Christchurch, little impact has been made on the levels of particulate matter, despite this being an issue of concern for some considerable time.³

The Minister for the Environment has recently announced her intention to review the 1994 air quality guidelines with a view to making them more stringent. She referred to the carbon monoxide and nitrogen dioxide levels in Auckland and smog in Christchurch as being particular areas of concern.⁴

In rural areas, apart from isolated effects associated with incineration, the main air quality issue of concern is spray drift from agricultural chemicals. This is a particular issue when traditional farming businesses are co-located with organic farming enterprises or lifestyle blocks. Aerial spraying gives rise to most complaints.

3.3.2 Assessment of risk

In general terms, air quality in New Zealand is very good. However, it is plausible (in theory at least) that the areas in which air quality is under pressure may pose a risk for the value of New Zealand's exports.

For example, the times of the year when air quality in Christchurch is at its worst coincides with overseas visitors arriving for their ski holidays.⁵ The air quality in central Auckland may also create negative impressions of New Zealand's environment, as Auckland is the point at which the vast majority of visitors arrive in New Zealand.

Similarly, episodes of spraydrift in rural environments could compromise the value of New Zealand's growing organic trade, especially if this leads to pesticide residues being found in New Zealand's organic produce.⁶

³ Woodward (2001), Vehicle emissions in the urban environment – their effects on health.

⁴ Hon Marian Hobbs Minister for the Environment Media Statement "Air quality problems spark guidelines review," 23 January 2001.

⁵ It is worth noting here that the number of visitors arriving in Christchurch during the winter is comparatively low and the majority of those arriving tend to stay only one night before moving onto a skiing destination.

⁶ Note that "residue-free" product schemes are currently being undertaken in both the organic and "non-organic" horticultural sectors. Examples of the latter include the kiwifruit industry's "kiwigreen" scheme and the pipfruit industry's Integrated Fruit Production (IFP) scheme. Such programmes would be negatively impacted by chemical residue contamination.

3.4 LAND

3.4.1 Overview

The State of New Zealand's Environment Report notes that, since the time of human settlement, New Zealand's landscape has undergone a dramatic transformation. In particular human settlement has resulted in indigenous forests being reduced from around 23 million hectares (or 85% of the land area) to approximately 6.2 million hectares (23% of the land area) in the last 700-800 years.

Concomitant with the decline in indigenous forests has been a rise in the area of grassed land to around 14 million hectares (over 50% of the land area). Most of the pasture used for grazing is now in the form of introduced species. The remaining native grasslands are under pressure from grazing, rabbits, and invasive weeds, or are being oversown by introduced species.

The conversion to pasture has also led to soil erosion in many areas. Survey data collected in the 1970s indicates that around half the country is affected by moderate to slight erosion with around 10% being classified as having a severe to extreme erosion risk.

Besides pastoral farming, the other major land use is forestry based around exotic conifers. Approximately 1.6 million hectares are planted in conifers with new plantings running at around 70,000 hectares per year. The rise in exotic forestry has brought additional environmental impacts. In particular the logging of exotic forests can sometimes lead to impacts on the visual amenity of rural landscapes (particularly hillsides) and increased pressure on roads from the resultant logging truck traffic.

As well as the soil erosion and amenity issues raised above, New Zealand also has its share of contaminated sites – albeit not to the same extent as the more highly industrialised countries. Although good data in this area is hard to come by, it is estimated that there are around 7800 urban and industrial sites, which may be chemically contaminated, 1500 seriously. Sites include landfills, service stations, sawmills, timber treatment plants, railway yards, engine works, metal industries and chemical manufacturers.

In addition, several thousand of the nation's 80,000 farms, orchards and market gardens may have contaminated sites or have heavy metal residues from fungicides. Some farms have DDT residues.

3.4.2 Assessment of risk

Notwithstanding the fact that New Zealand has an international reputation built around the quality of its land and landscape, there do appear to be some reasonably significant environmental issues which could plausibly affect the value of New Zealand's export products.

First, the susceptibility of New Zealand's steeper landscapes to erosion and the visual impact caused by some of New Zealand's land use practices (such as the logging of exotic forests) may compromise the credibility of the images used to sell New Zealand as a tourism destination or as a sustainable producer of agricultural and forestry products.

3. Environmental Sector Scan

Second, the possibility of contaminated sites in New Zealand's rural areas resulting in chemical residue in exported food and beverages may pose a threat to any value derived from New Zealand's international environmental image.

3.5 FRESHWATER

3.5.1 Overview

The more remote parts of New Zealand have some of the finest water quality in the world. Water quality is particularly high in mountain streams and in sparsely developed areas particularly in the South Island and the upper reaches of most North Island rivers. Similarly, New Zealand's 30 or so large, deep lakes all appear to be of high quality.

However, water quality declines measurably in lowland streams and rivers, particularly in pasture-dominated catchments; some lowland rivers are unsuitable for swimming because of faecal contamination from farm animals, poor water clarity, and nuisance algae growths. Furthermore, the stream water in some intensive dairy farming areas is in such poor condition that it may be unsafe for livestock to drink. The lower reaches of some rivers are also polluted by discharges of industrial wastes, urban sewage and stormwater run-off.

In addition between 10% and 40% of New Zealand's 700 smaller shallow lakes are nutrient enriched (eutrophic). Most of these are located in the North Island and in pasture-dominated catchments. A number are subject to fish kills or are no longer capable of supporting fish life.

By far and away, the main source of pressure on water quality is pastoral agriculture. Agriculture is a contributing factor to the degradation of many surface waters and some groundwater. Pollutants include sediment, animal waste and nutrients. Pastoral agriculture also contributes to increased flooding and erosion in many areas by removing deep-rooted vegetation from hillsides and riverbanks.

In addition, the use of irrigation water, mainly for pasture, is a source of pressure on water levels, particularly in some South Island rivers and aquifers. Land drainage for agriculture has led to an 85% reduction in New Zealand wetlands.

In the main, degradation of freshwater quality can be put down to non-point sources particularly in the guise of organic matter, nutrients, and sediment washing into waterways or nitrates leaching into groundwater. Pollution from point sources (such as dairy sheds, factories etc.) has declined over the last 20 to 30 years, as treatment systems have been upgraded and alternative disposal methods (e.g. onto land or onto constructed wetlands) have been developed.

Recent trends in agriculture, including the conversion of sheep farms to dairy are likely to be increasing the pressure on water quality in the rural New Zealand environment.

In urban areas, pressures on water quality come from increasing consumption and from sewage and stormwater discharges along with the damming of rivers for electricity and water supply. The impact of pests and weeds, and the potential impacts of climate change have also been identified as contributing risk factors.

There is considerable uncertainty about the impact of these pressures on the quality of New Zealand drinking water. Of New Zealand's 1638 community drinking water supplies,

3. Environmental Sector Scan

serving 85% of the population, only 29% (serving 92% of the population) have been classified.⁷ Of those water supplies classified, 7% (serving 54% of the population) are considered safe, while a further 2% (serving 5% of the population) are considered to be marginal. Nineteen percent (serving 18% of the population) have an unsatisfactorily high risk of contamination.

The state of New Zealand's groundwater is subject to a considerable amount of uncertainty. However, the limited information available suggests that shallow aquifers, particularly beneath dairying or horticultural land are susceptible to elevated nitrate levels. In addition, in some coastal areas, excessive drawdown of freshwater aquifers has resulted in seawater intrusion. The extent of contamination from seepage from landfills, other waste disposal systems, and contaminated sites are unknown. The few surveys to date have found pesticide traces, but at very low concentrations.

3.5.2 Assessment of risk

The evidence on the state of New Zealand's freshwater resources suggests that freshwater quality varies considerably. Notwithstanding the fact that New Zealand has some of the world's most pristine water, there are considerable areas of the country where water quality is significantly degraded.

There are several plausible hypotheses for how threats to water quality may impact on the value of New Zealand's export receipts. The most obvious of these are outlined below.

First, it is conceivable that there may be a link between water quality and the tourism industry. Water quality is a key component of the overall image of environmental quality sold to overseas tourists. Examples include rivers and lakes suitable for outdoor experience activities such as jetboating, rafting, swimming and fishing. Any degradation of drinking water quality can also be expected to have an impact on the tourism industry.

Second, it is evident that the impact on water quality of pastoral farming (and the dairy industry in particular) is something that needs to be carefully managed. Although New Zealand's population density is low by international standards, its farmland aided by favourable climatic conditions supports high stock numbers. This contributes to considerable pressure from effluent on New Zealand's rural waterways. It is possible that the environmental impacts of dairy farming in New Zealand could have an impact on the purchase behaviour of environmentally conscious consumers.

3.6 THE MARINE ENVIRONMENT

3.6.1 Overview

From the limited data available, it seems that the state of the seawaters around New Zealand is of generally high quality. The exceptions are near some river mouths and in some harbours and estuaries where sediment, heavy metals, nutrients, bacterial counts and marine debris levels have been elevated by urban stormwater, sewage and agricultural run-off.

⁷ As at the time of the publication of the State of the Environment Report. The remaining 71 percent of water supplies (serving 8% of the population) have not been graded because they serve communities of less than 500 people. Approximately 15% of the population are not connected to community supplies.

3. Environmental Sector Scan

The areas most under threat tend to be the harbours and estuaries close to major population centres. The State of New Zealand's Environment report notes the results of a qualitative survey carried out in the mid-70s in which the perceived quality of estuaries was assessed. Of the 162 estuaries for which responses were required, 38% were considered to be "clean", 41% rated as "slightly polluted", 16% "moderately polluted" and 4% "grossly polluted".

The problem estuaries included Waitemata Harbour, Manukau Harbour, Kaipara Harbour, Tauranga Harbour, Porirua Harbour, Wanganui River mouth, Ahuriri Estuary, Pauatahanui Inlet, Wellington Harbour, Waimea Inlet (Nelson), Brooklands Lagoon and the Waimakiriri River mouth, Avon-Heathcote estuary, Lyttelton Harbour and the New River Estuary (Invercargill).

Although there is no recent comprehensive national data on the state of the coastal environment, some areas are relatively well documented. In particular, studies carried out in the mid-1990s by the Auckland Regional Council of estuaries in the Auckland region show a steady increase in the degree of heavy metal contamination (lead, zinc and copper) and hydrocarbons (polycyclic aromatic hydrocarbons in particular) attributable in the main to motor vehicle emissions transported into the harbour via stormwater.

In terms of bathing water quality, evidence from the Ministry's Environmental Performance Indicators Programme shows that, of the sites monitored around the country, only a handful show signs of enterococci concentrations being elevated to levels sufficient to cause concern. Further detail is contained in Appendix C.

Other issues of particular note include the prevalence of non-biodegradable litter and the emergence of toxic algae blooms. As well as the impacts this causes on visual amenity, the build up of plastic litter on the sea floor can inhibit gas exchange between the seafloor and overlying waters reducing the oxygen levels required to sustain life.

There appear to be two primary pathways by which non-biodegradable litter enters the coastal environment. Material lost overboard from vessels is an obvious source. Less obvious perhaps is the stormwater pathway already noted above with respect to heavy metal contamination. A study published in 1995 by the Island Care New Zealand Trust found that over 28,000 pieces of litter per day (10 million items per year) enter Auckland's Waitemata Harbour via the stormwater drainage system.⁸

Invasive species of plants, fish and other animals pose a potential threat in some parts of the coast (as they do in other New Zealand ecosystems). Of particular note are the toxic algae blooms which have recently become an intermittent problem in our coastal waters. There is some speculation that they may involve exotic species introduced in ship ballast water.

3.6.2 Assessment of risk

While many of New Zealand's coastal waters are of high quality, there are localised areas in which environmental quality is of concern – particularly estuaries and harbours near main population centres.

Potentially, the most significant connection between the (localised) degradation of the coastal marine environment and New Zealand's export receipts comes through the

⁸ Island Care New Zealand Trust (1995), "Marine Debris – A Stormwater Problem", *Water and Wastes in New Zealand* 85: 20-25.

tourism industry. Of possible concern is the impact of litter on the visual amenity of the coastal environment – particularly around the main population centres – and on eco-tourism operations such as whale or dolphin watching. Although the standard of beachwater is occasionally a problem in some locations (such as the inner reaches of Wellington Harbour) it is generally of a very high quality.

3.7 WASTE

3.7.1 Overview

The State of the Environment Report estimates that New Zealand industry and households account for the following volumes of waste being sent to landfills on an annual basis:

- 3 million tonnes of construction and demolition debris;
- 1 million tonnes of plant matter and foodscraps;
- 600,000 tonnes of paper and cardboard; and
- 220,000 tonnes of plastic.

Other significant items in the solid waste stream include 300 million steel cans and 30 million litres of used oil. In addition, New Zealand generates approximately 500 billion litres of sewage flowing into 258 public waste water plants.

Since the publication of the 1997 State of the Environment Report, the EPI programme has begun tracking some indicators of waste and waste management – notably the amount of waste disposed to landfill and the amount of waste recycled.

The increasing volumes of waste are putting pressure on the remaining available capacity of landfills and sewage and stormwater infrastructure. In addition, only a third of the country's landfills are reported as having any kind of clay lining indicating that the remainder are likely to be porous creating risks of leachate reaching waterways. As of 1997, only 13% had systems for preventing leachate entering waterways. Similarly, only 9% of landfills had systems in place for treating landfill stormwater runoff.

The development of new waste disposal infrastructure is hampered both by the large capital cost involved, particularly for stormwater and sewerage treatment, and by the NIMBY (Not in my backyard) phenomenon. This is leading to increasing pressures on the existing infrastructure as well as the desire to look at alternative waste management strategies such as recycling and eco-efficient production techniques.

The generation and disposal of hazardous waste provides an additional dimension to the pressures posed by waste. It is only recently that the nature of the pressure posed by hazardous wastes has begun to be understood. A survey in 1996 conducted in the Auckland region by the Auckland Regional Council found that the volumes of hazardous waste were much higher than previously thought. The hazardous waste stream included: timber treatment chemicals, metal finishing wastes (such as cyanides, chromium sludges, acids and alkalis, degreasing chemicals), pesticides, asbestos, sludges of mineral acids and alkalis, polychlorinated biphenyls, numerous chemical wastes, solvents, dyes etc as well as pharmaceutical and laboratory wastes.

The management of hazardous wastes has long been a matter of concern in New Zealand. The need to reform the legislation governing hazardous substances was

identified as early as the 1980s. In addition, the OECD raised concerns about the lack of facilities within New Zealand to dispose of hazardous wastes. Although the new statute governing the management of hazardous wastes generated from hazardous substances *The Hazardous Substances and New Organisms Act 1996* was passed five years ago, it only came into effect on 2 July 2001, with respect to hazardous substances.

3.7.2 Assessment of risk

The evidence available to date suggests that the generation of waste, including hazardous wastes within New Zealand, continues to pose a threat to the New Zealand environment.

It is plausible that this in turn could impact on the perception of environmental quality that underpins New Zealand exports. The sectors most likely to be affected include:

- tourism, particularly if the quality of waste management is such that the waste stream is allowed to degrade the quality of marine and freshwater resources (including groundwater)
- the agricultural and horticultural sectors (including organics) particularly if the hazardous waste stream results in chemical residues being found in food exports.

3.8 CONCLUSIONS: ENVIRONMENT AND EXPORT SECTOR COUPLETS

Generally, the evidence available suggests that the quality of New Zealand’s environment is relatively high, commensurate with the relatively low levels of population pressure. However, with respect to all of environmental indicators considered in this report, there is evidence of environmental degradation sufficient to raise questions about the sustainability of the value of New Zealand’s exports attributable to its environmental image.

Perhaps, even more striking however, is the lack of good quality information on the state of New Zealand’s environment including information on how environmental quality may be changing over time. Notwithstanding the fact that the State of New Zealand’s Environment report collated and synthesised previous research and the Environmental Indicators’ Programme has developed a comprehensive range of indicators, there’s no escaping the fact that more work is needed to coordinate the reporting of environmental indicators so that the information is both consistent and current. Until we can access meaningful environmental information on an ongoing basis and link this to other social and economic information, the relationship between environmental quality and export value will remain less clear than it might be.

Notwithstanding this uncertainty, it is possible to develop several plausible hypotheses concerning the links between the state of the New Zealand environment and the value of New Zealand’s exports. These are summarised in Table 1 below. The left-hand column records the environmental issue, the right hand column identifies the export sector that could possibly be affected.

Table 1: Principal likely links between environmental issues and export value

Environmental Issue	Associated Export Sector
Air Urban smog	Tourism

3. Environmental Sector Scan

Environmental Issue	Associated Export Sector
Rural spray drift	Organic food exports Other “non-organic” food exports
Land Erosion Contaminated sites	Tourism/sustainable agriculture Organic food exports/tourism
Freshwater Lowland rural water quality Drinking water quality	Tourism, pastoral farming (dairy in particular) Tourism
Coastal marine Non-biodegradable litter	Tourism
Waste Waste volumes and landfill quality Management of the hazardous waste stream	Tourism Agricultural exports (including organic food exports/tourism)



Ministry for the
Environment
Manatū Mō Te Taiao

Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

4. VALUE CHAIN ANALYSIS

4.1 INTRODUCTION

In this chapter, we look in more detail at the production and distribution of New Zealand's more prominent export products and services. The sectors considered are the tourism and dairy industry and the rapidly growing sector of organic food exports.

The purpose of this phase of the analysis is to identify where in the value chain the environmental value is being created and captured. This, coupled with an assessment of the practicality of undertaking survey work, determines the nature of the empirical survey work required.

The chapter is organised as follows:

- Section 4.2 provides a brief introduction to value chain analysis;
- Sections 4.3 to 4.5 profile in more detail the dairy, tourism and organics sectors (respectively); and
- Section 4.6 develops conclusions as to the precise nature of the survey work scheduled to follow.

4.2 OVERVIEW OF VALUE CHAIN ANALYSIS

Typically, the creation of goods and services involves several steps in the transformation of natural resources to end products sold to the consumer in the market place. During each step, one can observe not only the cost of production (or transformation or distribution) but also the price the (intermediate) product commands. The difference between the selling price and cost has a number of "components", one of which may be a premium attached to the image of the product.

An understanding of these steps in the value chain is important in any strategic analysis as it provides an indication of where along the production and distribution chain the value is being created (and/or captured).

In this particular context, value chain analysis can provide us with some insight as to where along the value chain the development of environmental drivers might be occurring. In technical terms, it can indicate where the "economic rents" associated with brand, image or other means of product differentiation, including those associated with environmental image, are being created.¹ This in turn provides us with some indication about where along the value chain it might be best to target the survey effort.

By way of illustration, Figure 6 provides a (purely hypothetical) view of the value chain associated with the export/production of dairy produce to Taiwan, along with the associated rents. In this (hypothetical) example, the wholesaler is capturing most of the available rent. Thus, in this example, the wholesaler could be a key point of focus when considering the possible impact of environmental drivers.²

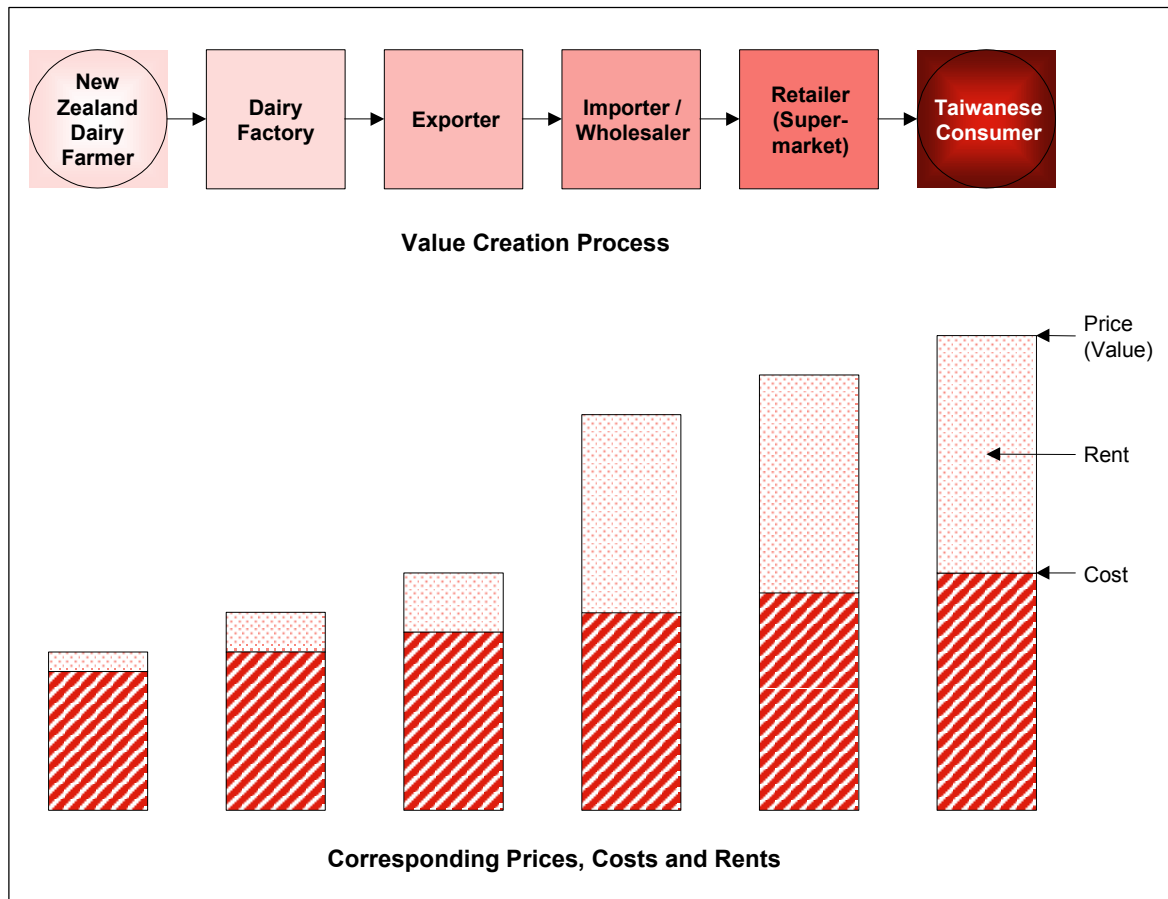
¹ In this sense, a "rent" is defined as the difference between the price obtained for a product and the cost of its production.

² Note, although we believe that this is a useful step to go through, the results of this analysis do need to be interpreted with some care. For instance, although it is quite possible in the example above that the

4. Value Chain Analysis

Value chain analysis can be done to a considerable degree of sophistication and detail and be quite time consuming. However, in this particular context, we restrict the value chain analysis to a qualitative assessment. The purpose of the value chain analysis is to help focus the survey effort rather than it being an end in itself.

Figure 6: Hypothetical illustration of value chain analysis



4.3 DAIRY

4.3.1 Production, distribution and marketing of dairy product

The dairy industry is an integrated industry with farmers owning co-operative processing companies, which in turn own the New Zealand Dairy Board (NZDB). The milk produced by dairy farmers is supplied to their co-operative manufacturing dairy company. These companies are owned by the dairy farmers who supply them. There are currently four companies located throughout the country (New Zealand Dairy Group, Kiwi Co-operative Dairies Ltd., Westland Co-operative and Tatua Co-operative Dairy Co.). Kiwi Co-operative Dairies was merged with Northland Co-operative in 1999.

wholesaler is generating the value associated with the product and that this value is in part driven by environmental image factors, it is also possible that the value is being added further down the value chain and the wholesaler is able to capture the value through market power (e.g. exclusive agreements with the exporter).

4. Value Chain Analysis

On 18 June 2001, the dairy industry's farmer shareholders voted to merge the New Zealand Dairy Group, Kiwi Dairies and the Dairy Board into one dairy company. The legislation necessary to implement that decision is now before Parliament. It is Government's intention that the legislation be passed into law during September. It is expected that the new company will be formally in business by October 2001³.

Although there are four co-operative companies, the New Zealand Dairy Group and Kiwi Co-operative Dairies are responsible for over 95% of production.

More than 90% of the 1.5 million tonnes of dairy produce manufactured each year is sold overseas, making the NZDB the country's largest single exporter and the world's largest dairy export marketing organisation. It has total annual sales of around NZ\$7.7 billion.⁴ The Dairy Board's primary function is to market overseas all dairy products manufactured in New Zealand for export. The Board works with dairy companies to ensure their manufacturing programmes meet the standards of the international marketplace. It also integrates the industry's shipping, packaging, transport, storage, market promotion and quality control needs and provides necessary support services in the form of financial facilities, data processing, livestock improvement and administration.

The dairy companies are responsible for marketing milk and other dairy products on the domestic market, while the NZDB organises marketing in overseas markets. Approximately 40% of the Board's revenues are from consumer products sold under the well known international brands Anchor, Chesdale, Fern, Fernleaf and Anlene, with the remainder from the ingredients business (of which about one third is undifferentiated products and two thirds being customised and speciality products).⁵

The marketing arms of the Dairy Board comprise two strategic business units: NEW ZEALAND MILK and NZMP. The former deals with the marketing of consumer dairy products under the aforementioned brands. The consumer side of the business has its own structure now with a completely separate management organisation based on core product categories. These are Milks, Natural Cheeses, Processed Cheeses and Spreads.

The latter is an ingredients business dealing with cheese products, milk protein ingredients (casein and caseinates), milk powders and cream products. NZMP often deals with corporations such as Nestle and Kraft, to provide them with ingredients such as butter. The table below shows the main products and their respective brands marketed by NEW ZEALAND MILK overseas.

Table 12: Major dairy products marketed overseas and their respective brands

Brand	Product
Anchor	Salted/Unsalted Butter Spreadable Butter Cultured Butter Clarified Butter/Ghee Anchor Milk Powder
Andec	High Calcium Milk Powder

³ New Zealand Dairy Board web-site, www.nzdb.com

⁴ The total sales figure of \$7.7 billion includes sales from the NZDB's joint venture companies such as Cadipro and Soprole in Latin America.

⁵ MAF web-site, www.maf.govt.nz/MAFnet/sectors/dairy

4. Value Chain Analysis

Anlene	Liquid Milk Milk Powder
Annum	Milk powder for pregnant women/new mothers
Chesdale	Processed Cheese Products
Fernleaf	Full Cream Milk Powder Extra Calcium Milk Powder
Mainland	Cheeses Spreadable Butter

The NZDB sold almost 1.5 million tonnes of product in 1999/2000 for a total sales value of NZ\$7.7 billion. NZ\$4.7 billion of this was from the ingredients business and NZ\$3 billion from consumer products.⁶ This includes the production of the NZDB's overseas plants. Principal overseas production and re-packing centres are given in the table below. Note that these also comprise joint venture companies that process dairy product that is not of New Zealand origin.

Table 13: Principal overseas production and repacking centres

Region	Country	Product
Europe	UK (Swindon)	Butter
	Germany (Rellingen)	Ingredients blending
Asia	Malaysia	Milk powder canning, liquid milks and yoghurt
	China	Milk powder in sachets and slice on slice cheese
	Sri Lanka	Milk powder canning, short life milk and yoghurt
	Bangladesh	Milk powder in sachets
	Philippines	Processed cheese and recombined butter
	Saudi Arabia	Milk powder in cans and processed cheese
Africa	Egypt	Butter and ghee packing
Americas	USA (Harrisburg)	Cheese ingredients
	USA (Allerton)	Caseinates
	Jamaica	Processed cheese
	Guatemala	Milk powder in sachets
	Mexico	Recombined cheese
	Venezuela (Cadipro)	Canned milk powder, long life milk, milks and yoghurt
	Chile (Soprole)	Full range of dairy products

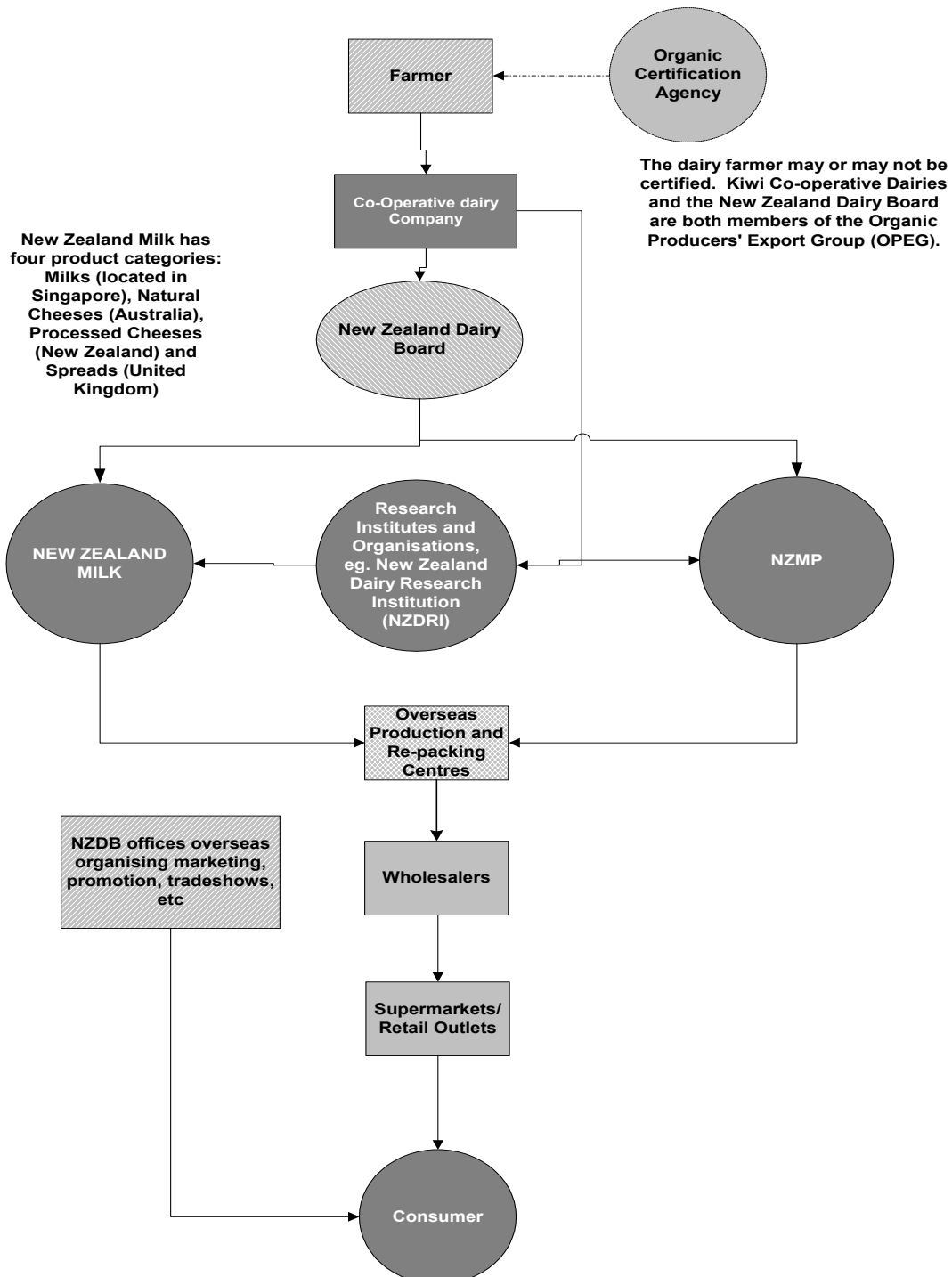
In addition to production and re-packing centres, the Dairy Board also has offices in key overseas markets such as the United Arab Emirates, Bahrain, the USA, Singapore, Australia, the UK and Germany.

⁶ Dairy revenue figures from New Zealand Dairy Board Annual Report 2000.

4. Value Chain Analysis

The figure below is a pictorial representation of the production, processing, marketing and distribution process of New Zealand consumer dairy exports. Note that this process varies with region. For example, in the United Kingdom, the consumer side of the dairy industry, NEW ZEALAND MILK, deals directly with supermarkets such as Sainsbury's. In developing countries, where strong retail structures are absent, the dairy industry deals with wholesalers. In South America, NEW ZEALAND MILK deals with both supermarkets and wholesalers. The diagram below is a generic one, to give us some indication of the process by which a dairy product reaches the end-user from its inception in New Zealand.

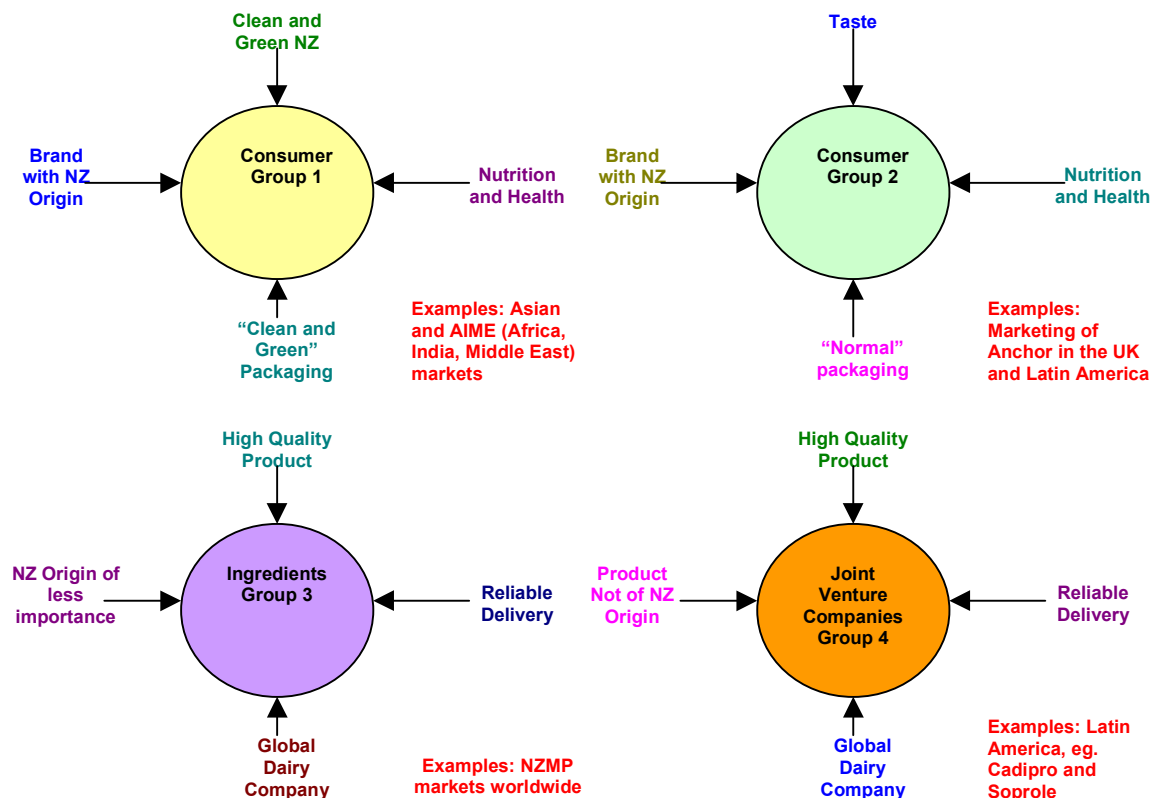
Figure 8: The production, processing, marketing and distribution process of New Zealand dairy exports



4.3.2 Location of environmental value added

In order to determine the location of environmental value added (and thus determine where the survey effort should be directed) it is important to understand the various consumer groups that the New Zealand dairy industry caters to. Figure 9 summarises the four main groups.

Figure 9: Dairy industry consumer groups⁷



The dairy industry derives the most environmental value from the first consumer group, where the clean green marketing strategy is most overt. In Asian markets such as Malaysia, Taiwan and the Philippines, country of origin and environmental image play a crucial role in marketing dairy products. The "Nutrition for Life" range of products are typically branded to emphasise that they hail from "clean green New Zealand" (products are packaged with images of lush New Zealand pastures and streams).

While the clean green marketing strategy was used for the second consumer group in the past to promote New Zealand dairy products, NEW ZEALAND MILK is increasingly moving away from its overt "country of origin" branding in Europe. "Anchorland" is now a commonly used branding strategy in the United Kingdom, whereby consumers associate New Zealand butter with an "imaginary Anchorland" as opposed to New Zealand.⁸ The country of origin does not play as important a role as it does with the first consumer group.

⁷ Consumer grouping data from Andrew Smith, New Zealand Dairy Board.

⁸ Andrew Smith, New Zealand Dairy Board.

4. Value Chain Analysis

The third group comprises NZMP's (the ingredients business) markets. The focus here is more on high quality product delivered on time by an efficient global company. While New Zealand's clean green image may play a role in influencing sales, it is not as important in promoting the product.

The fourth group represents the NZDB's joint venture companies in Latin America, which do not process New Zealand product. This group therefore reaps no value from New Zealand's clean green image.

Given that the first group (comprising the Asian and Africa, India and Middle East (AIME) markets) reaps the most value from "clean and green", it makes sense to target these markets in terms of the survey effort.

The largest product group that the New Zealand dairy industry exports is the milk powder group. Products range from wholemilk powder to skimmilk powders with added calcium. The main destinations for this product group include South America, the Middle East and Asia. Malaysia is the largest single market for milk powders, followed by Taiwan. The strategy of NEW ZEALAND MILK in these markets is founded on exploiting consumer concerns about health and wellbeing, which research has identified as being closely linked with New Zealand dairy products. Part of its strategy was the launch of the "Nutrition for Life" line, which comprises a range of low fat, high calcium milk powders (the brands are ANMUM, ANMUM 2, ANMUM FOLLOW ON, ANLENE, ANDEC, ANLENE GOLD and PROLENE). Most of these products are available throughout Asia (particularly Malaysia, Taiwan, the Philippines and Singapore) and in Latin American markets such as Venezuela. Only Taiwan and Malaysia currently have the full range of "Nutrition for Life" product range.⁹

In analysing the value of New Zealand's clean green image with regard to the dairy sector, the Asian region is of particular importance. This is not only because of the volume of dairy exports destined for Asia, but also because evidence suggests that New Zealand's clean green environment is a definite marketing advantage. For example, in 1999, the Board of Foreign Trade (BOFT) in Taiwan banned a total of 118 products originating from Belgium because of the dioxin contamination scare. This included all imports of milk, eggs, dairy and egg based products, animal feed, animal fat, poultry, livestock products, crackers and chocolate. The NZDB's joint venture partner in Taiwan experienced an increase in trade enquiries due to the incident. An increase in trade enquiries was also experienced in Hong Kong during this incident.¹⁰

While consumers in the European market have become increasingly "food safety conscious", with regard to agricultural methods and hormone treatments on cattle, due to recent food scares, this trend has also been noticeable in New Zealand's Asian markets. In 1999, when New Zealand was considering the use of the hormone recombinant Bovine Growth Hormone (rGBH) – also known as asbovine somatotropin (rBST) – to raise milk production, safe food campaigners across Asia warned against it. They threatened to launch a boycott against New Zealand dairy products if use of the hormone was approved. Incidentally, Europe has banned the hormone, and consequently banned US beef imports.¹¹

⁹ Anonymous (2000), New Zealand Dairy Board: The Facts Part 2, *Dairy Industries International*.

¹⁰ Trade New Zealand web-site, Asia Watch (21 June 1999) www.tradenz.govt.nz/intelligence/news/asiawatch/north/taiwan19990621.html.

¹¹ Asia Times Online (9 June 1999) www.atimes.com/food/AF09Cf01.html.

4. Value Chain Analysis

The dairy survey undertaken within the context of this study targets Malaysian consumers buying New Zealand liquid milk and milk powder in Kuala Lumpur. The Malaysian market was chosen due to its size coupled with NEW ZEALAND MILK's overt use of New Zealand's clean green image as a marketing strategy there. It is the single largest destination for New Zealand dairy products. For the year ended June 2000, milk powder exports to Malaysia were worth almost NZ\$238 million. Total dairy exports to Malaysia were worth NZ\$272 million.¹²

4.4 ORGANICS

4.4.1 Production, distribution and marketing of organic product

The structure of the New Zealand organic industry is complex. Exporters of organic produce comprise not only large organisations such as Zespri International (formerly the Kiwifruit Marketing Board), ENZA (formerly the Apple and Pear Marketing Board) and Heinz-Wattie's Australasia Ltd., but also smaller family owned businesses.

The Organic Products Exporters Group (OPEG) is a network of businesses, research institutions, consultancies and certifying agencies that was formed in 1995 with support from the New Zealand Trade Development Board, (Trade NZ). Members range from New Zealand's largest food companies, such as Heinz Wattie's Australasia, ENZAFruit and Zespri International, to others that are small, family concerns. Together, OPEG members market an impressive variety of products including lamb, beef, poultry, fresh fruit and vegetables, frozen and canned vegetables, honey, dairy products, eggs, grain, baby food, wine, juice, vinegar, flaxseed oil, herbal teas and wool.

In order to ensure the integrity of New Zealand's organic exports, OPEG requires its members' products to carry internationally recognised certification. In New Zealand, the three certifying agencies associated with OPEG are BIO-GRO New Zealand Inc., the Bio Dynamic Farming and Gardening Association and AgriQuality New Zealand Ltd.

While OPEG's focus is to help members sell their products internationally, its activities have a positive spin-off for all New Zealand organic companies, whether or not they intend to export. OPEG supports a vibrant domestic market because it will help develop the experience and infrastructure within the industry necessary for sustainable export growth.

There are two main ways in which New Zealand organic produce is distributed and marketed overseas. Fruit marketing boards such as ENZA and Zespri can either sell directly to a supermarket, or go through a wholesaler or distributor, who in turn sells the produce to the local supermarkets.

The export of organic apples is dominated by ENZA, New Zealand Organics Ltd. and DM Palmer Ltd. These apples are destined for wholesalers and distributors in the United Kingdom, such as Organic Farmfoods, Empire World Trade and Worldwide Fruit. These wholesalers supply the supermarkets. While most supermarkets in the United Kingdom retain the ENZA brand, New Zealand Organics Ltd. and DM Palmer Ltd are required to label their product with the supermarket house brand.¹³ This means that most consumers are unaware of the country of origin when they purchase a New Zealand organic apple. The reason is that their purchase is motivated by the fact that they are purchasing an

¹² Trade New Zealand, Overseas Trade, 2000.

¹³ Greig Taylor, New Zealand Organics Ltd.

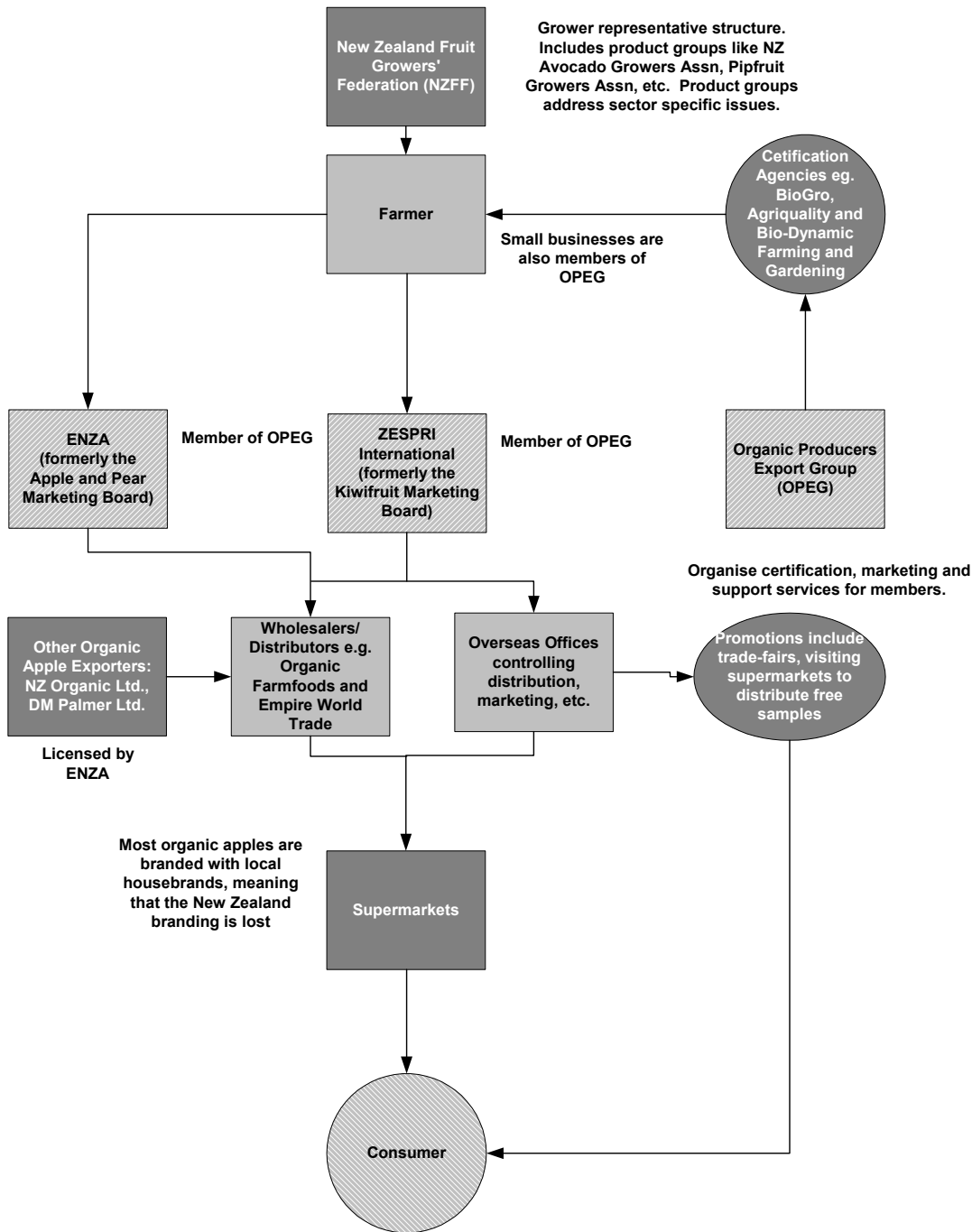
4. Value Chain Analysis

organic product, rather than a product from a “clean green” country. Consumers rely on their supermarkets to select the best organic produce available. Under such a scenario, environmental value is driven by the supermarkets.

Zespri kiwifruit is also distributed in a similar fashion. Figure 11 illustrates the distribution and marketing of New Zealand organic produce. Note that this pertains only to the export of kiwifruit, apples and pears (about 55% of apples are exported as fresh fruit, while 20% is exported as apple juice concentrate).

Farmers certified by Bio-Gro New Zealand Inc. supply fruit to Zespri and ENZA. The two companies not only organise packing and shipping, but also distribution of product to international retailers and wholesalers. Unlike the marketing of the organic apples, however, the produce is branded Zespri and ENZA. Both Zespri and ENZA conduct promotional events in key international markets, via their network of overseas offices. Zespri, for example, conducts road tours in both Europe and North America. The tours take the form of visits to grocery stores and supermarkets and the distribution of free samples of Zespri kiwifruit. Promotional events also include trade fairs, which target retailers and wholesalers.

Figure 11: Marketing and distribution of New Zealand kiwifruit, apples and pears overseas



Note that ENZA and Zespri also supply supermarkets directly.

Other fruits and vegetables are marketed by individual businesses. The Horticulture Export Authority (HEA) is an umbrella organisation for this sector, but does not market or own product.

4.4.2 Location of environmental value added

The most probable location of environmental value in the case of the organic sector is the supermarkets. In a recent debate on the GM issue before the Royal Commission on Genetic Modification, Zespri's Chief Executive, Tony Marks discussed the increasingly significant role that supermarkets in Europe are playing in shaping what products are

4. Value Chain Analysis

made available for consumers.¹⁴ He stated that there is currently a strong move towards amalgamation in the supermarket trade. The British supermarket trade is controlled by five supermarkets, which control 70% of product sold. Similarly, in France, the number one supermarket chain Carrefour took over the second largest supermarket chain, Promodes, and thereby acquired 68% of the French supermarket trade. There have been similar moves towards amalgamation in the United States. The environment that New Zealand exporters are selling into, thus, is one of increasing amalgamation, where relatively few of institutions control the majority of groceries sold on the domestic market.

The presence of major supermarkets is especially significant with regard to the organic food industry. In a publication about the European market for organic vegetables, Frost & Sullivan¹⁵ noted that the presence of major supermarkets is vital in making foods widely available to the public. Marketing support is crucial to stimulate consumer demand by raising public awareness of organic foods. Frost & Sullivan also claimed that in the United Kingdom, the supermarket chain Safeway reported that although only 2% of the fruit and vegetable trade is organic, it accounts for 80% of telephone enquiries. Another British supermarket, Tesco, reported a 500% increase in the sales of organic fruits and vegetables, following a price cut to make them more affordable.

Tony Marks also noted that there is an increasing trend by supermarkets to regard themselves as “gate-keepers” for their consumers. This is coupled with a general distrust amongst consumers, of governments to look after the welfare of consumers. Given the recent outbreaks of food related diseases such as BSE, E. Coli and Listeria in Europe, supermarkets are becoming increasingly risk averse. As a consequence, they impose a series of technical specifications that they require importers to meet on behalf of their customers. The overall impression is that consumers shop at their respective supermarkets because there is an underlying guarantee that the food they purchase is completely safe.

Under such a scenario, if New Zealand’s environment were to degrade to the extent that aspersions were cast on the quality of food exports, supermarkets would almost certainly be the first ones to react by cutting off supply. During his presentation to the Royal Commission on Genetic Modification, Tony Marks recounted an incident involving Dutch pears a couple of years ago. Chemical residue was found in some Dutch pears by a supermarket chain. The supermarket initially thought that it might just affect one or two grower lines. Thereafter, the supermarket discovered that the problem was slightly wider than that, and reacted by simply removing all Dutch pears from the shelves. This response is typical of other supermarkets in Europe also. Supermarkets are not overly sympathetic to the needs of the grower. Given a potential food safety problem, they will simply react by finding alternative sources of supply.

In the case of imported organic products labelled with the supermarket label, environmental value is captured by the retailer. The origin of the product, and hence New Zealand’s clean green image has little role in shaping consumer decision (unless the consumer makes it a point to enquire about the source of the product).

In analysing the organic sector, particular attention needs to be given to the GM issue. Supermarkets in Europe are coming under increasing pressure from both consumers and environmental groups. Environmental groups wield considerable power in the United

¹⁴ Zespri International’s submission on behalf of the Kiwifruit Industry to the Royal Commission on Inquiry into Genetic Modification (30 November 2000).

¹⁵ Frost and Sullivan, Report 3365: The European Market for Organic Vegetables.

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Kingdom, in the wake of controversies stemming from BSE and GM food.¹⁶ Supermarkets are thus at pains to appear adamant on their non-GM stance.

In Europe, outbreaks of food scares and the GM issue has fuelled the demand for organic food. While US consumers appear to have confidence in their food safety authorities and foods containing GM components are generally accepted, European consumers do not have the same level of confidence in their authorities following the BSE and dioxin scandals (Economics in Action, 2001). They are generally suspicious of GM foods, and as a consequence large supermarkets are increasingly refusing to stock food which contains GM components.

In assessing the impact New Zealand's clean green image has on the organic sector, it is therefore useful, as a first best strategy, to target the supermarket buyers; they are the ones making the decision to buy New Zealand organic product. However, it is not always practical to approach supermarket buyers; they are typically reluctant to fill out surveys. Furthermore, the "buyer" structure of supermarkets is generally complex, in that there may not be one single individual who only buys organic products. For example, a supermarket may have separate buyers for pipfruit and exotic fruits such as mangoes and kiwifruit. Under such a scenario it would be necessary to ascertain who exactly completes the survey (we may have to approach more than one person in a supermarket), which may become time-consuming.

An alternative to targeting the supermarkets is to focus the survey efforts on the wholesalers and distributors who are also direct customers of ENZA and Zespri. Organic Farmfoods in the UK is the largest distributor of organic fresh produce and is responsible for about 60% of organic fresh produce supply in the country.¹⁷ Another large wholesaler and buyer of New Zealand organic fresh produce is Worldwide Fruit (ENZA's sole distributor in the UK). Wholesalers and distributors would typically anticipate the behaviour of the supermarkets that they supply. That is, if New Zealand's stance on GM caused concern among supermarket buyers to the extent that they cut off all New Zealand organic fresh fruit supply, it would not be in the interests of the wholesalers to continue purchasing New Zealand organic products.

The survey for the organic sector thus targets wholesalers and distributors in the UK. More details on the survey effort are given in Chapter 5.

4.5 INBOUND TOURISM

4.5.1 Production, distribution and marketing of tourism services

The two key tourism organisations in New Zealand are Tourism New Zealand (TNZ) and the Office of Tourism and Sport. The latter is an independent office established alongside the Ministry for Economic Development. Its role is to support the cause of tourism and sport within the government in order to maximise the benefits and opportunities that can be obtained. The office also monitors the outcomes of the work of Tourism New Zealand.

The Tourism Industry Association of New Zealand (TIANZ) represents the interests of the organisations which make up New Zealand's tourism industry. TIANZ provides leadership, guidance and services for the benefit of its members so as to contribute to a viable and sustainable tourism industry. Its role is to be an advocate for its members and

¹⁶ Milmo (2001), Retail Chains Ban Potentially Risky Consumer Items, *Chemical Market Reporter*.

¹⁷ Jon Manhire, Chief Executive Officer, OPEG.

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develop industry programmes and quality tourism standards. TIANZ is currently developing the Green Globe 21 certification programme for sustainable tourism. Kaikoura is piloting the Green Globe 21 status for communities in New Zealand. This independently certified programme is similar to company certification, but is based on an interest of community approach. Various tourism companies nation-wide are being encouraged to submit environmental plans (EPs) to be considered for affiliation with the programme.

TNZ is responsible for the co-ordinated marketing and promotion of New Zealand overseas as a tourism destination. Its objective is to ensure that New Zealand is developed and marketed as a tourism destination to maximise the long-term benefits to New Zealand. TNZ works with the tourism industry to develop quality systems, new tourism products and international marketing. TNZ maintains a network of overseas offices located in Sydney, Melbourne, Brisbane, London, Los Angeles, New York, Tokyo, Osaka, Frankfurt, Singapore, Bangkok, Hong Kong, Taipei and Seoul.

As part of promoting and marketing New Zealand overseas, TNZ also organises trade events, via its network of overseas offices. For example, in the month of March 2001, TNZ made presentations at trade fairs in Sweden, China, Singapore, Australia, France, Germany and India. These trade shows are aimed at wholesalers such as travel agencies, to encourage them to actively promote New Zealand as a tourist destination.

Another marketing strategy was the launch of the *100% Pure New Zealand*¹⁸ campaign. TNZ have dedicated a web-site to the campaign. The emphasis is on New Zealand's unique environment and all the benefits that a tourist can potentially reap from it.¹⁹ The web site also lists various travel agencies in different countries, which a tourist could approach, for further information about a trip to New Zealand. Various regions in New Zealand and possible activities tourists can engage in are also provided. Accommodation details are also accessible from the web-site.

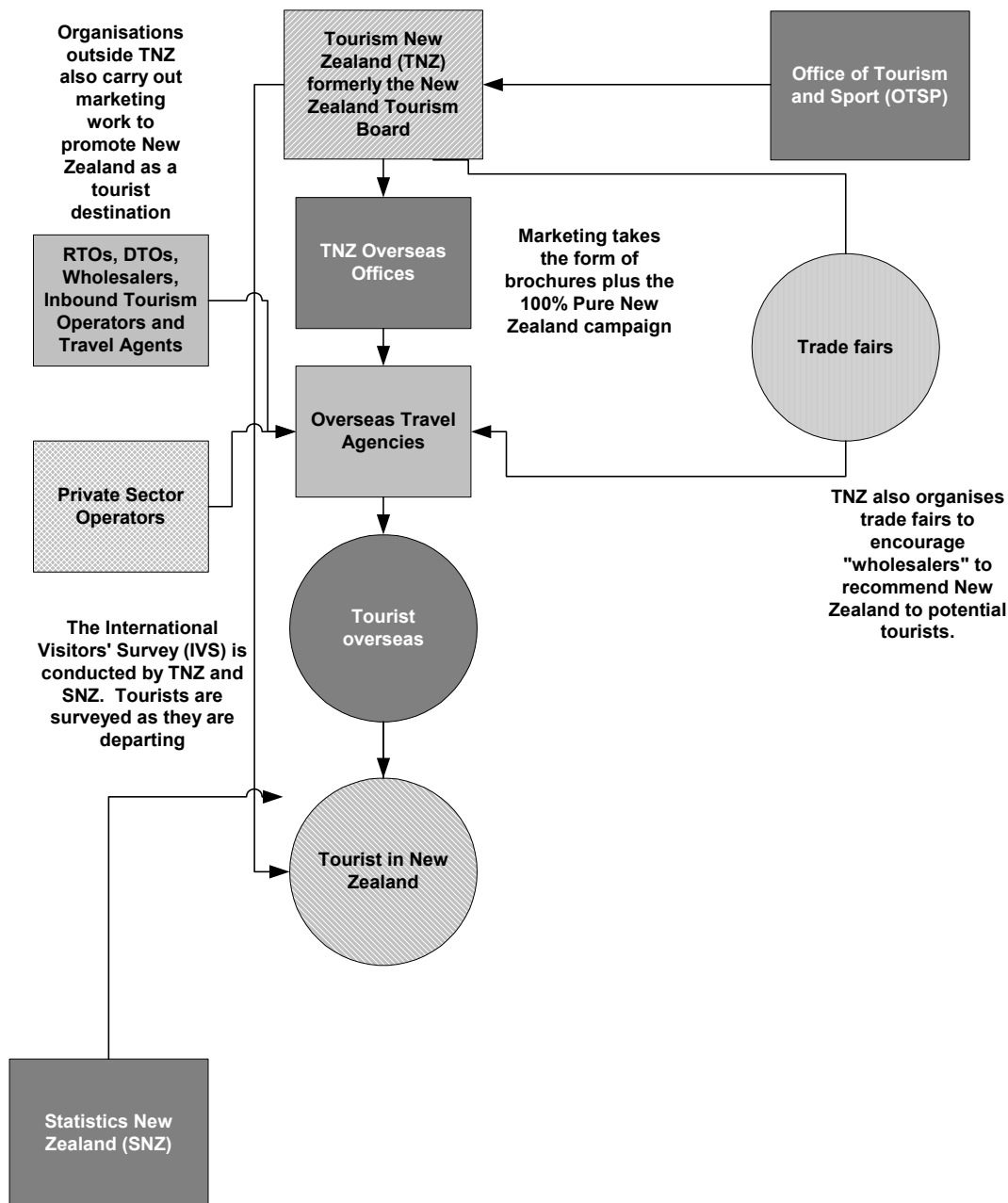
Regional Tourism Organisations (RTOs), District Tourism Operators (DTOs), wholesalers, inbound tourism operators, travel agents and private sector operators are also responsible for international marketing to promote New Zealand as a tourism destination.

Figure 13 illustrates the marketing and distribution of New Zealand tourism services to a potential tourist.

¹⁸ www.purenz.com

¹⁹ TNZ is currently broadening the scope of their marketing campaign by placing more emphasis on New Zealand's landscape, culture and people (source: Malcolm Anderson, TIANZ).

Figure 13: The marketing and distribution of New Zealand tourism services



4.5.2 Location of Environmental Value Added

There are two main ways that a potential tourist can be motivated to visit New Zealand. The first is by word of mouth. For the year ended February 2001, there were 1.824 million visitors to New Zealand.²⁰ With so many visitors, it is undoubtedly the case that tourists who have previously visited New Zealand talk about their experiences in New Zealand, motivating others to choose New Zealand as a destination for their vacation. The second, perhaps more common, way in which a tourist is motivated to visit New Zealand involves promotional work carried out by Tourism New Zealand and other organisations. Environmental value is added at the point where the potential tourist is exposed to promotional material about New Zealand's "clean green" environment (whether it be by

²⁰ TNZ press release, March 2001, www.tourisminfo.govt.nz

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word of mouth, or at the moment when they pick up a travel brochure, or visit the *100% Pure New Zealand* website).

The analysis of the tourism sector is more complex than that of the dairy and organic sectors. The tourism sector is quite different from the dairy sector, in terms of the location at which environmental value is added. In the case of inbound tourism, environmental value is largely driven by the end user. While travel agencies can influence a potential tourist's decision to travel to New Zealand to a certain extent, the final decision on whether or not to undertake the journey depends on the tourist. Thus, in the case of inbound tourism, the role of the gatekeeper (in this case the travel agent) is less significant than in the dairy and organic sectors.

Thus, to gain an understanding of the value of New Zealand's clean green image in the tourism sector, it is necessary to target the end user (ie. the tourist) for survey purposes. More details about the survey design for the inbound tourism sector is provided in Chapter 5.

4.6 CONCLUSIONS

The analysis above helps us identify where it would be most appropriate to focus the survey effort. Conclusions are presented below.

4.6.1 The dairy sector

In the dairy sector, the size of the Malaysian market coupled with NEW ZEALAND MILK's "clean green" marketing strategy in Asian markets, suggested the Malaysian market as a particularly interesting market to target. In the Malaysian market, milk powder is New Zealand's main export product. For the year ended June 2000, milk powder exports to Malaysia were worth almost NZ\$238 million. Total dairy exports to Malaysia were worth NZ\$272 million.²¹

Unlike in Europe and the United Kingdom, the Malaysian supermarkets do not appear to exercise a strong "gatekeeping" role. Rather, it is the consumer in Malaysia who is the primary determinant of what products get purchased. As a consequence, in the Malaysian market, it makes most sense to target the consumer (rather than any of the intermediaries).

4.6.2 Organic food exports

With respect to exports of organic produce, the European and UK markets are noteworthy for the growth they are experiencing in the demand for organic product. The UK is currently New Zealand's largest market for organics.

In a number of respects the value chain for organic exports to the UK is quite different from the export of dairy product to Malaysia. As foreshadowed above, in the UK markets, the supermarkets act as "gatekeepers" on behalf of their consumers. Furthermore, in many cases the country of origin is unknown to the consumer. For these reasons it makes more sense to target the intermediaries when considering the impact of a change in New Zealand's environmental image.

²¹ Trade New Zealand web-site, www.tradenz.co.nz

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In looking at the intermediaries operating in the supply of organic produce to the UK supermarkets, it is clear that there are two or three wholesale buyers who are in an extremely influential position. In particular, Organic Farmfoods in the UK is the largest distributor of organic fresh produce and is responsible for about 60% of organic fresh produce supply in the country.²² Another large wholesaler and buyer of New Zealand organic fresh produce is Worldwide Fruit (ENZA's sole distributor in the UK).

These wholesalers and distributors can be expected to reflect the demands of the supermarkets they supply. If New Zealand's stance on GM caused concern among supermarket buyers to the extent that they refused to accept New Zealand organic produce, it would not be in the interests of the wholesalers to continue purchasing from New Zealand.

For the reasons outlined above, it was decided that the survey effort in the organics sector should be targeted towards the wholesale suppliers and distributors.

4.6.3 Tourism

In the case of inbound tourism, environmental value appears to be largely driven by the end user. While travel agencies can influence a potential tourist's decision to travel to New Zealand to a certain extent, the final decision on whether or not to undertake the journey depends on the tourist. Thus, in the case of inbound tourism, the role of the gatekeeper (in this case the travel agent) is less significant than in, for example, the European markets for farm produce.

Thus, to gain an understanding of the value of New Zealand's clean green image in the tourism sector, it is necessary to target the end user (i.e. the tourist) for survey purposes. It was decided to target tourists from all of our major tourism markets, namely; Australia, USA, Japan, UK and Korea.

More details on survey design and methodology with respect to all of the sectors are contained in the next chapter.

²² Jon Manhire, Executive Director, OPEG.



Ministry for the
Environment
Manatū Mō Te Taiao

Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

5. VALUATIONS

5.1 INTRODUCTION

In this chapter we describe the empirical valuation work undertaken during the course of this assignment.

In brief; for each of the areas investigated, we measure the difference in the quantity of goods and services purchased under the status quo (current environmental image) and the quantities purchased under some hypothetical scenario depicting a degraded state of the environment.

The definition of these alternate scenarios varies with the sector under analysis, as does the subjects targeted for the survey effort.

The chapter is organised as follows:

- Section 5.2 describes the valuation work done in the dairy sector;
- Section 5.3 describes the work done on the valuation of organic produce; and
- Section 5.4 describes the work done on inbound tourism.

All three sections of the chapter contain a description of the survey design, a description of the valuation methodology and a summary of the results. The survey questionnaires themselves, along with other miscellaneous data gathered from the empirical work are to be found in the appendices.

5.2 DAIRY

5.2.1 Overview

The dairy sector survey was conducted in Kuala Lumpur. Five supermarkets in the Kuala Lumpur area were selected so as to ensure a good cross section of consumers. Table 14 summarises the location and typical clientele of these supermarkets. The third column in the table gives us an idea of the type of consumers that frequent the supermarket, while the fourth column contains the interviewer's insights into the general behaviour of the consumers interviewed.

Table 14: Description of supermarkets where the survey was conducted

Supermarket	Location	Typical Clientele	Interviewer Insights
TOPS Subang Jaya	Suburban	Middle class	Environmentally conscious, but sensitive to price change as well.
Bangsar Cold Storage	Suburban	Wealthy/Middle Class	Environmentally conscious and not swayed by price drops.
Carrefour Mid Valley	Suburban	Middle Class	Environmentally conscious, but sensitive to price change as well.
Puchong Mall	Suburban	Low Income/Lower Middle Class	Environmental image not a major driver in purchasing decision and very sensitive to price drops.
TOPS Kuala Lumpur City Centre	Downtown Kuala Lumpur	All types	Combination of the above

The interviewer approached customers leaving the supermarket. To ensure that the sample was random, every fifth consumer leaving the supermarket was approached. Only the main shopper for the household was targeted and younger persons (under the age of 18) were eliminated. Ninety-four subjects were interviewed in total.

5.2.2 Survey design

By far the most important issue in designing the survey relates to the question of how to present consumers with images of the New Zealand environment – both with respect to the existing environmental image and the alternative degraded scenario.

One of the options we considered was to represent environmental quality in terms of quantitative parameters (such as those that form part of the Ministry for the Environment's EPI Programme). From a policy perspective, this would allow the results of the survey to be directly translatable to movements in environmental quality – as measured by those indicators.

However, we discounted this option on the grounds that most consumers would have a great deal of difficulty in relating to environmental image represented through numerical parameters.

We also considered asking respondents to contrast their image of New Zealand's environment with that of some defined place that did not enjoy the same environmental reputation. However, the difficulty with this approach was that it presumed that all the respondents had the same image of the alternative. This is unlikely to be the case in practice.

For the reasons outlined above, we settled on pictorial representations of (existing and degraded) environmental images supplemented by verbal descriptions as the best means of representing the two environmental states. The pictorial representations were selected so that the "existing image" related reasonably closely to the images used by the Dairy Board in its marketing.¹ The degraded images were of cases where poor farm management has led to environmental damage. All of the images (both "existing" and "degraded") were untouched photographs of the New Zealand environment.

¹ In fact, a number of the images came from the Dairy Board image library.

5. Valuations

The complete survey questionnaires (along with image couplets) can be found in Appendix D.

The primary purpose of the survey is to determine how the purchasing behaviour (in terms of the quantity of NEW ZEALAND MILK products purchased) would change under a differing perception of New Zealand's environmental quality.² These changes in quantities purchased are sufficient to drive the valuation methodology (discussed below).

5.2.3 Valuation methodology

In determining the valuation methodology, it is important to consider quite carefully the structure and conduct of the Malaysian market for dairy product. This is examined below.

In Malaysia, the local dairy industry does not produce sufficient quantities of fresh milk to satisfy Malaysia's fresh milk needs.³ The bulk of dairy imports come from New Zealand and Australia. There is competition between Australian and New Zealand exporters with both producers vying for market share.

In a report examining the potential for US dairy producers to enter the Malaysian market,⁴ it was noted that there were few prospects for imports and sales of US milk products and brands directly to consumers. This was attributable to the small but brand loyal market.

In many respects the Malaysian dairy market exhibits the characteristics usually associated with oligopolistic competition. In particular, it is quite likely that any price reduction on the part of any one of the major suppliers would be matched by a corresponding price reduction from its competitors.⁵ This in turn means that it is unlikely that any company could benefit from increased volumes by dropping their prices.

This has important implications for the valuation exercise at hand. Consider the situation where perceptions of New Zealand's environment worsen in Malaysia to the extent that the demand for New Zealand dairy products decreases.

While New Zealand producers have the option of reducing prices (to marginal cost) in an attempt to increase the quantity sold, it is unlikely that this strategy would have the desired effect. In particular, the price reduction is likely to be matched by New Zealand's competitors with market share reverting to the pre price reduction levels. The net result to the New Zealand supplier is a loss of revenue and profit. As such, the optimal strategy for the New Zealand producer is to maintain prices at existing levels *even if quantity demanded drops as a consequence of the changed perception of New Zealand's environment*.

Consequently, for the purposes of this valuation, we have assumed demand to be insensitive to price. That is, for a given perception of environmental quality, a price reduction will not result in a change in the quantity of New Zealand product demanded. Further, we have assumed that New Zealand suppliers will not reduce price in the face of reduced demand.

² Change in willingness to pay for New Zealand's milk products are also of interest – but to a lesser extent (see Section 5.2.3).

³ *Malaysia Dairy and Products Annual 2000*, USDA Global Agricultural Information Network (GAIN) Report.

⁴ *Malaysia Dairy and Products Annual 2000*, USDA Global Agricultural Information Network (GAIN) Report.

⁵ This is certainly the view of dairy marketing personnel within the region.

The next issue to be considered is what happens to the product that ceases to be demanded. There are two scenarios worth considering here. The first is that the product ceases to be produced; the second is that the product gets re-directed into some other market. We consider the second option to be the more likely.

Furthermore it seems most likely that the product would be re-directed into a market that does not rely on New Zealand's environmental image.⁶ Consequently, we have assumed that the product that would have otherwise been sold into Malaysia through the Dairy Board's consumer business, NEW ZEALAND MILK, would be redirected into the ingredients side of the business (NZMP).

This understanding of the market makes the valuation exercise reasonably straightforward. Essentially, the loss of value to New Zealand is equivalent to the profit differential between that obtained in the added value NEW ZEALAND MILK brand and the ingredients business multiplied by the volume affected.

A. Loss in sales value

The Asian and AIME markets are volatile and an active investment area. This makes reliable profit information difficult to come by. To this end, we first perform an analysis of loss in sales value under worsened perceptions followed by a heuristic analysis on effects on profit.

Consider the following:

- R_0 = the revenues of the NEW ZEALAND MILK group in the markets under consideration;
- R_1 (with $R_0 > R_1$) = the revenues of the NEW ZEALAND MILK group under worsened environmental perceptions.

Assume, the volume lost in these consumer markets is re-directed to ingredients markets world-wide (i.e. products that are not branded with country of origin).⁷ Note that the revenue (per unit volume) obtained from commodity products is less than that obtained through consumer branded products.

The loss in sales value is then given by:

$$\Delta \text{ Sales Value} = R_0 - R_1$$

B. Loss in profit

While the above yields the loss in revenue, it is useful to consider the effect of worsened environmental perceptions on profit.

The following is a purely heuristic approach that enables us to gain some understanding of how much profit would be lost to the New Zealand dairy sector if perceptions of New Zealand's environment worsen in our key overseas markets.

First consider the following terminology:

- Q_C = Total quantity of dairy ingredients sold globally;

⁶ It is unlikely (although not impossible) that Malaysia would suffer a changed perception of New Zealand's environmental image and yet other like markets would be unaffected.

⁷ Andrew Smith, New Zealand Dairy Board.

5. Valuations

- Q_B = Total quantity of added value (branded) dairy products sold globally;
- π_C = surplus per ton of dairy ingredient;
- π_B = surplus per ton of added value (branded) product; and
- π_{TOTAL} = Total Surplus = \$361 million from NZDB Annual Report 2000.⁸

Now π_{TOTAL} can be represented as a linear combination of the profit gained from ingredients and the profit gained from the added value products as follows:

Equation 1: Decomposition of total profit

$$\pi_{TOTAL} \approx Q_C \times \pi_C + Q_B \times \pi_B$$

(Note that **Error! Reference source not found.** is a very crude approximation. In reality the decomposition of total profit would be much more complex.)

Now, assume that there is a relationship between π_B and π_C of the following form:

Equation 2: Relationship between commodity and added value profit

$$\pi_B = \gamma \pi_C$$

For different values of γ , we can evaluate the profit loss to New Zealand due to worsened perceptions via:

Equation 1: Lost profit due to worsened perceptions

$$\begin{aligned} \pi_{lost} &\approx \left\{ Q_{oB} \pi_B \times \frac{\Delta_{worse}}{100} \right\} - \left\{ Q_{oB} \pi_C \times \frac{\Delta_{Redirected}}{100} \times \frac{\Delta_{worse}}{100} \right\} \\ &= \left\{ Q_{oB} \pi_B \times \frac{\Delta_{worse}}{100} \right\} \left\{ 1 - \frac{\pi_C}{\pi_B} \frac{\Delta_{Redirected}}{100} \right\} \\ &= \left\{ Q_{oB} \pi_B \times \frac{\Delta_{worse}}{100} \right\} \left\{ 1 - \frac{1}{\gamma} \frac{\Delta_{Redirected}}{100} \right\} \end{aligned}$$

Where:

- Q_{oB} = Quantity of branded product destined for the added value markets under the status quo;
- Δ_{worse} = Percentage decrease in demand due to worsened perceptions (from survey);
- $\Delta_{Redirected}$ = Percentage of lost branded products sent to commodity markets.

This analysis requires the total profit (the NZDB's Annual Report (2000) indicates that this figure is π_{TOTAL} = NZ\$361 million⁹) and the total quantities of branded and ingredient

⁸ Note that the \$361 million figure is a surplus above commodity including both consumer/branded and ingredient sales and is not a pure profit figure. It provides a useful upper bound attributable to added value marketing including that associated with New Zealand's environmental image.

⁹ Note that this total profit figure also takes into account the domestic market. However, for a rough analysis of profit it should suffice (95% of product is exported).

5. Valuations

products sold. The total sales volume for NZMP for the 1999/2000 period was 1.052 million tons¹⁰ (i.e. $Q_C = 1.052$ million tons). The total sales volume of consumer (branded products) was 330,000 tons (i.e. $Q_B = 330,000$ tons).

The approximate loss to the New Zealand dairy industry is given by Equation 1.

It is useful to gain some idea as to what the value of γ might be. Due to the lack of information on profits earned by the dairy industry, it is not possible to obtain a precise estimate of γ . One way of estimating the value of γ would be to examine the ratio of revenues earned from the added value markets to those earned from the ingredients markets. The disadvantage with this method is that it only provides a good estimate if the costs are near zero (a rather unrealistic assumption). Even when the costs associated with the added value and ingredients products are similar (or even the same), the value of γ is very sensitive to the cost. Hence different values for the costs will yield very different values for γ . When the costs associated with the two markets vary, the matter is further complicated.

Due to the lack of information on the cost and profitability of the dairy industry, we are not in a position to comment on a likely value for γ . Thus, for the purposes of this study we have contrived values for this profitability ratio.

C. Transitional effects

In considering the profit differential, there is good reason to believe that the profit differential in the short-term will be different from the long-term impact. In the short-term, despite worsened environmental perceptions and a loss in volume from added value markets, the NZDB would still incur the costs of most of the existing business infrastructure.¹¹ In the long-term, however, the dairy industry can be expected to adapt if these losses (due to worsened environmental perceptions) persist. In particular, the business infrastructure and the industry's labour force will be subject to change. Given the fact that business infrastructure and labour costs represent the bulk of the costs in the dairy industry, the short-term and long-term cost structures under worsened perceptions will be quite different. Hence, the short-term and long-term profit differentials will also be different.

It is reasonable to assume that short-term profit loss will be bounded by loss in revenue on one side and by loss in long-term profit on the other. The difference in short and long term effects will depend on the extent and speed of restructuring by the dairy industry, in response to reduction in demand.

D. Generalising from Malaysia to other markets

Although the survey was limited to the Malaysian market, we understand from the Dairy Board that the Malaysian market is typical of markets in the Asian and AIME (Africa, India and Middle East region) regions. All of these regions are markets in which added value product is sold. All use New Zealand's environmental image as a marketing platform; country of origin coupled with "clean green" images of New Zealand dairy farms play a major role in promoting New Zealand dairy products.

¹⁰ Information on volumes of consumer products and ingredients was provided by Andrew Smith, New Zealand Dairy Board.

¹¹ Andrew Smith, New Zealand Dairy Board.

5. Valuations

As a consequence, in computing the impact of a change in environmental image, we have generalised from Malaysia to the rest of the Asia and AIME region.

5.2.4 Results

Exploratory analysis of the dairy survey is included in Appendix E. The percentage change in purchasing behaviour was measured for each respondent (i.e. the percentage change in amount of New Zealand dairy products bought under the current and worsened perceptions). Histograms depicting the distribution of the percentage change in amount of New Zealand dairy product bought are provided in Appendix E.

The histograms indicated that change in consumer purchasing behaviour (for both milks and milk powders) is bimodal. That is, there appear to be two distinct subgroups within the New Zealand dairy buying population: those who would stop buying New Zealand dairy products under worsened perceptions (i.e. percentage change is 100%) and those who would continue to buy New Zealand dairy products in the same quantity as before (i.e. percentage change is 0%). The former subgroup appeared to be the dominant one.

Awareness of the country of origin was also very common. Of the 94 consumers surveyed, only nine were unaware that the products they were buying were from New Zealand.¹²

Interaction between the respondents and the interviewer also provided some interesting qualitative insights.¹³ A large proportion of the respondents claimed that they chose New Zealand dairy products over European ones due to the environmental and food related scares experienced there. The consumers who would stop buying New Zealand dairy products completely, under the alternative scenario, appeared to be insensitive to reductions in price. In other words, they would not buy New Zealand dairy products under a worsened environmental state even if prices were dropped dramatically.¹⁴

One respondent claimed that they would continue to purchase New Zealand dairy products under worsened perceptions only if the New Zealand Government made assurances about the state of New Zealand's environment.

Another interesting point noted by the interviewer was that in the Malaysian market there might be a relationship between the income level of a consumer and their attitudes towards environmental quality. In particular, he noted that respondents who appeared to have a higher income were generally more environmentally focused and less likely to be swayed by promises of discounts under a worsened environmental scenario, than those who seemed to be on lower incomes. This is, however, a purely qualitative insight, as income levels were not tracked by the survey.

Table 16: Relevant statistics from dairy survey

Statistic	Value
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¹² Note that for the purposes of the valuation, we have assumed that consumers who were unaware of the country of origin would not change their purchasing behaviour under an alternative environmental scenario. Hence the percentage change in amount of New Zealand dairy bought under worsened perceptions is 0%.

¹³ Note that these observations are purely anecdotal and were not recorded as part of the survey effort.

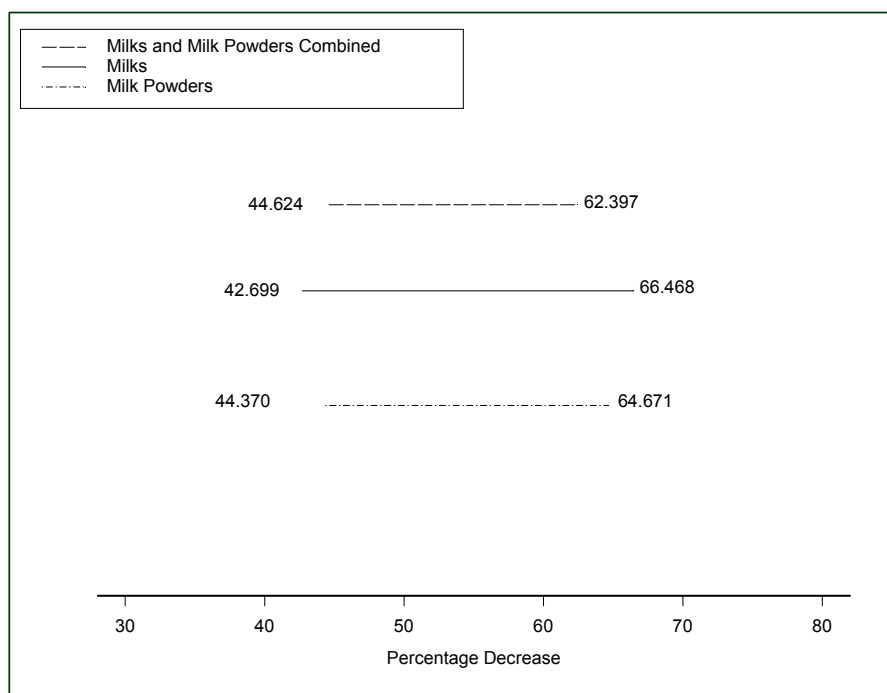
¹⁴ Note, however, that the survey postulated that a price drop in New Zealand product would be matched by New Zealand's major competitors.

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Average Amount of Liquid Milk Purchased Under Status Quo (litres per month per consumer)	8.450 litres
Average Amount of Liquid Milk Purchased Under Worsened Perceptions (litres per month per consumer)	3.380 litres
Average Percentage Decrease in Liquid Milk Purchased	54.6%
Average Amount of Milk Powders Purchased Under Status Quo (in kilograms per month per consumer)	3.623 kg
Average Amount of Milk Powders Purchased Under Worsened Perceptions (in kilograms per month per consumer)	1.513 kg
Average Percentage Decrease in Milk Powders Purchased	54.5%
Overall Average Percentage Decrease	53.5%

The 95% confidence intervals for average decrease in amount purchased are given in Figure 15.

Figure 15: 95% confidence bounds for percentage decrease in purchasing behaviour



For the purposes of the valuation, we assume that under worsened environmental perceptions, New Zealand would lose 53.5% (the aggregated average) in volume from its added value markets in Asia and AIME.

Consider the following terminology:

- Q_0 = Quantity of added value/branded products destined for Asia and AIME;
- P_0 = Price per ton of added value product;
- P_C = Price per ton of dairy ingredient;
- Δ_{worse} = Percentage change in volume of added value products purchased due to worsened perceptions.

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- $\Delta_{\text{Redirected}}$ = Percentage of “lost” product redirected to ingredients markets.

The loss in revenue is then given by the difference in revenue from added value products in Asia and AIME under the status quo and revenue from added value products in Asia and AIME under worsened perceptions and revenue from dairy ingredients (that have been redirected from the added value markets due to loss in demand):

$$\text{Loss in Revenue} \approx P_0 \times Q_0 - \left\{ \left[Q_0 - \frac{\Delta_{\text{worse}}}{100} \times Q_0 \right] \times P_0 + \left[\frac{\Delta_{\text{Redirected}}}{100} \times \frac{\Delta_{\text{worse}}}{100} \times Q_0 \right] \times P_C \right\}$$

The table below looks at the revenue lost for different amounts of added value products redirected to commodity markets.¹⁵

Table 17: Loss in sales revenue from added value products in Asia and AIME

Percentage of “Lost” Product Redirected to Commodity Markets	Loss in Revenue NZ\$M
100%	240.9
80%	306.4
60%	372.0
40%	437.5
20%	503.1
0%	568.6

Table 17 indicates that if all the lost product from the Asian and AIME markets was redirected to ingredients markets world-wide, then the loss in revenue is given by NZ\$241 million. This is the loss from selling the product at commodity market prices as opposed to added value prices. The worst case scenario is where the NZDB is unable to redirect any of the lost product to ingredients markets, in which case the revenue loss to New Zealand is approximately NZ\$569 million.

The short-term loss to New Zealand will depend on the commodity prices on the world market. In the NZDB’s 2000 Annual Report,¹⁶ it was noted that NZMP’s increase in revenue from the year before was lower than expected due to low average commodity prices on the world market. The increase in revenue was attributed in part to increased volumes. Under the scenario where New Zealand loses market share in its branded markets and the worldwide commodity prices are low, the loss to the dairy industry would be greater.

¹⁵ Information on revenues and volumes for the Asia and AIME region was provided by the New Zealand Dairy Board. For reasons of confidentiality, this data has not been reproduced in this report.

¹⁶ New Zealand Dairy Board Annual Report 2000, www.nzdb.com

Figure 17: Loss in profit versus percentage of lost added value products redirected to ingredients markets

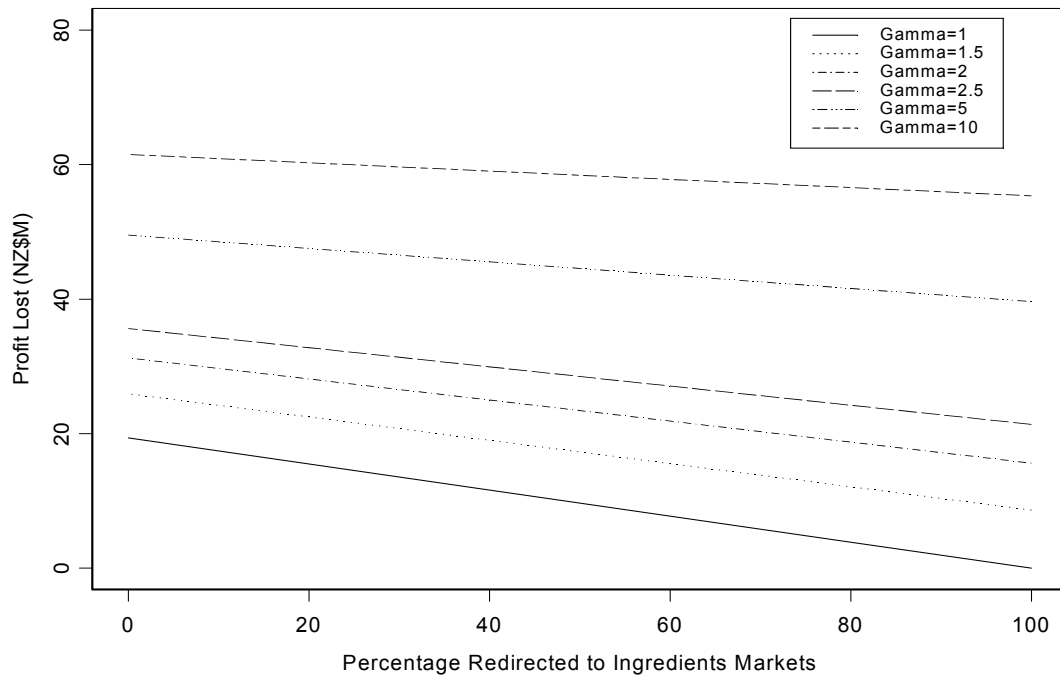


Figure 17 shows the effects on profit. The loss in profit is approximated using Equation 1 and is plotted against the percentage of lost added value product redirected to commodity markets. Loss in profit was evaluated for various values of γ . The larger the value of γ (i.e. the larger the profit per ton of added value product in relation to profit per ton of commodity product) the greater the loss in profit.

From Figure 17, we can see that the largest loss in profit is around NZ\$60M ($\gamma = 10$, $\Delta_{\text{Redirected}} = 0\%$). The loss to New Zealand will depend on the how much more profitable the added value market is in comparison to the commodity markets.

5.3 ORGANICS

5.3.1 Overview

The survey in the organic sector targeted wholesalers and distributors of New Zealand organic fresh produce.

Two wholesalers of organic fresh produce in the United Kingdom were interviewed: Organic Farmfoods and Worldwide Fruit. The former is the largest distributor of organic fresh produce in the UK and is responsible for approximately 60% of all organic fresh produce distributed there. The latter is ENZA's sole distributor in the UK.

The product group targeted in the survey is fresh fruit, since it accounts for almost 80% of New Zealand organic exports.

5.3.2 Survey design

In Chapter 4, we discussed the emerging trend among European supermarkets to act as gatekeepers for their consumers. Supermarkets are becomingly increasingly wary of potential food safety problems, and are particularly sensitive to the GM issue. As already mentioned, large supermarket chains such as Tesco and Sainsbury have put “GM free” signs on their doors and refuse to stock any GM food.

In such a risk averse environment, it is evident that New Zealand’s clean green image places us in a favourable light. Given the possibility of New Zealand adopting GM technology in the future, it is interesting to consider the impact that this will have on our export receipts.

To this end, this survey analyses the effect on New Zealand’s organic export receipts in the UK with respect to different stances New Zealand may adopt on the GM issue. While this impact could extend to all of New Zealand’s agricultural exports, we were interested in identifying, in particular, how it might affect the small but rapidly growing organic export industry.

As with the other sectors, the survey essentially measures purchasing behaviour under various policy positions with respect to GM crops; notably:

- *New Zealand allows limited field trials of GM crops for research purposes.*
- *New Zealand allows uncontrolled release of GM crops.*

5.3.3 Valuation methodology

Due to the small size of the sample (n=2) it is not sensible to use the results to derive a net loss estimate for the entire organic sector. Organic Farmfoods and Worldwide Fruit are both major wholesalers in the UK, and while their responses may be reflective of other wholesalers and distributors in the country, they may not accurately represent the opinions of other players in the market. Moreover an aggregated effect from the two survey responses would have a very large margin of error.

To this end we examine each survey response individually.

The valuation of the organic sector is quite challenging (compared to the dairy and inbound tourism sector valuations). Change in purchasing behaviour and the subsequent loss to New Zealand depends on a variety of factors.

In the United Kingdom, the organics industry is greatly influenced by a handful of individuals who can in turn influence the behaviour of supermarket buyers. Organic Farmfoods, for example, engages in various research and development activities and wields a considerable amount of influence in the British organic industry. If New Zealand organic products were boycotted by Organic Farmfoods due to our stance on GM, supermarkets would most probably follow suit,¹⁷ as would other wholesalers.

The second factor to keep in mind is the destination of “lost” organic product. As in the case of the dairy sector, redirection to other markets is one possibility. However, redirecting organic produce under the scenario where New Zealand allows uncontrolled release of GM crops may be a difficult task. Most of New Zealand’s major organic

¹⁷ Supermarkets may react by cutting off supply of New Zealand organic products from other UK wholesalers. ENZA and Zespri also supply some of their products to supermarkets directly, and this may also be under threat if wholesalers in the UK started to cut off supply.

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markets (UK, Japan and the EU) are very averse to GM, and redirection to these markets would be unlikely.

One option to abate the loss would be to redirect the product as conventional non-organic produce. The disadvantage here is that the returns on organic produce can be up to five times higher than that obtained from conventional produce.¹⁸ Furthermore, given the fact that the short-term costs for the organic industry typically tend to be higher than those for conventional growers, the profit margin would also be a lot lower.

One of the problems encountered in the organic sector valuation was obtaining accurate cost information (to evaluate lost profit). Cost information for the organic sector is sketchy at best. Data that is even two to three years old is generally outdated and new information is very difficult to come by.

Aggregated profit information (for organic and conventional varieties) from Zespri and ENZA annual reports provide little information on average profit from organic produce. The reason is that the cost structure of organic orchards is complex and profit is affected by a variety of factors. Consider the example in Saunders et al (1997),¹⁹ which deals with organic kiwifruit. It is noted that the input costs of organic kiwifruit orchards are typically 10% to 20% higher than that for conventional ones. The yield per hectare of organic orchard is also lower for organic yields. These factors are somewhat offset by a higher premium on organic kiwifruit. The profit structures of conventional and organic kiwifruit will therefore vary both in the short-term and the long-term, and aggregated profit information may not be a sensible figure to use.

To this end the ensuing sections examine revenue lost under the alternative GM scenarios, and then evaluate the profit lost under various profit margin assumptions.²⁰

A generic description of the methodology follows. Consider the following terminology:

- P_0 = current price per kilogram of organic fruit under consideration (e.g. organic kiwifruit);
- V_0 = current volume (in kilograms) of organic fruit supplied;
- γ = profit margin;
- C = Supply cost per kilogram = $P_0 \times (1 - \gamma)$;
- Δ_{GM} = Percentage decrease in purchasing behaviour due to alternative GM scenario;
- P_{new} = new price²¹ per kilogram of organic fruit;
- V_{new} = volume of organic food supplied under alternative GM scenario = $V_0 \times (1 - \Delta_{GM})$;

¹⁸ McKenna & Campbell (1999), Strategies for “Greening” the New Zealand Pipfruit Export Industry: The Development of IFP and Organic Systems.

¹⁹ Saunders, Manhire, Campbell, Fairweather (1997), “Organic Farming in New Zealand: An Evaluation of the Current and Future Prospects Including an Assessment of Research Needs”, *MAF Research Paper*.

²⁰ For the purposes of this study profit margin is defined as the percentage of revenue attributable to profit. Profit lost under a specific profit margin and GM scenario pertains to the amount of profit that the New Zealand organic sector would lose under that specific GM and profit scenario.

²¹ The “new price” here refers to the scenario where New Zealand organic fruit exporters reduce prices to mitigate effects of a negative impact due to New Zealand’s stance on GM.

5. Valuations

- π_0 = profit (per kilogram) under status quo = $P_0 \times V_0 \times \gamma$;
- π_1 = profit (per kilogram) under alternative GM scenario = $V_{\text{new}} * (P_{\text{new}} - C)$;
- π_{lost} = profit lost under alternative GM scenario = $\pi_0 - \pi_1$.

In analysing the profit lost to New Zealand organic traders it is important to note that the supply cost per kilogram, C, remains constant even when price is changed. That is, even when the cost per kilogram of organic kiwifruit, say, is given by P_{new} , the supply cost per kilogram is still:

$$C = P_0 \times (1 - \gamma)$$

In other words, if New Zealand organic fruit suppliers attempted to mitigate the impact of a negative response from its wholesalers by dropping the price of organic fruit, the supply cost would remain the same, but the original profit margin γ would decrease. This assumption is implicit in the formulation above. We also assume that the supply cost per kilogram is invariant to changes in total volume supplied.

Note that the results obtained pertain specifically to the revenue or profit lost from supplying to Organic Farmfoods and Worldwide Fruit, and not to the market generally.

5.3.4 Organic Farmfoods²²

The results for the limited field trials scenario were particularly interesting. Under this scenario and no price change, Peter Segger stated that in the short-term they would not reduce their demand. They would, however, initiate research and development and commercial work to secure other sources of supply. In the long-term, demand for supplies from New Zealand would be reduced.²³

If New Zealand allowed limited field trials and dropped prices by 10% (or even 20%) then Organic Farmfoods would reduce demand by 50% and the replacement strategy described above would accelerate. The reason is that such a price signal would indicate that consumer interest in New Zealand organic foods was waning.

If New Zealand allowed uncontrolled release of GM crops in New Zealand, then Organic Farmfoods would replace all New Zealand organic supplies within one year. Peter Segger stated that under such a scenario, it would appear that there is no future for New Zealand organic crops on the UK market due to the unacceptably high risk factor.

This decision is price insensitive, in that no matter how low the prices of New Zealand organic products drop, supply would still be severed and there would be no mitigating effect through price manipulation.

Figure 18 shows the percentage reduction in Organic Farmfoods' demand for New Zealand organic fresh produce under the various GM and pricing scenarios.

²² Peter Segger, Managing Director of Organic Farmfoods, completed the survey.

²³ Note that this scenario essentially represents the status quo. Since the commencement of the new organisms side of the HSNO Act in 1997, the Environmental Risk Management Authority has approved 13 field trials for GMOs within New Zealand. Peter Segger's response suggests that the current policy of allowing field trials within New Zealand is likely to encourage Organic Farmfoods to consider alternative supply options without necessarily affecting demand in the short-term. It is possible that the precise nature of reaction of wholesalers and retailers in our overseas markets to allowing limited field trials may be a function of a variety of additional factors such as location of the trials and risks of cross contamination.

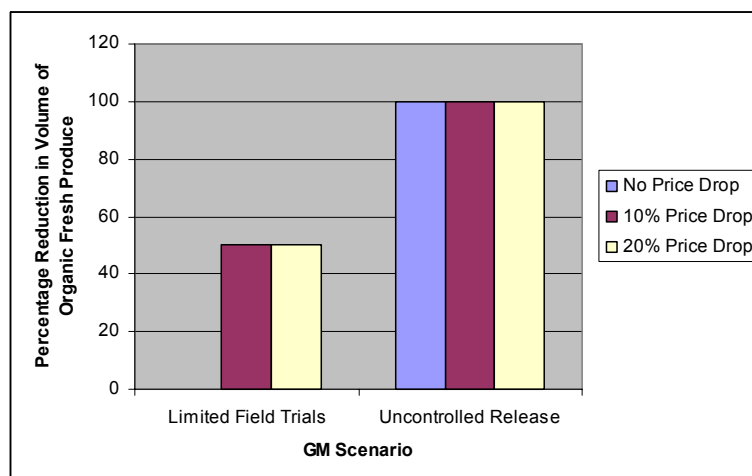
Figure 18: Organic Farmfoods: purchasing behaviour under various GM and pricing scenarios

Table 18 shows the profit earned from organic kiwifruit (sold to Organic Farmfoods) under the status quo for three different profit scenarios.

Table 19 illustrates losses in organic kiwifruit profit under the two different GM scenarios as well as the three pricing regimes (price of organic kiwifruit remains the same: a 10% price reduction and a 20% price reduction). Loss in profit is examined for three different profit margins.

For the purposes of the valuation we have assumed an average return of \$1.98 per kilogram of organic kiwifruit.²⁴

Table 18: Organic kiwifruit profits under status quo

	Profit Margin = 5%	Profit Margin = 10%	Profit Margin = 20%
Profit under Status Quo	\$356,400	\$712,400	\$1,425,600

Table 19: Loss in organic kiwifruit profit under various profit scenarios

GM Scenario	Pricing Regime	New Profit, $\gamma=0.05$	Loss in Profit $\gamma=0.05$	New Profit, $\gamma=0.10$	Loss in Profit $\gamma=0.10$	New Profit, $\gamma=0.20$	Loss in Profit $\gamma=0.20$
Limited Field Trials	Same price	\$356,400	\$0	\$712,800	\$0	\$1,425,600	\$0
Limited Field Trials	10% price decrease	(\$178,200)	\$356,400	\$0	\$712,800	\$356,400	\$1,069,200
Limited Field Trials	20% price decrease	(\$534,600)	\$356,400	(\$356,400)	\$712,800	\$0	\$1,425,600
Uncontrolled Release	Same price	\$0	\$356,400	\$0	\$712,800	\$0	\$1,425,600
Uncontrolled Release	10% price decrease	\$0	\$356,400	\$0	\$712,800	\$0	\$1,425,600

²⁴ Zespri paid an average return of \$7.11 per tray of Zespri Green Organic Kiwifruit to its growers for the last financial year. A standard tray is equivalent to 3.6 kilograms, yielding a return of \$1.98 per kilogram of organic kiwifruit. (Source: Natalie Cho, Zespri International)

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GM Scenario	Pricing Regime	New Profit, $\gamma=0.05$	Loss in Profit $\gamma=0.05$	New Profit, $\gamma=0.10$	Loss in Profit $\gamma=0.10$	New Profit, $\gamma=0.20$	Loss in Profit $\gamma=0.20$
Uncontrolled Release	20% price decrease	\$0	\$356,400	\$0	\$712,800	\$0	\$1,425,600

The net loss given in the table above pertains to the scenario where none of the lost product on the UK market is redirected. If any of this produce were redirected then the net loss figures would be lower.

The cells in Table 19, which contain parentheses represent negative values (i.e. losses), while the figures in bold represent scenarios where the profit lost would be greater than the profit earned under the status quo (given by Table 18). In these scenarios, the loss in profit has been constrained to be no greater than the current profit. These invoke the assumption that we would not continue to sell kiwifruit at a loss.

The data in Table 20 was taken from Campbell and McKenna (1999).²⁵ Price schedules for different varieties of organic apples are provided.²⁶ For the purposes of this valuation we assumed that the average return from organic apples was given by the average of the prices listed in the table below, namely \$37 per tce.²⁷ This was equivalent to a return of \$2.03 per kilogram of organic apples.

Table 20: Organic apple prices

Apple variety	Revenue (\$/tce)
Braeburn	42
Cox's Orange Pippin	42
Fiesta	35
Fuji	40
Granny Smith	27
Pacific Rose	43
Red Delicious	25
Royal Gala	42

Table 22 describes the loss in organic apple profit under various profit margin assumptions.

Table 21: Organic apple profits under status quo

	Profit Margin = 5%	Profit Margin = 10%	Profit Margin = 20%
Profit under Status Quo	\$355,520	\$710,500	\$1,421,000

²⁵ Campbell & McKenna (1999), Strategies for "Greening" the New Zealand Pipfruit Export Industry: The Development of IFP and Organic Systems.

²⁶ Note that these prices pertain to fully organic apples as opposed to transitional.

²⁷ Tray Carton Equivalent = 18.2 kilograms.

Table 22: Loss in organic apple profit under various profit scenarios

GM Scenario	Pricing Regime	New Profit, $\gamma=0.05$	Loss in Profit $\gamma=0.05$	New Profit, $\gamma=0.10$	Loss in Profit $\gamma=0.10$	New Profit, $\gamma=0.20$	Loss in Profit $\gamma=0.20$
Limited Field Trials	Same price	\$355,520	\$0	\$710,500	\$0	\$1,421,000	\$0
Limited Field Trials	10% price decrease	(\$177,625)	\$355,520	\$0	\$710,500	\$355,250	\$1,065,750
Limited Field Trials	20% price decrease	(\$532,875)	\$355,520	(\$355,250)	\$710,500	\$0	\$1,421,000
Uncontrolled Release	Same price	\$0	\$355,520	\$0	\$710,500	\$0	\$1,421,000
Uncontrolled Release	10% price decrease	\$0	\$355,520	\$0	\$710,500	\$0	\$1,421,000
Uncontrolled Release	20% price decrease	\$0	\$355,520	\$0	\$710,500	\$0	\$1,421,000

Note that the results here are applicable to Organic Farmfoods only and have not been generalised to infer about the UK market.

5.3.5 Worldwide Fruit²⁸

The response from Worldwide Fruit was quite different to that of Organic Farmfoods. Under the limited field trials scenario the results showed that Worldwide Fruit would not change its purchasing behaviour (i.e. percentage reduction in demand is zero). This was also true under a 10% price drop. Under a 20% price drop, however, Worldwide Fruit would increase its demand by 10%. This is vastly different from Organic Farmfoods' response.

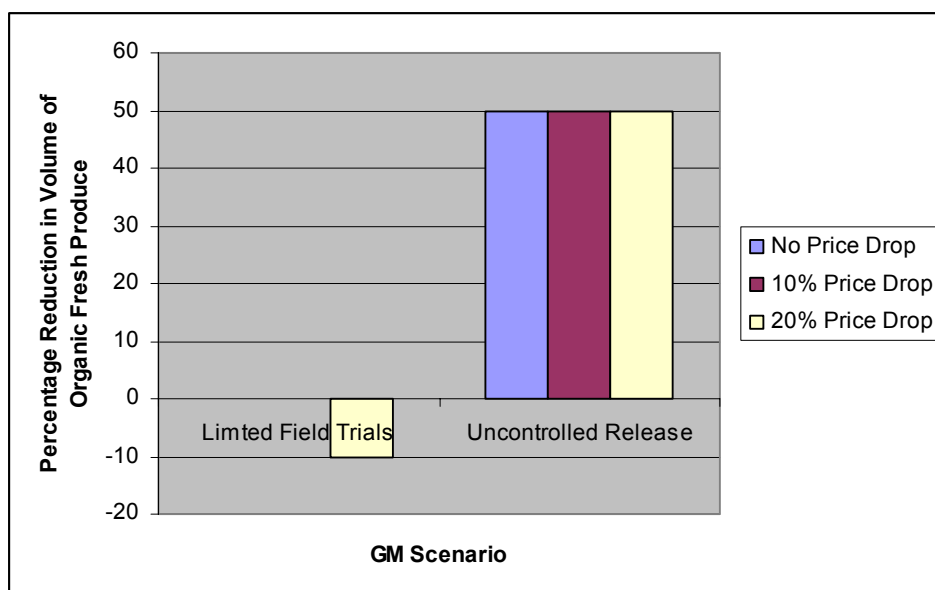
Under the uncontrolled release scenario, Worldwide Fruit would reduce supply by 50% (for all three pricing regimes).

Figure 20 illustrates Worldwide Fruit's purchasing behaviour under the different GM and pricing scenarios. Note that a negative reduction in supply is equivalent to an increase in supply.

²⁸ Gary Harrison completed the survey on behalf of Worldwide Fruit.

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Figure 20: Worldwide Fruit: purchasing behaviour under various GM and pricing scenarios



Tables 24 and 26 examine the loss in profit (for organic kiwifruit and apples respectively) from Worldwide Fruit. The methodology and assumptions from the previous section have been applied here also.

Table 23: Organic kiwifruit profits under status quo

	Profit Margin = 5%	Profit Margin = 10%	Profit Margin = 20%
Profit under Status Quo	\$59,400	\$118,800	\$237,600

Table 24: Loss in organic kiwifruit profit under various profit scenarios

GM Scenario	Pricing Regime	New Profit, $\gamma=0.05$	Loss in Profit $\gamma=0.05$	New Profit, $\gamma=0.10$	Loss in Profit $\gamma=0.10$	New Profit, $\gamma=0.20$	Loss in Profit $\gamma=0.20$
Limited Field Trials	Same price	\$59,400	\$0	\$118,800	\$0	\$237,600	\$0
Limited Field Trials	10% price decrease	(\$59,400)	\$59,400	\$0	\$118,800	\$118,800	\$118,800
Limited Field Trials	20% price decrease	(\$178,200)	\$59,400	(\$118,800)	\$118,800	\$0	\$237,600
Uncontrolled Release	Same price	\$29,700	\$29,700	\$59,400	\$59,400	\$118,800	\$118,800
Uncontrolled Release	10% price decrease	(\$29,700)	\$59,400	\$0	\$118,800	\$59,400	\$178,200
Uncontrolled Release	20% price decrease	(\$89,100)	\$59,400	(\$59,400)	\$118,800	\$0	\$237,600

Table 25: Organic apple profits under status quo

	Profit Margin = 5%	Profit Margin = 10%	Profit Margin = 20%
Profit under Status Quo	\$219,240	\$438,480	\$876,960

Table 26: Loss in organic apple profit under various profit scenarios

GM Scenario	Pricing Regime	New Profit, $\gamma=0.05$	Loss in Profit $\gamma=0.05$	New Profit, $\gamma=0.10$	Loss in Profit $\gamma=0.10$	New Profit, $\gamma=0.20$	Loss in Profit $\gamma=0.20$
Limited Field Trials	Same price	\$219,240	\$0	\$438,480	\$0	\$876,960	\$0
Limited Field Trials	10% price decrease	(\$219,240)	\$219,240	\$0	\$438,480	\$438,480	\$438,480
Limited Field Trials	20% price decrease	(\$723,492)	\$219,240	(\$482,328)	\$438,480	\$0	\$876,960
Uncontrolled Release	Same price	\$109,620	\$109,620	\$219,240	\$219,240	\$438,480	\$438,480
Uncontrolled Release	10% price decrease	(\$109,620)	\$219,240	\$0	\$438,480	\$219,240	\$657,720
Uncontrolled Release	20% price decrease	(\$328,860)	\$219,240	(\$219,240)	\$438,480	\$0	\$876,960

5.3.6 Conclusions

Although the valuation performed in the preceding sections does not give us an aggregated effect of GM on the organic sector, it nevertheless gives us a good idea of the extent of the losses New Zealand would suffer. Given the fact that Organic Farmfoods supplies most of the major supermarkets in the UK, any negative response from them would imply a similar reaction from most retail outlets. Furthermore, it is evident that the New Zealand organic sector would suffer the heaviest losses under the uncontrolled release scenario.

Another point worth noting is that the loss under the limited field trials scenario described above pertains to the short-term. In the long term, allowing limited field trials may result in some wholesalers seeking alternative sources of supply (as was the case with Organic Farmfoods). Hence in the long-term New Zealand may also suffer losses in the event of limited field trials.

5.4 INBOUND TOURISM

5.4.1 Overview

The tourism survey targeted departing international visitors from Auckland's international airport. The survey was carried out by NFO CM Research Ltd., who also conduct the fieldwork for the International Visitor Survey commissioned by Tourism New Zealand.

Visitors from New Zealand's top five inbound tourism markets (Australia, USA, UK, Japan and Korea) were targeted. Fifty respondents from each market were interviewed. We assume that a sample size of 50 (from each market) is adequate in terms of obtaining confidence bounds for the percentage change in tourist "purchasing behaviour" (and

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hence an idea of the uncertainty in our estimates) by applying the Central Limit Theorem.²⁹

Interviewers were located airside at the exit from the Aviation Security checkpoint. All passengers, including first class, business class and VIPs must pass this point. Every eighteenth person who exited the checkpoint was selected. The selected person was approached by one of the multilingual interviewers and asked a series of screening questions. These questions eliminated anyone under the age of fifteen, people on the armed forces or diplomatic business.

5.4.2 Survey design

The structure of the inbound tourism survey is similar to that of the dairy sector, with respect to the way in which current and alternative scenarios are presented to the respondents.

International visitors are given two sets of images. One is a set of “current images”, which depict the current overall state of New Zealand’s environment (i.e. the status quo). These are images that are typically used to promote New Zealand in our key overseas markets. The respondents are then presented with a set of images depicting an alternative environmental scenario, in which New Zealand’s environment has been degraded.

As with the dairy survey, the aim is to measure their purchasing behaviour (in terms of visitor nights in New Zealand) under both scenarios. The difference in visitor nights between the two scenarios enables us to value the impact New Zealand’s environmental image has on inbound tourism. The methodology is discussed in more detail in the next section. The tourism survey can be found in Appendix D.

5.4.3 Valuation methodology

In conducting the tourism component of the valuation, we relied heavily on data provided by the Department of Statistics in the Tourism Satellite Account. The key data set is reproduced in the Table 27.³⁰ From this data set, we can derive a number of benefit measures to New Zealand (Table 28).

Table 27: Compositon of tourist expenditure

Direct value added	A	Profits	\$1634M	14.2310	17.4447	36.5529
	B	Net taxes	\$369M	3.2137	19.1082	
	C	Wages	\$2194M	19.1082		
GST	D	GST	\$851M	7.4116	7.4116	7.4116
Imports	E	Imports	\$2284M	19.8920	56.0355	56.0355
Indirect value added	F	Indirect costs	\$4150M	36.1435		

²⁹ Let X_1, X_2, \dots, X_n ($n \geq 30$) be a simple random sample with population mean μ and standard deviation σ . Assume that the X_i are independently and identically distributed. The Central Limit Theorem states that for a sample size of 30 or more the sample mean \bar{X} is distributed as a normal random variable with mean μ and standard deviation σ/\sqrt{n} .

³⁰ The data in **Error! Reference source not found.** has been taken from the Tourism Satellite Account for the year ended March 1997.

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Total			\$11480M	100%	100%	100%
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Table 28: Measures of benefit for tourism industry

Type of Measure	Derivation (Using Data from Table 9)	Percentage of Total Expenditure (%)
Direct Value Added (1)	A + B + C	37
Direct Value Added + GST (2)	A + B + C + D	44
Direct Value Added – Wages + GST (3)	A + B + D	25

The procedure outlined below requires us to make the assumption that there is no difference between domestic and international tourism. The assumption is unavoidable because satellite accounts do not differentiate between the two types of tourists. Note that for the year ended March 1997, international tourists spent 26.3% (or \$3015 million) of the \$11,480 million spent by all tourists. The \$3015 million spent by international tourists excludes airfares.

The impacts of a change in perception can be derived as follows:

If we let p_i denote the ratio of the current average length of stay to the average length of stay under worsened environmental perceptions of a tourist from country i ,³¹ then the loss of expenditure from tourists from country i is given by:

$$\Delta_i = \text{Current Total Expenditure from Country } i \times (p_i - 1)$$

Where Δ_i denotes the change in the total amount spent by all tourists from country i . The results of the survey enable us to estimate p_i . The total annual impact (in terms of tourism expenditure) due to worsened perceptions for all five markets is given by:

$$\text{Total Annual Impact} = \sum_{i=1}^5 \Delta_i$$

Given a loss of Δ_i in expenditure due to worsened perceptions, we can estimate the net loss to New Zealand using each of the three benefit measures in Table 10, as follows:

- To measure the net loss to New Zealand in terms of *direct value added* we simply multiply the total annual impact derived above by the percentage of total expenditure that can be attributed to direct value added, i.e. 36.553%:

$$\text{Total Annual Impact (Measure 1)} = \sum_{i=1}^5 \Delta_i \times 37\%$$

- The total annual impact in terms of direct value added plus GST can be derived in a similar fashion:

$$\text{Total Annual Impact (Measure 2)} = \sum_{i=1}^5 \Delta_i \times 44\%$$

- The total annual impact in terms of the third benefit measure (Direct Value Added – Wages + GST)³² is given by:

³¹ Here $i = 1, 2, 3, 4, 5$ for each of the markets we are examining, namely Australia, USA, UK, Japan and Korea.

$$\text{Total Annual Impact (Measure 3)} = \sum_{i=1}^5 \Delta_i \times 25\%$$

5.4.4 Results

This section describes the application of the valuation methodology discussed above. Results from the exploratory analysis of the survey results are included in Appendix E.

The distribution of percentage change in length of stay is similar in form to the results obtained in the dairy sector valuation. The histograms of percentage change in length of stay (see Appendix F) for all five markets were bimodal, with modes at 0% and 100%. Like the dairy sector, there appear to be two distinct subgroups of tourists. One group will not change their purchasing behaviour at all (i.e. still visit New Zealand *and* stay the same number of days) under worsened environmental perceptions. The other group would not visit New Zealand at all under worsened perceptions.

For all five markets the mode at 100% was the dominant one, although for Australia the mode at 0% was comparable to that at 100%. The reason for this perhaps lies in the fact that most Australians visit New Zealand predominantly due to the sense of cultural familiarity and proximity, as opposed to purely “environmental” reasons. Australian visitors would therefore be less likely to be influenced by worsened perceptions about New Zealand’s environment than their North American, European and Asian counterparts.

The respondents were also asked to rate the importance of their perceptions about New Zealand’s environment in influencing their decision to come to New Zealand on a scale of 1 to 5 (1 being not important at all and 5 being very important). The boxplots summarising these results are given in Appendix F. Table 29 gives the quartiles of these ratings by country.

Table 29: Importance of perceptions about New Zealand’s environment to international visitors

	Australia	USA	UK	Japan	Korea
Maximum	5	5	5	5	5
Upper quartile	5	5	5	5	5
Median	3.5	4	4	4	5
Lower quartile	2	3	3	4	4
Minimum	1	1	1	1*	2*

Outliers are marked with an asterisk.

For all five markets, both the upper quartile and maximum are given by 5. Australia has the lowest median and lower quartile value. This accords with our previous comments about New Zealand’s environment being of less significance to Australians than to visitors from other countries. The Japanese and Korean markets have a very high lower quartile. This means that 75% of respondents from these markets rated the importance of New Zealand’s environment as 4 or higher. Compared to the US and UK results, it appears

³² Note that the inclusion of wages (strictly, compensation of employees) in a benefit measure is arguable. In a fully employed labour force, the wage rate signals the opportunity cost of labour and so wages should not be included. Where labour is not a binding constraint, wages should be included.

5. Valuations

that New Zealand's environment may play a slightly more significant role in the Asian markets.

Change in purchasing behaviour for the tourism sector will also be influenced by the purpose of visit. For example, a visitor on a business conference would attend irrespective of the state of New Zealand's environment. The length of stay, however, may be affected by their perceptions of New Zealand's environment in that if they believed New Zealand to be clean and green, they may add on a few days on the end of their visit to sightsee. Similarly, tourists visiting friends and family would most likely undertake a trip to New Zealand under worsened perceptions, but may reduce the length of stay.

Table 30 shows the average percentage decrease in length of stay by purpose of visit.

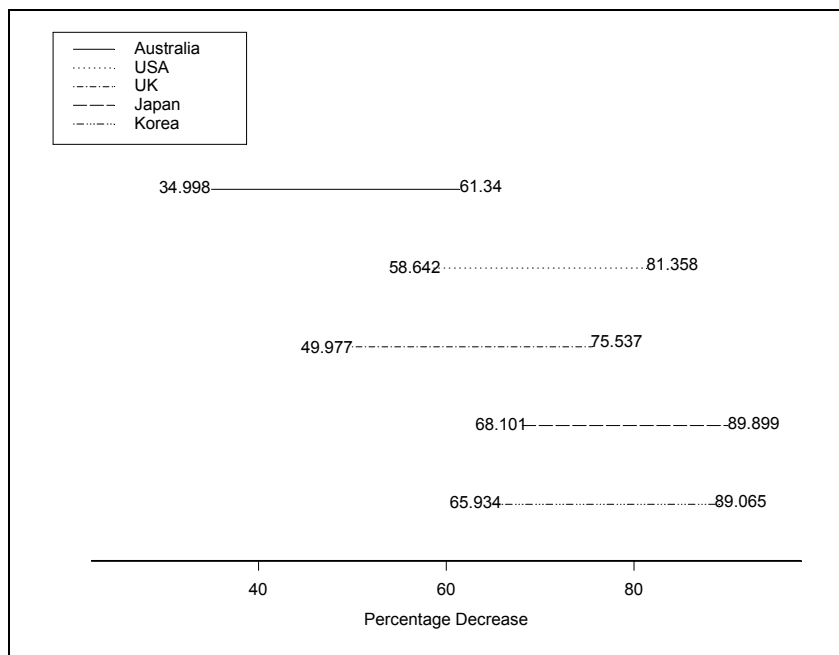
Table 30: Average percentage decreases in lengths of stay

	Australia	USA	UK	Japan	Korea
Vacation	68.75%	76.04%	76.43%	86.36%	90%
VFR ³³	32.70%	52.38%	23.91%	50%	68.75%
Business	34%	25%	25%	31.25%	50%
Education	NA	25%	NA	73.75%	75%
Other	0%	NA	100%	66.67%	NA
Overall average	48.17%	70%	62.76%	79%	77.5%

The group exhibiting the highest percentage change is the vacationers, while the group with the lowest percentage change is those on business. Note that for the Japanese and Korean visitors, the results indicate that the percentage change in length of stay was very high for all groups. This finding accords with our observations about the importance of perceptions about New Zealand's environment in Japan and Korea. Both markets had very high lower quartile values and the only low ratings were outliers.

Australia had the lowest overall average percentage change in length of stay, followed by the UK, while Japan and Korea had the highest average percentage changes.

³³ Visiting friends and relatives.

Figure 21: 95% confidence bounds for average percentage decrease in length of stay

The 95% confidence bounds for the average percentage decrease in length of stay for all five markets are given in Figure 21. Note that the confidence intervals for Japan and Korea are further to the right on the number line than the other markets, indicating that the proportion of tourists lost in these Asian markets will be the greatest. Also given the fact that Japanese tourists have the highest expenditure the loss of visitors from the Japanese market will be particularly damaging. (For the year ended March 2001, Japanese tourists on vacation spent an average NZ\$591 per day.)³⁴

Table 31 gives us the results of the valuation exercise. Note that all visitor expenditure figures (by market) used in this section are from the Tourism New Zealand Trade and Media web-site³⁵ and are for the year ended March 2001.

Table 31: Valuation results for tourism sector

	Australia	United States	United Kingdom	Japan	Korea	Total Annual Impact
Total Expenditure (NZ\$M)	907	807	693	703	108	3218
Current Average Length of Stay (days)	18.44	39.08	37.18	34.98	42.16	NA
Average Length of Stay under Worsened Perceptions (days)	8.9	7.72	13.56	10.14	12	NA
$P_i = \frac{\text{Future Average Stay}}{\text{Current Average Stay}}$	0.4826	0.1975	0.3647	0.2899	0.2846	NA

³⁴ Expenditure figures were taken from the IVS section of TNZ's trade, research and media web-site, www.tourisminfo.govt.nz

³⁵ Tourism New Zealand Trade, Research and Media web-site, www.tourisminfo.govt.nz

5. Valuations

	Australia	United States	United Kingdom	Japan	Korea	Total Annual Impact
Loss in Expenditure = $\Delta_i =$ Total Spent * $(p_i - 1)$ (NZ\$M)	-469	-648	-440	-499	-77.3	-2133
Measure 1 = Total Loss in Expenditure * 0.36553 (NZ\$M)	-171	-237	-161	-182	-28	-780
Measure 2 = Total Loss in Expenditure * 0.43965 (NZ\$M)	-207	-285	-193	-219	-34	-938
Measure 3 = Total Loss in Expenditure * 0.24859 (NZ\$M)	-117	-161	-109	-124	-19	-530

The first benefit measure (added value) yields a loss of NZ\$780 million to New Zealand, while the second (added value plus GST) yields a larger loss of NZ\$938 million. The third measure deducts the labour component and yields a loss of NZ\$530 million.

The valuation for the tourism sector only analyses the effects on our top five markets (which jointly accounted for almost 85% of all visitor arrivals in the year 2000)³⁶. The effects of the other markets (such as Singapore, Taiwan and Germany) have been excluded. Had they been included, the loss figures in Table 31 would have been greater.

The loss figures are thus representative of the losses we would expect from our top five tourism markets. It is also worth noting that this loss can be regarded as an upper bound estimates in that the “before and after” images used in the survey serve as a “shock” (equivalent to the recent foot and mouth disease and Scrapies scares) as opposed to a gradual change in perceptions. Also, as noted in the dairy sector valuation, we are assuming that the perceptions of everyone in the population are altered.

³⁶ Tourism New Zealand Trade Research and Media web-site, www.tourisminfo.govt.nz



Ministry for the
Environment
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Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

6. CONCLUSIONS

6.1 OVERVIEW

During the course of this investigation, it has become clear that New Zealand's environmental image is a key driver of the value New Zealand is able to obtain for its goods and services in the international market place.

At the qualitative level, there is evidence from previous surveys and analyses to suggest that environmental image is an important contributing factor to the behaviour of purchasers of New Zealand's exports. In addition, many of the key marketers of New Zealand product use New Zealand's image as part of their marketing strategies.

The empirical work done in the context of this study reinforced this assumption and provides some additional insights into the size and nature of the impact. Key conclusions with respect to the empirical work are outlined below:

6.1.1 Dairy sector

The analysis of the dairy sector found that Malaysian consumers purchasing New Zealand dairy products could be categorised into one of two groups. Those who would continue purchasing New Zealand dairy products under worsened environmental perceptions (i.e. New Zealand's "clean green" image is not a predominant factor in their purchasing decisions) and those who would stop buying New Zealand product under worsened perceptions.

Surveys undertaken in Kuala Lumpur indicated that the average percentage change in the amount of dairy product purchased by consumers was almost 54%. These results were used to generalise to other markets in Asia and Africa, India and Middle East (AIME) regions. We found that the approximate loss in revenue depended on how much "lost" product could be redirected to ingredients markets where environmental image plays a less important role. The loss in revenue varied from NZ\$241 million (in the case where all the lost product was redirected to ingredients markets) to NZ\$569 million (in the case where none of the lost product was redirected).

The approximate loss in profit depends on how much more profitable the consumer business is than its ingredients counterpart (as well as how much lost product is redirected). The worst case scenario (where the consumer business yields a profit ten times as much as the ingredients business) had a profit loss of around NZ\$60 million associated with it.

The long-term profit loss would most likely be substantially less than that in the short-term. In the short-term, despite worsened environmental perceptions and a loss in volume from added value markets, the NZDB would still incur the costs of most of the existing business infrastructure, implying that a loss in revenue would have a large impact on profit. In the long-term, however, these costs will gradually decrease (as the industry adapts to a reduction in demand) yielding a less substantial loss in profit.

6.1.2 Organic produce

The valuation of the organic sector was particularly challenging. New Zealand's stance on GM and its subsequent effect on the organic sector will depend on consumer opinions in our key overseas markets coupled with the views and behaviour of relatively few individuals occupying key positions in the distribution chain. This makes the impact difficult to predict with any certainty.

Evaluating loss of profit to the organic sector under the two GM scenarios was another challenge. A small sample size, coupled with a lack of information about the cost structure of the organic fresh fruit sector made the task a difficult one. Given the difference in cost structure between organic and conventional orchards, aggregated profit figures from ENZA and Zespri annual reports provide very little insight into how much profit was attributable to organic lines.

The valuation was conducted individually for each survey response and loss in profit to the organic sector was evaluated for a variety of contrived profit margins. In the short-term the loss in profit would be considerably higher than that in the long-term, due to the high input costs associated with organic farming.

Overall, it appeared that in the short-term New Zealand's organic sector would not be affected by limited field trials going ahead. In the long-term, however, New Zealand organic producers may be replaced with alternative sources of supply. Price signals are also an important consideration, in that there may be no mitigating effect through price manipulation. A price drop may indicate that consumer interest in New Zealand organic products is waning. New Zealand already allows field trials of GMOs, but it is not clear if this was known to the survey respondents. Therefore the extent of the risk faced by organic growers is also unclear.

Under the "uncontrolled release" policy the New Zealand organic sector would almost certainly suffer immediate losses. The two survey responses (Worldwide Fruit and Organic Farmfoods) indicated that under an uncontrolled release scenario they would immediately decrease or sever supply.

6.1.3 Inbound tourism

The results from the inbound tourism survey, like those from the dairy sector survey, indicated that there were two distinct groups of tourists: those that would visit New Zealand (and stay the same number of days) irrespective of our environmental image and those that would not visit New Zealand at all under worsened perceptions.

The extent of the change in purchasing behaviour (measured here by the percentage change in length of stay) varied by country. Australians exhibited the least change at 48%), while Japanese and Korean tourists showed the highest change (at 79% and 77.5% respectively).

The loss to New Zealand from these five markets varied from NZ\$938 million (loss in direct value added plus GST) to NZ\$530 million (deducting the labour component from direct value added).

Change in visitor behaviour largely depends on the purpose of visit. Visitors on business were more likely to reduce their length of stay, as opposed to cancelling the trip entirely, as was the case with tourists visiting friends and family. The group, which showed the highest percentage change in length of stay, was, not surprisingly, those on vacation.

6.2 EMERGENCE OF GREEN PROTECTIONISM

The valuation methodology used in this investigation is based on the actions of consumers and retailers (under a hypothetically degraded environment), and the associated economic impacts. A second important economic dimension that should be mentioned is the emergence of “green protectionist” strategies in First World countries to limit food imports from countries such as New Zealand.¹

McKenna and Campbell (1999)² noted an example regarding difficulties encountered by the New Zealand kiwifruit industry in the Italian market in 1992. Italian authorities claimed that New Zealand kiwifruit exceeded the maximum residue levels (MRLs) for certain agrichemicals. McKenna and Campbell (1999) further noted that such protectionist policies were not entirely independent of politics. The restrictions on New Zealand sales occurred at the same time as the harvest of the Italian kiwifruit crop. At the same time the New Zealand pipfruit industry also experienced difficulty satisfying sanitary and phytosanitary (SPS) criteria established for entry into the US market with lower MRLs.

In the early 1990's these moves intensified after the completion of the GATT round in 1995. SPS barriers now involve much lower MRLs, an increasing range of banned inputs and clauses enabling embargoes on goods that might cause environmental damage or compromise animal welfare. Campbell and Coombes (1999)³ suggest that such “food barriers” have become a mechanism for protecting Japanese and EU farmers against a tide of cheap, intensively produced imports from the US.

Campbell and McKenna (1999) noted that the process for establishing legitimacy for environmental claims has proved problematic. While the principle of providing “scientific proof” was agreed upon, the practice of attaining scientific consensus was another matter entirely. An example quoted was the widespread agreement in 1999 of US science establishments that Bovine Growth Hormone (BGH) has no adverse effects, while EU scientists contended that there are potential human and animal welfare risks from using this particular input.⁴

The second example discussed by McKenna and Campbell (1999) involved the debate over the potential environmental and health risks associated with GM foods.

It was noted that it is unlikely that markets will move towards more permissive SPS regimes. Rather, it is more likely that some First World markets will become more restrictive. New Zealand fresh fruit and vegetables (FFV) exporters have identified these trends as threatening to the long term market access for conventionally produced FFV from New Zealand.

Given the emergence of such protectionist strategies any perceived change in the state of New Zealand's environment (or indeed New Zealand's stance on GM) could be capitalised upon by markets wishing to restrict New Zealand food imports.

¹ Hugh Campbell.

² McKenna and Campbell (1999), Strategies for “Greening” the New Zealand Pipfruit Export Industry: The Development of IFP and Organic Systems.

³ Campbell and Coombes (1999), “Green Protectionism and Organic Food Exporting from New Zealand: Crisis Experiments in the Breakdown of Fordist Trade and Agriculturalist Policies”, *Rural Sociology* 64(2).

⁴ US meat imports into the EU were subsequently banned.

6. Conclusions

To assess the impact on New Zealand (in particular, with regard to the GM issue) under such a scenario, it is then worthwhile considering not only the economic impacts associated directly with the actions of consumers and retailers in our key overseas markets, but also those impacts associated with potential barriers arising from green protectionism.

6.3 QUALIFICATIONS TO THE VALUATIONS

Needless to say, one has to be extremely careful in attaching undue weight to the figures generated in the course of this work, or in generalising too quickly to the value of New Zealand's environmental image generally. In particular, there are reasons for thinking that the valuation might be too high – or too low.

Some of the factors that would tend to inflate the estimates of value include:

- The respondents may be acting strategically in responding to the questionnaire, ie they may overstate their reaction in the hope that it will lead to an improved focus on the environment;
- The questionnaire itself may draw the attention of the respondent to the issue of environmental image in a way that would not happen in reality; and
- The images chosen are relatively extreme, ie they represent a clear contrast which is unlikely to eventuate in practice; it is much more likely that a gradual (rather than step) change in environmental quality would occur which may lead to a more muted reaction.

Some of the reasons for believing that the results may underestimate the true value are:

- All of the industries subjected to the valuation work are growth industries; as volumes of goods and services sold in the future increase, so will the value able to be attributed to environmental quality;
- There is evidence to suggest that not all of the value able to be extracted from New Zealand's environmental image is being exploited. For example, the bulk of the exports of the New Zealand Dairy Board are into the global ingredients market where relatively little use is made of New Zealand's environmental image;
- The evidence seems to suggest that the importance of environmental factors in purchase decisions is growing in overseas markets;⁵ and
- The threat of green protectionism (mentioned above).

For these reasons, we are reluctant to push the quantitative analysis too far – for example to develop Net Present Values of New Zealand's environmental image to the industries under consideration.

While these uncertainties might have been a concern if the change in purchase behaviour observed was relatively small, the size of the impact is such that they do little to undermine the significance of the result.

⁵ See Chapter **Error! Reference source not found.**

6.4 RISK ASSESSMENT

The size of the contribution environmental image is making to some of our major and emerging export industries, coupled with the degradation in environmental quality in some key areas, suggests that New Zealand may stand to lose the value created by its current environmental image.

On this issue, it is important to note that the relationship between environmental quality and export value is somewhat indirect in nature. In particular, it is the environmental image that creates the value, not environmental quality *per se*.

Furthermore, environmental image and environmental quality may move independently of one another. For example, it is quite possible that the efforts of marketers could maintain an image of environmental quality in spite of a deterioration in environmental quality – particularly in the dairy sector where the consumer has no direct experience of environmental quality.⁶ Similarly, it is possible that New Zealand's environmental image could deteriorate without any change in environmental quality – the concern over the misreporting of the incidence of scrapie in New Zealand in Germany in early 2001 is a good example.

Thus it is quite possible that, in the short term at least, New Zealand may be able to maintain at least some of the contribution to environmental value in the face of declining environmental quality. However, it seems unlikely that this could be sustained over the long term. In the long term, one can expect environmental image and environmental quality to track one another.

Before leaving the discussion of risk, it is perhaps also worthwhile reflecting on the chances of reversing a loss of value attributable to a loss of environmental quality. While, this matter was not explicitly addressed in this study, it seems likely that it would be difficult to restore the positive image of New Zealand's environment held by overseas consumers should this be shattered through an adverse environmental effect. If this was in fact the case, it would argue for a risk averse approach to environmental management.

6.5 EXTENDING THE RESEARCH TO FUTURE WORK

This investigation has made a first attempt at valuing New Zealand's environmental image in terms of export receipts with respect to three sectors. There are areas in which this investigation can be further extended in the future. These are discussed below.

The basis of the contingent valuation used in this research was to measure change in consumer purchasing behaviour by exposing survey subjects to "environmental" stimuli. In this case, stimuli comprised sets of idyllic and degraded environmental images, as well as alternative stances on the GM issue. In reality, however, environmental image is only one of the many drivers, which may induce a consumer to purchase New Zealand product. For example, Malaysian consumers purchasing New Zealand dairy products will be affected not only by New Zealand's "clean green" image, but also a variety of factors such as price and taste.

⁶ This is less likely to be the case in the tourism and organics sectors where, respectively, the tourists, and the international buyers, will tend to have first hand experience of New Zealand's environmental quality.

6. Conclusions

Future research in this area could include valuing these other “purchasing drivers” concurrently with environmental image.⁷ This would enable us to not only value New Zealand’s environmental image, but also the contribution it makes to our export receipts, relative to other drivers such as price and taste.

The contingent valuation applied in this investigation only measured change in purchasing behaviour given a perceived degradation in New Zealand’s environment. The implicit assumption was that the end-consumer would purchase less, given a change for the worse in New Zealand’s environment. To this end, it may also be interesting to measure the potential gains to New Zealand, given an improvement in its environmental image.⁸ That is, we could test both:

- scenarios that measure sales loss due to environmental degradation; and
- scenarios that measure sales gains due to environmental improvement.

Given our prior beliefs about the value of New Zealand’s environment, we would expect studies measuring gains to New Zealand due to environmental improvement to display an upward response (while studies measuring losses to New Zealand due to environmental degradation would display a downward response).

One aspect of “clean green” marketing strategies, which was omitted in the report was the relativity of New Zealand’s “clean green” image to other “clean green” nations.⁹ It is important to note that New Zealand is by no means the only country which takes advantage of such “clean green” positioning. Countries such as Australia and Canada have also adopted similar marketing strategies. An interesting question is whether (perceived) environmental degradation in New Zealand would have a more severe effect, if our “clean green” competitors were seen to retain or improve their environmental image and vice versa.

⁷ A conjoint analysis would enable us to determine the exact role that the various purchasing drivers play.

⁸ Andy Heinemann, National Research Bureau.

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7. INFORMATION SOURCES

The information sources consulted in the preparation of this report are listed in Section 7.1 and 7.2 below. The report has also benefited greatly from the assistance and co-operation of a number of individuals from within the Ministry for the Environment, and within the industries covered in this report as well as a number of peer reviewers. The individuals who contributed to the report are listed in Section 7.3.

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- New Zealand Lamb Co-operative (Inc), web-site www.nzlamb.com
- NEW ZEALAND MILK, www.nzmilk.com
- New Zealand Ministry of Agriculture and Fisheries (MAF), www.maf.govt.nz
- Organic Products Exporters Group, www.organicnewzealand.org.nz
- Royal Commission on Genetic Modification, www.gmcommission.govt.nz

7. Information Sources

Sustainable Agriculture Network, www.sare.org

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Tourism New Zealand, Trade, Research and Media, www.tourisminfo.govt.nz

TradeNZ web-site, www.tradenz.co.nz

7.3 ACKNOWLEDGEMENTS

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8. GLOSSARY

AIME	Africa India and the Middle East
BGH	Bovine Growth Hormone
BSE	Bovine Spongiform Encephalopathy (Mad Cow Disease)
DTO	District Tourism Operator
EPI	Environmental Performance Indicators
EP	Environmental Plan
EU	European Union
FFV	Fresh Fruit and Vegetables
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GE	Genetically Engineered/Genetic Engineering
GM	Genetically Modified/Genetic Modification
GMO	Genetically Modified Organism
GST	Goods and Services Tax
HEA	Horticultural Export Authority
HSNO	Hazardous Substances and New Organisms Act
IFOAM	International Federation of Organic Agriculture Movements
IFP	Integrated Fruit Programme
MRL	Maximum Residue Level
NIMBY	“Not in my Backyard”
NZDB	New Zealand Dairy Board
NZDRI	New Zealand Dairy Research Institute
NZMP	New Zealand Milk Products (Ingredients business)
OECD	Organisation for Economic Cooperation and Development
OPEG	Organic Products Exporters Group
OTSP	Office of Tourism and Sport
PSRM	Pressure State Response Model
rBST	Recombinant Asbovine Somatotropin
rBGH	Recombinant Bovine Growth Hormone (same as rBST)
RTO	Regional Tourism Operator
SPS	Sanitary and Phytosanitary
tce	Tray Carton Equivalent (18.2 kilograms)
TIANZ	Tourism Industry Association of New Zealand
TNZ	Tourism New Zealand



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- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
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APPENDIX A: THE NON MARKET VALUATION OF ENVIRONMENTAL ATTRIBUTES

A.1 OVERVIEW

Valuation of environmental attributes is a process that entails several key steps, including:

- Identification of WHAT is to be valued;
- SPECIFICATION of what is to be valued;
- CHOICE of a valuation method;
- DESIGN of the process for applying the method to the item to be valued;
- Data COLLECTION;
- Data ANALYSIS; and
- REPORTING.

In this appendix, we provide an overview of each of these steps with particular emphasis on the valuation of environmental image. Note that the precise nature of the application of this process depends on the particular context of the investigation.

A.2 IDENTIFICATION OF WHAT IS TO BE VALUED

There are two prime components of this step, the nature of the item to be valued and the context within which that valuation takes place.

A.2.1 Items to be Valued

A key decision within any exercise of this type is to determine what precisely it is that is to be the subject of the valuation exercise. For example, the focus may be on New Zealand's clean green image generally, or changes in the quality or image of specific environmental components.

Valuation of image is the simpler of the two. It requires alternative images to be described to purchasers of NZ products. The purchasers are then asked to describe their purchase behaviour contingent upon the proposed hypothetical state of New Zealand's environment.

Valuation of individual components is a more difficult task. It requires a great deal of pre-testing and selection of a satisfactory statistical design to ensure that values are retrievable from the data. It also requires a larger sample size, so it is more expensive.

This immediately poses something of a dilemma. Clearly, the more detailed valuation of components is more useful in terms of providing quantitative insight into where effort should be applied to obtain the largest benefits from expenditures on environmental improvement. However, this needs to be traded-off against the additional expense involved in obtaining the valuation.

A.2.2 Context

In thinking about the application of valuation methods, we have to be particularly conscious of the context in which the exercise is going to take place. As discussed in the body of this report, the markets of interest along with the point in the value chain to be targeted may well be quite diverse in terms of the characteristics they display. This has implications for the valuation method.

Contrast, for example, the market for agricultural produce and the market for tourism. These markets show quite different characteristics. Tourists visiting New Zealand do so in discrete trips. They typically make a dichotomous decision, choosing either to come to New Zealand or not. Commodity markets differ because purchasers decide not only whether to purchase our products, but how much to purchase. This difference in choices implies that different methods need to be applied to these two types of export.

In addition, these markets may also differ in terms of where in the value chain, environmental drivers enter the purchase decision. Arguably, tourists (the final consumers) make the decision about whether to purchase a vacation in New Zealand (although tour operators and wholesalers may also intermediate). However (at least some) agricultural produce is sold to businesses who undertake further processing, or market the goods to consumers. This difference has implications for whose behaviours are important to understand for the purposes of this study.

A.3 SPECIFICATION OF WHAT IS TO BE VALUED

Having determined what it is to be valued, it is necessary to specify as precisely as possible the alternative states that are going to be the subject of the valuation process. This is particularly important when dealing with matters as abstract as “image”.

Specification is necessary because valuation approaches require that we specify some new (hypothetical) image and then gauge the market’s response to that image. Although we might attach labels to these alternative states, such as “unclean”, “dirty” or “filthy”, use of these simple descriptors is inadequate because different people will have their own perceptions of what they mean. Consequently, it is not possible to relate the measured values back to any particular state of the environment and the results become meaningless for policy purposes.

A.4 CHOICE OF A VALUATION METHOD

In simple terms, we want to know how much of various products or services New Zealand will sell whenever our image takes on specified states. This knowledge may then be combined with information on producer benefits to derive a value to New Zealand (in the relevant markets) of the hypothesised changes in image.

There are a range of methods that may be used to assist in the valuation task. The choice of method depends on the characteristics of the valuation problem. In the next few paragraphs below, we outline the methods available and provide an assessment with respect to their applicability to the valuation of the environmental drivers of New Zealand’s exports.

At the broadest levels, there are two main types of predictive processes that can be employed to assist in valuation tasks of this type; revealed preference approaches and stated preference approaches. Revealed preference approaches rely on observations of actual market behaviours to make inferences about behaviour and value, while stated preference approaches create some form of hypothetical situation and ask people to predict their behaviour in that situation.

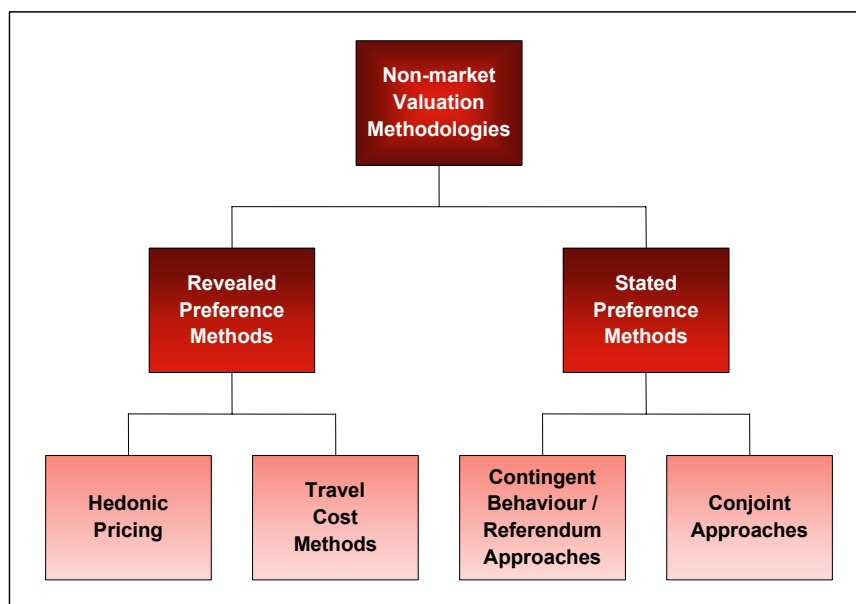
The most common revealed preference methods are travel cost methods and hedonic pricing. Travel cost methods involve the analysis of the costs incurred in travelling to a particular (environmental) destination. While they are theoretically applicable to areas such as tourism, practical difficulties rule them out for international contexts.

Hedonic approaches are applicable in cases where people evaluate characteristics of alternatives before making a purchase decision and the outcomes of those purchase decisions are observable in the market place. Application of the hedonic approach would require that the characteristics of a large number of alternatives be available, as well as the choices made by individuals. For example, in order to value New Zealand's image for tourism it would be necessary to identify for each market the image and other characteristics of all possible holiday destinations, as well as the prices of holidaying in those destinations, in order to infer the marginal value of the image characteristic. Measurement of destination characteristics is problematic for conceptual and cost reasons. Objective measurement of image is also problematic. Should those problems be surmountable, there remains an identification problem. These considerations rule out the hedonic approach in this context.

The inapplicability of revealed preference approaches forces reliance on stated preference approaches. The two most common of these are contingent behaviour (valuation)/referendum approaches and conjoint approaches. Conjoint approaches mimic the hedonic approach, but present people with a small set of options with specified characteristics and then require a statement about the preferred option or ranking of options. The approach is statistically complex and is expensive to implement, but does allow identification of the relative worth of characteristics.

Contingent behaviour/referendum approaches compare behaviour between some specified base (usually the status quo) and some specified alternative. Referendum approaches are used for dichotomous decisions (eg holiday in New Zealand /do not holiday in New Zealand), while contingent behaviour approaches are employed where the behaviour of interest is quantitative in nature (how much product would be purchased). These approaches are relatively cheap and can provide quality information with relatively small sample sizes. The taxonomy of non-market valuation processes is summarised in Figure 1 below.

Figure 1: Taxonomy of non-market valuation methodologies



A.5 PROCESS FOR APPLYING THE METHOD TO THE ITEM TO BE VALUED

Once the preferred valuation method has been determined, it is necessary to focus on the data requirements and the data collection methods.

A.5.1 Data Requirements

The stated preference approaches require the target population to be surveyed in a way that allows them to express their expected behavioural responses under the specified hypothetical conditions. The core information required is the respondent's prediction of behaviour under the various scenarios. However, it is also useful to collect personal/business information to help in verification of the sample and to identify how behaviours change within sub-groups.

A.5.2 Data Collection Methods

Data collection for stated preference techniques requires presentation of information to a survey participant, coupled with a request for the participant to process that information to formulate a response and to report the outcome. In other words, data collection is a two-way communication exercise and the method chosen must reflect the nature of the information that that must be communicated as well as providing the respondent with suitable opportunities for information processing and decision making.

The methods used to collect the data are determined by communication, time, cost, location and sampling matters. Principal data collection methods include postal and other written surveys, in-person interviews on-site, in public locations (e.g. shopping malls), or at the participant's home, telephone interviews, and computer-based surveys.

Most social scientists prefer in-person interviews to allow optimal communication. This approach typically achieves higher response rates than the others and allows the interviewer to control the flow of information, to use visual aids that are not available using other approaches, and to clarify issues during the process. The down side is that personal interviews can be expensive (particularly those undertaken at home or in the workplace), and they can be susceptible to interviewer bias.

Postal surveys, telephone interviews and computer-based surveys do not require the surveyor to make physical contact with the participant, so are applicable in cases of spatial separation. Computer-based surveys allow the best control of information flow to the participant, but are also reliant upon the participant having access to a computer that is able to process the software utilised in the survey process. Telephone surveys allow good information control, but are more expensive than written surveys and are prone to low response rates. They do not allow the use of visual aids.

A.5.3 Sampling Framework

The sampling framework identifies who the target population is and how they will be sampled. This part of the assignment is very context specific.

A.5.4 Sample Size

The sample size necessary to obtain predictions of the impacts of image changes within specified bounds is most easily identified for the referendum approach for which there is a binomial response.

The precise size of the sample needed for a given level of required accuracy is a function of the propensity of the population to change their behaviour in response to the change in environmental image. The most uncertain outcomes arise when the estimated proportion is 0.5. In that case a sample size of 100 cases yields a 95% confidence interval of 0.1. In other words, the true proportion is in the range (0.4-0.6). Increasing the sample size to 400 cases reduces the confidence interval to 0.05 (true value is in the range =0.45-0.55). Other proportions mean that smaller sample sizes may be used. For example if the estimated proportion is 0.2, then the 95% confidence interval for a sample of 100 is 0.2 ± 0.08 .

Estimation of confidence intervals for continuous responses is somewhat more complex because the volume of product sold to each individual changes.

A.6 DATA COLLECTION, ANALYSIS AND REPORTING

The remaining steps of the process involve the data collection, analysis and reporting.

Data analysis is relatively straightforward for referendum data in the image valuation context. Survey responses are used to determine the proportion of current purchasers who would remain in the market at each of the hypothetical scenarios. If referendum data is used to value components then discrete dependent variable models (such as logit and probit models) must be utilised. These models produce functions that can be used to describe the proportion of the present market, given any combination of component characteristics. Modelling is straightforward, and can be undertaken using most statistical software packages.



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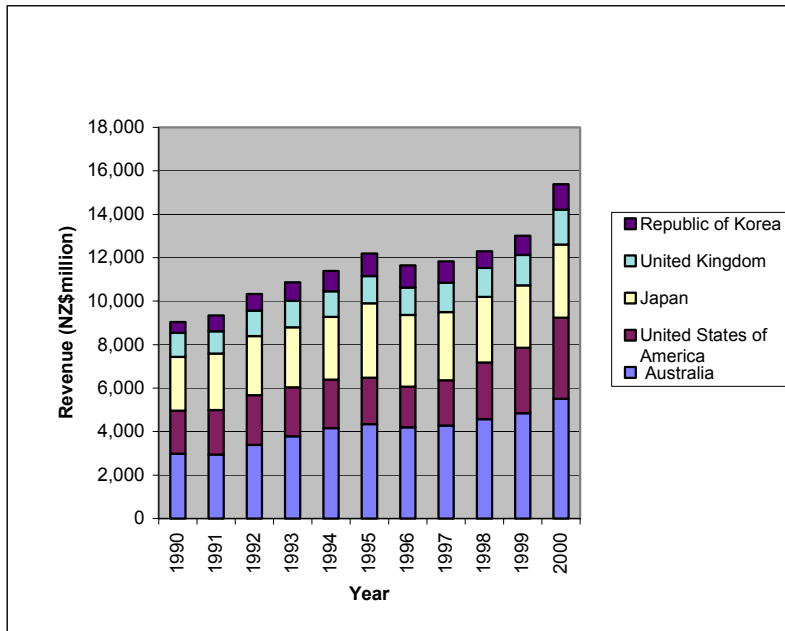
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APPENDIX B: EXPORT SECTOR DATA

B.1 SELECTED EXPORT SECTOR DATA

This appendix contains selected data on New Zealand's exports.

Figure 1: Export earnings from New Zealand's top five export destinations for the years 1990 to 2000



Figures for the year 2000 are provisional.

Figure 2: New Zealand's major export sectors for the year ended June 2000 (excluding tourism)

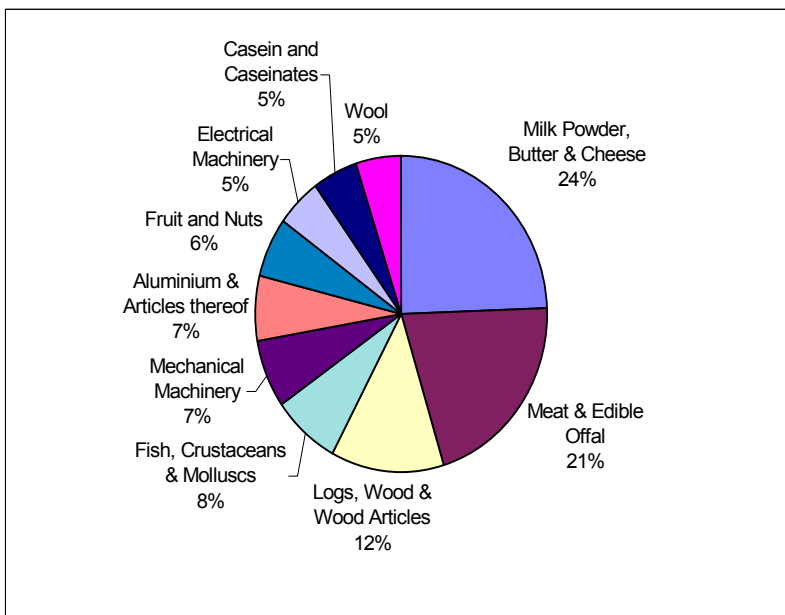


Figure 3: New Zealand organic exports from June 1996 to 2000

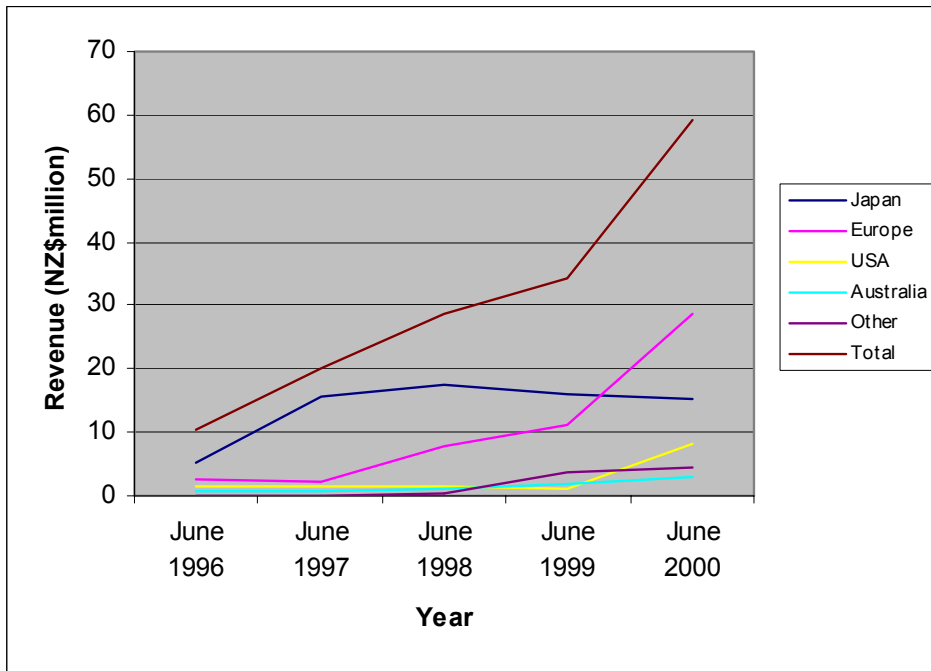


Figure 4: Number of tourist arrivals by market for the period 1996–2000

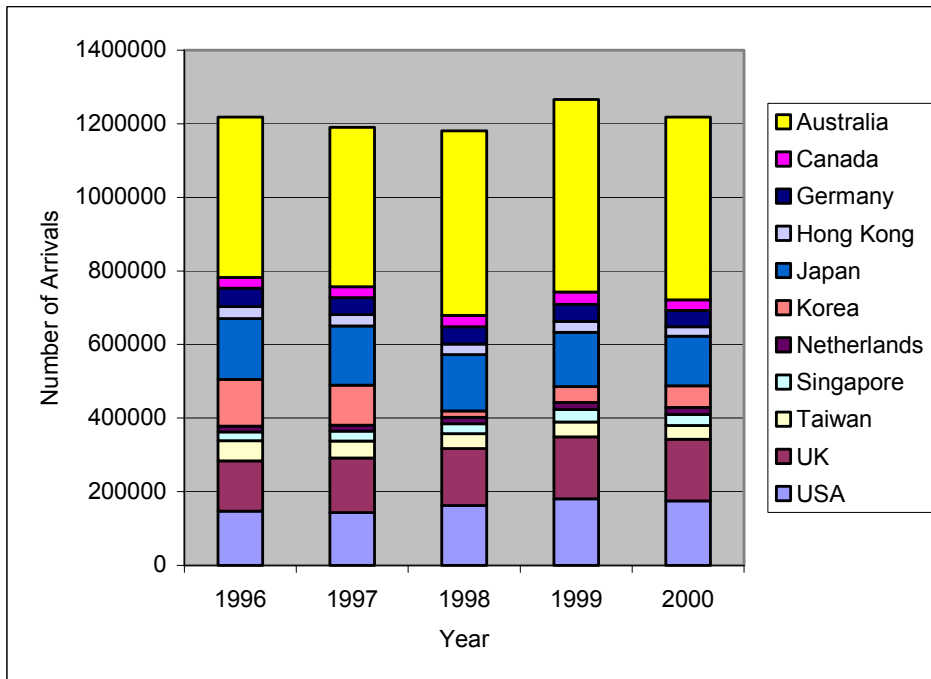


Figure 5: Arrivals from New Zealand's top five tourism markets

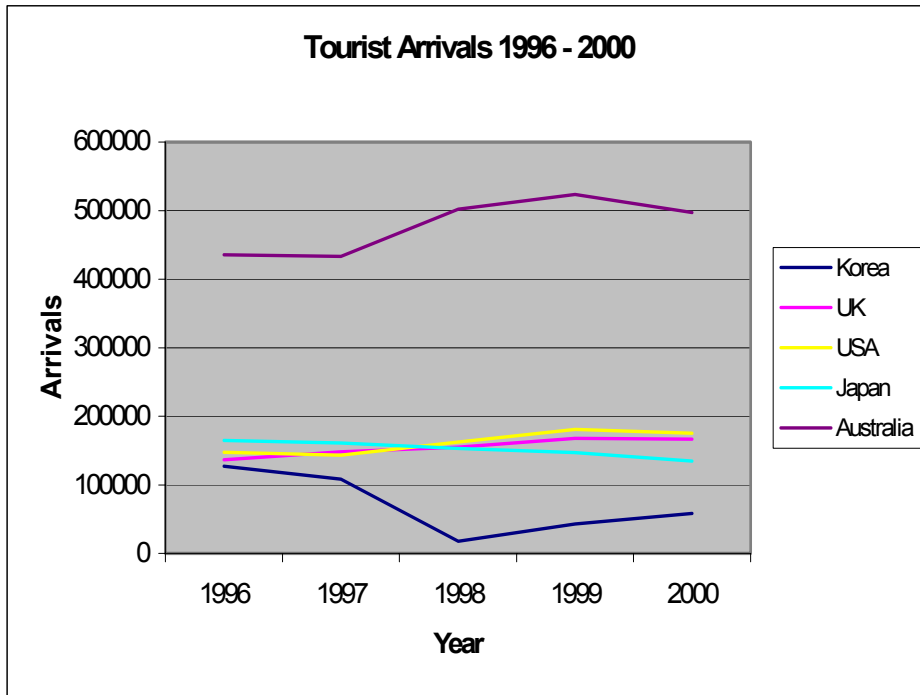


Figure 6: Expenditure by tourists from New Zealand's top five markets

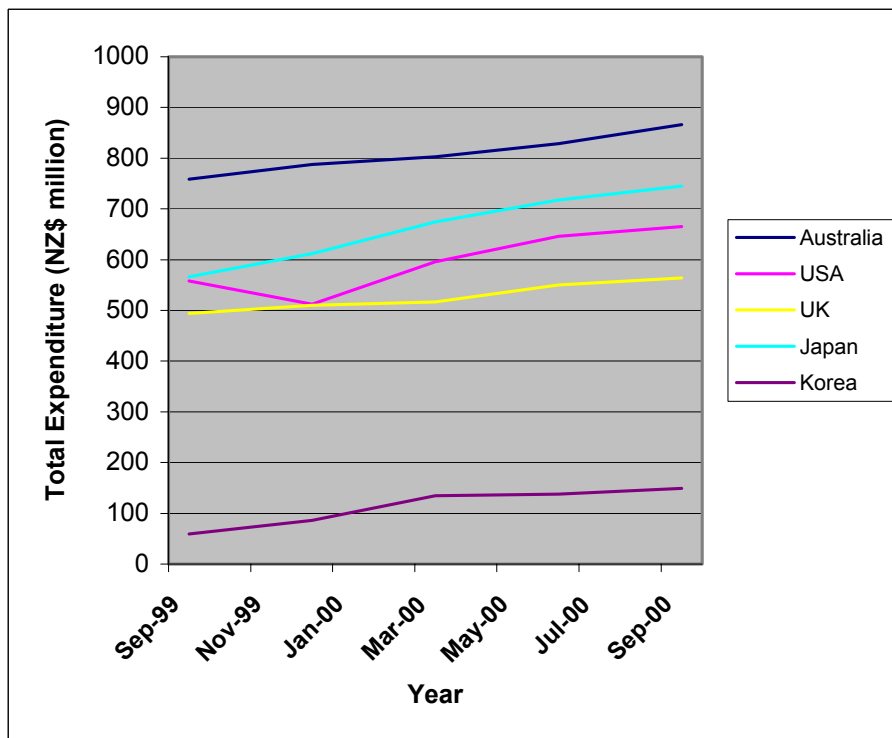


Figure 7: New Zealand dairy exports by product type from 1993 to 1999

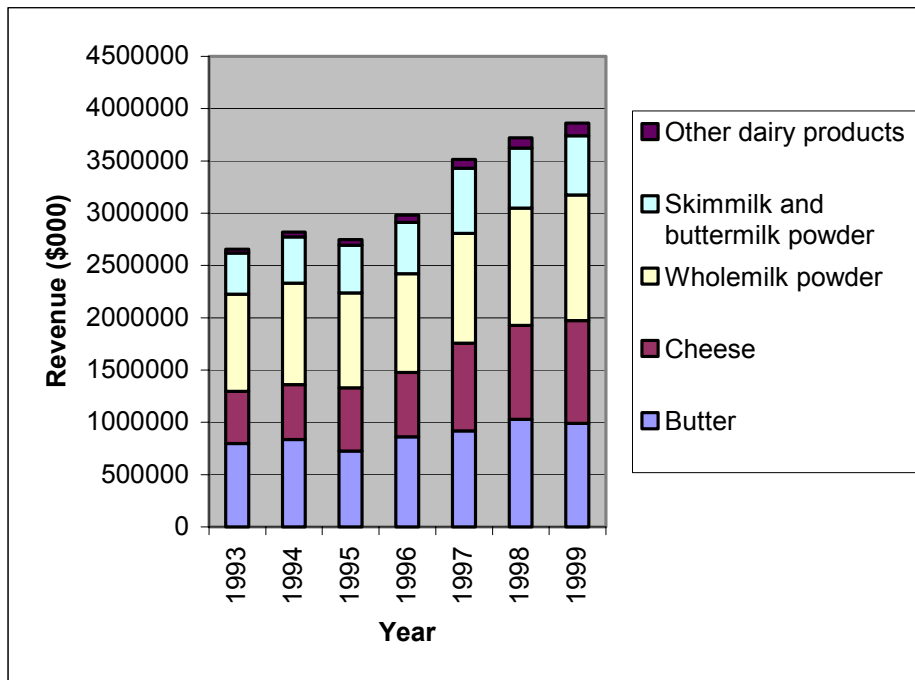
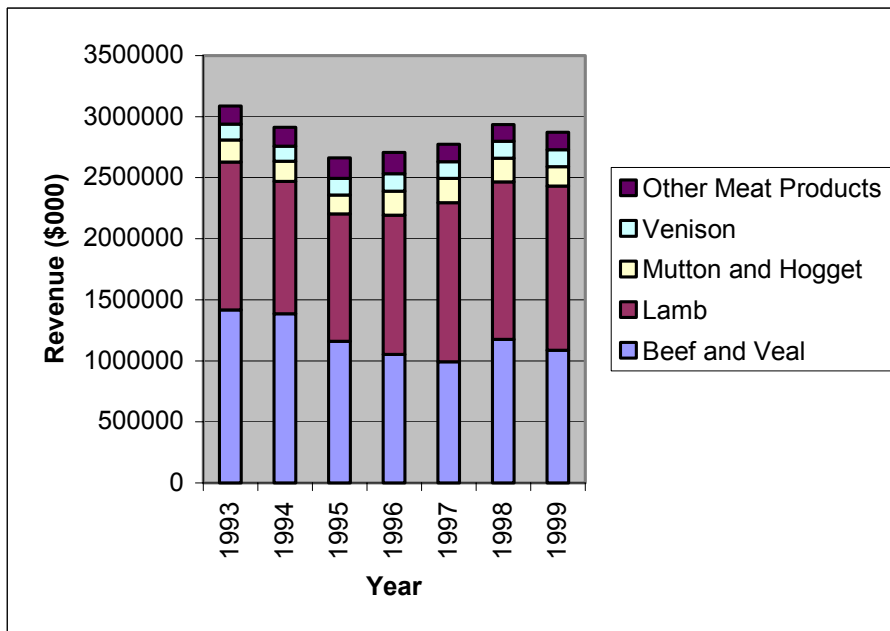


Figure 8: New Zealand meat exports by product type 1993–1999



B.2 EXPORT SECTOR BASE DATA**Table 1: Export earnings (in millions of New Zealand dollars) from New Zealand's top five export destinations for the years 1990 to 2000**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Australia	2980	2937	3388	3786	4162	4342	4205	4276	4578	4841	5502
USA	1979	2047	2293	2257	2229	2142	1860	2085	2596	3005	3737
Japan	2486	2611	2715	2759	2887	3417	3302	3138	3030	2878	3370
United Kingdom	1094	1024	1165	1217	1182	1256	1256	1354	1327	1401	1609
Korea	502	719	767	857	929	1035	1028	978	762	883	1171

Figures for the year 2000 are provisional.

Table 2: New Zealand's major organic markets by value (NZ\$ million) from June 1996 to 2000

	June 1996	June 1997	June 1998	June 1999	June 2000
Japan	5.28	15.75	17.5	16.12	15.1
Europe	2.56	2.1	8	11.07	28.7
USA	1.63	1.5	1.4	1.3	8.02
Australia	0.89	0.62	1.3	1.79	2.82
Other	0.08	0.02	0.5	3.9	4.43

Table 3: Number of tourist arrivals by market for the period 1996 to 2000

	1996	1997	1998	1999	2000
USA	147,389	143,574	162,343	180,881	175,313
United Kingdom	136,485	148,182	155,290	168,271	166,964
Taiwan	55,090	45,857	40,375	40,228	37,618
Singapore	24,185	27,527	26,743	33,903	29,707
Netherlands	14,946	16,226	17,374	19,553	19,657
Korea	127,356	108,266	17,686	43,234	58,404
Japan	165,014	161,046	152,977	147,345	134,781
Hong Kong	33,308	30,392	28,913	29,694	25,947
Germany	49,921	46,698	46,481	46,243	44,668
Canada	28,937	29,682	31,016	33,296	28,262
Australia	435,862	433,010	501,892	523,428	497,090

Table 4: Total expenditure (NZ\$ million) by tourists from New Zealand's top five markets

	September 1999	December 1999	March 2000	June 2000	September 2000
Japan	566	612	674	718	745
Korea	59	86	135	138	149
UK	494	510	517	550	564
USA	558	512	596	646	665
Australia	759	788	803	829	866

Table 5: New Zealand's dairy exports by value (NZ\$ million) from 1993 to 2000

	1993	1994	1995	1996	1997	1998	1999	2000
Butter	796.51	834.04	725.94	860.38	917.51	1028.82	990.01	1003.72
Cheese	497.94	527.97	604.51	617.40	838.44	897.74	983.29	987.30
Wholemilk powder	930.26	971.01	905.12	942.46	1049.98	1123.75	1199.77	1269.55
Skim milk powder	393.17	439.47	459.14	491.59	623.17	571.79	569.07	590.76
Other dairy products	38.83	47.68	52.79	70.26	86.29	100.87	119.26	122.16
Caseins and caseinates	522.88	558.89	509.11	557.15	569.36	651.66	762.89	800.63

Table 11: New Zealand's meat exports by value (NZ\$ million) from 1993 to 2000

	1993	1994	1995	1996	1997	1998	1999	2000
Beef and veal	1418.66	1384.17	1160.82	1053.66	992.30	1174.61	1087.22	1400.39
Lamb	1208.87	1084.68	1043.85	1139.13	1302.11	1291.73	1343.19	1520.16
Mutton and hogget	180.12	166.02	152.81	197.86	200.78	194.67	160.54	169.79
Venison	129.78	123.53	138.13	143.24	136.78	136.94	138.04	156.93
Other meat products	150.09	156.59	167.11	174.27	142.63	137.46	144.84	173.06



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APPENDIX C: ENVIRONMENTAL DATA

C.1 ENVIRONMENTAL INDICATORS

The indicators proposed by the Ministry for implementation under the Environmental Indicators Programme are listed below.

C.1.1 Air indicators

Stage 1	Particulate matter (PM ₁₀) Carbon monoxide (CO) Sulphur dioxide (SO ₂) Nitrogen dioxide (NO ₂) Ground level Ozone (O ₃)
Stage 2	Benzene Particulate matter (PM _{2.5}) Lichen diversity/coverage Visibility

C.1.2 Fresh water indicators

Stage 1	Dissolved oxygen Ammonia Temperature Clarity Trophic State Index (TSI) % population with good water supply Periphyton (effects of slime on bathing)
Stage 2	Occurrence of native fish, Giant Kokopu, Red Finned Bully Macroinvertebrates (insects in rivers) Periphyton (effects of slime in rivers) Riparian condition Wetland condition and extent Groundwater – nitrates, abstraction quality Water abstraction

C.1.3 Land Indicators

Stage 1	Changes in areas susceptible to hill country erosion % change in area of slip at selected sites
Stage 2	Change in areas susceptible to high country degradation Change in area susceptible to agricultural impacts Acidity or alkalinity of soil Organic matter Change in area susceptible to reduction in soil health Bulk density of soil pH soil test Organic carbon

C.1.4 Climate change indicators

Stage 1	Total emissions (global warming potential) per sector per year Background levels of greenhouse gases (CO ₂ , CH ₄ and N ₂ O) Monthly average New Zealand temperature
---------	---

C.1.5 Ozone indicators

Stage 1	Spectroradiometer UV measurements Dobson spectrophotometer ozone readings Minimum ozone over Antarctica The size of the Antarctic ozone hole Tropospheric concentration of total active chlorine New Zealand's consumption of ozone-depleting substances
---------	---

C.1.6 Waste indicators

a. Solid waste

Stage 1	Quantity of waste disposed to landfill and cleanfill from each region Composition of waste disposed to landfill in Waste Analysis Protocol categories Quantity of waste recycled Public access to solid waste resource recovery (recycling) facilities
---------	---

b. Liquid waste

Stage 1	Stock density
Stage 2	Nutrient loading to land and water Quantity of major discharges to water (biological oxygen demand) Stock effluent equivalent of total nitrogen

c. Hazardous waste

Stage 1	Quantity of hazardous wastes accepted at: landfills, hazardous or wastewater treatment facilities, exported (interim indicator using existing information collection systems) Quantity of priority hazardous waste generated and stored: physically hauled away, discharged on site, (interim indicator using existing information collection systems)
Stage 2	Quantity of hazardous waste accepted at: landfills, hazardous or wastewater treatment facilities, exported (under national information collection systems) Quantity of priority hazardous waste generated and stored, physically hauled away, discharged on site as required by regulation

C.1.7 Hazardous substances indicators (proposed)

Stage 1	The number of incidents reported The number of new substances registered under HSNO The number of substances deregistered under HSNO The number and quantities of very toxic and ecotoxic hazardous substances: Produced, Imported, Exported
Stage 2	The number of incidents which fall into the following categories: Major, Minor

C.1.8 Contaminated sites indicators

Stage 1	The number of sites that fall into the following categories <ul style="list-style-type: none"> • confirmed contaminated • remediated
Stage 2	The number of sites that fall into the following categories: <ul style="list-style-type: none"> • under investigation moderate to low risk sites • under investigation high risk sites • confirmed contaminated moderate to low-risk sites • confirmed contaminated high risk sites • remediated sites

C.1.9 Toxic contaminants indicators

Stage 1	Toxic contaminants in meat (proposed) Toxic contaminants in human milk (proposed)
Stage 2	Benzene in air Nitrates in groundwater Toxic contaminants in fresh water eels (proposed)

C.1.10 Marine indicators

Stage 1	<p>Confirmed marine spills by type, source and location</p> <p>% monitored beaches complying with the guideline median for marine recreation or shellfish gathering</p> <p>% season beaches or coastal areas were not suitable for contact recreation or shellfish gathering</p> <p>Quantity and category of litter per unit area in the strand-zone of beached</p> <p>% of New Zealand coastline in public ownership</p> <p>Number of different non-fish and protected species caught by species, per fishery, by area, by year</p> <p>Ratio of current biomass to target biomass for modelled fish stocks</p> <p>Percentage of fish stocks modelled that are at or above target level</p> <p>Number of assessed fish stocks about which stock status is known or unknown</p> <p>Level of total catch for each fish stock species by area</p> <p>Ratio of total catch to sustainable yield for modelled fish stocks</p> <p>Current Total Allowable Catch for each fish stock</p> <p>Ratio of Total Allowable Catch to sustainable yield for modelled fish stocks</p> <p>% fish stocks with current biomass below target where rebuilding strategies are in place</p>
Stage 2	<p>Level of fishing effort by method, by area, by year (or season)</p> <p>number non-assessed species (harvested or associated/dependant) of high, medium, low or unknown value with the percentage of associated/dependant species that are fully or partially protected</p> <p>Frequency, location, and species of toxic and non-toxic algae blooms</p> <p>Number of taxa in IUCN and NZ threat categories</p> <p>Abundance and distribution of adventive marine species</p> <p>Change in catchment land use for estuaries, embayments or open coast areas</p> <p>Change in sediment for selected estuaries, embayments or open coast areas</p> <p>Change in catchment land use for estuaries susceptible to eutrophication</p> <p>Chlorophyll 'a' concentrations or Trophic Index for selected estuaries</p> <p>Toxic and ecotoxic contaminants in shellfish at selected monitoring sites</p> <p>Extent of selected marine habitats, ecosystems and environments</p> <p>Biodiversity condition of selected marine habitats and communities</p> <p>% area of each of New Zealand's different marine environments, ecosystems and habitats under protection</p> <p>Area of New Zealand coastline by region with: legally; physically; unrestricted public access</p> <p>% of coastal environment in each category of natural character</p> <p>Change in area of habitats covered by marine farms</p>

C.1.11 Biodiversity indicators

Stage 1	<p>Change in the extent of each land cover class</p> <p>% area of each of New Zealand's different environments, ecosystems and habitats under protection</p> <p>The number and percentage of extinct species in selected taxonomic groups</p> <p>The number of taxa in IUCN and NZ threat categories</p>
Stage 2	<p>The genetic diversity of valued introduced species</p> <p>Change in gross habitat fragmentation of indigenous vegetation cover</p> <p>Change in the abundance and distribution of selected animal pests</p> <p>Change in the abundance and distribution of selected weeds</p> <p>Change in the extent of each land use pressure on biodiversity</p> <p>The biodiversity condition of selected ecosystems and habitats compared with historic and current baselines</p> <p>The evolutionary diversity remaining in selected taxonomic groups (first group, birds) compared to historic and current baselines</p> <p>The extent of selected freshwater ecosystems (wetlands, lakes, rivers, karst and geothermal) compared with historic and current baselines</p>

C.1.12 Transport indicators

Stage 1	<p>Vehicle fleet composition</p> <p>Usual mode of journey to work</p> <p>Total vehicle-kms for road vehicles per year</p>
Stage 2	<p>Road congestion</p> <p>Percentage of main arterial roads with active water treatment</p>

C.1.13 Energy indicators (proposed)

Stage 1	<p>Total primary energy supply (TPES), by energy type per year</p> <p>Total consumer energy (TCE), by energy type by sector per year</p> <p>TCE/TPES as a percentage per year</p>
Stage 2	<p>Non-renewable primary energy supply as a proportion of TPES</p> <p>National average efficiency of thermal electricity generation, including co-generation (MWh/PJ)</p> <p>Avoidable spillage in the hydro-electricity system (GWh) per year</p> <p>Transport sector energy use per vehicle km travelled per year (PJ/VKT)</p> <p>Commercial sector energy use per employee per year (GJ/employee)</p> <p>Residential energy use per household (GJ/household)</p> <p>Industrial; sector energy use as a proportion of industrial GDP (PJ/\$m)</p>

C.2 AIR QUALITY INDICATORS

Air quality is currently being monitored in seven sites around New Zealand with respect to five parameters. This section of the appendix describes the results of the monitoring programme to date.

C.2.1 Measurement

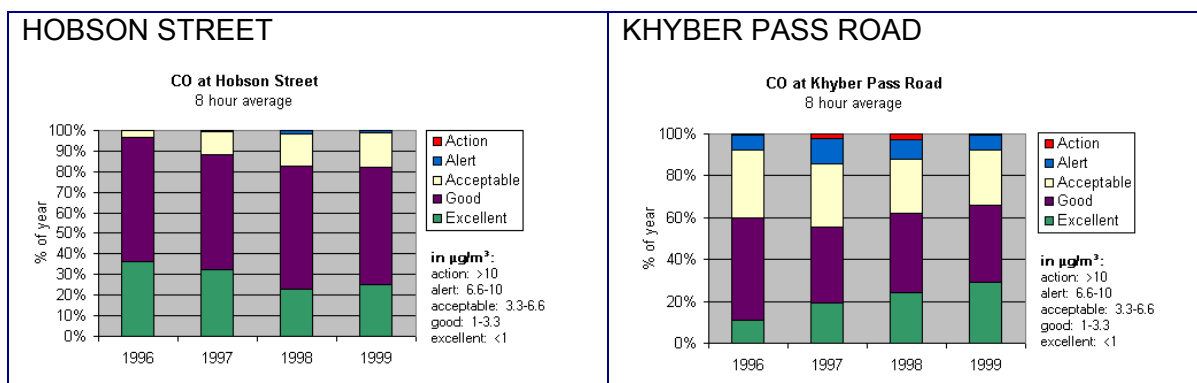
Air quality monitoring currently consists of the tracking of five parameters: Carbon Monoxide, Nitrogen Oxides, Particulate Matter, Sulphur Dioxide and Ozone. For each of these parameters, ambient air quality standards are identified. Air quality is measured by way of qualitative descriptors referenced to the ambient air quality standard (Table 1: below).

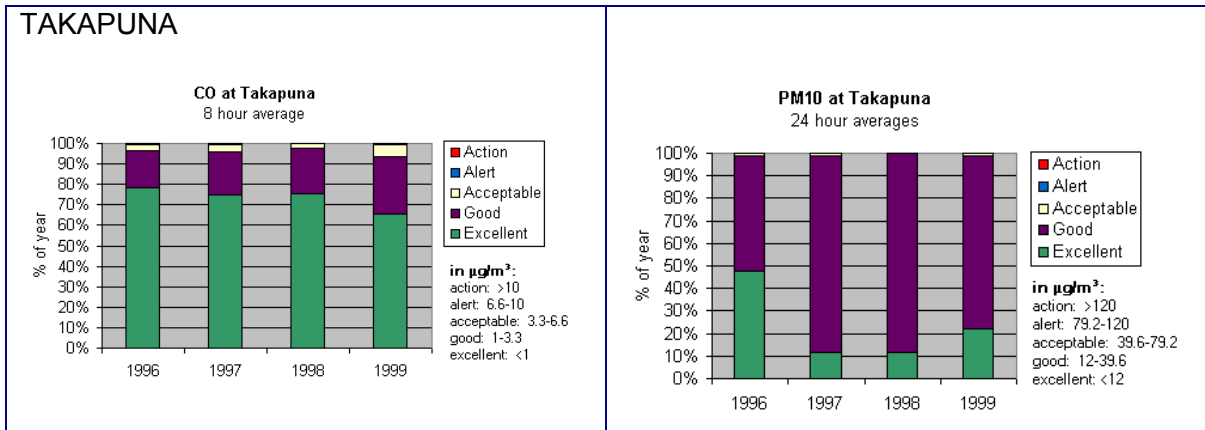
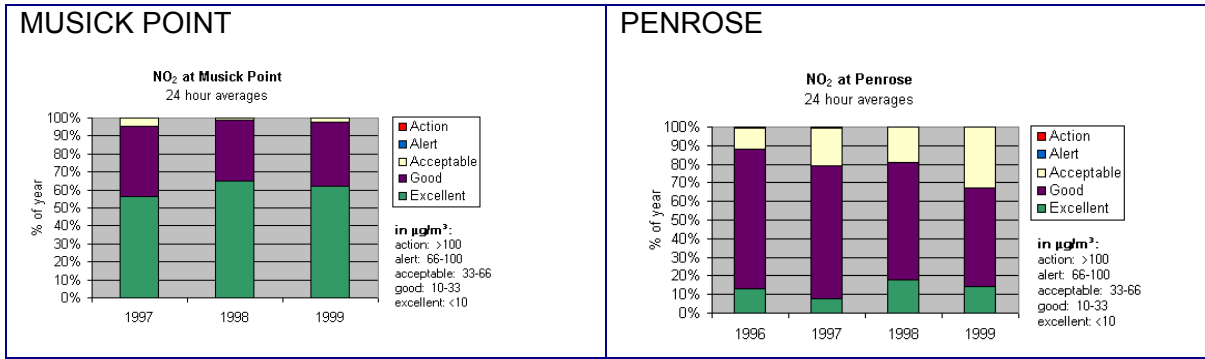
Table 1: Measurement of air quality indicators

Category	Maximum measure value	Comment
Excellent	Less than 10% of the guideline	Of little concern, if maximum values are less than a tenth of the guideline, average values are likely to be much less
Good	Between 10% and 33% of the guideline	Peak measurements in this range are unlikely to impact air quality
Acceptable	Between 33% and 66% of the guideline	A broad category, where maximum values might be of concern in some sensitive locations but generally at a level which does not warrant dramatic action
Alert	Between 66% and 100% of the guideline	A warning level, which can lead to exceedences if trends are not curbed
Action	More than 100% of the guideline	Exceedences of the guideline are a cause for concern and warrant action if they occur on a regular basis

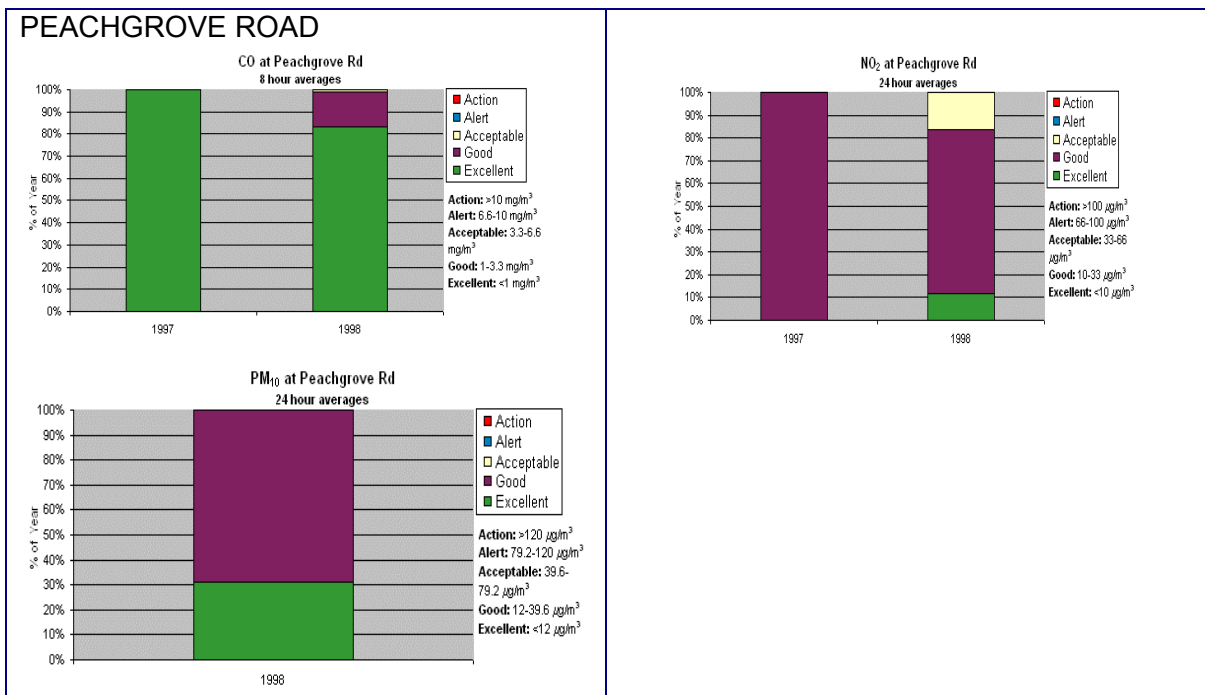
C.2.2 Results

a. Auckland sites

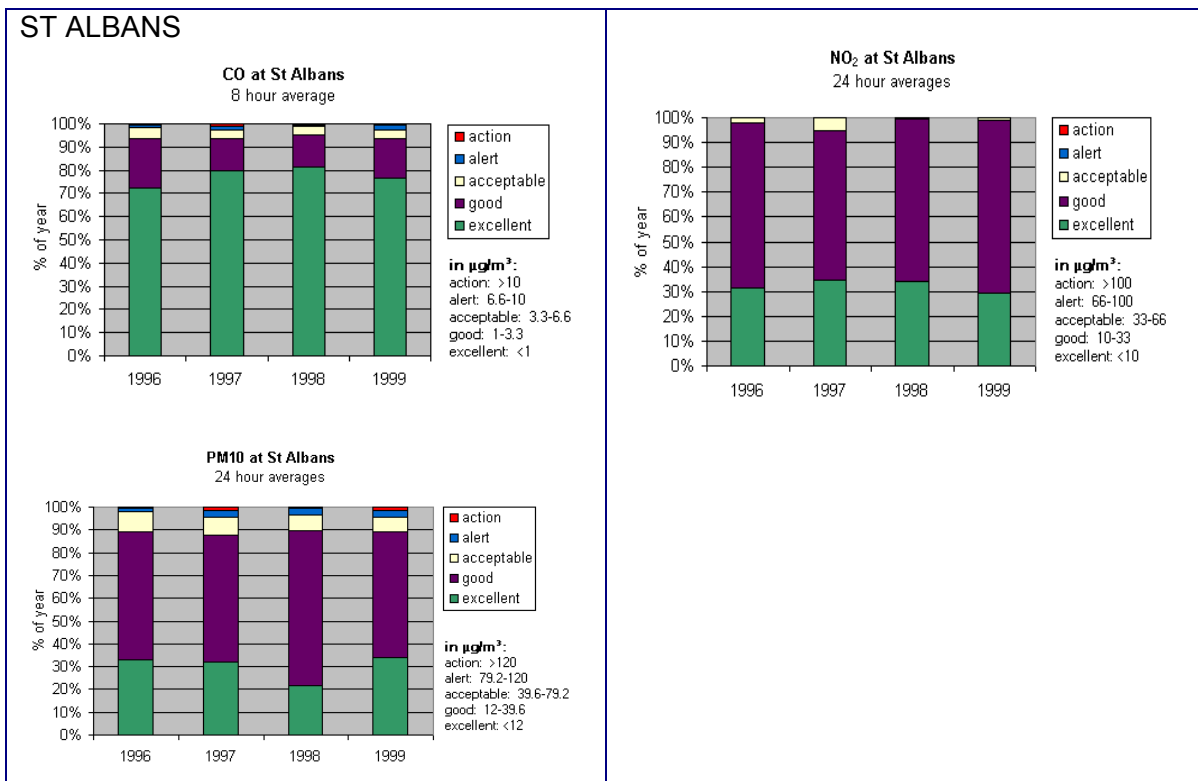




b. Waikato site



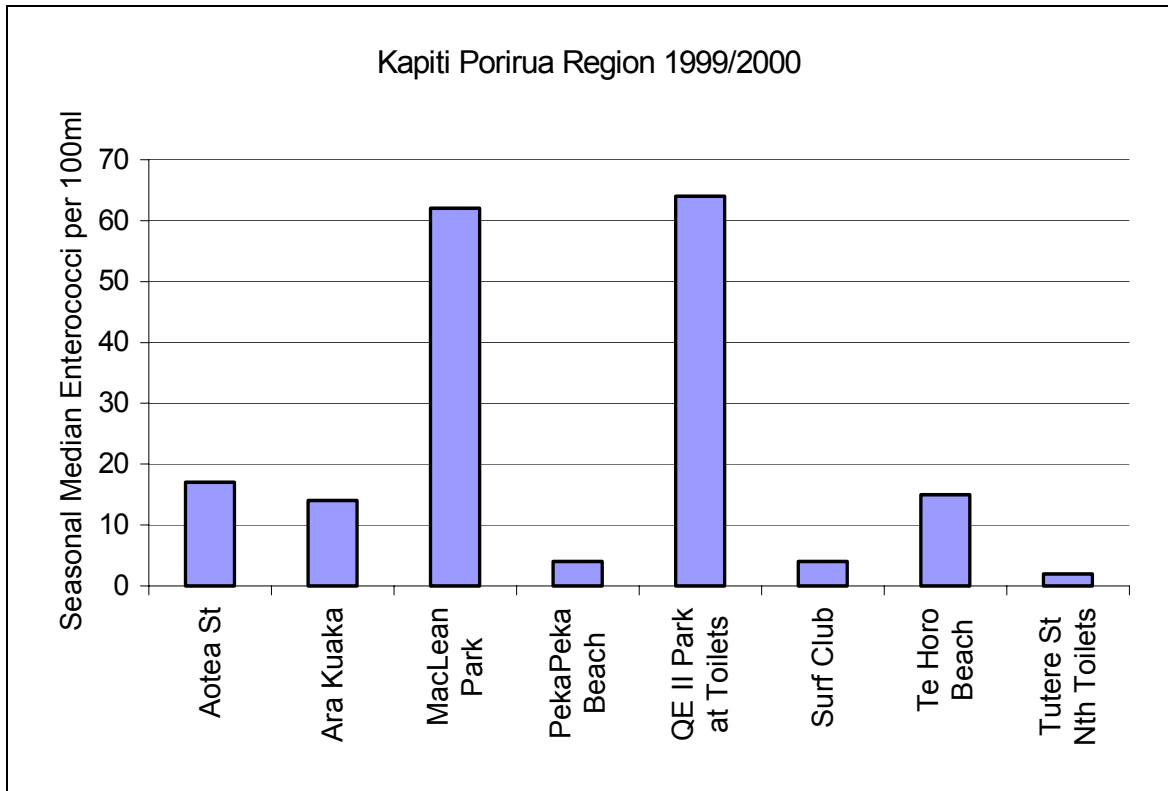
c. Canterbury site



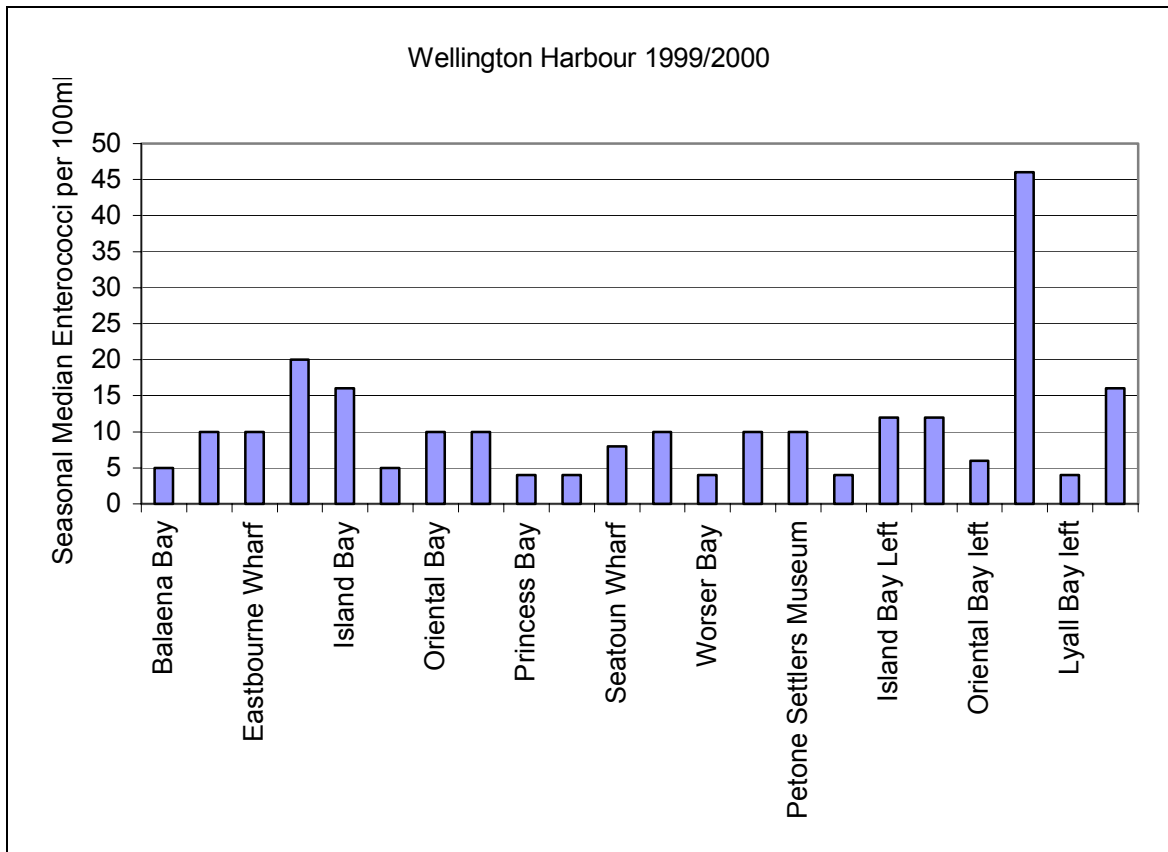
C.3 BATHING WATER INDICATORS

Areas in which bathing water quality has recently reached levels deemed to be unsafe are represented below. Median enterococci levels greater than 35 indicate that water quality at the site is likely to have failed to meet the guidelines at some point during the monitoring period.

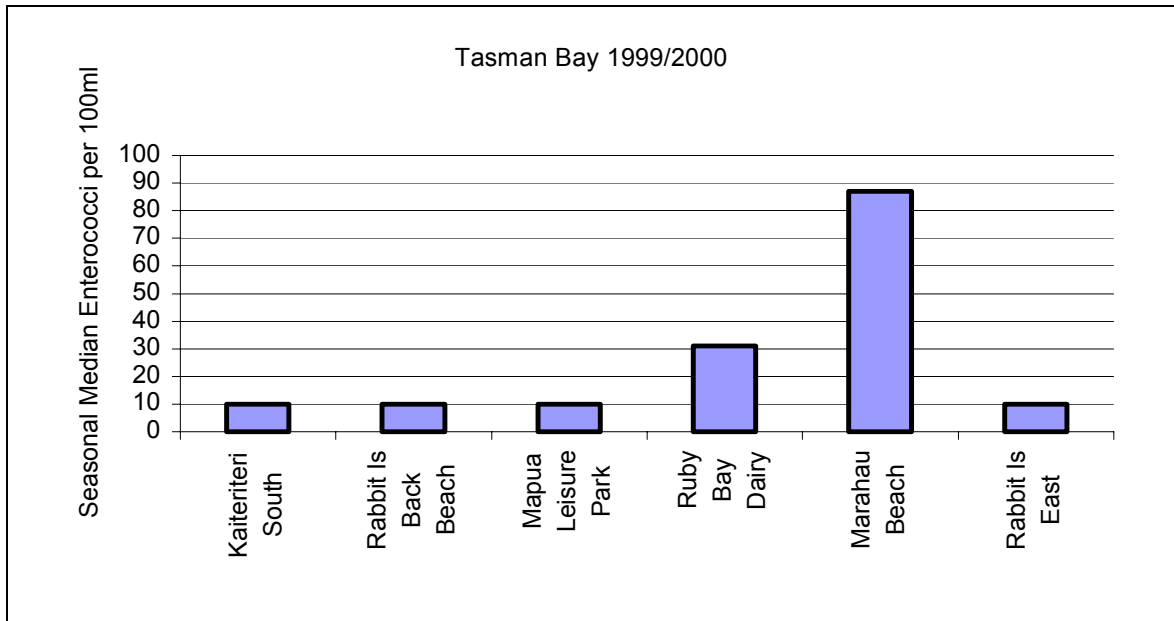
a. Kapiti Porirua area



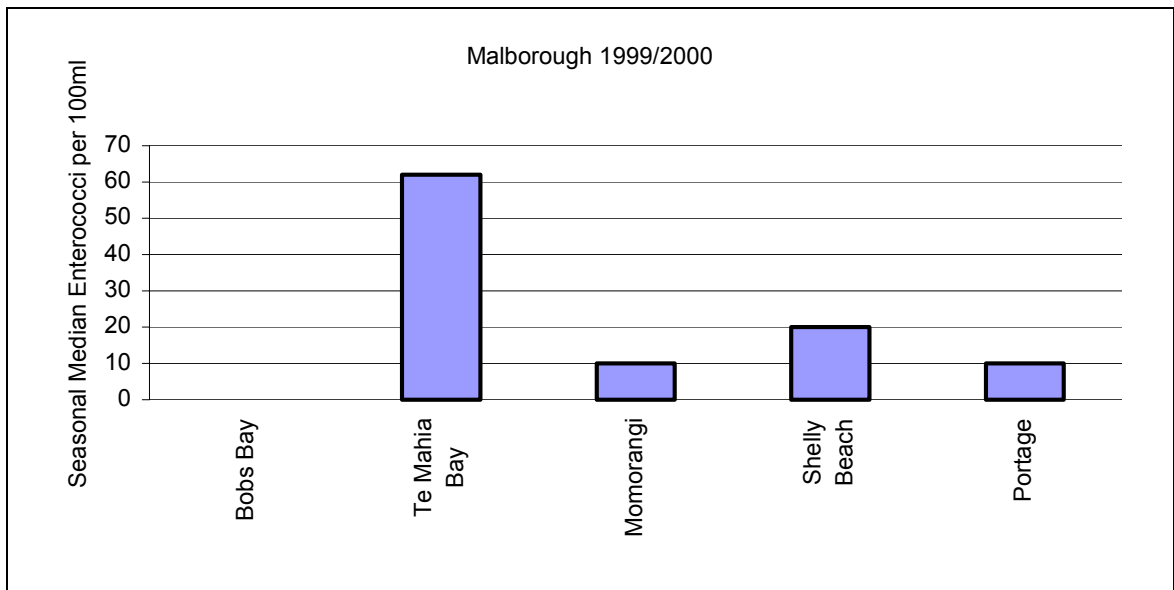
b. Wellington Harbour

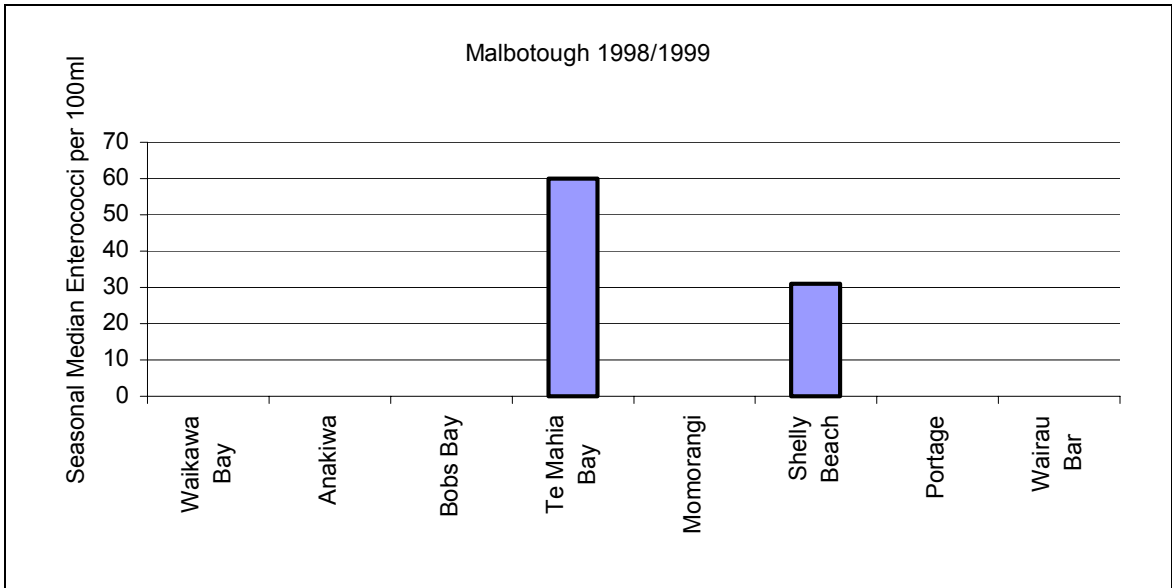


c. Tasman Bay



d. Marlborough area

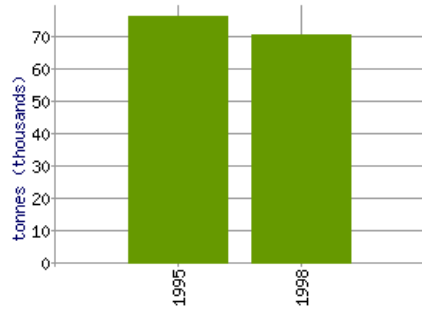




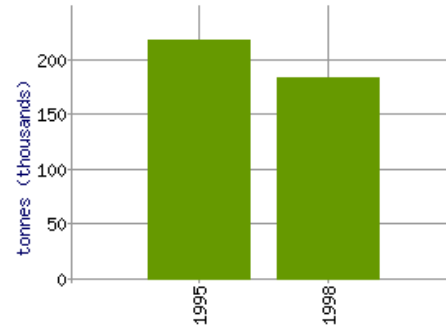
C.4 WASTE INDICATORS

Volumes of waste disposed to landfill.

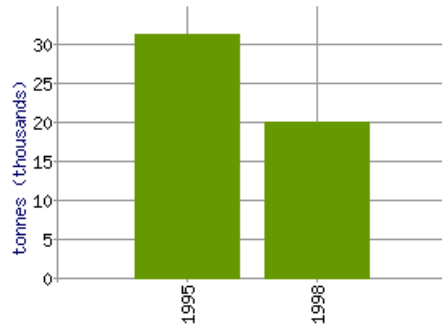
NORTHLAND REGION



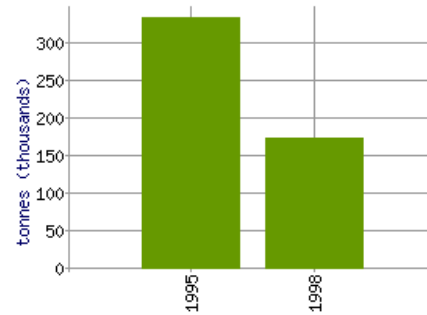
BAY OF PLENTY REGION



GISBORNE REGION



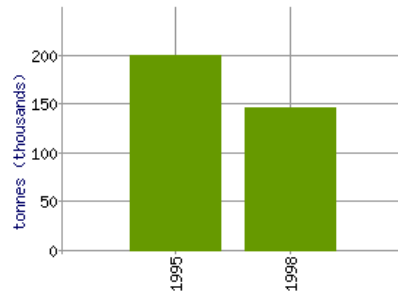
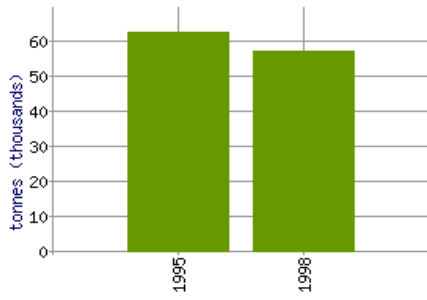
WAIKATO REGION



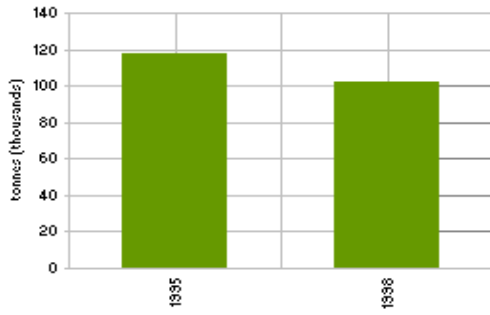
TARANAKI REGION

WANGANUI-MANAWATU REGION

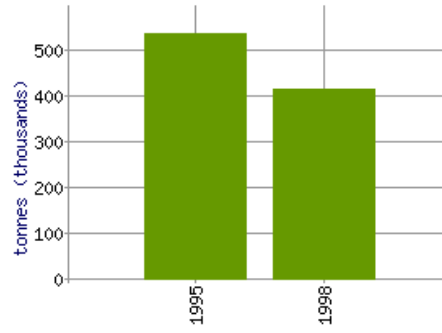
Appendix C: Environmental Data



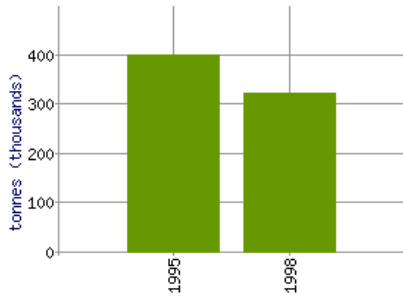
HAWKES BAY REGION



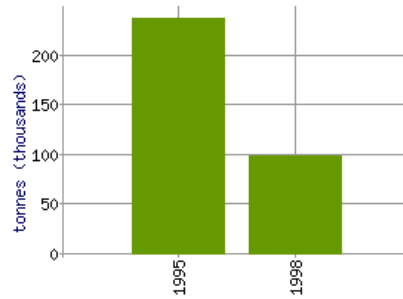
WELLINGTON REGION



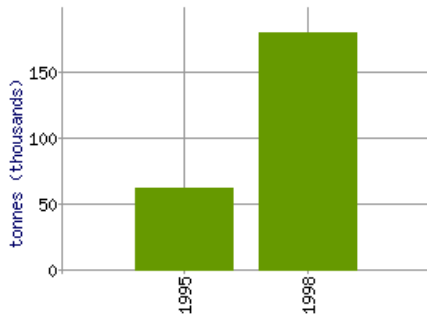
CANTERBURY REGION



OTAGO REGION



SOUTHLAND REGION





Valuing New Zealand's Clean Green Image

The Ministry for the Environment commissioned PA Consultants to carry out this study (funded by the Contestable Research Fund of the Ministry of Research, Science and Technology) to provide an estimate of the value for New Zealand's export trade of our clean green image.

There is considerable discussion about New Zealand's clean green image, but relatively little solid information about its value. This was clear from an earlier study which the Ministry commissioned through the Sustainable Management Fund, *Green Market Signals*, published in 1999. The current study is, in part, a response to the suggestions received from industry groups and others at that time.

The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

If you would like to discuss this report further, please contact Dr Ralph Chapman, Manager of the Strategic Policy Group, Ministry for the Environment, at (04) 917 7444 or email him at ralph.chapman@mfe.govt.nz.

APPENDIX D: SURVEY QUESTIONS**D.1 DAIRY****D.1.1 Questions**

1. Are you the main shopper for food in your household? (If YES continue; If NO thank and end survey)

NO YES

2. Do you currently purchase any milk or milk powder products? (If YES continue; If NO thank and end survey)

NO YES

3. What brands do you currently purchase, eg. Fernleaf Milk?

Table 1: New Zealand dairy products available in Malaysia

Product	Brand	Product Purchased (Please ✓)	Current Qty Purchased (in kgs per month)
Milk	Fernleaf Anlene Prolene Andec		
Milk Powders	Anmum Anlene Gold Hi-Cal Anlene Gold Low Fat Andec Chocolate Andec Hi-Cal Dumex 1+, 3+, 6+ (Not branded as NZ product) ¹ Dumex Follow On (Not branded as NZ product) Fernleaf Hi-Cal Fernleaf 3+ Fernleaf Regular/Instant Prolene (Hi-Iron) Provin		

¹ The Dumex brand is an interesting example of value derived from New Zealand's clean green image. Dumex is a Malaysian brand, which purchases its ingredients from NZMP, and is not a product associated with the NEW ZEALAND MILK group. Even though it is a Malaysian brand, Dumex uses New Zealand's clean green image as a marketing strategy to promote its product, and emphasises the origin of its product.

4. Using these pictures of milk and milk powders as a guide (see attached), please indicate what quantities of milk and/or milk powder you purchase monthly (or how often you buy them: eg. one a month, one a week, etc).
5. Did you know that the brands mentioned above are from New Zealand? **(If YES continue; If NO thank and end survey)**

NO YES

Framing section

Consider the first set of images (see attached). These scenes are typical of New Zealand’s environment today. Dairy farming without adequate environmental management can pollute water, create slips on hills, cause erosion on pastures and change ecology in streams. These effects are uncommon in New Zealand now, but without proper care, could occur in the future. If they did, New Zealand would look like the following scenes (see attached).

Keep in mind that your decision to buy milk-based products may be based on a number of factors such as price, taste, convenience and environmental quality.

6. Let’s say that in the future you thought New Zealand’s environment was like the alternative images. How would your buying pattern/behaviour change?

Table 2: Purchasing behaviour under no price change

Product Group	Buying Pattern				Percentage Change (%) How much more or less?
	More	Less	Same	Stop	
Milk					
Milk Powders					

7. Assuming again, that your perceptions of New Zealand were reflected by the alternative images, and the price of ALL milk-based products (New Zealand and other) decreased by 10%, how would your buying pattern/behaviour change now?

Table 3: Purchasing behaviour under 10 percent price reduction

Product Group	Buying Pattern				Percentage Change (%) How much more or less?
	More	Less	Same	Stop	
Milk					
Milk Powders					

D.1.2 Pictures of New Zealand dairy products available in Malaysia

In order to determine the quantity of dairy products being bought by Malaysian consumers the following photographs of New Zealand dairy products sold in Malaysia were used. Most respondents may have difficulty stating what quantity of dairy products they purchase precisely in terms of litres or kilograms. These photographs were used as a guide to ascertain the quantity purchased by each respondent.

Figure 1: Varieties of NEW ZEALAND MILK powders available in most Malaysian supermarkets



Figure 2: Varieties of New Zealand liquid milk available in most Malaysian supermarkets



D.1.3 Images depicting New Zealand's current environment

For a more detailed description of these photographs, see **Error! Reference source not found..**

Figure 3: Current Image 1



Figure 4: Current Image 2



Figure 5: Current Image 3



Figure 6: Current Image 4



D.1.4 Images depicting New Zealand under an alternative (degraded) environment

Figure 7: Alternative Image 1

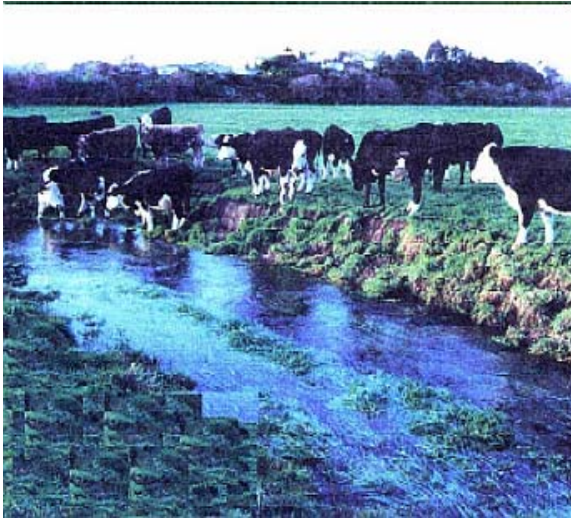


Figure 8: Alternative Image 2



Figure 9: Alternative Image 3



Figure 10: Alternative Image 4



Figure 11: Alternative Image 5



Table 45: Descriptions of “current” and “alternative” images in tourism survey

Scenario	Image	Description
Current	1	This image shows evidence of good riparian management, whereby the streambank has been stabilised by proper planting.
Current	2	A typical New Zealand hillside exhibiting signs of good land management. There are no signs of slips or erosions.
Current	3	Cows grazing in front of a river. This is a typical image used to promote New Zealand dairy product overseas.
Current	4	The grazing area of a dairy farm in the Taranaki region. The grazing area is of a high quality with no signs of overgrazing.
Alternative	1	An example of poor land and water management. Inadequate fencing and no planting along the streambanks means that livestock have access to the waterways. This can cause streambank erosion and polluted waterways.
Alternative	2	Inadequate land management on steeper landscapes can cause landslides and slips on hillsides. The hillside in this image shows signs of severe erosion.
Alternative	3	The grazing area of another New Zealand farm. Here inadequate management has led to overgrazing in some parts of the pasture.
Alternative	4	This image is an example of a poorly managed milking shed. Effluent runoff from the shed has created a nutrient enriched (eutrophic) pond.
Alternative	5	This is an example of a dairy farm where the effluent management system is malfunctioning. This has resulted in effluent runoff into streams.



Ministry for the
Environment
Manatū Mō Te Taiao

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The aim of this current study is to quantify the extent to which particular New Zealand exports benefit from positive perceptions about our environment. The project focuses on three export sectors: dairy, inbound tourism, and organic produce. It assesses the potential consumer reaction to an illustrative decline in New Zealand's cleanness and greenness.

The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

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D.1 INBOUND TOURISM

D.1.1 Questions

Screening section

1. Which country have you *last* lived in for 12 months or more?
If Australia, UK, USA, Japan or Korea continue
If Other then thank and end survey
2. And have you been in New Zealand for at least one night, but less than 12 months?
If YES, continue
If NO, thank and end survey
3. [If necessary] Are you aged 15 years or older?
If YES, continue
If NO, thank and end survey
4. Are you currently travelling on official Armed Forces or Diplomatic Corp business, or accompanying someone who is?
If YES, thank and end survey
If NO, continue

Questionnaire

5. Please indicate the country last lived in from Question 1.

Australia

USA

Japan

Korea

6. Which one of these describes your main reason for travelling to New Zealand?

Holiday

Visiting friends and relatives

Education/Study

Business conference

Other (Please specify) _____

Don't know

7. How many days did you stay in New Zealand on this trip?

Framing Section

Consider these images as representing the current overall state of New Zealand's environment. (See attached current images)

Now consider these alternative images (see attached alternative images), which show signs of poor environmental management, such as streambank erosion, poor water quality and air pollution.

Environmental quality is just one of the many things that you might think about when deciding to travel to New Zealand. Your decision to travel to New Zealand may have been based on a number of factors such as airfares, price of accommodation, friends

and relatives living in New Zealand or sports, recreation and business opportunities here.

8. If you thought New Zealand's environment was like the alternative images, would you have still made this trip? (Probe if "Don't know": please just answer this question as best as you can)

NO **YES** **DON'T KNOW**

9. Would these images have made you stay a different number of days in New Zealand? (Probe if "Don't know": please just answer this question as best as you can)

NO **YES** **DON'T KNOW**

10. How many days do you think you would have stayed? (Probe if necessary: please just give your best estimate)

Concluding Section

11. How important were your perceptions of New Zealand's environment in your decision to come here?

Not at all important **Not very important** **Neither/nor**

Important **Very important** **Don't know**

12. From what you have seen of New Zealand's environment during your visit, were the expectations you had prior to your visit met?

NO **YES** **DON'T KNOW**

13. Which of these age groups do you fall into?

15-24 years **25-34 years** **35-44 years**

45-54 years **55-64 years** **65 years +**

14. Interviewer will record the sex of the respondent here.

MALE **FEMALE**

D.1.2 Images depicting New Zealand's current environment

For more detailed descriptions of these photographs, see Table 1.

Figure 1: Current Image 1



Figure 2: Current Image 2



Figure 3: Current Image 3



Figure 4: Current Image 4



Figure 5: Current Image 5



Figure 6: Current Image 5



D.1.3 Images depicting New Zealand under an alternative (degraded) state

Figure 7: Alternative Image 1



Figure 8: Alternative Image 2



Figure 9: Alternative Image 4



Figure 10: Alternative Image 3



Figure 11: Alternative Image 5



Figure 12: Alternative Image 6



Table 1: Descriptions of “current” and “alternative” images in tourism survey

Scenario	Image	Environmental Attribute	Description
Current	1	Land and Water Quality	This image shows evidence of good riparian management, whereby the streambank has been stabilised by proper planting.
Current	2	Land Quality	A typical New Zealand hillside exhibiting signs of good land management. There are no signs of slips or erosions.
Current	3	(Marine) Water Quality	Totaranui Beach, a New Zealand national landmark frequented by tourists. The water quality here is very good.
Current	4	Land and Water Quality	A picture of the Marlborough Sounds, another New Zealand tourist attraction. Both land and water here are of high quality.
Current	5	Air Quality	A picture of Auckland on a clear day.
Current	6	Air Quality	A picture of Christchurch on a clear. Neither this image, nor the one of Auckland shows any signs of air pollution.
Alternative	1	Land and Water Quality	An example of poor land and water management. Inadequate fencing and no planting along the streambanks means that livestock have access to the waterways. This can cause streambank erosion and polluted waterways.
Alternative	2	Land Quality	Inadequate land management on steeper landscapes can cause landslides and slips on hillsides. The hillside in this image shows signs of severe erosion.
Alternative	3	(Marine) Water Quality	A sign warning potential swimmers not to enter the water which is contaminated.
Alternative	4	(Marine) Water Quality	Another sign warning of marine water contamination. This one warns against catching shellfish from the area.
Alternative	5	Air Quality	Christchurch on a day when smog levels are high.
Alternative	6	Air Quality	Another example of Christchurch on a smoggy day.



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Manatū Mō Te Taiao

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The empirical work done in this study reinforces the qualitative evidence that our clean green image is valuable, and provides some useful insights into the size and nature of that value. The results are of course not definitive – no contingent valuation study can ever be so – but they do strongly indicate a significant vulnerability of export value (through reduction in product quantities likely to be purchased by consumers) in the event of a (hypothetical) degradation of New Zealand's environment.

While the research's approach and findings have been robustly peer reviewed, like all empirical economic estimates, the conclusions rest on assumptions and a specific methodology. That said, the study certainly provides food for thought. Main findings are as follows:

- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
- The study suggests this image is worth at least hundreds of millions, possibly billions, of dollars – aggregating value elements from dairy, tourism, and organic produce, and extrapolating to other sectors such as meat.
- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
- However, there are environmental problems that are sufficient to raise questions about the sustainability of the value of New Zealand's exports attributable to its environmental image. There is a risk that New Zealand will lose value that is created by the current environmental image if we are not vigilant in dealing with the problems that could threaten the image.

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D.1 ORGANICS

1. What organic New Zealand organic products (fresh fruit) do you currently purchase and in what quantity (monthly)?

Table 1: Quantity of New Zealand Organic Fresh Fruit bought

Fruit	Monthly Quantity
Kiwifruit	
Apples	
Other fruits	

2. Currently there are no genetically modified (GM) crops or other products in New Zealand for commercial production. Let's say that some time in the future the following situation arose:

New Zealand allows limited field trials of GM products for research purposes.

If the price of the products listed in Question 1 remained the same, would you buy more, less or the same amount of organic products as you do now? Please indicate the change in percentage.

Table 2: Purchasing behaviour under limited field trials and no price change

Fruit	Monthly Quantity
Kiwifruit	
Apples	
Other fruits	

3. Now consider the same situation described in the previous question, but say that the price of the aforementioned products decreased by 10%, would you buy more, less or the same as you do now? Please indicate the change in percentage.

Table 3: Purchasing behaviour under limited field trials and a 10% price decrease

Fruit	Monthly Quantity
Kiwifruit	
Apples	
Other fruits	

4. Once again, consider the situation where New Zealand allows limited field trials of GM products for research purposes, and assume that the price of the products you listed in Question 1 decreased by 20%. Would you buy more, less or the same as you do now? Please indicate the change in percentage.

Table 4: Purchasing behaviour under limited field trials and a 20% price decrease

Fruit	Monthly Quantity
Kiwifruit	
Apples	

Other fruits	
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5. Now consider another hypothetical scenario. Let's say that some time in the future the following situation arose:

New Zealand allows uncontrolled release of GM products.

6. If the price of products listed in Question 1 remained the same, would you buy more, less or the same as you do now? Please indicate change in percentage.

Table 5: Purchasing behaviour under uncontrolled release and no price change

Fruit	Monthly Quantity
Kiwifruit	
Apples	
Other fruits	

7. Now consider the same situation described above, but say that the price of the products in Question 1 decreased by 10%, would you buy more, less or the same as you do now? Please indicate the change in percentage.

Table 6: Purchasing behaviour under uncontrolled release and a 10% price decrease

Fruit	Monthly Quantity
Kiwifruit	
Apples	
Other fruits	

8. Once again, consider the situation where New Zealand allows uncontrolled release of GM products, and assume that the price of the products in Question One decreased by 20%. Would you buy more, less or the same as you do now? Please indicate the change in percentage.

Table 7: Purchasing behaviour under uncontrolled release and a 20% price decrease

Fruit	Monthly Quantity
Kiwifruit	
Apples	
Other fruits	



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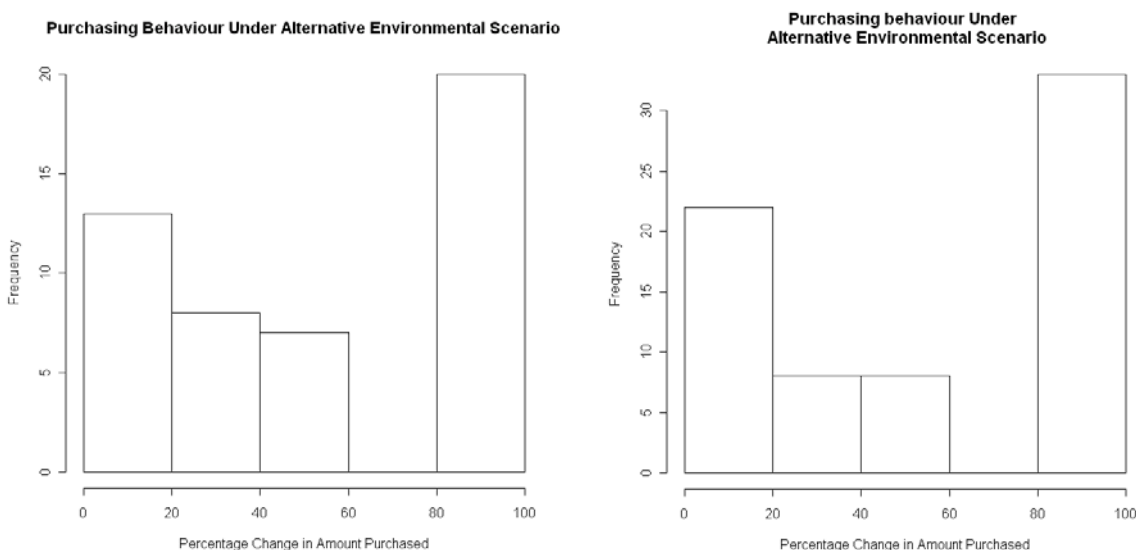
- New Zealand's clean green image does have a value. Environmental image is a substantial driver of the value New Zealand can derive for goods and services in the international market place.
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- New Zealand is relatively clean and green. This is mainly attributable to our low population density resulting in relatively benign environmental pressures.
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APPENDIX E: EXPLORATORY ANALYSIS OF DAIRY SURVEY RESULTS

The histograms below give us some idea of the distribution of “change in purchasing behaviour” among Malaysian consumers. Note that both histograms are bimodal indicating that there are two population subgroups, one of which would stop buying New Zealand products (i.e. percentage change = 100%) under worsened environmental perceptions. The other group is insensitive to changes in New Zealand’s environmental image and would not change their purchasing behaviour under worsened perceptions (note that this group includes those consumers who were unaware that the dairy products they were purchasing was from New Zealand).¹

Figure 1: Distribution of percentage change in purchasing behaviour



The histogram on the left pertains to the milks group while the one on the right pertains to the milk powders group.

¹ The group of consumers who were unaware of the origin of the dairy product/s they were purchasing was very small. Only nine respondents out of the 94 surveyed were unaware that the dairy products they were buying came from New Zealand.



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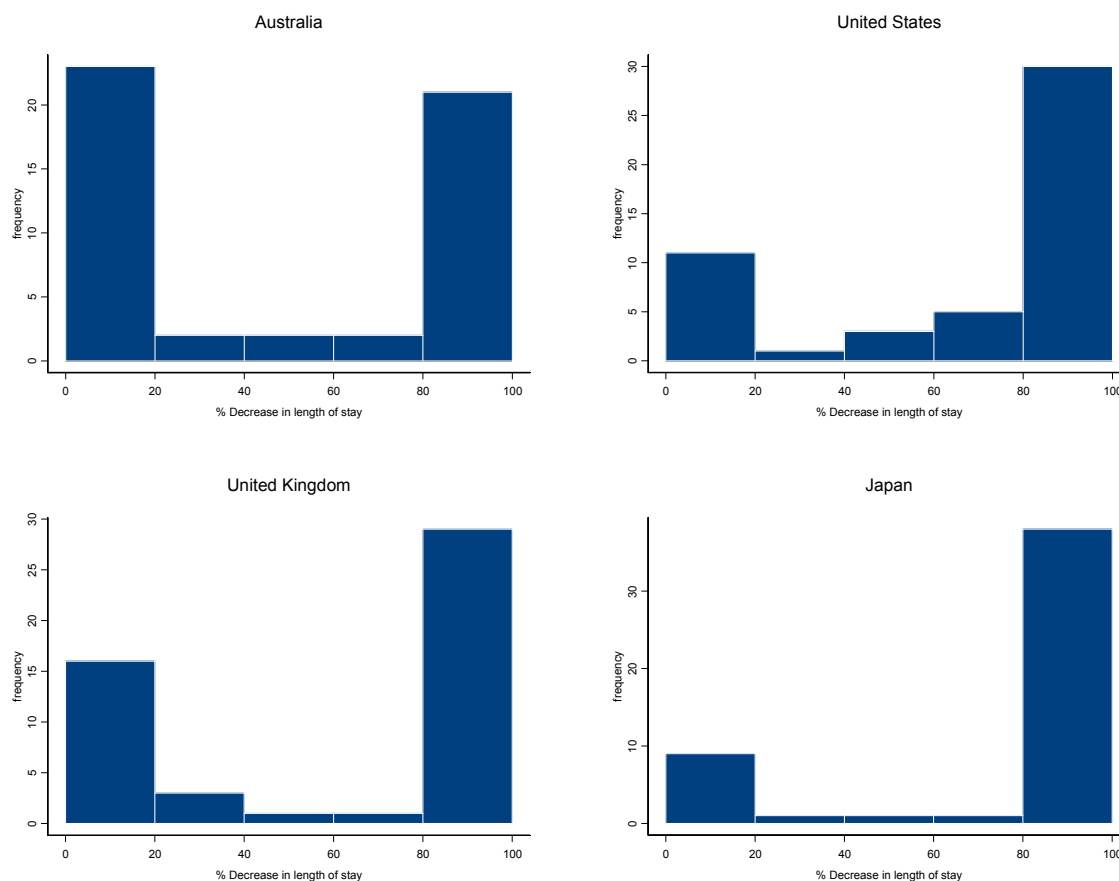
APPENDIX F: EXPLORATORY ANALYSIS OF TOURISM SURVEY RESULTS

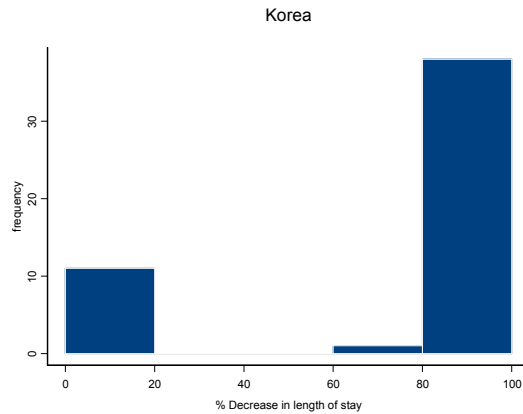
F.1 LENGTH OF STAY UNDER WORSENERD PERCEPTIONS

Table 1: Average % decreases in lengths of stay due to worsened perceptions about New Zealand’s environment

Country	Holiday/ Vacation	Visiting Friends and Relatives	Business	Other	Overall Percentage Decrease in Length of Stay
Australia	68.75	32.70	34	0	48.17
USA	76.04	52.38	25	25	70.0
UK	76.43	23.91	25	100	62.76
Japan	86.36	50	31.25	72.12	79.0
Korea	90	68.75	50	75	77.5

Figure 1: Distribution of % change in length of stay by market





Note that all of these histograms are bimodal with one peak at “no change in length of stay” (change 0%) and the other peak at “Would not make this trip” (change 100%). We could infer that there are two main types of visitors. The first group (denoted by the first peak) represent the group of people who would not change their “purchasing habits” at all in the event of worsened perceptions. The second group (denoted by the second peak) represents the group of people who would NOT visit New Zealand under worsened perceptions.

F.2 PERCEPTIONS OF NEW ZEALAND’S ENVIRONMENT

One of the questions in our survey asked how important the respondent’s perceptions of New Zealand’s environment was in their decision to undertake a trip here. Their response was measured on a scale of 1 to 5 as follows:

- 1 = Not important at all
- 2 = Not very important
- 3 = Neither/nor
- 4 = Important
- 5 = Very important

The boxplots below summarise their responses. Australia was the only market with a median of below 3. This is quite interesting given that Australia had the lowest percentage decrease in number of days stayed. The “perception” scores for Australia are also more widely spread than those of the other markets.

Also note that for the Asian markets (Japan and Korea) the only low scores (1 and 2) are in fact outliers.¹

¹ Outliers are denoted on the boxplot via the isolated lines.

Figure 2: Importance of perceptions

