

MEASURING UP



The State of the Environment Report for the Wellington Region 1999



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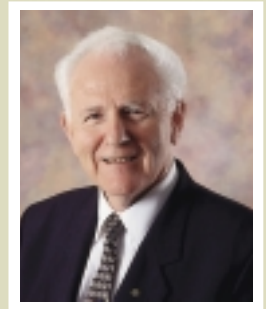


caring about you & your environment

FOREWORD

Welcome to our latest state of the environment report.

The report's aim is encapsulated in the title, *Measuring Up*. It gives us vital data about the health of our Region's natural and physical resources, so that we can gauge how well we are sticking to the course set in our 1995 Regional Policy Statement. This is an accountability exercise, just like the financial report the Council prepares each year.



Stuart Macaskill

In putting together this report we have tried to be up-front and objective. The findings tell us that:

- we are doing some things well – for example, steady improvements in the standard of sewage-disposal operations have led to better water quality
- we are doing other things less well – for example, some shallow groundwater is being contaminated from surrounding land uses
- we cannot assess our performance in areas like managing air quality, soil quality and ecosystems because of a lack of information.

Measuring Up is packed with information that will help the Council to plan its work for the next three years, and to undertake the first Regional Policy Statement review. It will help us determine whether our future vision for the Wellington Region still remains within reach.

Overall I feel that we can point to solid progress in managing our Region's environment in the eight years since the Resource Management Act took effect. But let's be clear – the job is far from over. We need to renew our efforts to ensure the natural and physical treasures of our Region are well safeguarded into the 21st century.

With this report, you too can measure whether the way we live in this Region is sustainable in the long term.

A handwritten signature in black ink that reads "Stuart Macaskill". The signature is written in a cursive style.

Stuart Macaskill
Chairperson

A Vision for the Future

In the Wellington Region of the future it could be that:

- The water in streams, rivers and lakes is of a quality and of sufficient quantity to meet the demands of people and ecosystems. The natural character of wetlands, lakes and rivers is preserved, and there is public access to and along important water bodies.
- When natural hazard events occur, their effects are mitigated. Human actions do not add unnecessarily to the likelihood or magnitude of the effects of natural hazard events.
- The coastal environment is accessible to the community and, where possible, its natural character is preserved. Those coastal areas where there has already been degradation are rehabilitated or restored and further degradation is halted. Our coastal waters retain their natural characteristics.
- The soils are able to maintain their desirable physical, chemical and biological characteristics.
- The quantity of waste generated is minimal and the potential of waste products to be reused and recycled is realised. The use of raw materials is sustainable and production processes are clean.
- The natural and managed ecosystems are healthy and their processes support diverse populations of plants and animals and maintain the quality of soil, air and water.
- The important landscapes and treasured parts of the Region are protected.
- The nature and rate of development, and of growth, meets the needs of people, but takes place in a sustainable manner.
- Energy is used efficiently and there is minimal reliance on non-renewable energy sources.
- The air retains its natural characteristics.
- There is an accessible transport system which is safe, which allows for diversity in modes of transport, which uses resources efficiently and which has minimal adverse effects on the environment.
- People are able to satisfy their recreational demands with little adverse effects on the environment.
 - Urban areas are healthy and attractive places for people to live and work.
 - Places, things and objects of cultural and heritage value are conserved.
 - Regional public works and services and network utility operations are provided for in a sustainable manner.

Why a state of the environment report?

How green are our valleys? Or, for that matter, our lakes, soils and swimming beaches? Not until the environmentally aware 1990s did New Zealanders really start to address these vital questions. A new way to manage our nation's precious natural resources came into being in 1991 with the passing of the Resource Management Act (RMA). Under the reform process, Regional Councils were given responsibility to manage the natural and physical resources of their areas.

As part of the new approach, Regional Councils were charged with drafting a Regional Policy Statement setting out environmental issues of significance in their Region. When the Wellington Regional Council completed its Statement in 1995, the final foundation stone for environmental management in our Region was set in place. At the heart of the new approach is the sustainable management of our resources.

So how are we measuring up? This report attempts to answer that question by examining what we know about the state of our environment and comparing this with the vision for our Region enshrined in the Regional Policy Statement. The vision is outlined opposite.

This is our vision for environmental management in the Region. How do we achieve this vision? First we need to come up with specific *objectives*, then devise *policies* and

methods for achieving them. Finally – and this is absolutely essential – we need to know whether the whole thing is working, whether we are getting there. For this we need to know, at regular intervals, what kind of shape natural resources are in and what is causing them to be in that state.



The aim of this State of the Environment Report is to make this assessment. The Report gives a picture of the current state of the natural and physical resources in the Region. It describes the responses adopted to manage these resources, and reviews our performance in achieving the environmental objectives set out in the Regional Policy Statement. We are publishing the report now so that it can be used to inform a mid-term review of the Regional Policy Statement, timed for 1999/2000.

Environmental monitoring

To bring together the information for this report the Council has put in place a very thorough environmental monitoring programme. We gather information to help us take stock of the state of the environment and its constituent parts in six ways.

1. **Baseline monitoring** provides just that: a baseline knowledge of the environment (the quality and quantity of resources) from which to determine trends in any effects we might be having, either wanted or unwanted. Baseline monitoring sites are generally located to give a representative spread throughout the Region.
2. **Resource definition investigations** focus on increasing our understanding of a particular resource. For example, pump tests tell us about the amount of water available from our groundwater resources.
3. **Targeted investigations** focus on particular aspects or parts of a resource. For example, in recent years Hulls Creek has been investigated to find the sources of faecal coliform contamination.
4. The Council responds to **pollution incidents** as they occur, cleaning up or ensuring that steps are taken to resolve them. We also record and analyse these incidents, which gives us useful data on the stresses on the environment or the pressures being placed on a resource.
5. **Consent compliance monitoring** ensures that resource consent holders are complying with the conditions on their consents. The results of compliance monitoring can often augment information gathered through other monitoring programmes.
6. **Surveillance:** the monitoring of compliance with the RMA and with regional plans provides a measure of resource use and is used to identify instances where resource consents are required, or where enforcement action is necessary.



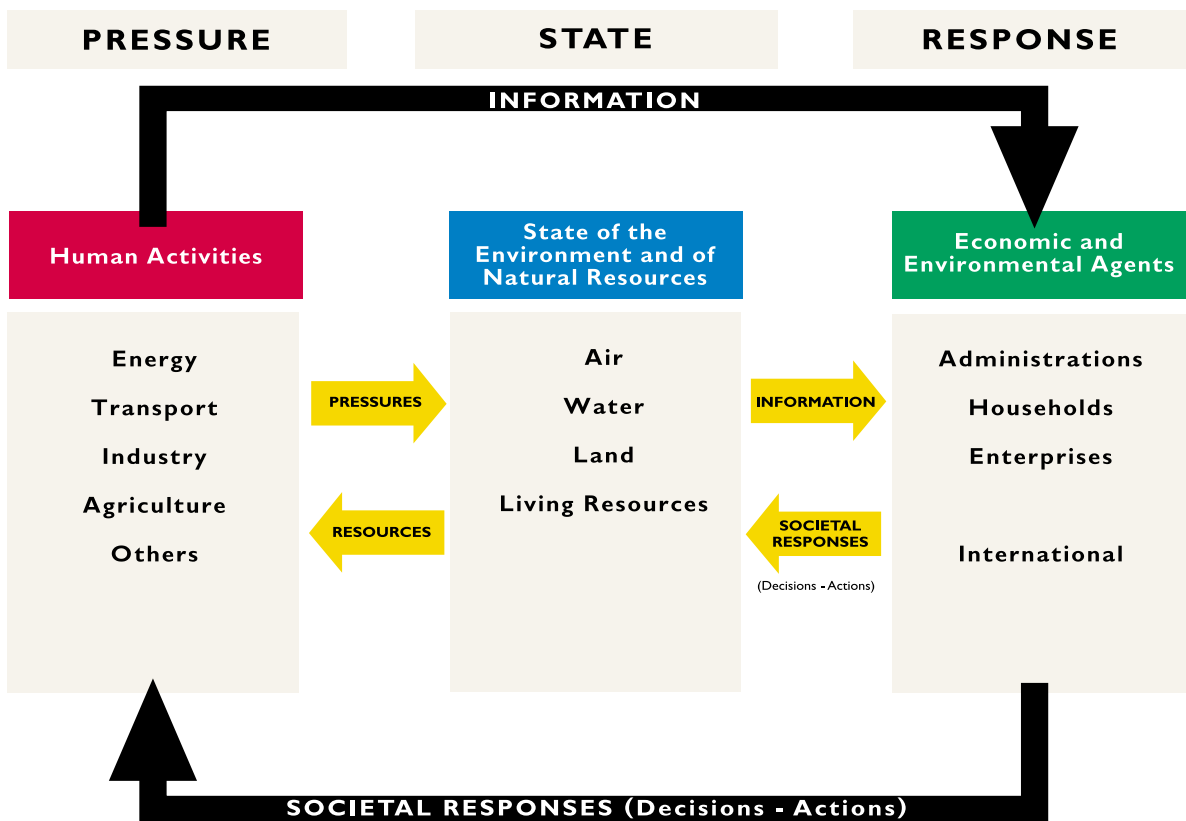
A number of other agencies, including territorial authorities, the Energy Efficiency and Conservation Authority and Historic Places Trust, gather information that helps us to build a big picture of the state of our environment.

Pressure-State-Response Reporting Framework

In March 1997 the Council adopted the pressure-state-response (PSR) framework as the basis for its state of the environment reporting. This approach, developed by the Organisation for Economic Co-operation and Development (OECD), complements that used by the Council in its Regional Policy Statement and Regional Plans.

The PSR framework, shown in Figure 1, recognises that our environment is a complicated form of feedback loop: human activities and natural causes exert pressures on the environment; these change the state or condition of the environment; society *responds* by developing or implementing policies that influence those human activities or modify natural processes; and this in turn changes the kinds of pressures.

Figure 1: Pressure-State-Response Model



Source : Adapted from OECD

Think of what happens when we use a river for our water supply. As more people take water, (a pressure) the river flow (its state) may decrease. If this decrease is deemed to be a problem, the Council may impose limits on the amount of water that can be taken (a response).

About this report

The report has three main sections. First, it sets a context for assessing the Wellington environment by giving a brief description of the Region. We then take a detailed look at 11 key resource management topics that formed the chapters of the Regional Policy Statement. These are:

- Iwi and the Environment
- Freshwater
- Soils
- The Coastal Environment
- Air Quality
- Biodiversity and the State of Our Ecosystems
- Landscape and Heritage
- Natural Hazards
- Energy
- Waste Management and Hazardous Substances
- Built Environment and Transportation

Finally, the report examines the progress we've made towards achieving our vision for the future.

In preparing this report the Council has been conscious of the fact that it is to some extent writing its own school report. To provide a check that issues are not being missed a selection of iwi and environmental groups from throughout the Region were invited to provide commentaries on the state of the environment from their perspective. These commentaries appear throughout the report.



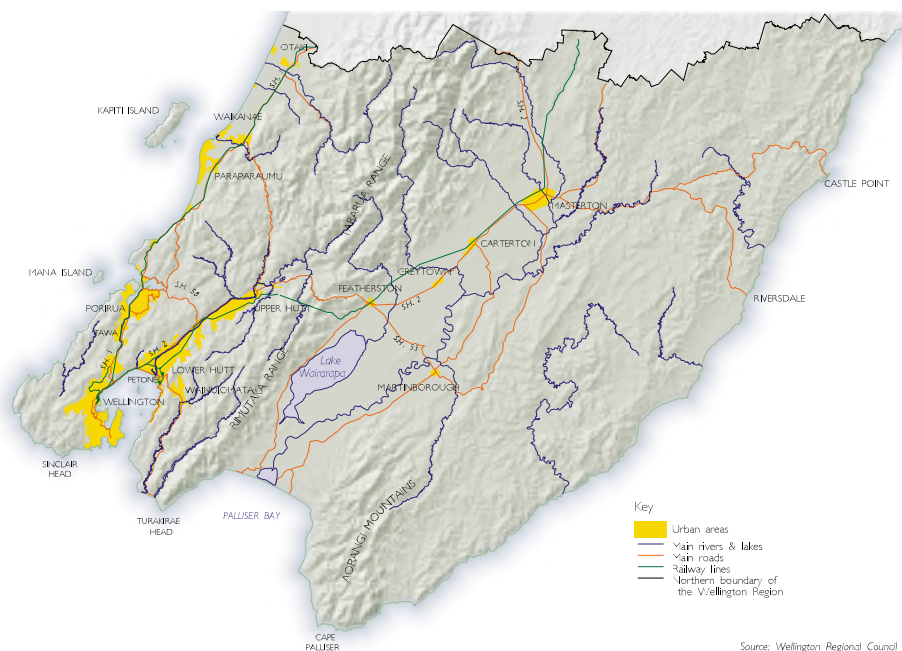
A statue in the making

The basic shape of a landscape is the block on which the unique characteristics of any region are sculpted, and nowhere is this more apparent than in Wellington. Huge chunks of greywacke basement rock, broken along the several faultlines that rip through the Region, have been bumping and grinding against each other for several million years, giving us the hollow of the Wairarapa and Hutt Valleys and the uplifted ridges of the Tararua Ranges. Not to mention earthquakes.

Cycles of climate change have provided a rough polish. During cooler periods glaciers have carved out the Tararuas, creating large alluvial plains. During warmer phases this same material has been reworked by the major rivers to form the floodplains that infill the Hutt and Wairarapa Valleys and form the coastal plain along the Kapiti Coast. Sea levels also rose during interglacial periods, inundating the river valleys and floodplains, and eventually leaving behind marine sediments which formed the capping layers for the artesian aquifers that now supply us with freshwater.

The final touch is, of course, the rich abundance of life that cloaks the Region, from farmland to suburb, native bush to coastal dune, roadside to mountain top. It is this immensely complex biological and physical web, and our human interaction with it that constitutes the subject matter of this environmental report.

Figure 2: The Wellington Region



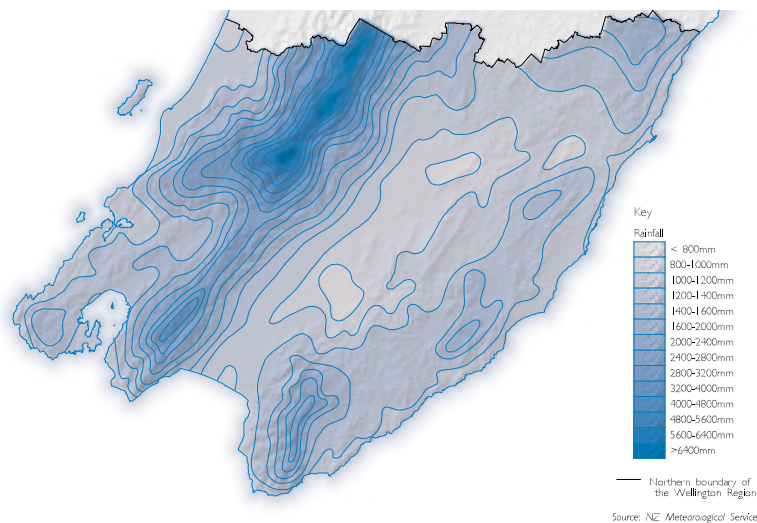
Our Region today

Climate

As anyone who has ventured to the far south in winter will vouch, our Region enjoys a temperate climate, with moderate rainfall, relatively mild daytime temperatures, and infrequent frosts. Because of its location and physiography, Wellington is renowned (somewhat unfairly) for its wind. During spring a pattern often develops whereby several days of strong northerly winds are followed by a brief southerly change and a short spell of calm weather, before a return to northerlies again.

Annual rainfall ranges from 800mm in the eastern Wairarapa, to a damp 7000mm in the high parts of the Tararua Range (Figure 3). We tend to get a typical variation of low rainfall in the summer and high rainfall in the winter, although we can get deluged at any time of the year.

Figure 3: Variations in Annual Rainfall

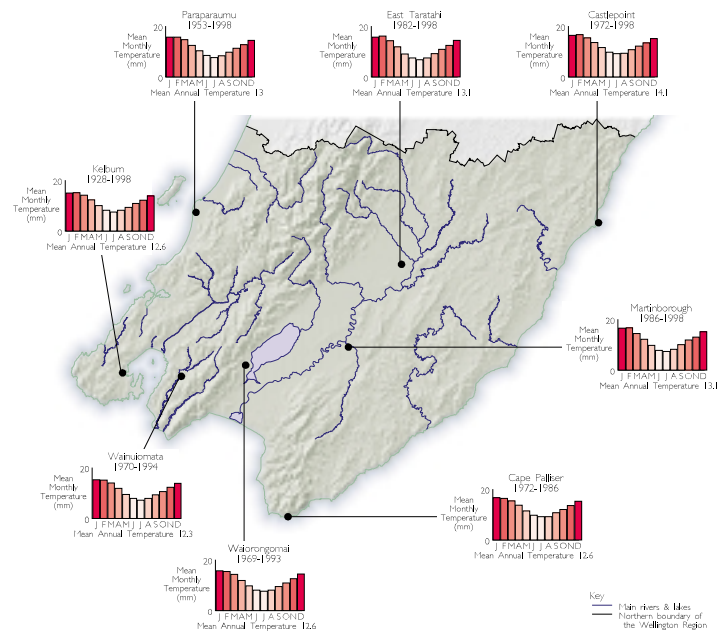


Where there's rain there's cloud, and not surprisingly our sunshine hours dip in mid-winter (around 100 hours in June) and peak in excess of 200 hours in January during the summer holidays. Large deviations from these figures occur in sheltered valleys and gullies, which develop unique microclimates (you may never get the washing dry). Although Wellington doesn't get the extremes of

temperature of some regions, the rugged topography and weather extremes can lead to large variations on any given day (Figure 4).

If you've been convinced for years that your house two streets away from your friend is more sheltered, science may be on your side. Figure 5 shows that large variations in wind exist across the Region. The wind-funneling effect of Cook Strait leads to a high frequency of strong winds around the southern coast, while the complex terrain

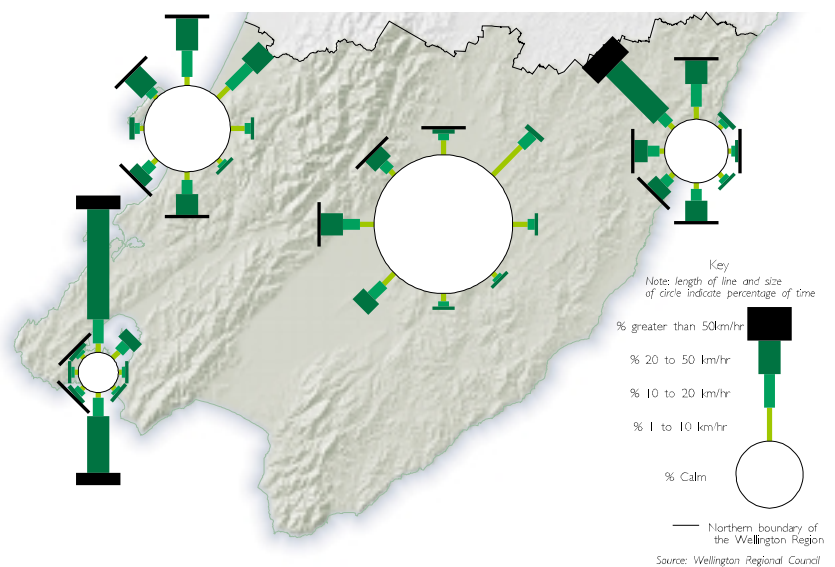
Figure 4: Variations in Annual Temperature



Source: Wellington Regional Council

results in local deviations in wind direction and strength. Wind records from Cape Palliser and Castlepoint show that the Wairarapa Coast is also amongst the windiest spots in New Zealand. Seasonal variation in wind strength is not large, but late spring does tend to top the chart. Maximum wind speeds can be very high during extreme weather events: winds of up to 200 km/h were recorded at Kelburn during the Wahine storm on 10 April 1968, and a peak gust of 215 km/h was recorded at Hau Nui in the Wairarapa on 19 October 1998.

Figure 5: Mean Annual Wind Speed and Direction



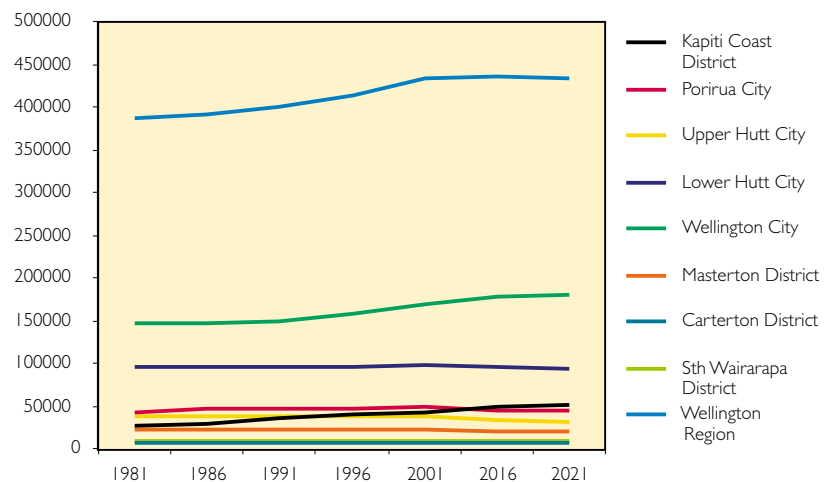
Population

In 1996 our total population was 413,976, making the Region the third most peopled area in New Zealand. Over 80% of residents live in the urban areas of Wellington City, Hutt Valley, and Porirua City. The Kapiti Coast is still the fastest growing part, increasing by 11.2% between 1991 and 1996. Wellington City increased by 5.8% and Lower Hutt City by 1%, while Upper Hutt City (-1%), Carterton District (-1%), and South Wairarapa District (-1.02%) all experienced a decline.

The Region's total population increased by 3.4% over the same Census period, which is lower than the national figure of 7.2%. Figure 6 shows the change in population and projections for each territorial authority from 1981 to 2021.

The population will probably peak between 2001 and 2016, then decline as we head towards 2021. The increase will result from net migration into two areas, Wellington City and the Kapiti Coast District, which will continue to show growth while all other areas show a decline. This decline in population will be hardest felt in rural areas, and in Porirua and Hutt cities.

Figure 6: Population Trends and Projections for the Wellington Region 1981 to 2021



IWI AND THE ENVIRONMENT



GOOD NEWS

- There have been increased opportunities for Iwi to participate.
- Regional Council is seeking opportunities to improve its relationship with Iwi.

BAD NEWS

- Regional Council is not taking the Principles of the Treaty into account in a systematic way.

Maori know the Wellington Region as Te Upoko o te Ika Maui: The Head of the Fish of Maui, giving it a special symbolic importance. Over the centuries many different tribes have occupied the lands at the base of the North island, and the area around Wellington Harbour (Te Whanganui a Tara) has had a particularly turbulent history. The first European settlers landed at Petone in 1839, a year before the signing of the Treaty of Waitangi, which continues today to be a fundamental bridge in the relationship between tangata whenua and the many other cultures who have made New Zealand home.

The Regional Council has established a relationship with six tangata whenua tribes in the Region, collectively known as Te Tangata Whenua o te Upoko o te Ika a Maui. These tribes are:

- Ngati Kahungunu ki Wairarapa
- Te Atiawa/Taranaki ki Te Upoko o te Ika a Maui
- Ngati Toa Rangatira
- Te Atiawa ki Whakarongotai
- Ngati Raukawa ki te Tonga
- Rangitaane o Wairarapa

Tangata whenua have a special status under the RMA, derived from the Treaty of Waitangi. All of those exercising functions and powers under the Act must:

- take into account the principles of the Treaty of Waitangi
- recognise and provide for, as a matter of national importance, the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga
- have particular regard to kaitiakitanga (the exercise of guardianship).

Objectives

A mutually satisfactory relationship is developed and maintained between the Wellington Regional Council and the iwi of the Region.

The principles of the Treaty of Waitangi are taken into account in resource management.

There are increased opportunities for tangata whenua to exercise kaitiakitanga in the Region.

There are increased opportunities for the cultural aspirations and tikanga of tangata whenua with regard to natural and physical resources to be met.

Regional Policy Statement

Te Tangata Whenua o te Ika a Maui and the Regional Council formalised their relationship by signing the Charter of Understanding in November 1993. While the Charter creates a forum for all Iwi to participate, the Council also recognises the need to have a relationship with each individual Iwi authority. The issues presented in this chapter are a general assessment and may not reflect each Iwi in every case.

Between a rock and a hard place: trying to make it work

Pressures on the Council

There are pressures on both the Council and Iwi that seriously affect relationships and fruitful participation in resource management processes. On the one hand, central government and resource users and developers want the Council to minimise regulation and provide a fast and efficient resource consent process, at the least possible cost to applicants. To achieve this, the Council must have systems and procedures in place to ensure a speedy turn-around of resource consent applications, particularly for small-scale activities with minor effects. It must also ensure that regulation is appropriate and necessary to promote sustainable management.

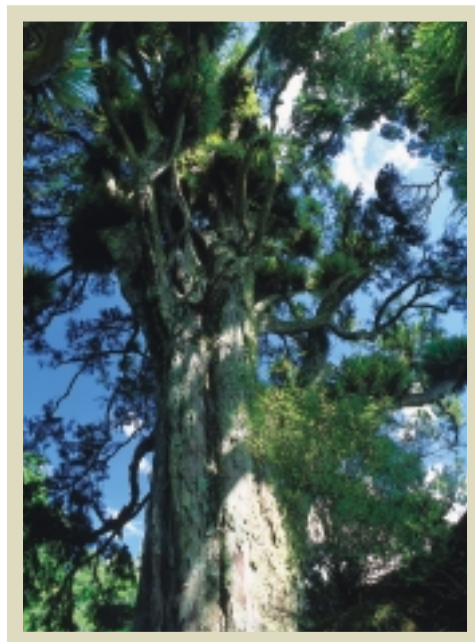
On the other hand, the Council faces pressures from Iwi because of the need to balance its responsibilities to tangata whenua under the RMA against its responsibilities to provide guidance and leadership for the whole community. The public are generally unaware of Maori concerns and interests.

The situation is made more difficult because of the uncertain constitutional position of local government in the governance of New Zealand. Or, to put it bluntly, local government has no clear obligation to give effect to the Treaty of Waitangi. While the RMA requires the Council to take the principles of the Treaty into account, there is no definitive list of principles and no statutory obligation to act in conformity with them. There is, however, a clear expectation from Iwi that the Council will do so. Consequently, Iwi aspirations and Council duties often lead to tense relationships.

Decisions from the Government, the Waitangi Tribunal and the courts continue to provide guidance as more claims and cases are heard. The decisions create greater certainty, but also place more responsibility and obligations on the Crown and their agencies. Local government's approach to the Treaty therefore requires a flexibility that can accommodate any changes arising from the decisions.

Pressures on Iwi

Iwi face even more pressure. The skills and personnel available to carry out environmental work are limited. By acknowledging the value of kaitiakitanga and seeking to give it scope, the RMA places a large responsibility on Iwi to participate in environmental management. Yet the resources to participate effectively are not being provided by central government. Many Iwi therefore rely on volunteers to process the varying amounts of resource consents, documents for consultation and site visits that need attending to. This way of working is unsustainable.



The lack of resources also affects the capacity of Iwi to train and employ their own people. With little breathing space amongst the paperwork for Iwi to plan and strategise their own environmental objectives, issues tend to be dealt with in an ad hoc manner. New graduates with the relevant skills are discouraged from working with Iwi, unless it is in a voluntary capacity, because there are no financial resources available for them to do so.

Discrepancies between resources available to Maori and local government are continually highlighted, and present a challenge to the relationship between the two parties.

Those who *are* able to work on Iwi environmental management often have other pressures on their time. Most of the representatives are involved in other areas of work for their Iwi, especially Waitangi Tribunal claims. The claims are a huge drain on time and resources and often involve many people within the Iwi. Court cases are also labour-intensive, and many of the Iwi the Council works with face high workloads.

Adding to the problem is the fact that each Iwi must forge a myriad of relationships with the different local and central government agencies in their rohe (tribal area), and then consult with these institutions on a wide variety of issues, ranging from Maori land to biodiversity strategies. Because Maori view many of these issues as interconnected, environmental concerns become enmeshed in many of the concerns felt by Iwi today.

"It is difficult to separate effects, issues and causes for this report because we view the environment as a whole, living, breathing entity. It is also difficult to focus on Regional Council areas of work as often issues cross over to other organisation's work (e.g. District Councils, DoC)."

Rangitaane o Wairarapa

The pressures on Iwi are recognised as being immediate as well as intergenerational, affecting current and future generations of tangata whenua.

Where we are now

The Council has an ongoing relationship with six Iwi in the Region. The quality of these relationships is variable, but is at best adequate, at worst, poor. Iwi have indicated to the Council that the relationship is not satisfactory from their perspective.

Table 1 is an assessment of the extent to which the principles of the Treaty of Waitangi are taken into account in resource management. 'Resource management' here refers to the Council's involvement in the preparation and implementation of the Regional Policy Statement and Regional Plans, the management of resource consents, monitoring and enforcement. These functions are tested against six primary principles:

- **The essential bargain:** local government's rights to exercise functions, powers and duties under the RMA in exchange for the protection of Maori interests, in particular, kaitiakitanga.

- **Active protection:** taking action to protect resources of importance to Iwi.
- **Tribal self-regulation:** the ability of Maori to determine the way they manage themselves and to appoint their own people to represent them on resource management issues.
- **Partnership:** Maori and non-Maori working together in the management of natural resources.
- **Mutual benefit:** both parties gaining from the relationship and from the management of natural and physical resources.
- **Equality:** equal treatment of both Maori and non-Maori. The principle of equality ensures that Maori are aware of and are included in all of the resource management processes that affect them and their relationship with the land.

Table 1: Assessment of the extent to which the principles of the Treaty of Waitangi are taken into account in resource management.

PRINCIPLE	REGIONAL POLICY STATEMENT AND REGIONAL PLANS			RESOURCE CONSENTS				MONITORING	ENFORCEMENT
	PREPARATION	DECISIONS	IMPLEMENTATION	NOTIFICATION	PROCESSING	HEARING	DECISION		
THE ESSENTIAL BARGAIN									
CONTROL OVER OWN RESOURCES	Some	Some	Some	Some	Some	Some	Some	None	None
ACTIVE PROTECTION	Some	Some	Some	Some	Great	Some	Some	Some	Some
TRIBAL SELF-REGULATION									
RECOGNITION OF TRIBAL STRUCTURES	Great	Great	Some	N/A	Great	Great	Some	Some	None
RESTORATION OF IWI SELF MANAGEMENT	Some	N/A	Some	N/A	N/A	N/A	None	None	None
PARTNERSHIP									
ACTING IN GOOD FAITH	Great	Great	Great	Great	Great	Great	Great	Great	Great
A CONTINUING RELATIONSHIP	Great	None	Some	Great	Great	Some	None	Some	None
PARTICIPATION	Some	None	Some	Some	Some	Some	None	None	None
CONSULTATION	Great	None	Some	Some	Great	N/A	None	None	None
MUTUAL BENEFIT									
MAORI RIGHT TO DEVELOPMENT	Some	Some	N/A	N/A	N/A	N/A	Some	None	None
EQUALITY	Great	Great	Great	Some	Great	Some	Some	None	None

While only a subjective assessment, the results show the varying degrees to which the principles are or have been taken into account by the Council in exercising its functions under the RMA. In preparing, making decisions on and implementing the Regional Policy Statement and Regional Plans, the Council has taken most of the principles into account to some extent. With respect to resource consents, the principles are generally taken into account in the notification, processing and hearing of consents, but to a lesser degree when making decisions.

While the assessment shows that the Council does not take many of the principles into account when undertaking its monitoring and enforcement actions, the Council

does recognise tribal structures, acts in good faith, and has a continuing relationship with Iwi across most of its resource management functions.

Despite the existing pressures, Iwi now have increased opportunities to exercise kaitiakitanga in the Region compared with five years ago. Iwi have more people involved in resource management, greater skills in this area, and more resources available to them. However, apart from the resources provided by the Council, the increased opportunities have not been the result of Council actions.

What's being done?

We have taken note of the concerns expressed by Iwi about the nature of their relationship with us, and have agreed to review the Charter of Understanding. Some additional funding has been provided in the current Annual Plan to assist Iwi to participate more fully in resource management. The Council plans to visit each Iwi to discuss the relationship and to identify ways in which it can be improved to the mutual benefit of both parties.

There are increased opportunities for the cultural aspirations and tikanga of tangata whenua to be met, because:

- the Council provides Iwi with copies of all non-notified resource consent applications in their rohe, and, since July 1998, has provided financial assistance and a procedure for Iwi to have an input for consideration by Council staff when processing the consents
- Iwi now receive a staff visit for all notified resource consents in addition to the standard letter advising them of the application
- the Council has used Maori commissioners on resource consent hearings on three occasions in the last 12 months, enabling Iwi matters to receive greater attention in the consideration of the applications
- some staff and all Councillors have received preliminary training in tikanga Maori and Maori values
- staff are assisting one Iwi in the development of their Iwi Management Plan, and the Council is likely to provide some financial assistance.



Prospects for Iwi environmental management

The current review of the Charter of Understanding and the participation of Iwi in resource management should result in increased opportunities for the objectives in the Regional Policy Statement to be met. Developing a strategy or framework that sets out opportunities for Iwi participation and the resources to be made available would help foster relationships.

The Council acknowledges that more resources alone will not resolve tangata whenua issues. The tension between the Council's jurisdiction and tangata whenua aspirations to exercise kaitiakitanga and tino rangatiratanga will continue. This is a vital issue that the Council and tangata whenua will have to work on together

FRESHWATER



GOOD NEWS

- Overall freshwater quality is good and generally water is suitable for its stated purposes of management.
- Adverse effects caused by major discharges to water are decreasing as resource consents are renewed.
- Within the variance due to climatic fluctuations our surface water resource is generally available in sufficient quantity to meet our reasonably foreseeable needs.
- Apart from some areas of localised contamination our groundwater is generally of good quality.
- We have good public access to freshwater bodies.

BAD NEWS

- In some areas water quality is deteriorating due to stormwater and non-point source discharges – if left unchecked water may become unsuitable for its purpose of management.
- The worst affected water bodies in the Region have not improved significantly.
- Some rivers regularly drop below minimum flow levels set in the Proposed Regional Freshwater Plan.
- Lower Hutt groundwater is over 100% allocated.
- The quality of some shallow aquifers is being adversely affected by surrounding land uses

Introduction

Water is an indispensable resource. Whether spouting out of a drinking fountain at Wellington Zoo, irrigating an olive grove at Martinborough, or filling a swimming pool in the Hutt Valley, people must have it. Less glamorously – but just as importantly – it is the receiving environment for various waste discharges.

Not surprisingly, water is a taonga, a treasure, for tangata whenua, both spiritually and physically. It possesses mauri or life force that can be harmed by certain practices, such as mixing water from different catchments and rivers, and the discharge of sewage. The conflict between these uses means that the resource must be carefully managed.

The Council is currently finalising the Regional Freshwater Plan, which, together with the Regional Policy Statement, provides the objectives and methods for managing the quality and quantity of our freshwater resources, as well as public access.

Water quality

Keeping it clean: pressures on water quality

Natural pressures

The flow of surface and groundwater changes with the weather. During dry periods flow rates reduce and contaminant concentrations can increase. Following heavy rainfall, erosion of exposed stream banks and naturally occurring slips causes discoloration and sedimentation of rivers and streams.

The geology of parts of the Region is also a factor. For example, water in the Kapiti coastal groundwater zone has naturally occurring levels of manganese well above drinking water standards.

Water abstraction

Drawing off water (abstraction) can adversely affect water quality by changing the natural flow pattern. Low groundwater levels can cause the aquifer to refill from surface water bodies with lower quality, such as wetlands, lakes or estuaries. Too much abstraction can also draw in water from portions of the aquifer containing lower-quality mineralised water. In extreme cases, seawater can be dragged into coastal aquifers.

Land use

Land-use activities that involve discharges of contaminants or affect the surface of the land can affect freshwater quality. Discharges fall into two categories: point and

Objective

The quality of freshwater meets the range of uses and values for which it is required, safeguards its life supporting capacity, and has the potential to meet the reasonably foreseeable needs of future generations.

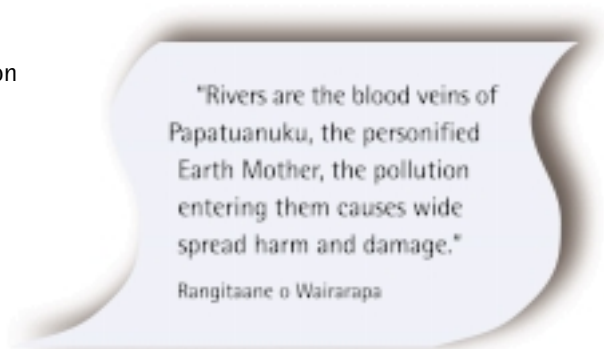
Regional Policy Statement

non-point source. Point-source contamination is the result of a specific discharge – for example, sewage discharges, agricultural effluent ponds, septic tanks, silage pits, subsurface drains, leaking storage tanks, and stormwater outlets.

Non-point source discharges occur from a wide area, such as from fertiliser and pesticide application, and spray application of agricultural effluent. The cumulative environmental effects of non-point source discharges are often significant.

Some examples of land uses in the Region that can adversely affect water quality are:

- increased dairying in areas of the Wairarapa
- intensification of land use in many horticultural areas
- increased rural subdivisions throughout much of the Region
- increasing use of land disposal for effluent treatment
- expansion of urban areas
- removal of riparian (riverside) vegetation
- high-density stocking
- stock access to rivers and streams.



"Rivers are the blood veins of Papatuanuku, the personified Earth Mother, the pollution entering them causes wide spread harm and damage."
Rangitaane o Wairarapa

Where we are now

Surface water

Under the Proposed Regional Freshwater Plan, all rivers, lakes and wetlands are managed to provide for aquatic ecosystems. Some rivers are also managed to provide for swimming, natural state, water supply and fisheries. How well we are doing is evaluated by measuring physical, chemical and biological indicators of freshwater quality and assessing the results against water-quality guidelines prepared by the Ministry for the Environment, Ministry of Health and Australia and New Zealand Environment and Conservation Council (ANZECC).

Results of recent baseline monitoring show that about 84% (52 of the Council's 62 sites) of the water bodies in the Region that are monitored have water quality suitable for their specified purpose. Long-term trends indicate little change in quality over the past five years. There have been some improvements in the bacterial and nutrient levels of some streams, mainly as a result of maintenance works undertaken by territorial authorities on stormwater and sewage systems. Deterioration caused by increased bacteria and turbidity levels has occurred in other streams – possibly the result of stormwater run-off and non-point source discharges.

Freshwater quality around the Wellington Region

Kapiti Coast

Poor oxygen results mean that the Ngarara and Mangaone Streams and Mazengarb Drain all fail to meet the aquatic ecosystem guideline. These lowland streams have a

different character to others around the Region: they are silty, slow flowing, and drain swampy areas, which raises an issue about the appropriateness of existing water-quality guidelines for this type of stream. However, ammonia levels in Ngarara Stream have also been found to be toxic to aquatic life at times, and it's getting worse. The cause is probably run-off from rural and urban areas and sewage discharges.

"Already this year there have been several reports of dead fish [in the Waikanae River] from source point pollution. In our view neither the RPS nor kaitiaki water quality objectives are being met."

Te Runanga o Ati Awa ki
Whakarongotai

Water in the lower Waikanae River has consistently failed to meet guidelines for swimming because of high bacteria levels and poor visibility. The likely causes are stormwater run-off, river works, bank erosion and silt discharges. Water in Waitohu Stream at the Norfolk Crescent monitoring site fails to meet the oxygen guideline for aquatic systems. Water quality here has deteriorated since 1996 – the effect of an oxidation pond discharge. Waitohu Stream, Waikanae River and Wainui Stream are all sources of public drinking water supplies and have been assessed as having water quality acceptable for this purpose.

Porirua

There has been no significant change in water quality at sites monitored in Porirua over the past five years. The water is generally suitable for its specified purpose (maintenance of aquatic ecosystems).

Wellington

The Owhiro, Kaiwharawhara and Ngauranga Streams meet the physiochemical guidelines for aquatic ecosystems, although macroinvertebrate community index results suggest otherwise. There have been improvements in the oxygen, ammonia and nutrient levels recorded in Ngauranga Stream over the past five years – the result of a targeted investigation that identified several specific contaminant sources, and follow-up work by both the Regional Council and Wellington City Council. Monitoring results for Ohariu and Makara Streams show that neither met the aquatic ecosystem guidelines because of high turbidity levels and undesirable biological growths.



Hutt Valley and Wainuiomata

There has been no noticeable change in the water quality of the rivers and streams of the Hutt Valley / Wainuiomata area over the past five years – which is not necessarily a good thing. Both the Waiwhetu Stream and lower Wainuiomata River fail the aquatic ecosystem guidelines: Waiwhetu Stream because of poor oxygen levels and high turbidity, Wainuiomata River because of high phosphorous levels which cause undesirable biological growths. The macroinvertebrate community index results for the lower Wainuiomata indicate poor water quality habitat. Public water supplies are taken from a number of

locations within the catchments of the Hutt, Wainuiomata and Orongorongo Rivers. Water in the Hutt River passes with flying colours, but recent detection of giardia at unsatisfactory levels has reduced the grading for the Wainuiomata and Orongorongo River waters to marginal. Work has been undertaken to fix these problems and higher gradings are hopefully not far off. The upper and middle reaches of the Hutt River are managed for bathing as well as aquatic ecosystems, and faecal coliform concentrations indicate that all sites are suitable for bathing.

Wairarapa

The Huangarua, Waiohine Gauge, Waingawa South Rd, and Mt Bruce sites rate well, probably because of the low-level land uses surrounding them and no municipal oxidation pond discharges. Water quality is poor at Double Bridges, Whangaehu, Mangatarere, Waiohine, Bicknells, Waihenga, and Gladstone. All of these sites are surrounded by land used for intensive agriculture, and (with the exception of the Whangaehu River) are also all downstream of municipal oxidation pond discharges. The Whangaehu and Mangatarere River sites are the worst, regularly exceeding the bacteria level for bathing.

Not unexpectedly, the Ruamahanga River is squeaky clean in its upper reaches (Mt Bruce) but has poorer water quality in its mid - lower reaches (Te Ore Ore, Gladstone, and Waihenga). The scouring effect of the frequent freshes and floods keeps algal growths down, and faecal coliform levels indicate that most sites comply with the guidelines for stock watering and bathing, most of the time.

The Whakawiriwiri Stream has improved significantly since 1995, the effect of changing the local methods of effluent disposal from direct discharge to water to discharge to land. Lake Wairarapa is 'supertrophic' (has comparatively high nutrient concentrations compared to other lakes in New Zealand), and trends show no significant change since monitoring began in 1994.

Water for public supplies is taken from Boar Bush Gully, Moroa Water Race, Huangarua River, Waingawa River and Kaipatangata Stream.

Groundwater quality

The Proposed Regional Freshwater Plan seeks to ensure

"The Ruamahanga seems to be the 'sink' for pollution. It has tributaries entering into it containing various contaminated discharges (point and non-point), the Ruamahanga also has its own direct and diffuse discharges."

Rangitaane o Wairarapa

"Amongst Wairarapa iwi there is a general perception that water quality in the region is in decline. It is often one of the key concerns held by Maori in the Wairarapa region. According to perception, the two greatest factors affecting the state of our water quality are the discharge of sewerage and the diffuse water pollution from agricultural activities."

Ngati Kahungunu ki Wairarapa Maori
Executive Taiwhenua

that all groundwater is protected from the adverse effects of discharges. The Proposed Regional Plan for Discharges to Land also sets targets for a significant reduction in contamination of groundwater as a result of discharges of sewage to land, and promotion of land management practices that minimise the effects of agricultural contaminants.

The Council currently collects baseline samples at 51 sites covering a range of settings, from spring discharges to confined aquifers in excess of 120 m deep. In general, shallow bores are sampled quarterly while deeper bores, or those in areas with limited use of groundwater, are sampled either six-monthly or annually. Additional samples are also occasionally collected in areas not covered by the regular sampling programme, just to keep an eye on things.

The good news: results indicate that groundwater quality is generally very high throughout the Region. Groundwater quality in most aquifers meets the drinking water standards. Some fail either because of naturally occurring geochemical processes, or as a result of localised contamination from land-use activities.

Table 2 summarises groundwater quality data from six representative aquifer systems in the Region. Significant differences in quality are obvious between shallow and deeper aquifers, while shallow unconfined aquifers, predominantly recharged by either rainfall infiltration or river seepage, also show significant differences in groundwater quality.

Some shallow unconfined aquifers on the Kapiti Coast and in the Wairarapa also

Table 2: Summary of groundwater quality data from the Wellington Region

Groundwater zone	WAIRARAPA			HUTT	KAPITI	
	Opaki	Moroa	Lower Valley	Lower Hutt	Coastal	Hautere
Aquifer depth (m)	6	5	45	35	10	90
Aquifer type	Unconfined	Unconfined	Confined	Confined	Unconfined	Confined
Recharge source	River	Rainfall	N/A	River	Rainfall	N/A
Electrical conductivity	85	138	832	127	251	594
pH	6.3	5.8	6.9	6.2	7.0	7.4
Total hardness	28	34	221	28	33	130
Chloride	6	15	90	14	42	110
Sulphate	5	8	0	7	12	< 1.0
Nitrate - nitrogen	0.9	6	0	0.8	0.2	< 0.01
Ammonia	< 0.05	< 0.05	10	< 0.05	0.3	0.4
Sodium	6	11	74	11	30	65
Calcium	8	8	54	7	7	31
Magnesium	2	3	21	3	4	12
Iron	0.1	0.4	13.2	0	2.9	1.8
Manganese	< 0.05	< 0.05	1.3	0	0.1	0.9

Note: all parameter concentrations are in mg/L

show evidence of localised contamination from land-use activities. The most common groundwater quality problems are elevated nitrate levels and microbial contamination. A groundwater quality survey of the Kapiti Coast in November 1996 showed that a significant number of wells (24 of the 33 sampled) on the Hautere Plain contained nitrate levels close to or above the Ministry of Health's maximum acceptable levels for drinking water. The high nitrate-level bores were all screened in the unconfined aquifer at depths of less than 35 m. This is of concern because many residents in this area use shallow bores as their sole source of domestic water. Deeper bores generally contained very low nitrate levels.

In total, an area of approximately 12 square km was affected by the high nitrate levels. Subsequent monitoring has shown nitrate levels to have remained relatively stable over the intervening two years.

This nitrate contamination is attributed to a combination of the hydrogeology and land use. The aquifer system is recharged exclusively from rainfall infiltration (seeping down) and the area has been used for dairying and horticulture for a long time. Recent isotope sampling has indicated an age of 15–20 years for groundwater in the unconfined aquifer. The current pattern of nitrate contamination may therefore reflect the cumulative effects of past land use.



Some shallow aquifers on the Kapiti Coast and in the Wairarapa also show evidence of localised contamination, for similar reasons. The most common problems are elevated nitrate levels and microbial contamination. These are generally associated with effluent disposal, fertiliser application and stocking rates, or as a result of poor well construction or well-head security

What's being done?

The preparation and implementation of the Proposed Regional Freshwater Plan are the primary responses of the Regional Council to ensure that the Region's surface water resources are managed in a sustainable manner. Specific measures include:

- identifying specific management purposes for freshwater bodies and setting relevant guidelines
- recognising that discharging contaminants to water is a legitimate use, provided the effects of the discharge do not compromise the management purpose.


The discharge of stormwater, water from reservoirs and pipelines is permitted subject to conditions that preserve water quality. Resource consents are required for all other discharges.

Other responses include:

- gathering water quality information (monitoring)
- involving people and communities in the way freshwater is managed by:
 - keeping them informed about the state of freshwater quality
 - encouraging people to report pollution incidents
- promoting the retirement and planting of riparian margins
- working with territorial authorities so that the effects of land use on water quality are adequately controlled
- taking action on illegal discharges.

As sewage discharge consents are renewed, new conditions are imposed that give the opportunity to improve water quality. Similarly through the consent process there has been a move to discharge treated effluent to land rather than directly to water. This has also led to general improvements in water quality.

Several of the territorial authorities in the Wellington Region have implemented maintenance and improvement programmes for their sewage and stormwater systems. In some areas these works have led to improved water quality.



"What is being done about the high nitrate levels in Te Horo? Although the source of contamination has been identified, commonsense would point towards a horticultural origin. WRC should encourage cover crops when fields are left fallow to stop erosion and turbidity."

Kapiti Environmental Action

Prospects for water quality

Surface water

Surface water quality is being maintained at most locations under the present management system, although adverse effects are occurring in some areas as the result of rural run-off and stormwater discharges. As the effects of major discharges are reduced through resource consents taking effect, the issues arising from the uncontrolled discharge of rural run-off and stormwater will become more evident.

The Regional Policy Statement seeks the enhancement of a number of badly contaminated water bodies in the Region. The rivers and streams identified are: the Waikanae River Estuary, Mazengarb Drain, Ngauranga Stream and Makoura Stream. Based on recent monitoring results Makara Stream and Donalds Creek could be added to the list. Getting water quality to a level that makes these waters suitable for sustaining aquatic ecosystems will require a greater level of action than currently occurs.

What can we do? Significant water quality improvements could be achieved over time by:

- requiring improvements in discharge quality as resource consents are renewed.
- requiring discharge consents for stormwater discharges where these are known to have adverse effects
- promoting the involvement of people and communities in freshwater management in ways that do not require resource consents, but that will enhance water quality (for example, streamside management groups)
- subsidising retirement and planting of riparian margins where this will enhance aquatic habitat
- undertaking measures to physically remove silt and contaminated sediments
- discouraging unnecessary stock access to rivers and streams
- facilitating environmental care groups within the community.

Groundwater

Groundwater throughout the Region is generally suitable for the current range of uses, although in some areas the quality of shallow groundwater is being reduced by the effect of intensive land uses and on-site sewage disposal. More work is needed, including:

- the identification of groundwater protection zones that delineate areas where groundwater is more susceptible to the effects of land use and on-site discharges
- placing greater controls over activities such as the use of pesticides and fertiliser and disposal of contaminants within these susceptible areas
- further developing our understanding of the sources of contaminants affecting groundwater quality.

"KEA feels there is a lack of commitment to the Waikanae estuary which is under stress. Interest shown by WRC would be helpful and would complement the good work being done further upstream."

Kapiti Environmental Action

The fact that contamination of groundwater is very difficult to fix is a good reason for maintaining a conservative approach to managing our groundwater resources to ensure that they are sustained in the longer term.

Objective

The quality of freshwater meets the range of uses and values for which it is required, safeguards its life supporting capacity, and has the potential to meet the reasonably foreseeable needs of future generations.

Regional Policy Statement

Water quantity

Most of the time we don't really think about how much water we use. Yet the freshwater resources of the Region come under pressure to meet a wide range of needs. Taking water for agriculture, water supply and industry must be weighed against the need to maintain the life-supporting capacity of rivers and the need to protect the cultural, historical and spiritual properties of water sacred to Maori.

Water water everywhere?

Climatic change

The weather is a huge factor influencing water quantity. Natural variations in rainfall affect the volume of water that infiltrates the ground to recharge aquifers, or runs off to produce river flows. River levels are obviously influenced by the amount of water that falls within their catchments. Very low flows decrease the habitat available for aquatic life, and can exacerbate water-quality problems from discharges into rivers.

Low rainfall also means that aquifers don't recharge and groundwater levels fall. Conversely, during periods of above-average rainfall, the rate of recharge is increased and groundwater levels rise. Many aquifers exhibit significant groundwater level fluctuations in response to the seasonal variation in rainfall. Similarly, water levels in aquifers recharged predominantly by seepage from rivers and streams are affected by seasonal flow variations.

Other climatic factors such as temperature, wind speed and evapotranspiration rates have a major effect on soil moisture levels. These factors largely control the rate of groundwater recharge from rainfall while having a major influence on the demand for groundwater for irrigation and municipal supply.

Water abstraction

The highest demand for water generally occurs during the summer months, when the availability of water is naturally lower, and this can significantly reduce river flows. In the Wellington Region the total volume of water allocated for abstraction through resource consents is currently about 579,181 cubic m per day (m³/day). Table 3 shows who uses all this water.

Agriculture heads the list, accounting for nearly half of all water abstracted. Two thirds of this water is taken in the Wairarapa. The water is mainly used for irrigation, and to a lesser extent for stock watering, wash-down water and domestic use. Taking water for stock purposes and domestic needs are permitted activities (no consent is required) at rates of up to 20 m³/day. The amounts of water taken as permitted activities are not accounted for in Table 3.

Table 3: Volume of surface water allocated in the Wellington Region, March 1999

CATEGORY	VOLUME (m ³ /day)	PERCENT
Agriculture	284,255	49.0
Community Water Supply	201,336	34.8
Other	90,984	15.7
Industry	2,606	0.5
Total	579,181	100.0

Community water supply is also a big consumer. The main catchments used for water supply are the Hutt, Wainuiomata, Orongorongo, Waikanae, Waitohu and Waingawa Rivers, and the Kaipaitangata Stream.

Other uses include smaller takes for swimming pools and lakes in public parks and gardens. Most of the water taken by industry is used for washing aggregate in gravel plants and quarries.

The extent to which groundwater abstraction can reduce aquifer levels depends on the amount and rate of abstraction, as well as the physical properties of the aquifer materials. A significant reduction in levels can lead to a number of problems, including:

"Fresh surface water, especially in summer, has continued to be depleted as it is increasingly taken for stock and irrigation purposes, this of course has impact on the quality of our rivers."

Rangitane o Wairarapa

- less groundwater available for consumers
- an increased rate of infiltration from surface water bodies, causing a reduction in stream flow or drying out of wetland areas
- a reduction in flow from springs
- a reduction in groundwater quality, caused by changes in the natural pattern of groundwater flow
- ground subsidence
- the movement of brackish water into coastal aquifers.

Land use

Changes in land use can have a significant effect on the water balance and stream flow. Table 4 lists some of the commonest changes and their potential effects on the availability of water.

Table 4: Potential effects of changing land use on surface water

REMOVAL OF	REPLACED WITH	EFFECTS
Forest/scrub	Pasture	Increase in water yield; higher flood peaks; lower base flow.
Native forest	Pine	Water yield increases after clearfelling but returns to normal after about 5 years, and eventually is lower than before disturbance.
Gorse/scrub	Pine	Water yield increases after clearfelling but returns to normal after about 5 years, and eventually is lower than before disturbance.
Pasture	Pine	Annual water yields reduce by up to 50%; low flows may fall by 50% and peak flows by 80%.
Rural/forest	Urban development	Increase in the size of floods; flood peaks occur more quickly; reduced groundwater infiltration leads to lower base flow.

Reduction or destruction of wetlands can also have adverse effects. Wetlands are important in sustaining flow in rivers and streams during dry periods, and can help to control floods by storing floodwater and releasing it gradually.

Where we are now

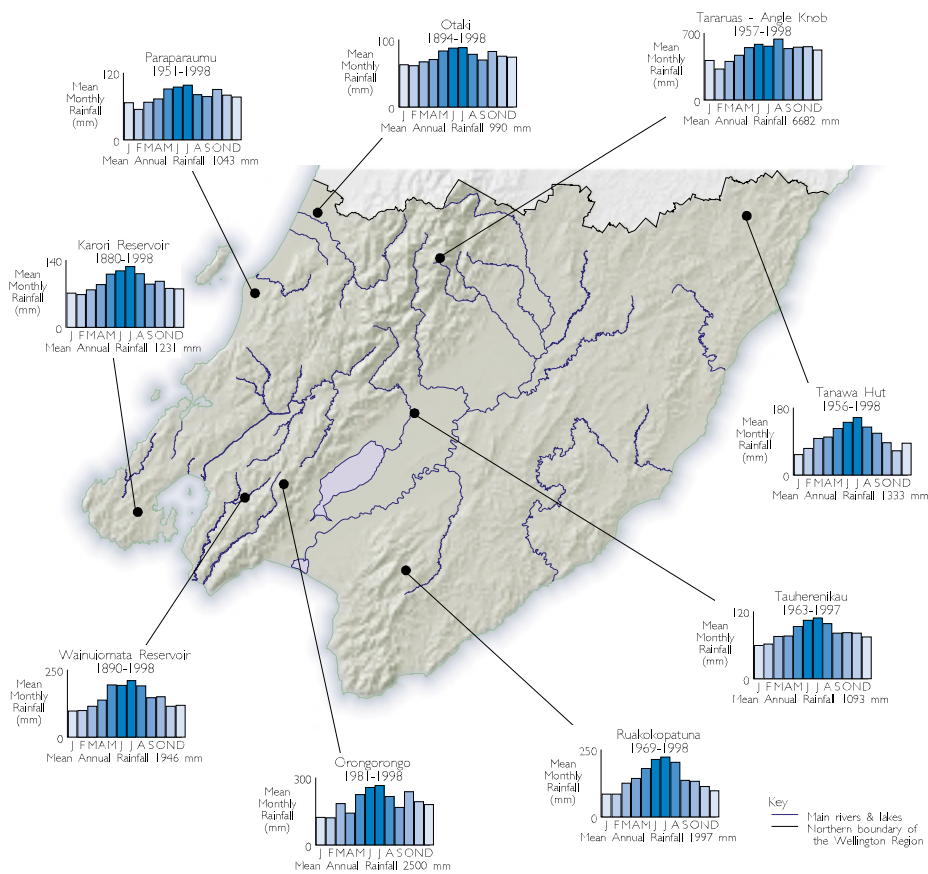
Surface water

We can tell how much surface water we have by monitoring *rainfall, river flow and lake and tide levels.*

Rainfall

Average rainfall across the Region varies from less than 800 mm per year in the Wairarapa valley, to about 7,000 mm in the Tararua Ranges. Figure 7 shows the wettest areas are the Tararua, Rimutaka, and Aorangi Ranges, while the drier areas are in the Wairarapa valley and on the Kapiti Coast.

Figure 7: Mean Average Rainfall Across the Region



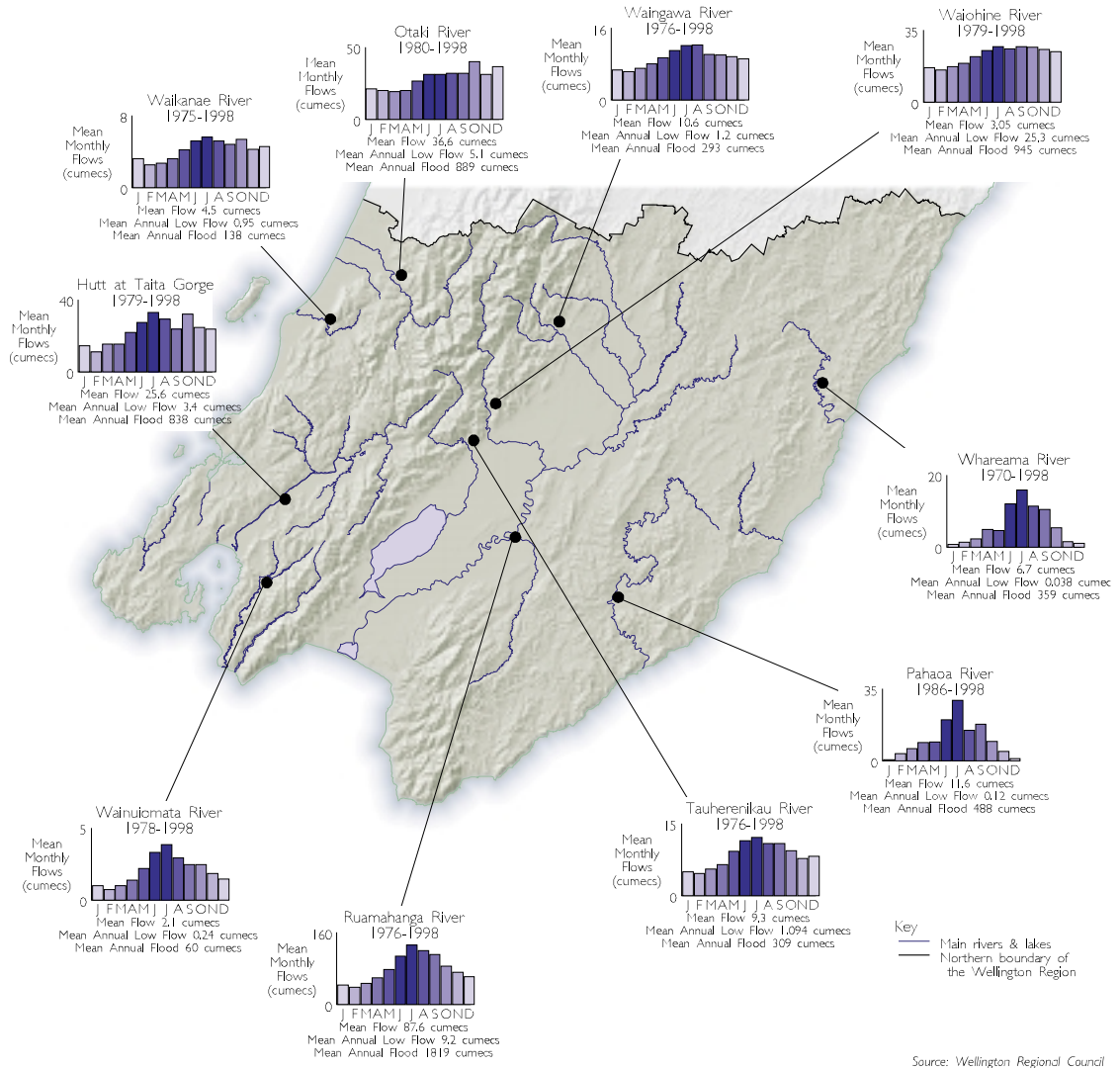
Source: Wellington Regional Council

Rivers

The Ruamahanga is the largest river in the Region, its catchment covering about 41% of the total land area. The Hutt River is the second largest: nearly 130,000 people live within its catchment, with some 71,000 (18 % of the Region's population) exposed to the risks of flooding. River flows across the Region vary throughout the year as rainfall varies: lower flows in summer and autumn, and higher flows in winter and spring. During summer and autumn, dry weather can cause extremely low flows in the eastern hill country (Figure 8).

The Proposed Regional Freshwater Plan specifies minimum flows for some rivers in the Region, which allow people and communities to use the water while ensuring flows are sufficient to maintain their natural and amenity values. Stepdown levels have also been set to provide a warning that minimum flows are being approached and to trigger water-conservation measures. Table 5 lists these critical flows and provides a summary of the performance of each of these rivers relative to these levels over the past five years. Each year for the past five years the Waingawa River, Waitohu Stream and Wainuiomata River have fallen below these desirable minimum flow levels. The dry summer and autumn of 1999 resulted in sustained periods of low flow in many rivers across the Region.

Figure 8: Mean Annual Flows in Selected Rivers.



As resource consents are renewed, new conditions are attached that restrict the amount of water that can be taken from these rivers once stepdown levels or desirable minimum flow levels are reached. Many consents to take surface water expire in 2001.

Lakes

The Region has only a few lakes, but they are highly valued for their cultural and recreational values, and the significant habitats they provide for animals and plants. Lake Wairarapa is the largest. It covers 80 square km, but is no deeper than 3 m throughout. During large floods the lake is used to store flood water from the Ruamahanga River, which is then released after the flood peak has passed. The level of Lake Wairarapa is affected by inflow from tributaries and the lower valley flood ways, flow in the Ruamahanga River, tidal influences, the state of the river mouth at Lake Onoke, and operation of the barrage gates.

Target lake levels have been specified in the resource consent issued for the operation of the barrage gates. The Council is required to maintain Lake Wairapa at levels that provide adequate flood protection while allowing for farming, wildlife and recreational values. No other lakes within the Region are routinely monitored.

Wetlands

Wetlands provide a habitat for wildlife, help reduce flood damage and mitigate some effects of water pollution. They are critical to effective functioning of freshwater and coastal systems. Historically wetlands have been drained and converted to productive use, but they have also been adversely affected by invasion of plant pests, silt accumulation from earthworks and transport developments, toxic chemical and nutrient inputs, and damage from changes to river hydrology upstream of wetlands.

Table 5: Desirable Minimum Flows and Step-down Levels for Wellington Rivers

Proposed Regional Freshwater Plan Levels	Flow (L/s)	1995		1996		1997		1998		1999	
		No. of Days Below Level	Lowest Flow for Year	No. of Days Below Level	Lowest Flow for Year	No. of Days Below Level	Lowest Flow for Year	No. of Days Below Level	Lowest Flow for Year	No. of Days Below Level	Lowest Flow for Year
Waitohu at the KCDC Water Supply Intake											
Desirable Minimum Flow	140	1		1		2		0		12	
1st Stepdown Flow	180	17	136	12	130	9	137	1	170	48	129
Otaki River at the Lower Gorge											
Desirable Minimum Flow	2550	0	4848	0	5748	0	4634	0	5841	0	3890
1st Stepdown Flow	4370	0		0		0		0		7	
Mangaone at the Ratanui Recorder											
Desirable Minimum Flow	22	0		0		0		0		0	
1st Stepdown Flow	45	0	76	0	71	0	73	0	85	0	63
Waikanae at the Water Treatment Plant											
Desirable Minimum Flow	750	0		0		0		0		0	
1st Stepdown Flow	900	0	1023	0	1156	0	1162	0	1101	4	851
Hutt at Birchville											
Desirable Minimum Flow	1200	0		0		0		0		0	
1st Stepdown Flow	1450	0	1942	0	1736	0	2644	0	2282	0	1500
Wainuiomata at and below Manuka Track											
Desirable Minimum Flow	100	0		0		0		0		0	
1st Stepdown Flow	-	0	139	0	174	0	208	0	152	0	126
Wainuiomata at Leonard Wood Park											
Desirable Minimum Flow	300	3		5		26		72		70	
1st Stepdown Flow	360	16	286	21	248	48	190	99	155	84	144
Orongorongo River at and below Truss Bridge											
Desirable Minimum Flow	100										
1st Stepdown Flow								0	186	0	205
Ruamahanga at Waihenga											
Desirable Minimum Flow	8500	3		0		0		2		1	
1st Stepdown Flow	9800	8	7025	3	7794	0	12041	5	7694	4	7020
Waiohine River at the Gorge											
Desirable Minimum Flow	2300	0		0		0		0		0	
1st Stepdown Flow	3040	3	2728	3	2160	0	3315	0	3748	3	2796
Tauherenikau at the Gorge											
Desirable Minimum Flow	1100	11		1		0		0		0	
1st Stepdown Flow	1400	23	844	4	992	6	1167	11	888	7	236
Waingawa at Upper Kaituna											
Desirable Minimum Flow	1100	2		0		0		01		5	
1st Stepdown Flow	1900	26	969	3	1066	17	1366	5	1399	36	961
Kopuaranga at Palmers Bridge											
Desirable Minimum Flow	270	0		0		0		11		7	
			286		381		398		226		236

Lake Wairarapa is the largest wetland complex in the southern North Island, and is considered to be of national and international importance for indigenous plant and animal communities. Between 1964 and 1984 works undertaken by the Lower Wairarapa Valley Development Scheme reclaimed 2600 ha of wetland for development into farmland.

Lake Onoke (about 7 square km), Lakes Kohangapiripiri and Kohangatera on the Pencarrow coast (1.5 square km) and Taupo Swamp south of Pukerua Bay are other major wetlands in the Region. The Council's flow recorder downstream of Taupo Swamp indicates that water levels in the swamp are reasonably stable. No other wetlands are monitored.

Groundwater

The quantity of groundwater available in the Wellington Region is determined by measuring water table levels in unconfined aquifers, and groundwater pressures in confined aquifers. Monitoring is generally concentrated on those sites with the highest levels of groundwater abstraction or where future development is likely to occur, but the monitoring network may need to evolve to reflect changing patterns of groundwater use and specific resource issues.

The Proposed Regional Freshwater Plan provides safe yields for each zone (Table 6). Safe yields set a limit on the total volume of groundwater that can be taken by resource consent holders in each area. At present, the Lower Hutt groundwater zone is the only aquifer system in the Region that is fully allocated, although abstraction volumes in several other groundwater zones, especially in the Wairarapa, are increasing. Minimum groundwater levels have been set for the Lower Hutt groundwater zone and in the Moroa aquifer near Carterton. Groundwater must be maintained above these levels at all times so that the water is available to all users, spring flows are maintained, or, in the case of Lower Hutt, to avoid the possibility of sea water entering the aquifer system.

Groundwater levels and artesian pressures have been around average over the past five years. Some extremes have been observed, largely due to the weather. For example, many aquifers in the Wairarapa reached the lowest levels recorded during the summer droughts of 1994 and 1998, but recovered to close to average levels during the subsequent winters. In contrast, groundwater levels reached record highs on the Kapiti Coast following the heavy spring rains experienced during 1998.

Many aquifer systems in the Region receive most of their recharge from rainfall infiltration, so are sensitive to changes in both the timing and amount of rainfall received. Very little summer rainfall seeps through because it's absorbed by the dry soil or taken up by plants. We really need the rain during winter and spring when the soil is near saturation.

Table 6: State of Groundwater Zones

Area	Groundwater Zone	Allocated Volume (m ³ × 10 ⁶ /year)	Calculated Safe Yield (m ³ × 10 ⁶ /year)	Percentage of Resource Allocated
Wairarapa	Ahikouka	1.76	3.3	53
	Battersea	1.52	5.3	29
	Carterton	1.08	3.9	28
	East Taratahi	0.23	6.8	3
	Fern Hill	0	4.7	0
	Greytown	1.37	20.0	7
	Hodders	0.05	4.0	12
	Huangaaru	0.005	2.0	2
	Lower Valley	0.01	0.8	1
	Lower Valley	6.02	13.5	45
	Lower Valley	2.74	7.7	36
	Mangatarere	1.75	7.6	23
	Martinborough Terraces	0.38	7.8	5
	Masterton	0.29	3.2	9
	Matarawa	0.67	10.0	7
	Middle Ruamahanga	4.73	7.3	65
	Middle Ruamahanga	1.18	2.2	53
	Moroa	0.49	0.8	62
	Opaki	0.14	2.3	6
	Parkvale	0.64	4.5	14
	Parkvale	2.46	4.1	60
	Pirinoa Terraces	0.38	18.1	2
	Rathkeale	1.48	4.5	33
	Riverside	1.23	3.9	32
	South Featherston	0.48	5.3	9
	Tauherenikau	1.71	20.0	9
	Tawaha	8.42	11.0	77
	Te Ore Ore	0.69	4.6	15
	Te Ore Ore	2.13	3.0	71
	Upper Plain	1.89	17.0	11
	Woodside	0.26	16.0	2
	Kapiti	Waitohu	1.8	6.4
Otaki		7.96	11.2	71
Coastal		0.7	6.92	10
Hautere		0.86	6.67	13
Waikanae		2.43	10.71	23
Hutt Valley	Raumati/Paekakariki	0.41	4.77	9
	Upper Hutt	3.6	26.86	13
	Lower Hutt	35.6	35.6	100
TOTAL		99.55	334.3	29

The total volume of groundwater allocated in the Wellington Region is about 99.6 million m³ per year. This represents about a third of the total volume of groundwater available for allocation on a sustainable basis. In addition, an unknown volume of groundwater is abstracted for domestic use and stock watering as a permitted activity (up to 20 m³ per household per day). While some aquifers are coming under increasing pressure for municipal supply and irrigation, there is no indication that problems lie ahead.

In the Wairarapa, recent dry summers and a jump in the number of rural subdivisions have seen a big increase in the number of bore permits issued over the past two years. On the Kapiti Coast use of shallow groundwater for domestic supply and garden irrigation has also increased significantly. A lot of shallow bores (less than 8 m) have been drilled recently to supply water for rural residential development, or by residents in urban areas affected by watering restrictions that curtail garden irrigation over summer.

The Lower Hutt groundwater zone is a major water source for the greater Wellington area. During the summer months this aquifer currently supplies up to 100 million litres of water per day for municipal supply – close to the calculated safe yield of the aquifer system.

What's being done?

Preparation and implementation of the Proposed Regional Freshwater Plan is the main way the Council is ensuring the Region's fresh water resources are managed sustainably. Five specific measures include:

1. setting minimum flows and water allocation budgets for rivers where:
 - there is potential for water shortages
 - there is sufficient information to set flows and allocate water with reasonable confidence
2. identifying water bodies that are susceptible to water shortages but where there is not enough information available to set minimum flows or allocate water budgets
3. establishing sustainable yields for each of the groundwater zones in the Region
4. requiring resource consents for:
 - surface water takes greater than 20,000 litres
 - taking any water from the Hutt Groundwater Zone, and for taking more than 20,000 litres from all other groundwater zones in the Region
 - drilling bores/wells directly into aquifers in the Region.

"Surface water in many areas of the Wairarapa is already exhausted and hence people are turning their attention to groundwater, which in some cases impacts on surface waters anyway. There is a perception here that the groundwater is just moving out to the coast wastefully so we may as well use it."

"District council town supply systems are steadily increasing their water takes to satisfy the demands of its users. The town supply systems also supply commercial grape growers and other horticultural enterprises and industry customers to the detriment of the domestic use."

Rangitane o Wairarapa

Other responses include:

- monitoring river flows, groundwater levels and water abstraction
- involving people and communities in the way freshwater is managed by keeping them informed about water allocation issues
- encouraging water conservation and efficient use of water
- developing skills and techniques for forecasting droughts using the southern oscillation index
- promoting user committees to assist with the allocation of water
- taking action on illegal water takes
- implementing low-flow monitoring programmes
- undertaking surveillance programmes designed to quantify the amount of water being taken as permitted activities.

A number of water supply authorities within the Region have implemented water conservation initiatives to reduce water use during periods of high demand and low supply. These have ranged from preparing educational material to imposing bans on using sprinklers and hoses.

Prospects for water quantity management

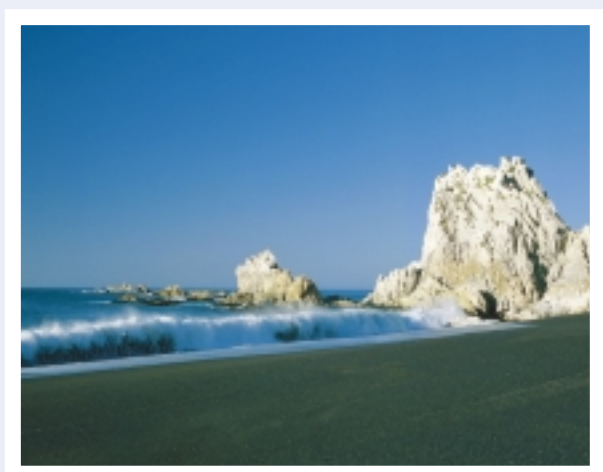
Surface water

Our monitoring over the past decade suggests that generally enough surface water is available to meet the full range of community needs. However, occasional shortages due to natural variations in climate highlight the need for the community to be prepared for water shortages. The Council's work in developing long-term drought forecasting techniques and water supply authority initiatives in water conservation help us to be prepared. But we also need to know more about the quantities of water that are taken as permitted activities, particularly in catchments that become stressed during extremes in climate.

Flows in a number of key rivers within the Region frequently drop below the minimum flow levels set in the Regional plan. As resource consents in these rivers are renewed, additional conditions restricting water takes during periods of low flow have been

included. The Council needs to upgrade its water level recorders on these sites to provide instantaneous records of flow so that the consent conditions can be implemented immediately whenever necessary.

While wetlands are recognised as important ecosystems, the Council gathers little information on wetland hydrology. The only monitoring currently undertaken occurs at Lake Wairarapa and downstream of Taupo Swamp. Good information about the hydrology of these areas and the likely effects of activities that could occur within their catchments is critical to sustaining these resources in the future.



Groundwater

The Council currently takes a regulatory approach to the management of groundwater – more so than for some other resources in the Region. This is necessary because adverse effects on groundwater can be long-lasting, even irreversible. The quantity of groundwater available throughout the Region is generally sufficient to meet the current needs, but in some areas (most notably Lower Hutt) groundwater is fully allocated.

Since the mid-1980s the volumes of groundwater allocated throughout the Region have gradually increased. This reflects the increased demand for water caused by increasing population and, in many areas, a change to intensive land use which requires intensive irrigation. The number and volume of resource consents issued gives the Council a guide to likely maximum water usage but gives little information on variations in demand through and between seasons. At present, only groundwater users in the Hutt Valley are required to supply the Council with records of actual usage. More collection of this data may be necessary in the future in areas where allocation levels approach the calculated sustainable yield of the aquifer system. As with surface water, we need to know more about the quantities of groundwater that are taken as permitted activities, particularly in areas that become stressed during extremes in climate, or in areas like the Kapiti Coast where groundwater utilisation has increased in recent years.

Public access to and along rivers and lakes

Hacking through the blackberry

So you want to stop the car and cool off by the river? But whose land are you tromping over? And is it worth fighting your way through the undergrowth? The main obstacle to improving public access to rivers, lakes and streams whose beds are in public ownership is the lack of legal access across private land, and uncertainty about where access is legally allowed. Even where legally provided for, access can be blocked by poor maintenance. It's difficult to manage reserves adjacent to water bodies – they are geographically dispersed, subject to flooding, a focal point for recreational use and vandalism and often require labour-intensive or resource-demanding maintenance. At some sites pest plants such as blackberry make access difficult.

Where we are now

The Regional Policy Statement lists rivers and lakes in the Region that are regionally significant. These are summarised in Table 7. Although access to these rivers and lakes is possible at some points, the Council places a priority on enhancing access to them.

Objective

The Regional Policy Statement contains no specific objective relating to public access to and along rivers and lakes, but includes the following anticipated environmental result:

Public access to water bodies is maintained and/or enhanced where appropriate.

Table 7: Water bodies of regional significance

REASON FOR SIGNIFICANCE	WATER BODIES
Natural features, indigenous vegetation or habitats of indigenous aquatic fauna	<ul style="list-style-type: none"> • Waiohine River (gorge and above) • Otaki River (gorge and above) • Hutt River (Kaitoke Gorge and above) • Lake Kohangapiripiri • Lake Kohangtera • Lake Onoke • Upper Wainuiomata River • Orongorongo River • Lake Wairarapa
Landscape and scenic qualities	<ul style="list-style-type: none"> • Ruamahanga River (gorge and above) • Waiohine River (gorge and above) • Otaki River (gorge and above) • Hutt River (Kaitoke Gorge and above) • Orongorongo River (upper reaches)
Landforms and geological characteristics	<ul style="list-style-type: none"> • Hurupi Stream (stream cliffs at coast) • Bells Creek, Mangaopari Stream, Makara River (4 km of river and stream cuts) • Otaki River (upstream of Pukehinau Stream) • Ruakokopatuna Gorge • Kaiwhata Stream Sills
Heritage, recreational or amenity values	<ul style="list-style-type: none"> • Mid-Ruamahanga River: recreation, angling • Otaki River (gorge and above): recreation, angling • Otaki River (gorge to SH1): recreation, angling • Hutt River (Kaitoke Gorge and above): recreation • Mid-Hutt River: angling • Wainuiomata River: angling • Kopuaranga River: angling • Middle and lower Orongorongo River: recreation • Lake Onoke: recreation • Lake Wairarapa: recreation, waterfowl hunting

Determining where the public can and can't get legal access is hindered by the complicated legal status of land adjacent to water bodies. The myriad of laws dealing with access mean such land is recorded and documented in many different ways (for example, legal road, road reserve, marginal strip, ambulatory strips, section 129 strips, local purpose reserves, section 58 strips). Some forms of access are only recorded on property titles and are therefore even more difficult to find.

We examined the extent of legal public access in 1998. The major findings were as follows.

- Where there is effective public access it is frequently the result of land in public ownership used for soil conservation or flood protection purposes being made available for recreational uses. For example, the Council allows access to significant parts of the Otaki, Waikanae, Hutt and Ruamahanga Rivers. Territorial authority recreation reserves also provide significant opportunities for access, for

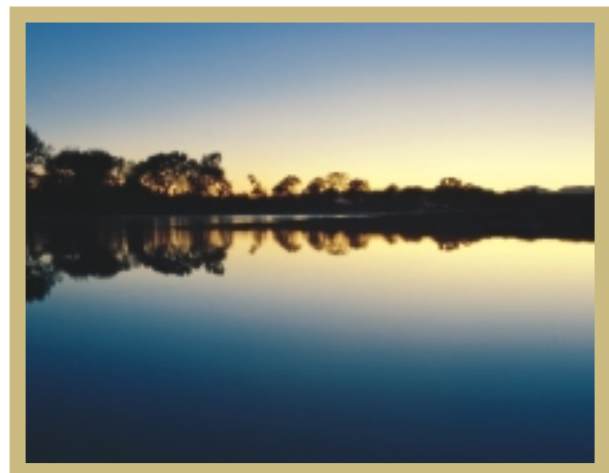
example, to the Waikanae and Hutt Rivers.

- There are no regionally significant water bodies where access is not possible at some point, but there are no rivers with continuous access along their full length.
- Much of the most effective legal access to rivers occurs where roads cross the water body (for example, to the Waikanae, Otaki, Ruamahanga and Waiohine Rivers).
- Many rivers and streams have esplanade reserves or strips along their edge, but there is no direct connection between these areas and a public road or place (for example, to the Waipoua, Waiohine and Otaki Rivers, and Lake Wairarapa).
- There are a number of informal access points where public use has become the norm but no legal access exists (for example, to the Ruamahanga, near Martinborough).
- The development of flood protection measures on private land limits their additional use for access, particularly in the Wairarapa.
- A lack of signage at many access points means users are not aware of their rights or responsibilities, and would generally find it difficult to know whether there is public access or not. Conversely, where easy access is available, in the lower reaches of some major rivers, overuse as a result of recreational activities can be a problem.
- The Hutt River is a success story, with effective public access to most of its length, due largely to land purchased for flood protection. Only a small portion north of Birchville can't be legally used. Visitor numbers along the length of the river have been estimated at a massive 1.1 million people annually. This level of use is largely attributed to the ease of accessibility.
- There is good access to the Wainuiomata River through the town, but access to this important fishing resource in the lower reaches is restricted.
- Access to Lake Pounui has been improved recently as a result of subdivision but there is still a small gap between the lake and the nearest road.
- On Lake Wairarapa public access via recreational reserves is mostly at the lake's northern end. There is little access along its sides.

What's being done?

The RMA provides some opportunity to maintain or enhance access to and along rivers and lakes. When land next to a river or lake is subdivided, public access can be provided for by the territorial authority that decides the subdivision consent. Creating reserve land during subdivision has not proven very effective. The access provided occurs randomly, depending on the area being subdivided rather than on the basis of where people actually want to go. There appears to be only a small number of esplanade reserves and marginal strips in the Region.

Territorial authorities can also place conditions relating to access on resource consents for the use and development of land adjacent to rivers and lake beds. The Council itself has no statutory responsibility for the



regulation of access to river and lake beds, only access along river beds. Giving access to and along river and lake beds is mainly a matter for landowners to decide, not through regulation but through goodwill and co-operation within the community.

The Council is making the following responses:

- advocacy for the enhancement of access to regionally significant rivers, through submissions on statutory plans and subdivision consents considered by territorial authorities
- control of the adverse effects of access along river and lake beds, through conditions on land-use consents
- maintenance and enhancement of access on Council-owned land
- promotion of access when river management schemes are developed and implemented
- providing the public and landowners with information on their rights and responsibilities as they relate to public access
- providing a small fund to enable landowners to improve and manage access.

Prospects for river and lake access

The Council's investigation indicates currently good levels of access to water bodies in the Region. This is largely because land adjacent to river and lakes is in public ownership, so this situation should continue (given that the land stays in public ownership and that free access continues to be allowed).

Improvements are possible through providing riparian reserves when land is subdivided, although in practice this has been very sporadic and is reliant on decisions made by private landowners. An alternative may be to ensure that whenever public funds are used in river management schemes, the development includes scope for improved public access. Many rivers in the Region would have improved access if this type of provision was made.

Providing information about access and the public's responsibilities appears to be crucial to maintaining a good relationship between private landowners and the public. And the better the relationship, the better the chances of enjoying that picnic by the lake.

SOILS



GOOD NEWS

- More people are adopting sustainable land-use practices.
- More than 90% of severely erosion-prone land is under an approved soil conservation programme.
- Six catchment control schemes have been implemented.
- Resource consents are now required for activities that can adversely affect soil quality and soil conservation.

BAD NEWS

- We have little detailed knowledge about the quality of soils in the Region – no baseline has yet been established.
- Some severely erosion-prone land is still being used in a non-sustainable way.
- More sustainable land use is needed.

Introduction

Scientists reckon it takes from one to four centuries for nature to make a single centimetre of topsoil. Estimates of the time needed to amass enough soil to form productive land range from 3000 to 12,000 years! How does it

happen? We know our planet is basically made of rock: hot and molten on the inside, cold and hard on the outside. On the surface, weathering processes break down the parent material, which mixes with organic and inorganic compounds in a long and complex process that (very slowly) produces soil.

"The fundamental key to maintaining ecological resilience and wellbeing in an ecosystem is soil health."

Te Ati Awa ki Whakarongotai

Best known for growing grass and crops, soils also absorb, retain and channel water; store and treat natural, domestic and industrial waste. They play a vital role in supporting buildings and other structures, and are a source of economically valuable minerals and construction materials.

Soils are, therefore, a primary source of the Region's economic wealth, and the Council has a responsibility to ensure that they are managed carefully. This responsibility spans soil conservation, maintaining and enhancing the quality and quantity of water, avoiding or mitigating natural hazards, and preventing or reducing any adverse effects of the storage, use, transport or disposal of hazardous substances.

Objectives

The soils of the Wellington Region maintain those desirable physical, chemical, and biological characteristics, which enable them to retain their life supporting capacity and to sustain plant growth.

The total stock and occurrences of Class I and Class II land* is sufficient to meet the needs of existing and future uses, and future uses are not limited by irreversible effects of existing uses.

Regional Policy Statement

*Class I and Class II soils are classified using the New Zealand Land Resource Inventory (NZLRI), which was developed by the Ministry of Works in 1975. They are high-quality, versatile soils, with the potential for a wider range of uses than soils of a lesser quality.

Soil quality

Anyone who has dug up the back lawn to plant cabbages knows the importance of healthy soil. A key aspect of the Council's land management is ensuring the continuing health or quality of the Region's soils (the terms 'soil quality' and 'soil health' are used interchangeably). By soil quality we mean: "...the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant growth and animal productivity, maintain or enhance water and air quality, and support human health and habitation." (Soil Science Society of America, 1991).

High-quality soils are more versatile, and can be used for intensive production of food and ornamental crops. Using land inappropriately can adversely affect soil quality: urban development covers and renders soils inaccessible for long periods, while industrial activities can contaminate

soils and make them unsuitable for other uses. Areas of high soil quality need to be maintained, where possible, to ensure sustainable management of land resources in the Region.

The lowdown on soil

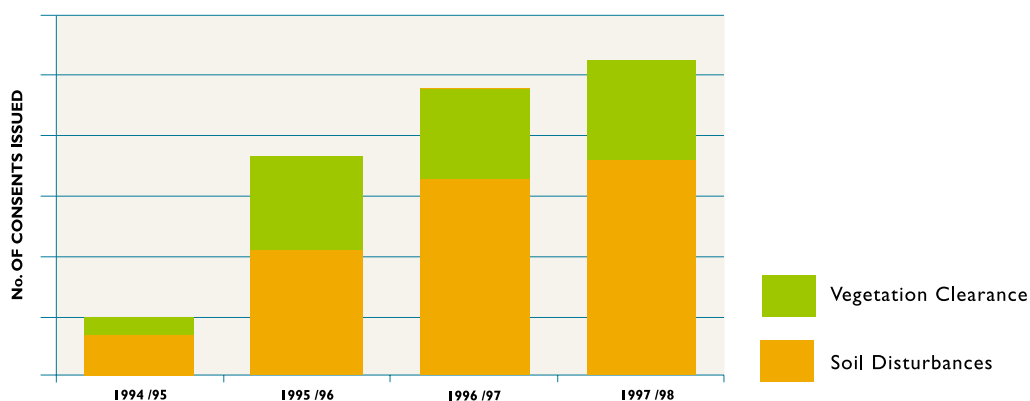
Urban expansion and inappropriate land use represent the main pressures on soil quality in the Region. Urban development has an irreversible effect on soil because it often involves its physical removal, or locks it up for long periods of time through construction of roads and buildings. For example, the highly urbanised Hutt Valley was once a fertile market gardening area. Similarly, urban expansion could threaten the last remaining good-quality soils in areas such as Otaki and the Wairarapa.

Even where soils remain in productive use, overstocking and over-cultivation of land can result in a long-term reduction in soil quality. We know, for example, that poorly managed intensive cropping practices will deplete soil fertility through the loss of organic matter, soil compaction and wind erosion.

Although trees are conservation-friendly in that they stabilise the ground against erosion, forestry can affect soil quality. Forest plantations alter the soil chemistry, making it more acidic, and during logging there is increased potential for soil loss through physical removal and erosion, and soil compaction.

Although the Council currently doesn't directly measure pressures on the Region's soil quality, a study of the type and number of land-use consents issued can give a snapshot of what's going on. Figure 9 shows a definite upward trend from 1994/95 to 1997/98 in the number of land-use consents issued for activities that could affect soil quality. Most consents were for excavations for building sites, roading and tracking, but consents granted for vegetation disturbance have also increased. This trend may not only stem from an increase in these land uses, but may also reflect such factors as changes in land-use consent requirements.

Figure 9: Land-use consents affecting soil quality, issued 1994–98.



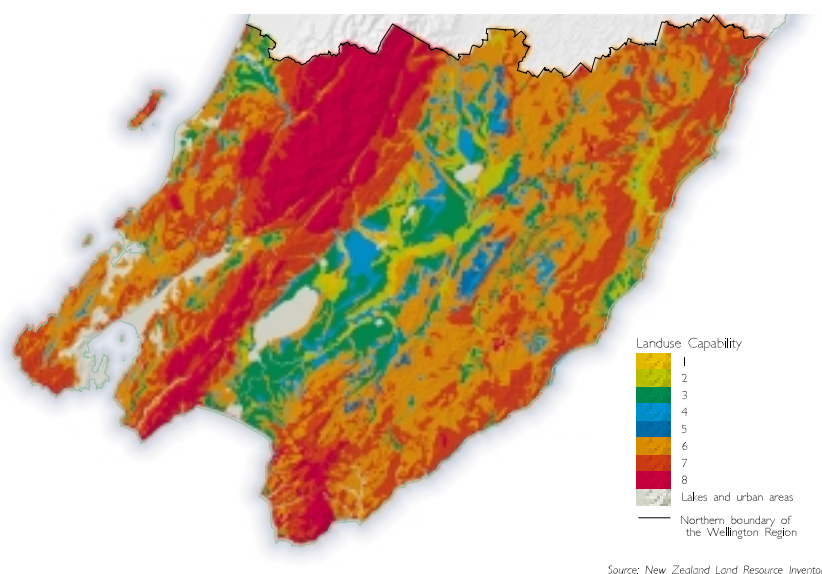
Land-use consents issued by the Council include conditions to ensure that soil conservation measures are taken – for example, to reduce sediment entering waterways or causing other adverse effects. But this doesn't prevent soil being locked up or made unavailable for productive use where buildings, roading and tracking occur on high-quality soils.

Loss of higher-quality soils can lead to greater pressure on soils of lesser quality. Lower-quality soils may require more fertiliser to produce a similar yield, and the quantities of fertiliser may then impact on groundwater quality, as has happened on the Kapiti Coast.

Where we are now

The Council has limited up-to-date information about the quality of soils in the Region. However, we know that the extent of high-quality soils is small, and that the total available land close to urban areas is decreasing. Data from the NZLRI (Figure 10) shows that less than 1% (5,200 ha) of the total land area of the Region is Class I, and less than 4% is Class II.

Figure 10: Land-use Classes In the Region



What's being done?

The Council has prepared a Proposed Regional Soil Plan, bits of which are currently under appeal to the Environment Court. The main focus is on soil conservation, but the Plan also includes policies aimed at locating activities causing potentially irreversible effects on soils of low versatility, and methods that encourage the establishment of a monitoring and evaluation framework for soil health. The Council has also prepared a scoping document for a soil monitoring strategy.

Prospects for soil quality

Continuing loss of high-quality soil is an issue the Council needs to act on. We need monitoring to determine the current state of the Region's soil quality, and to identify and quantify the pressures on high-quality soils. Without a baseline monitoring programme we can't assess changes in soil quality over time nor determine whether the Region's soils are being managed sustainably.

Landcare Research and the Ministry for the Environment are currently shaping a nationwide programme for establishing baseline information about soil quality, called the 500 Soils Programme. The Council's involvement in this project may be an effective way to establish a baseline soil-quality monitoring programme for the Region.

Soil conservation

Soil conservation involves managing the physical loss of soil through erosion. As we all know, either from personal experience or media images of landslides and floods, the accelerated loss of our soil resource can have severe environmental and economic impacts.

The anticipated environmental results of pursuing these objectives include:

- limiting the rate of soil degradation to that resulting from natural processes beyond the control of current soil conservation techniques
- ensuring that damage to farmland, urban areas and other land from floods, erosion and subsidence is at levels acceptable to local communities and the regional community
- making catchments stable and robust enough to withstand the effects of natural hazards and to accommodate human activities where required.

Muddy waters: pressures on soil conservation

Earthworks associated with the development of rural land for intensive residential use can cause sediment run-off, and soil and debris being deposited into nearby waterways. Sediments settle in estuaries and low-energy environments such as Pauatahanui Inlet. These earthworks are largely managed by territorial authorities.

River and stream bank erosion is an ongoing problem which, if not corrected, may cause loss of land, degrade stream habitats, and pose threats to residential areas. Causes of stream-bank erosion include the removal of streamside vegetation, creating roads or tracks that cross waterways, and stock access to areas without streamside vegetation.

Vegetation clearance and soil disturbance on steep and/or erodable land, such as when roads and tracks are constructed for agricultural or forestry purposes, exposes the soil to weathering by wind and rain, resulting in soil and nutrient run-off into waterways. Burning and uncontrolled grazing of native vegetation can also cause an increase in run-off that contaminates streams and ultimately clogs the rivers.

Inappropriate land use, such as intensive cropping and development of large subdivisions on land with light-textured soils, can make soils vulnerable to wind erosion. This reduces the fine topsoil layer, which in turn reduces the productivity of the soil.

Objectives

Land degradation is limited to that for which there is no feasible remedy.

Land uses within river catchments are consistent with downstream river management and water use requirements, and do not undermine catchment resilience to storm damage and other natural calamities.

The off-site impacts of soil degradation on land, water, air, ecosystems, and communities are avoided or mitigated.

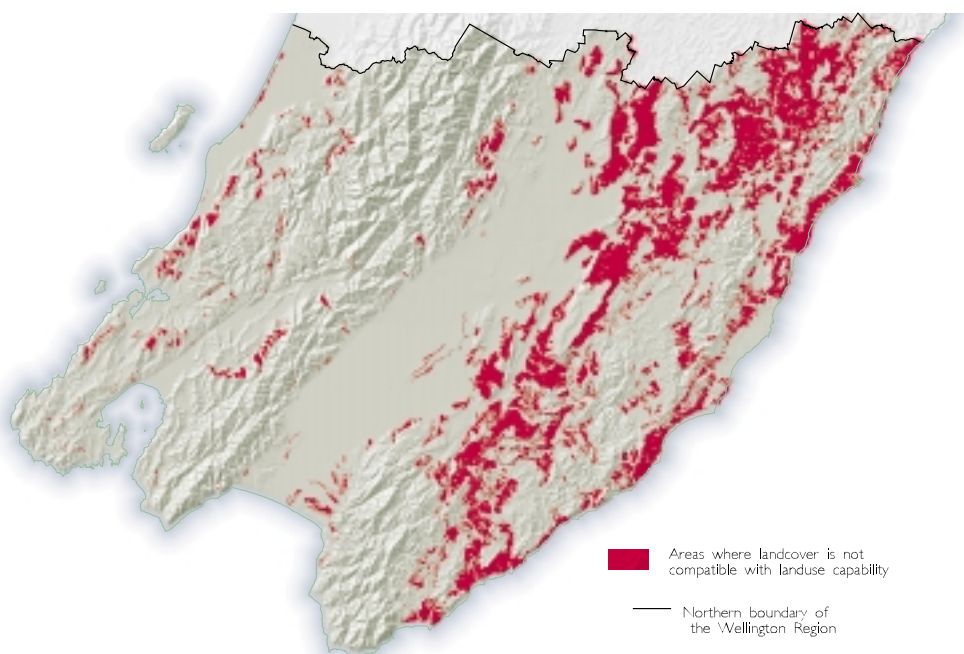
Regional Policy Statement

Storms can affect any part of the Region, resulting in widespread soil loss and new cycles of erosion.

Where we are now

Around 17% of severely erodable land is still used in a non-sustainable way (Figure 11). This land is capable of only a limited range of uses unless management practices and erosion control techniques are adopted to ensure that the land retains its soil cover and is protected against degradation. The Council is targeting unsustainable land use on erosion-prone land in its sustainable land-management programme. We see plantation forestry, indigenous bush and scrub reversion, and pasture planted with poplars and willows as long-term sustainable uses for severely erodable land.

Figure 11: Non-Sustainable Land Use 1999



Source: Wellington Regional Council

What's being done?

Our Proposed Regional Soil Plan aims at preventing soil erosion and fostering sustainable land management practices. The rules in the Plan control large-scale vegetation and soil disturbance activities on erosion-prone land, including roading and tracking.

A Regional Plan Implementation Strategy has been developed to co-ordinate some of the methods stated in the Soil Plan, such as those relating to promotion and education targeted at soil conservation. The Council has also begun to shape a strategy for monitoring soil conservation within the Region, noting where soil conservation measures have been successful. It has also identified farmed land with severe erosion potential and this is being targeted for the implementation of soil

"Land clearance has continued despite Wairarapa's erosion-prone tendencies. The land clearance is usually replaced with pinus radiata which has benefits in terms of soil stabilization once established, however the effects on water (surface and ground), the loss of productive lands and soil health are rarely investigated."

Rangitane o Wairarapa

conservation programmes – more than 90% of the targeted land is under an approved soil conservation programme. The programmes are prepared individually, in consultation with the landowner, to address long-term soil erosion issues.

Finally, the Council has implemented six catchment control schemes to control the off-site effects of soil erosion, and to protect community assets and roading infrastructure.

Prospects for soil conservation

Much of the erosion in the Region can be avoided simply by ensuring that land uses and land management practices match the characteristics of the land. Progress is being made to ensure this happens, but to achieve its stated objectives the Council must keep identifying and prioritising land-use pressures that can cause soil erosion. It needs to explore ways to promote sustainable land management using educational, regulatory and incentive measures. During 1999, the Council will undertake a project to establish further sustainable land management initiatives.

Soil contamination

Contaminated sites are "...sites at which hazardous substances occur at concentrations above background levels and where assessment indicates it poses or is likely to pose an immediate or long term hazard to human health or the environment." The threat arises through the potential for discharges to land, air, and/or water (including groundwater) and through compromising future uses of the sites.

By pursuing the objectives, of the Regional Policy Statement we expect that environmental damage from hazardous substances will be avoided, and the quality of water, air and soil in the Region improved.

Keeping soil clean

Land can be contaminated in a number of ways, from a variety of activities. Table 8 summarises some of these.

Objectives

The potential for any accidental or unanticipated effects to arise as a result of the use, storage, transportation and disposal of hazardous substances is minimised and any adverse effects that do occur are remedied or mitigated.

To minimise the risk of damage to the environment and human health from contaminated sites in the Region.

Regional Policy Statement

Table 8: Activities and land uses having a high probability to cause site contamination.

Acid/alkali plants and formulation	Agriculture / horticulture
Airports	Asbestos production and disposal
Chemical manufacture and formulation	Defence works
Drum reconditioning works	Dry-cleaning establishments
Electrical manufacturing (transformers)	Electroplating and heat treatment premises
Engine works	Explosive industries
Gasworks	Iron and steel works
Landfill sites	Metal treatment
Mining and extractive industries	Oil production and storage
Paint formulation and manufacture	Pesticide manufacture and formulation
Pharmaceutical manufacture and formulation	Power stations
Railway yards	Scrap metal yards
Service stations	Sheep and cattle dips
Smelting and refining	Tanning and associated trades
Waste storage and treatment	Wood preservation

Source: ANZECC 1992

Where we are now

The Council maintains a database of contaminated sites as well as sites with a history of storing, using or disposing of hazardous substances. More than 1000 are on the list. The environmental risk posed by each has been assessed using a screening risk assessment technique, which considers:

- the nature of the likely contaminants (for example, whether they are highly toxic or have a lower-level risk)
- the likelihood of contaminant release (based on factors such as storage security, or mobility in soil or groundwater)
- the sensitivity and nature of potential receptors of the released contaminant (for example, groundwater users, or vegetable gardens).

This assessment enables the sites to be classified by the risk they pose to the environment and human health. Of the 1096 sites assessed, 548 were classified as moderate priority (Class III) and 440 as high priority (Class II). There were 62 very high-priority (Class I) sites and 46 low-priority (Class IV) sites.

What's being done?

The Council uses its database of 'at-risk' sites to help decide where to investigate and what action to take. The discharge of contaminants to land is managed to avoid creation of new contaminated sites, and remedial action must be taken if sites show off-site adverse environmental effects.

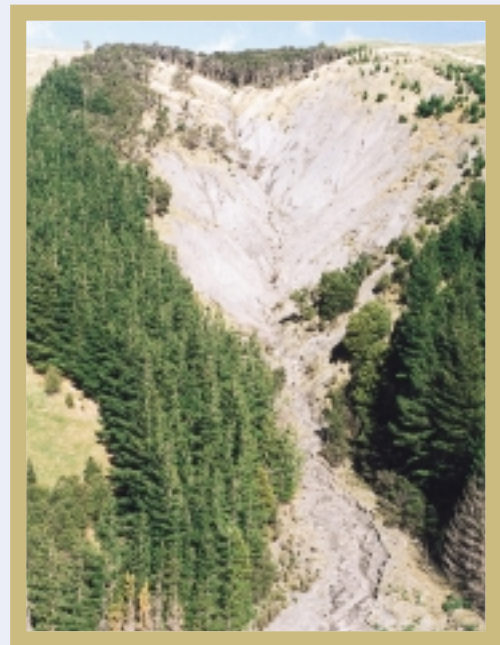
Submissions are made on district and city plans for the inclusion of appropriate policies, methods, and rules to control activities on contaminated sites. The Council provides data to territorial authorities so that information about actual or likely contamination is included in any Land Information Memoranda and Project Information Memoranda, to ensure that potential buyers or developers of land know about potential risks. We also provide information to other parties on request.

Investigation reports on contaminated sites are audited to ensure that environmental effects have been properly considered, and to assess any conclusions drawn from the investigation. Most district plans in the Region have rules ensuring that contaminated site issues are considered when land is redeveloped and rezoned.

Prospects for avoiding soil contamination

Under the current management regime, the Council only requires remedial action at contaminated sites where off-site adverse environmental effects have been proven. The assessment or clean-up of other sites is triggered only when land is being redeveloped or rezoned. Here Council works closely with territorial authorities to ensure contamination issues are taken into account.

Controls on discharges to the environment are aimed at avoiding the creation of new contaminated sites. A more proactive approach to pollution prevention would help here. Such an approach might involve the Council liaising with territorial authorities, and visiting industrial and commercial premises to assess and provide advice on appropriation pollution prevention measures.



THE COASTAL ENVIRONMENT



GOOD NEWS

- Natural character of the coast is relatively intact in the more remote parts of the Region.
- Greater controls over sewage discharges have improved coastal water quality.
- Coastal water is generally good quality.
- There is good public access to the coast in the western Region.

BAD NEWS

- Natural character of the coast has generally been affected close to urban settlements.
- If the current trend to approve development continues there will be further loss of natural character of the coastal environment.
- In some areas coastal water quality is being adversely affected by discharges.
- We don't monitor the effects of activities on the marine ecosystem.
- Public access to the coast is limited north of Cape Palliser

Introduction

The coastal environment of the Wellington Region varies from the cosmopolitan bustle of Oriental Parade to the rugged and remote Wairarapa coast. Naturally, this means people make use of the coast in a variety of ways, from swimming to building beach houses, discharging stormwater to gathering kai moana. Balancing the use and the protection of the coastal environment therefore needs careful management.

Preserving the natural character of the coastal environment and public access to and along the coastal marine area are matters of national importance under the RMA. The Minister of Conservation has prepared the New Zealand Coastal Policy Statement 1994, which sets out the broad policies for sustainably managing the coastal environment. In their own areas Regional Policy Statements provide a local framework for managing the ecological, geographical, cultural, social and economic issues that arise where the land meets the sea.

Council is putting the finishing touches to its Regional Coastal Plan, which covers the management of the 'wet' coastal marine area of the coastal environment. Territorial authorities have prepared district plans that control land uses in the 'dry' parts of the coastal environment.

The Regional Policy Statement sets objectives for the coastal environment that deal with natural character, public access, water quality, and the aspirations of tangata whenua. Each of these will now be discussed.

Looking good: The natural character of the coastal environment

Untouched, pristine, virgin – words that describe what we have come to value most about our environment. Natural character is the extent to which the natural ecology and physical processes of a place or resource remain intact. Although building on or altering the landscape does not necessarily mean that the natural character is lost, it is reduced.

Spoiling the view? : pressures on natural character

Urban sprawl and subdivision

Different parts of the Region experience different kinds of pressure. The Kapiti Coast has seen ongoing urban expansion, with two significant subdivision consent applications granted in

"The runanga consider coastal space allocation equally important. The report does not address this issue, yet there are growing demands for coastal space, e.g. mahinga mataitai, marine reserves, aquaculture, moorings, marina, customary, recreational and commercial fishing etc."

Te Runanga o Toa Rangatira

Objectives

The natural character of the coastal environment is preserved through:

1. The protection of nationally and regionally significant areas and values;
2. The protection of the integrity, functioning and resilience of physical and ecological processes in the coastal environment;
3. The restoration and rehabilitation of degraded areas; and
4. The management of subdivision, use and development, and the allocation of resources in the coastal environment so that adverse effects are avoided, remedied or mitigated.

Regional Policy Statement



the last five years: the Downs subdivision (31 lots) and the Pharazyn Charitable Trust subdivision (36 lots). Consents have also been given to various stages in the Kotuku Park development on the southern edge of the Waikanae estuary.

In Porirua City, recent land-use and subdivision consents have been within existing developed areas, with little development along the northern side of Pauatahanui Inlet and the other rural coastal areas. However, pressure for subdivision and development has seen Porirua City Council recently agree to a consent order that modifies their district plan to anticipate subdivision consent applications for small rural holdings on the northern side of the inlet.

Wellington City's coastal environment has remained more or less untouched, although a windfarm proposal for Makara has the potential to impact on the visual environment. No major developments have occurred in the coastal environment of Hutt City. There is ongoing development pressure from Petone round to Eastbourne, but the natural character in this area has already been substantially modified.

In the Wairarapa and rural areas generally, a downturn in the rural economy has led to a demand for sporadic subdivision of isolated coastal properties. In the last 2 years the subdivisions notified to the Regional Council would create 118 new coastal lots if approved by the relevant District Councils.

Coastal protection

The natural reaction of people who find the sea lapping at their door is to try to do something about it. The result has been the construction of protection works, or demands for something to be done by their local authority. Coastal protection works have been built in response to erosion on the Kapiti Coast, Palliser Bay and at Castlepoint. Much of the shoreline of Porirua and Wellington Harbours is already protected by structures of various sorts. There are continuing erosion problems at Kapiti and the Wairarapa, a particular concern being the variety of unsightly materials used in coastal protection structures – anything from demolition rubble to old tank tracks.

Marine developments

There has not been much pressure for new developments in the coastal marine area of the coastal environment. Most new proposals or developments are located in areas where the natural character has already been significantly modified by development. One exception was a proposal to build a jetty at Castlepoint (the application was declined).

Consumption of resources

Demand for aggregate products means that there is continued mining in the coastal environment. This pressure is likely to remain because of the good rock exposures found in coastal areas, and because beach sand provides a high-grade product.

The harvesting of fish from the marine environment by recreational and commercial fishers has impacts on the marine ecology. Shoreline areas with good access are at most risk from exploitation. Control of fishing activities is beyond the scope of the Council's functions.

Where we are now

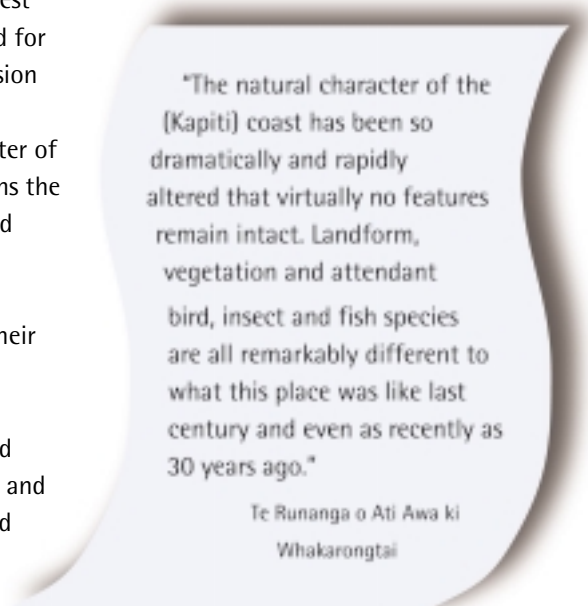
The natural character of the Kapiti Coast has been significantly changed by urban development and farming. Urban developments at Paekakariki, Raumati-Paraparaumu, Waikanae and Otaki have had the greatest impact. Many areas of dunes have been modified and developed for housing, roads, and recreation reserves. A history of coastal erosion at Paekakariki and Raumati has led to the building of coastal protection structures that have impacted on the natural character of beach areas. Exceptions are Queen Elizabeth Park, which contains the last relatively unmodified dune complex on the Kapiti Coast, and rural areas north of Waikanae.

Kapiti and Mana Islands remain largely untouched because of their reserve status and isolation from the mainland.

From Paekakariki to northern Titahi Bay the coast is exposed and rocky, with pocket beaches of coarse sand, pebbles and cobbles, and some medium-height cliffs. Large stretches of seawall, roads and quarrying activities north of Hongoeka Bay have an impact, but in other parts natural character is relatively high.

Porirua Harbour consists of two distinct inlets – Porirua and Pauatahanui. Porirua Inlet has been extensively altered: roads run along the margins, highway and rail development has cut off the natural shoreline along the eastern margin, and reclamations at the head of the Inlet have removed the natural shoreline. In contrast, while roads run adjacent to much of the 'northern side' of Pauatahanui Inlet, it remains largely unaffected. This high natural character extends to the margins and the associated tidal creeks, making the Inlet the biggest relatively unmodified estuarine area in the southern part of the North Island.

The coastal environment from Titahi Bay to Owhiro Bay retains much of its natural character because of its remoteness, although quarrying has a significant impact at Owhiro Bay. As we move around into Wellington Harbour, the natural character of most of the coastal environment has been significantly modified through human use.



"The natural character of the [Kapiti] coast has been so dramatically and rapidly altered that virtually no features remain intact. Landform, vegetation and attendant bird, insect and fish species are all remarkably different to what this place was like last century and even as recently as 30 years ago."

Te Runanga o Ati Awa ki
Whakarongtai

The coast from Pencarrow Head to Te Humenga Point in Palliser Bay is relatively untouched, with the exception of Fitzroy Bay, where there are mining activities. The natural character of the coastal environment at Te Kopi has been significantly altered by earthworks required for building the coastal road to Ngawihi and Cape Palliser. Unsightly coastal protection works have also affected some areas.

From Cape Palliser to Ngapotiki there are few built structures and natural features and processes predominate. North of Ngapotiki we enter farming country. At Riversdale urban development has compromised the natural dune systems, and development at Castlepoint has had a similar level of impact, although areas such as the lagoon below Castle Rock retain high natural character. The lagoon area is dominated by the rock itself, the scenic reserve, dunes and reef, and is backed by undeveloped ridgelines.

We don't know much at all about the state of the Region's marine ecology. The only marine reserve in the Region, Kapiti was resurveyed for the Department of Conservation earlier this year. The results showed that the ecology in the area was improving, and that it was in a better state than adjacent areas outside of the reserve.

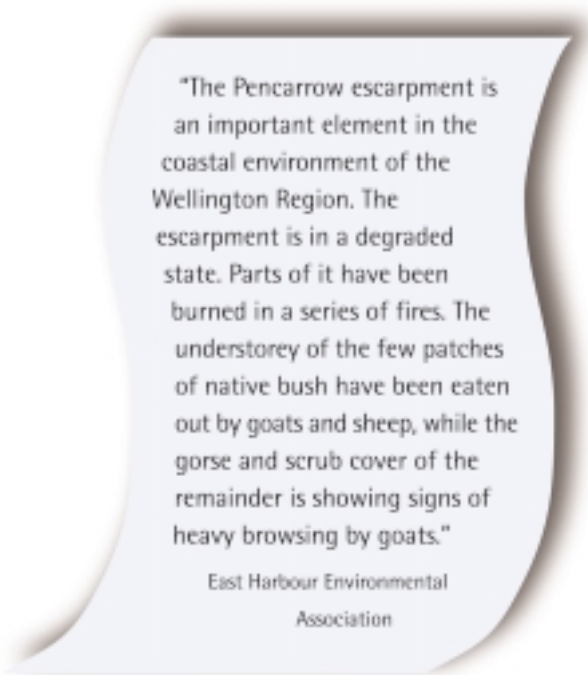
What's being done?

Reflecting the importance given to it in the RMA, the preservation of the natural character of the coastal environment is a feature of the New Zealand Coastal Policy Statement 1994, the Regional Policy Statement, the Proposed Regional Coastal Plan and district plans in the Region. It's also a consideration in the assessment of applications for resource consents for development in the coastal environment.

Each of the relevant district plans aim to protect the natural character of the coastal environment, although the rules chosen to achieve this protection vary. For example, the Wellington City Plan relies on its generally restrictive rural zone provisions, while Masterton District Council has identified a Coastal Management Area in its district plan. While this permits general rural activities, it highlights coastal issues as matters to be assessed in proposals requiring resource consent.

There have been isolated attempts to restore and rehabilitate degraded areas in the coastal environment. Most of these have focused on restoring coastal dune vegetation.

As noted above, the Region has only one marine reserve, at Kapiti, managed by the Department of Conservation. A proposal for a reserve on Wellington's south coast is well developed and will be formally lodged shortly.



"The Pencarrow escarpment is an important element in the coastal environment of the Wellington Region. The escarpment is in a degraded state. Parts of it have been burned in a series of fires. The understorey of the few patches of native bush have been eaten out by goats and sheep, while the gorse and scrub cover of the remainder is showing signs of heavy browsing by goats."

East Harbour Environmental
Association

Prospects for sustaining natural character

Subdivision, use and development have significantly altered the natural character of the coastal environment in the Wellington Region. Despite provisions in statutory plans that seek to protect natural character, there is ongoing pressure for new developments and uses that have the potential for adverse impacts, with a high potential for cumulative effects. If current trends to approve developments continue, there will be further loss of natural character of the coastal environment.

Public access

In summer, New Zealanders flock to the beach. The Region's coastal areas are visited more often for recreation than any other parts of the environment, resulting in a high demand for good public access to and along the coastal marine area.

Access can take a number of forms. Pedestrian and vehicular access (for example, to launch boats or to fish) are obvious ones. Others relate to tangata whenua use of coastal resources, and to visual access – views of the sea from the coastal environment, and of the coast from offshore. Competing demands for these different forms of access create the potential for conflict.

Getting to the beach: pressures on coastal access

New uses or developments can affect access to and along the coastal marine area. A new marina may make swimming impossible. Access over private property may be denied, perhaps because of a change in ownership or in response to public behaviour. While subdivision of coastal land may improve public access through the creation of esplanade or other reserves, coastal erosion can result in a loss of access through the physical loss of such amenities.

There can also be demands to change the nature of access to the coast. At Titahi Bay there has been pressure to increase the restrictions on vehicle access to the foreshore, while along the Pencarrow Coast road there has been pressure to lift restrictions on vehicles.

Where we are now

Overall, the public has good access to and along the coastal marine area of the Wellington Region. There have been some local examples where access has been an issue, such as under the Paremata rail bridge, and across private land to the scientific reserve at Turakirae Head.

Access to the beach on the Kapiti Coast can be gained from roads at Otaki Beach, Te Horo, Peka Peka, Waikanae, Paraparaumu/Raumati, and Paekakariki. Movement along the foreshore is not restricted, but is blocked by the natural barriers of the Waikanae

Objective
Existing provisions for public access to and along the coastal marine area remain and appropriate opportunities are taken to enhance public access.

Regional Policy Statement



and Otaki Rivers. At Porirua the beach can be accessed at Titahi Bay, Whitireia Park, and around much of Porirua Harbour.

Within Wellington City private land ownership restricts access to the north of Makara, but between Makara and Owhiro Bay there is an almost continuous stretch of paper road running along the coastline. From Owhiro Bay the coast road runs virtually all the way around to Pencarrow Head, generally giving good access, except where there are commercial developments (for example, marinas, CentrePort) and along the stretch from Kaiwharawhara to Petone. South of Eastbourne to

Pencarrow Head vehicles are banned, but walking and cycling are popular.

In the Wairarapa, the coastal road provides good beach access from Ocean Beach to Cape Palliser. North of Cape Palliser, seven roads lead to the coast, but public roads then cover only 40–50 km of the 140 km of coastline, and in only half of these are people able to get out of their cars and legally walk from the road to the beach. There are only two publicly accessible safe sites for launching boats on the Wairarapa coastline.

Once on the water, there are few artificial constraints to boat access in the Region, with the main controls relating to navigation safety. In some places, particularly in the Wairarapa, access is limited by the availability of suitable launching sites.

What's being done?

Like the preservation of the natural character of the coastal environment, the maintenance and enhancement of access to and along the coastal marine area is listed as a matter of national importance in the RMA. This means it is recognised in the New Zealand Coastal Policy Statement 1994, the Regional Policy Statement, the Proposed Regional Coastal Plan and district plans in the Region. It's also a consideration in the assessment of applications for resource consents for development in the coastal environment.

Because of the huge degree of public interest in access to the coast, any threats to existing access are usually given a high degree of scrutiny by local authorities and considerable efforts are made to maintain public access opportunities.

Prospects for public access

The generally high level of access to the coast has meant that little work has been done to enhance opportunities for access to and along the coastal marine area. Future efforts could focus on maintaining and improving existing access, rather than trying to open up new areas.

Objective

Coastal water quality is of a high standard

Regional Policy Statement

Coastal water quality

As the kids tear into the sea on a summer's day you don't want to be worrying about pollution levels. The enjoyment of our coastal environment – whether for swimming, fishing, boating or just admiring the view – depends on clean, unpolluted water. High water quality also ensures the flourishing of a diverse array of flora and fauna. As a community we want, and need, a high standard of water quality.

Keeping the sea clean

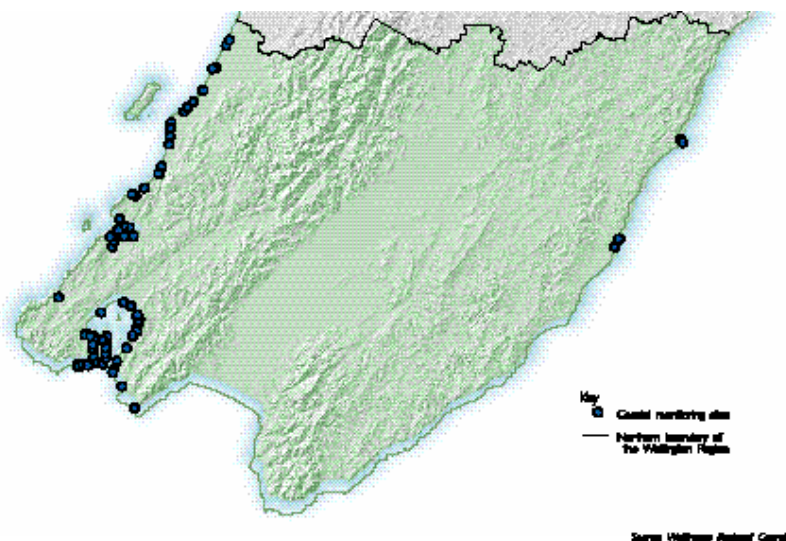
The following are the main pressures on coastal water quality:

- direct and indirect discharges of contaminants from point and non-point sources, including urban stormwater and sewage discharges
- rural run-off into waterways (this includes microbiological contamination of water by animals and agricultural wastes)
- increased sedimentation of waterways from stream-bank erosion, or stock access to streams
- urban developments that fail to control sedimentation into waterways draining into low-energy coastal environments
- accidental spills or discharges from marine vessels.

Where we are now

The Council has monitored levels of the bacterial indicators faecal coliforms and enterococci at a large number of sites around the Region to determine the state of coastal water quality. Currently we monitor 70 sites (see Figure 12) distributed over the

Figure 12: Coastal Water Quality Monitoring Sites



Kapiti Coast, Porirua coast, Wellington (southern coast and inner harbour), Eastern Wellington harbour, and the Wairarapa coast (Riversdale beach and Castlepoint). The Proposed Regional Coastal Plan recognises that urban development will have an influence on adjacent coastal water quality, and that different areas need to be managed for different purposes. Consequently, water adjacent to urban areas is being managed for contact recreation (swimming, skiing etc), while water in other areas is managed for shellfish gathering.

Results from 1998/99 show that 50 of the 70 sites met the standards set for the purpose for which they are being managed. Trends from March 1992 to February 1998 show that water quality has been maintained or improved at 95% of the sites. Only three sites showed a long-term decline in water quality. A few sites are persistently failing to achieve the standard: these are all located near stormwater discharges or river and stream mouths.

Kapiti

Water quality adjacent to Otaki, Te Horo, Waikanae, Paraparaumu and Paekakariki is managed for swimming, with the remaining areas managed for shellfish gathering. Of the 13 sites where trends were available, 10 showed that water quality was maintained, two showed deterioration and one showed an improvement.

In 1998/99, seven sites failed to meet standards suitable for the purpose for which they are being managed. One of these was at Peka Peka beach, which was unsuitable for shellfish gathering but suitable for contact recreation.

Porirua

The Porirua coastline runs from Paekakariki to Rocky Point. The coast is mainly rocky, but includes the popular bathing beaches of Plimmerton and Titahi Bay, Pauatahanui Inlet and Porirua Harbour. Porirua Harbour and Titahi Bay are managed for contact recreation. The remaining water is managed for shellfish gathering. Water quality was maintained or improved at 11 of the 12 monitored sites. Significantly, seven sites showed improvement, while only one indicated deterioration. In 1998/99 six sites met the standards suitable for the purpose for which they were managed (six sites failed).

Wellington

The Wellington coastline extends from Rocky Point to Korokoro, and ranges from the rocky and gravel beaches of Makara to the inner Wellington Harbour. Some areas on the south coast (for example, Mahanga Bay, Palmer Head, and Red Rocks) and along the Miramar Peninsula are managed for shellfish gathering, with the remaining areas managed for contact recreation. Water quality was maintained or enhanced at all 19 sites for which trends are available, with six showing improvement. In 1998/99 all but

"In the 1970s, a comprehensive study of the biological and physical processes in the Inlet and its catchment provided an invaluable 'snapshot' in time. In the 25 years since, the catchment has been significantly altered through major urban developments and intensification of rural land subdivision into lifestyle blocks. What has been lacking over the past 25 years is a comprehensive programme to monitor any change in the health of the Inlet."

Guardians of Pauatahanui Inlet

three of the 23 sites measured (Evans Bay, Owhiro Bay and Makara) met standards suitable for the purpose for which they were managed.

Wellington City Council has undertaken drainage works in the Evans Bay, Hataitai, Island Bay, Owhiro Bay, Wellington central and Lyall Bay areas. These works may have contributed to significant improvements in water quality in these areas. Further work on stormwater and leachate collection in Owhiro Bay should result in a more consistent high quality of coastal water in this area.

Eastern harbour

The eastern harbour coastline wraps around from Korokoro to Windy Point. The coast is generally rocky, with sandy beaches. Popular bathing beaches are Petone, Day's Bay, and Eastbourne. The coast between Camp Bay and Pencarrow Head is managed for shellfish gathering, with the remaining areas managed for contact recreation.

"The Association is concerned that there appears to be an increase in the frequency and size of discoloured water plumes associated with flooding of the Hutt River. It is now not unusual for a large sediment-discoloured plume to occur with even a moderate fresh on the river. After heavy rain a very large area of the harbour now becomes discoloured. We believe this was less common in the past. In addition, the frequency and amount of vegetation debris washed up on the east harbour beaches after floods appears to have increased."

East Harbour Environmental
Association

All of the 13 sites show that water quality was maintained (nine sites) or improved (four sites). In 1998/99 all but three of the 15 sites (Petone Beach, Eastbourne Wharf and Inconstant Point) met the standards for which they were being managed. The four sites showing a long-term improvement in water quality were Lowry Bay, Sorento Bay, York Bay and Burdens Gate. Improvements at Lowry Bay, Sorento Bay and York Bay may be due to ongoing sewer maintenance by Hutt City Council. The reason for the improvement at Burdens Gate is not clear.

There are 12 sites managed for contact recreation and three for shellfish gathering. The generally good quality of the coastal waters is attributable to the high-quality run-off from the hinterland, and good water quality from the Hutt River, although the Hutt River may have adversely affected the water quality at the eastern end of Petone Beach in the last year.

Wairarapa coast

Under the Proposed Regional Coastal Plan, water is managed for contact recreation in Lake Ferry and adjacent to Riversdale and Castlepoint. Remaining areas are managed for shellfish gathering.

Past studies show that overall coastal water quality in the Wairarapa is excellent. In 1998/99 monitoring indicated that only one of the six sites (Riversdale Lagoon) failed to meet the standard for which it's being monitored.

What's being done?

The Council has been working hard to improve coastal water quality for many years. Before the RMA, coastal water classifications were adopted for Wellington Harbour and Coastal Waters (1988) and Titahi Bay (1965). In addition, the lower reaches of many rivers that fall within the coastal marine area were included within river

classifications. The Wellington Harbour and Coastal Waters classification not only guided the standards for new discharges, but also enabled the conditions on existing consents for discharges to be reviewed.

The Proposed Regional Coastal Plan includes rules to control discharges to the coastal marine area from activities with the potential to cause adverse effects on water quality and amenity values. Controls are being administered through the resource consent process, and through compliance measures undertaken by the Council in response to coastal water quality monitoring results, or complaints from the public. Territorial authorities have initiated improvements to coastal water quality through upgrading sewage discharges and improving stormwater quality and drainage networks.

Often where problems are identified by baseline monitoring targeted investigations are undertaken to identify the causes of water quality problems. Recent investigations have included studies of shellfish and sediment in Porirua Harbour and a sanitary survey in Riversdale lagoon.

Prospects for coastal water quality

The quality of our coastal water is generally good, in terms of meeting the purpose for which it's being managed. We've seen that upgrades in stormwater and sewage networks can improve the quality of coastal water. Further improvements in these networks are likely to result in further enhancement of water quality.

Unfortunately, it appears that some sites aren't likely to come clean, mainly because the quality of the water entering the coastal marine area at these sites is poor. This is an issue that will be reviewed as part of the implementation of the Regional Coastal Plan.

Tangata whenua aspirations

For tangata whenua, there are two main issues for management of the coastal marine area: accessibility, and continuing use of the sea as a source of sustenance for the whole community. The quality of coastal water is a fundamental issue affecting the viability of the relationship between Maori and the coastal environment in the Region.

Pressures on tangata whenua aspirations

The pressures on the aspirations of the tangata whenua are the same as those described for natural character, access and coastal water quality.

The state of the environment

Private land ownership, coastal developments, depletion of fishing stocks and polluted coastal waters are all issues that impact on tangata whenua use of the coastal environment.

Prospects for tangata whenua aspirations

More emphasis has to be put on tangata whenua values in order for the Regional Policy Statement objective to be met.

Objective

There are increased opportunities for the aspirations of the tangata whenua for the coastal environment to be met.

Regional Policy Statement

AIR QUALITY



GOOD NEWS

- All major emissions to air are controlled through resource consents.
- Suburban air quality is generally good.

BAD NEWS

- In some areas and under certain weather conditions air pollution reaches maximum desirable levels.
- We have yet to establish an ambient air quality monitoring network.
- Odour is a growing problem
- The Region is subject to the effects of global warming.

Introduction

Many people think Wellington's legendary wind protects the Region from air pollution. But when climatic conditions combine with modern lifestyles (driving to work, keeping warm, manufacturing goods), air quality can be the loser. Pollutants build up with extended calm periods, in sheltered valleys, or when cold air traps contaminants close to the ground during wintertime.

Most of us realise how important clean air is to our health and well-being. Perhaps less obvious are the many roles we expect it to perform. The atmosphere insulates our Earth, providing a protective barrier to incoming sunlight. Its ever-changing moods (the weather) control many of the natural processes vital for producing food and supplying water to drink. We also 'use' the atmosphere to absorb the waste by-products from many common activities – burning fossil fuels for power and heat, driving our cars, farming, and manufacturing. But the air up there can only take so much.

In this chapter we look at the air around us: what makes it good and bad, and what we can do about it. We also look at some of the changes occurring in the wider atmosphere – the so-called 'greenhouse effect' – and consider its possible impact on our regional environment.

Objectives

High quality air in the Region is maintained and protected, and there is no significant deterioration of air quality in any part of the Region.

Air quality is enhanced in those areas with degraded air quality.

The adverse effects of the discharge of contaminants into air on human health, local or global environmental systems, and public amenity are avoided, remedied, or mitigated.

Regional Policy Statement

What pollutes our air?

Like most environmental issues, air quality is closely related to what we humans do. Most of the pollutants that cause problems are generated 'on-shore', although as part of the global community our Region is vulnerable to problems such as the greenhouse effect. We all know that cars, trucks, fires, heating, dust and industrial processes pump harmful pollutants into the air, but which are the worst offenders?

One way to quantify the sources of air pollution is through an inventory of emissions, which lists the number of sources of various contaminants and the amount each emits. The Council has done this for industrial, mobile and domestic air pollution sources, focusing on those pollutants used as indicators of the state of the air (see Table 9 below). When completed, the emissions inventory will provide an indication of the extent of the air pollution problem.

The usual suspects

The major air pollutants in our Region are fine particulate matter (particles less than 10 microns in size are commonly known as PM₁₀), nitrogen dioxide and carbon monoxide, and air toxins such as benzene. All of these can adversely affect people and the environment, as can odour.

The table below lists the contaminants found most commonly in the Region's air, and the activities usually suspected of giving rise to them.

Table 9: Principal air contaminants

Contaminant	Description	Effects	Sources
Nitrogen Oxides (NOx)	A family of highly reactive and acidic gases.	Nitrogen dioxide (NO ₂) is a suffocating red-brown gas; it can irritate the lungs and lower resistance to respiratory infections. NO ₂ is also responsible for the brown haze associated with vehicle emissions and traffic congestion on calm days.	Vehicle exhaust emissions, gas appliances and thermal power or steam generation.
Particulate matter	Deposited particles (dust) Fine particles (PM ₁₀ , PM _{2.5})	Nuisances effects; soils surfaces and settles on property; reduces visibility. Can affect human health when inhaled, especially by the young, elderly and asthmatics. Affects visibility by creating haze and obscuring scenic vistas.	Wind-blown dust from both natural and man-made sources (e.g. quarries, unsealed roads and land clearance). Combustion processes (e.g. vehicle emissions, domestic fires) and industrial processes.
Carbon monoxide (CO)	Colourless and odourless gas	Toxic to mammals; interferes with the blood's ability to absorb and circulate oxygen; lethal in high doses.	Vehicle emissions, domestic fires, bush fires.
Volatile organic compounds (VOCs)	A broad class of organic compounds that vaporise easily (e.g. benzene, 1,3-butadiene)	A range of effects depending on the substance. Can have effects on visibility, through to respiratory and carcinogenic effects.	Industrial processes, vehicle emissions, use of organic solvents and some types of vegetation (e.g. terpenes from pine forest).

Industrial/commercial, mobile, and domestic sources contribute to air quality in the following ways.

- Mobile sources are the worst offenders, contributing 80% of emitted carbon monoxide, 68% of released carbon dioxide, and a huge 96% of nitrogen dioxides.
- 2277 tonnes of fine particulate (dust, smoke and ash) are released into the air in the Region every year: 45% from domestic sources, 25% from mobile sources, and 30% from industry. Quarrying is the largest single contributing industry.

- Over 2 million tonnes of carbon dioxide is released annually, 88,000 tonnes of carbon monoxide and 20,000 tonnes of nitrogen oxide.
- Industrial emissions of the pollutants measured do not contribute significantly to overall regional air quality (except for fine particulate).
- For all the inventoried pollutants, four industry groups contribute more than 80% of the industrial emissions in the Region. These are landfills, wood product manufacturers, organic chemical producers, and commercial spray painters.
- Domestic sources (mainly sold fuel heaters such as open fires) contribute the majority of the fine particulate, and this is predominantly in the winter months. Pollution from domestic fires is likely to be an issue in areas that are subject to calm, frosty winter nights (such as Masterton).



Those mobile sources doing all the dirty work aren't going to go away. We expect that the total number of cars in the Region will increase by about 1% per annum (there were 180,000 cars in 1996, not including the Wairarapa, or 533 per 1000 persons). Changes in employment and recreation patterns will see the number of trips grow by about 3.5% per annum. Vehicles other than cars made an average of 67,800 trips a day in the Region in 1996, clocking up over 856,800 kms.

Although we haven't yet assessed their contribution, we know that natural and biogenic sources impact on air quality. These include dust from river beds, windblown salt from the sea, soil from eroding land and ploughed fields, gases emitted from plants, and pollen. Biogenic sources also include all farm and domestic animals. Studies are underway to determine the contribution of animals such as sheep and cattle to New Zealand's methane emissions. Some other smaller pressures on air are lead-contaminated paint dust from old houses and buildings, smoke from rural fires, and dust from unpaved roads, port activities, and building sites.

Air pollution complaints – an indirect indicator

In 1998/99 there were 596 complaints about air quality matters across the Region. Of these, 499 related to odour, followed by smoke (48), particulate matter (31), hazardous substances (17), and noise (1). Major sources of odour over the last 10 years have included:

- fish products plants
- meatworks and rendering plants
- sewerage systems
- sewage treatment plants
- cleaning products manufacturing
- commercial landfills
- spray irrigation of effluent

- farm organic waste stockpiles
- intensive farming (such as piggeries)
- spray painting.

Table 10 shows that perhaps contrary to what you might expect, air quality problems (as expressed through complaints) are more likely over the summer–autumn period than in winter, when domestic fires, heating boilers, and cars are likely to be heavily used. Why? Because spring is windier than autumn, so contaminants are more effectively dispersed. Also, people don't complain as much about smoke from domestic chimneys as they do about strongly unpleasant odours. The warmer, calmer summer and autumn days can accentuate bad smells.

Table 10: Air quality complaints by season (1991-1999)

	Spring	Summer	Autumn	Winter
Annual average	30	58	73	39

Historically, the bulk of odour complaints arise from a small number of activities affecting large numbers of residents. In 1997/98 and 1998/99, for example, three activities (the Taylor Preston abattoir, the Wellington City Council sewerage system in the Happy Valley area, and the Moa Point sewage treatment plant) gave rise to around half of all air-quality complaints. However, even when we exclude major sources, air-related complaints are still rising.

Does this mean our air is getting smellier? The trend may reflect a greater number of incidents, or simply people's unwillingness to put up with smells they don't like. We don't know. It might also be that with increasing numbers of people living in the inner cities and moving out to lifestyle blocks in rural areas, the potential for conflict between residential living and odour-producing activities has increased. Examples here include spray painting, fish processing, intensive farming, silage pits, and effluent spray irrigation.

Trends in resource consents

The Council requires resource consents before some air discharges are allowed. These discharges stem mainly from industrial processes and can have significant local effects on people or the environment. Through the consenting process, the Council makes sure the effects are avoided or mitigated. It can also give an indication of pressures on our air quality.

In recent times there has been a declining trend in the numbers of consents issued, reflecting a requirement in the mid-1990s to renew a large number of existing consents. The 19 consents granted in 1998/99 emphasise the point made earlier that

the contribution of industrial sources to air quality is small (although potentially locally significant). The number is expected to climb again when the Air Quality Plan is finalised, as some hitherto unconsented activities will require them (for example, chicken farms). There are currently 150 discharge to air consents in the Region.

Smoke nuisance complaint records suggest a declining trend in Hutt City and Wellington but the data is not conclusive. In both cities fire bans were imposed over the last two summers. Local authority fire officers comment that smoke is becoming less of a pressure than it once was due to more restrictive district rules about burn-offs and greater recycling of plant material at landfills.

Where we are now

To determine whether our air quality objectives are being met we must first decide what we mean by "high quality air", "degraded air" and how much deterioration we are prepared to accept. The Proposed Regional Air Quality Management Plan gives a detailed management framework for our air. The plan establishes a set of guidelines for air quality (Table 11) that tell us at what point the presence of contaminants in the air might harm the environment (known as maximum *desirable* levels – MDLs) or threaten human health (maximum *acceptable* levels – MALs). The maximum desirable levels (the more stringent of the two) have been set to provide a high level of protection for the environment and to indicate good air quality for places where people live.

Table 11: Regional Air Quality Guidelines

Indicator	Maximum Desirable Level	Maximum Acceptable Level	Averaging Times
Particulate	70 µg/m ³	120 µg/m ³	24 hours
	40 µg/m ³	40 µg/m ³	Annual
Carbon Monoxide	6 mg/m ³	10 mg/m ³	8 hours
Nitrogen Dioxide	95 µg/m ³	300 µg/m ³	1 hour
	30 µg/m ³	100 µg/m ³	24 hours

Source: Proposed Regional Air Quality Management Plan, May 1998
 Notes: µg/m³ = micrograms per cubic metre
 mg/m³ = milligrams per cubic metre

The Council began the first significant investigation into air quality in the Region in 1997. Using a mobile air-quality monitoring station, particulate matter, carbon monoxide, and nitrogen oxides were measured at selected sites around the Region. While carbon monoxide is likely to be just an urban problem, the others could pose problems throughout the Region. Due to the increasing interest in the potential impacts of toxic compounds on people, we are also measuring volatile organic compounds in some localities. Air pollution is usually worst when specific

meteorological conditions occur: calm, clear nights (and days) with little wind to break up and disperse the 'parcel' of air (such as the air sitting in a valley) into which the contaminants are being released. The monitoring station also records weather conditions to help explain the variations and trends in air quality.

How is the air up there?

Since exceeding regional guidelines is not a good result, the Ministry for the Environment, has devised a technique of measuring and flagging poor quality air so that something can be done at an early stage. The idea is to measure the amount of time that the contaminants in the air approximate the relevant guideline, according to the breakdown shown in Table 12.

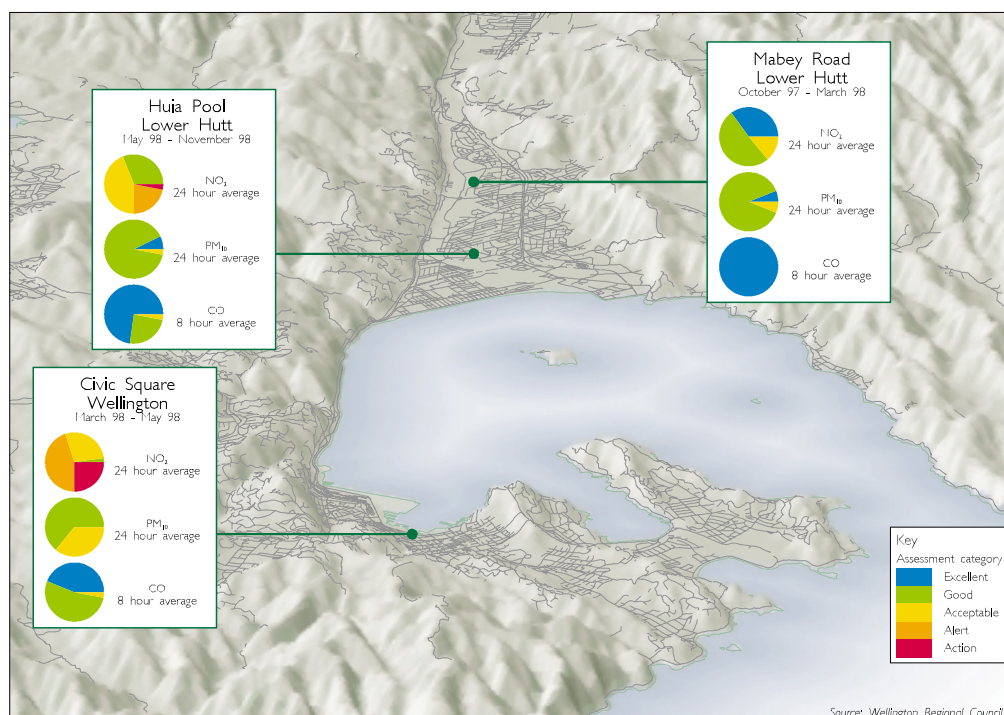
Table 12: Air Quality Assessment Categories

Category	Maximum Measured Value	Comment
ACTION	Exceeds Guideline	Completely unacceptable by national and international standards.
ALERT	Between 66% and 100% of the guideline	Warning levels, this can lead to guidelines being exceeded if trends are not curbed.
ACCEPTABLE	Between 33% and 66% of the guideline	A broad category, where maximum values might be of concern in some sensitive locations, but are generally at a level that does not warrant dramatic action.
GOOD	Between 10% and 33% of the guideline	Peak measurements in this range are unlikely to affect air quality.
EXCELLENT	Less than 10% of the guideline	Of little concern.

Because we've only been doing limited monitoring for a short time it's hard to say if our objectives are being met. All we can do now is provide some 'snapshots' of conditions in specific places and at certain times. Even so, these are revealing and tell us that air pollution can reach problem level at times.

Over the last two years carbon monoxide, nitrogen oxides, and fine particulate have been measured for short periods of time in four places: Mabey Road in Lower Hutt, Civic Square in Wellington, Huia Pool in Lower Hutt, and in Masterton. Results from the first three of these sites are shown in Figure 13. Carbon monoxide has also been measured on Jervois Quay and in Vivian Street, Wellington. We've measured fine particulate at the Basin Reserve, and undertaken dust monitoring along the full length of the Hutt Valley.

Figure 13: Air Quality Categories at Mabey Road, Civic Square and Huia Pool



Snapshots

- Motor vehicles, calm autumn conditions and sheltering buildings at **Civic Square** meant nitrogen dioxide levels consistently challenged or exceeded the maximum desired level (MDL) guideline in the autumn of 1998. However, maximum acceptable levels (MALs) were not exceeded.
- At the **Vivian Street/Victoria Street** corner, traffic volumes were sufficient to cause the carbon monoxide (averaged over 8 hours) guideline to be exceeded whenever there was a sustained period of calm weather. The exceedance of the 8-hour guideline indicates that carbon monoxide levels over a wider area are likely to be elevated – including in some residential areas – as generally calm weather is needed for levels to get this high.
- Carbon monoxide levels on **Jervois Quay** (Queens Wharf) were acceptable or better in the autumn of 1998. Peak levels were recorded in morning and afternoon 'rush hour' traffic.
- At **Huia Pool** (Lower Hutt) in winter, nitrogen dioxide concentrations reached elevated levels during periods of calm weather. At **Mabey Road** (Lower Hutt) windy conditions meant generally good-quality air, but during light winds pollutant concentrations increased.
- Fine particulate measured at the **Basin Reserve** (Government House) between February and October 1998 showed no cause for concern.
- The **Hutt Valley** has higher atmospheric dust levels than normal urban areas (1–3 grams per square metre over 30 days is typical for urban areas), probably because

of the location in a river valley. Upper Hutt has a higher average level (8.36) than Lower Hutt (5.15). Strong winds pick up dust from the river bed and rain deposits it again. Both rainfall and wind are usually higher at the upper end of the valley.

- Initial findings from Masterton in the autumn of 1999 point to a combination of calm conditions and domestic fires causing elevated particulate levels. Particulate was also studied in Masterton in 1995, but the MDL (24-hour) was not threatened.

These are only snapshots of local air quality. Air pollution levels vary from season to season and from year to year, depending on the weather. Nevertheless, we can make two interim conclusions. First off, vehicles are causing problems in downtown Wellington. Of all the locations monitored, the Wellington inner-city results show air quality under the greatest pressure. The main reason for this is the number and density of motor vehicles. Second, the quality of the air in suburban locations is generally good, but the air can become undesirably polluted in calm conditions.

What's being done?

Air pollution in Christchurch has now got so bad that all residents are now being urged to do their bit to reduce contaminant levels. Wellington hasn't reached this stage, although in the meantime there is enough in these results (and in our contribution to global problems) to make us all think hard about how we use the air around us.

The Regional Council is responding to the state of our air in the following ways.

- Most activities (other than mobile sources and domestic fires) that discharge contaminants into the air and may significantly affect air quality need resource consents. If granted, the resource consent usually contains conditions to avoid, remedy, or mitigate the effects on air quality. Compliance is checked at regular intervals.
- The Council has created a set of rules governing air discharges in the Proposed Regional Air Quality Management Plan. The plan details which activities need consents and which can occur as of right.
- Our pollution response team investigates and attempts to deal with any discharges or odours that people complain about. Discharges or odours not permitted by the Plan or that don't have a resource consent may be subject to enforcement action – if serious or not adequately addressed.

"Firstly, we have referred to the lack of air-quality data collected in Wellington in the past. Even with the Regional Council's present programme of monitoring ambient air quality, there is, as far as we are aware, no data collected at Seaview where most of the industrial discharges occur. Our second concern relates to the fact that each application for the establishment of a new activity or for a new discharge appears to be made on a case by case basis. There appears to be only limited opportunity for the Hutt City Council or for the Regional Council to consider cumulative effects of all applications granted. We are not convinced that the application by application approach can deal effectively with the compounding of technological hazard through inappropriate intensity or mixes of industry in the Seaview area. We consider some overview of the whole area is needed."

East Harbour Environmental
Association

- As mentioned, the Council is doing air quality monitoring and has a strategy for keeping tabs on the state of our air and what is affecting it. However, our current monitoring programme is insufficient to provide a complete assessment of whether the Regional Policy Statement objectives are being met because it can't cover a wide enough geographical area. It will need to be reviewed in due course.
- We have also established a meteorological station in the Hutt Valley to determine the factors that influence the dispersion of contaminants in the air.
- The effects of vehicles on air quality are managed primarily through the Council's Regional Land Transport Strategy (RLTS). This describes how the Region's land transport needs are to be provided for (including public transport), and must have regard to the effects of the transport system on the environment. A new RLTS was adopted in April 1999. The strategy:
 - recognises the need to provide an environmentally sustainable transport system, and that vehicles are causing air-quality problems in certain locations
 - proposes continued monitoring for carbon monoxide at key urban locations, and adopts carbon monoxide levels at Vivian Street as a performance indicator
 - proposes to increase the overall efficiency of the network and reduce congestion, and to make public transport a real and attractive alternative to the private car
 - plans to encourage well-tuned engines, small engine sizes, light-weight vehicles, and catalytic converters to reduce emissions
 - wants to make cycling and walking more attractive, and encourage land development that minimises the demand for travel
 - plans to introduce road pricing to enhance the road network. It signals that pricing to manage adverse environmental impacts is part of the long-term scenario for transport in the Region, but this will not be generally introduced within the next five years.

The Government has also been investigating the impacts of vehicles on air quality through its Vehicle Fleet Emission Control Strategy (VF ECS). The preliminary discussion paper states that vehicle emissions are not a national problem and places the onus on regional and local authorities to solve localised pollution problems with public transport and congestion-easing solutions. If this remains the policy direction, the VF ECS seems unlikely to offer any regional solutions. The Council made a submission on the VF ECS.

We have contributed to a number of industrial codes of practice to help reduce emissions. These include the Hot Dip Galvanising draft Code of Practice, the sand-blasting guidelines, and the Pork Industry Board's publications on odour management. The Council have also helped produce educational material with the New Zealand Agrichemical Education Trust to improve agricultural spraying practices.

Prospects for air quality

The results of monitoring at various locations within the Region warn us to keep a close eye on confined areas with high traffic volumes, and the effects of vehicles on air quality more generally. We need to know how widespread the problems experienced at the Vivian Street site are. We also need to figure out what to do about it.

The second air quality objective seeks the enhancement of air quality "in those areas with degraded air". At present there is no intention to tackle Vivian Street's problem directly, other than through the RLTS. Even then, the RLTS, allows for the worsening of the carbon monoxide levels by 2.5% over the next five years. However, it's probably wise not to attempt to deal with the site on a one-off basis, when others may be similarly affected and when any steps taken might simply push the problem somewhere else. More carbon monoxide research is being carried out at the Basin Reserve and this will help fill out the picture.

As the vehicle fleet matures, vehicles with emission control technology will become more common and this may reduce these effects (older vehicles are less likely to meet emission standards). While there have been no tests of vehicle compliance with emission standards in the Region, in the Waikato in 1996, 68% of all vehicles tested passed the required standard for carbon monoxide. But we can't be complacent. In Canterbury 41% (17,000) of vehicles failed a similar test. Vehicle tuning makes a big difference to whether a car passes or fails and owner education is needed to get this message across.

Our findings do offer some comfort for people living in the suburbs, but also suggest we should be finding out more about air movement and contamination in the confined suburban valleys. We can't say on the basis of one or two sites that adverse effects on human health or public amenity are being "avoided, remedied, or mitigated", as required by the objectives, and most emission sources (vehicles and fires) don't require consents.

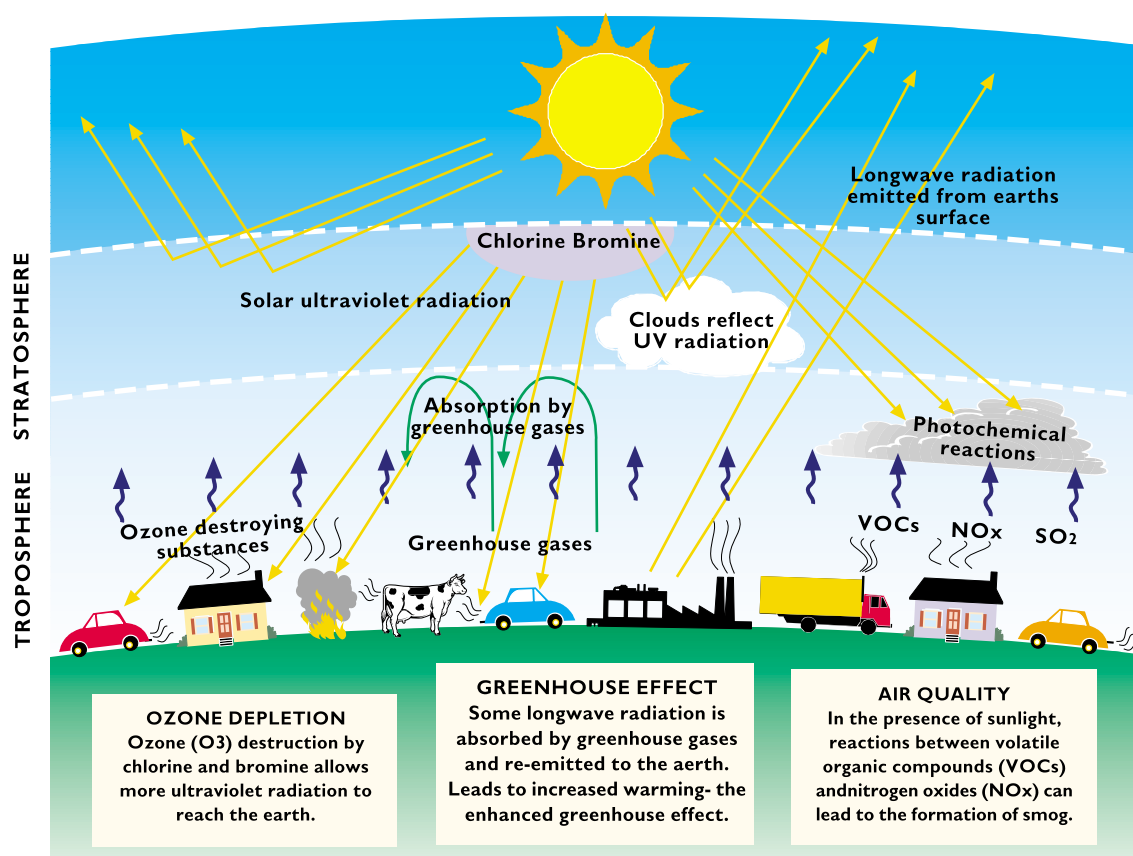
As yet we don't know anything about the air in the suburban valleys of Wellington (for example, Karori), or in Tawa, Porirua, Wainuiomata, or Upper Hutt, and there is little data for Wairarapa. It's important that this be investigated, as the Lower Hutt and Masterton results show that valleys have unique microclimates and meteorological conditions, and we cannot compare one area to another except in broad terms. However, air-quality monitoring is expensive and the community will have to decide if it wants to pay for in-depth studies in all of these areas.

The state of our atmosphere

The earth's atmosphere extends approximately 100 km above the earth, and plays a key role in regulating our weather and climate. Life depends on the ozone layer to protect us from getting toasted (by filtering out harmful ultraviolet light), and on the greenhouse gases in the upper atmosphere to keep us cosy.

The atmosphere can be divided into three main layers: the bottom layer or troposphere (up to about 20 km), the stratosphere (about 20–50 km) and the mesosphere or upper layer (see Figure 14). The combination of climatic conditions and human-induced emissions of gases and other pollutants disrupts the natural state of these layers and results in two significant global environmental problems: depletion of the ozone layer, allowing more ultraviolet radiation to reach the earth, and the enhanced greenhouse effect, increasing global temperatures. Each of these has implications for human and environmental health and well being. The illustration shows how it works.

Figure 14: The atmospheric environment



Source: EPA(NSW) 1997.

Turning up the heat?

We lack good information on the Region's contribution to greenhouse gas emissions, but our per capita contribution is likely to be high on a global basis. New Zealand has 0.07% of the world's population but contributes between 0.15 and 0.3% of human-induced greenhouse gas emissions. The Region's contribution is also likely to be high on a national basis because of its high traffic levels and relatively high socio-economic characteristics. This may be partially offset by the relatively high levels of afforestation in the Region: about half of New Zealand's carbon dioxide emissions are absorbed at present through forests acting as 'carbon sinks'.

Where we are now

In 1996 world climate scientists concluded for the first time that, despite the uncertainties, "the balance of evidence suggests that there is a discernible human influence on global climate". Global warming could see world temperatures rise 1–3.5 degrees by 2050. That may not seem much, but it corresponds to a rise in sea levels of up to 35 cm. Warming could have significant implications for the Region, but it's difficult to be sure because climate change predictions are highly variable down at the regional level.

Some of the potential changes could be:

- changes in rainfall, distribution, and intensity
- changes in crop suitability, pasture performance, and problems with weeds
- increases in plantation forestry tree growth
- exposure of low-lying settlements where the sea moves inland
- changes in coastal erosion, possible flooding as saltwater intrudes into freshwater areas
- possible environmental health problems associated with warmer climates
- diverse impacts on ecosystems.

Objective

While commonly seen as a global or national issue, climate change is also a regional concern. We make our contribution to greenhouse gas emissions (including carbon dioxide from transport sources and methane from agricultural production) and increased levels of greenhouse gases. The Regional Policy Statement's objectives recognise this, expecting steps to be taken within the Region to reduce the effects of discharges to air on "global environmental systems" (the atmosphere). While we can't solve either of these problems alone, we can make our contribution to a global solution.

What's being done?

Central government wants to manage climate change as a national issue, and this is particularly appropriate in the phasing out of ozone-depleting substances, where the Regional Council's role is minimal. New Zealand is a party to the Montreal Protocol on Substances which Deplete the Ozone Layer and has been phasing out these substances (chlorofluorocarbons, halons, etc) according to agreed timetables.

However, the Council has responded to the issue of greenhouse gases and will continue to do so. We have recently carried out a study of the impacts of increased global warming on the Region and will review this at five-yearly intervals. In addition:

- we actively participate in national policy-making on climate changes and transport management
- the Regional Land Transport Strategy is specifically geared towards improving the efficiency of the Regional transport system, reducing emissions through reduced congestion, decreasing the need for vehicle trips, and enhancing and encouraging public transport
- our flood protection strategies and construction take account of climate-induced flood variability
- the emissions inventory will give us a good description of the sources of greenhouse gases in the Region, and we expect to produce a companion volume on the Region's capacity to act as a carbon sink
- work is under way studying the effect on our rivers of El Nino/La Nina (the southern oscillation index), to allow us to more accurately predict river flows and the potential for water shortages under varying climatic conditions.

Prospects for the atmosphere

Although the actual effects of global warming are unclear, we recognise that our actions are contributing to it. This means that individually and collectively we must consider how our lifestyles are causing this problem and what we need to change to prevent future ecological impacts as well as impacts on our communities. Three areas seem to have the most potential: reducing air emissions from motor vehicles, becoming more energy efficient and the greening of ecosystems to act as carbon sinks. All three will require changes in our behaviour. Educational initiatives will help to make that change.

BIODIVERSITY

and the State of our Ecosystems



GOOD NEWS

- Plant and animal pests are being controlled through pest control programmes.
- Key native ecosystems are being actively managed
- WRC forests are managed as ecosystems
- There is a wave of enthusiasm for the restoration of degraded areas

BAD NEWS

- Many species and habitats have been lost or are now under serious threat
- Ecological processes are impaired in most ecosystems
- Lowland forests, wetlands, rivers, estuaries and coastal ecosystems need greater protection

Introduction

What do Peka Peka dunelands, a lush Featherston paddock and a leafy Kelburn backyard have in common? Each is an ecosystem – a community of different species, whether people, plants, animals or micro-organisms – interacting with each other and with their surrounding environment. Biological diversity – or biodiversity – is the name we give to this rich tapestry of life.

New Zealanders feel a special kinship with their unique native plants and animals, but our nation's biodiversity extends to a range of introduced species, and our Region is a complex web of both. While some of the newer arrivals, such as gorse and possums, may be considered worthless or even noxious, many others, such as sheep, cattle and pine trees, are vital to the Region's productive sector and are here to stay.

Healthy ecosystems provide us with the raw materials of life: plants and animals for food and shelter, fibre for clothing, rock materials for construction, and so on. They also provide numerous 'services' that power the cycle of life, processes that freshen the air and water, decompose and detoxify wastes, give us good soils, and stabilise climate extremes. We value their aesthetic qualities, use them for our recreation, and treasure them in our cultures.

Biodiversity is vital to the health of our ecosystems because human actions upset and threaten the environment, and the more diverse an ecological system is, the better it can cope with change.

Soiling the nest

The things we humans do in our daily lives have impacts on ecosystems, often for the worse. As a country and as a Region we should be striving to live in our environment in ways that are *sustainable* over the long term. Human actions that place pressure on our regional biodiversity and ecosystems, and which therefore have the potential to be unsustainable, include:

- drainage of wetlands and channeling of waterways
- pollution of the air and soil
- discharges into waterways
- fire
- habitat degradation
- grazing of forest remnants and riparian areas
- clearance of regenerating scrub and native trees
- water removal from waterways, which increases temperatures and elevates nutrient concentrations
- exotic pest plants (wild ginger, old man's beard) and grasses
- animal pests (possums, goats, deer, feral cats, mustelids, rabbits, rooks)
- predation, browsing, and competition from introduced species

Objectives: what should our ecosystems be like?

The overall quality [health] of ecosystems is increased.

Healthy functioning ecosystems are distributed throughout the Region, including the rural and urban environments.

The area and quality of indigenous ecosystems in the Region is increased.

The Region has a diversity of healthy ecosystems which represent the full range of regional flora, fauna and habitats.

Special ecosystems in the Region are actively protected and appropriately managed.

Regional Policy Statement

- structures, urban expansion, and land-use changes that modify or destroy habitats
- pollution, over-fishing, discarded plastic waste, fishing line and nets in coastal marine areas
- trawling for particular species
- recreational activities.

Where we are now

To help determine whether our objectives for ecosystems and biodiversity are being met we need to collect and sift through massive amounts of data. Piece by piece the Council, the Department of Conservation (DoC) and researchers are gaining an understanding of the condition of our Region's ecology and biodiversity. For example, DoC is developing a plant, bird, and weed database that will eventually be able to tell us how this vital part of our biodiversity is changing.

Because of the difficulty in measuring changes in biodiversity, we can only concentrate on selected pieces of the overall picture. The Council's existing monitoring programme is aimed at understanding changes in a few key areas: air quality, fresh water quality and quantity, coastal water quality, and the effectiveness of Council functions such as plant and animal pest management, and the health of indigenous forests.

The upshot is that while we can know with certainty that habitats and species have declined over the last 1000 years, we don't know with any precision how things have changed over the last 20 years (except in a few small areas). Given current funding, we are unlikely to know how they have changed two decades from now. This makes monitoring change in our ecosystems and comparing these against the expectations of the Regional Policy Statement extremely difficult.

However, what we can do is draw together the knowledge we possess from a myriad of investigations by scientists and the knowledge of local people working in the field to paint a picture. This has been attempted here. It is admitted that the focus is on a narrow range of fauna and flora. We don't comment on the condition of the Region's bacteria, protozoa, algae, fungi, land, marine and freshwater invertebrates and frogs. Passing comment is made about birds and reptiles.

"The runanga is concerned that inadequate consideration is being given to the maintenance and retention of ecosystems which allow for endemic freshwater species, particularly eels, inanga and whitebait to flourish in regional waterways. These species are an important food supplement for Maori but are generally disregarded in competing uses for riparian areas and waterways. We consider it important that the council consider methods for improving the habitats of these species and introduced regimes which will promote such improvements."

Te Runanga o Toa Rangatira

"In our rohe the most significant cause of ecosystem decline is the creeping but pervasive fragmentation of place, loss of successional opportunities and lack of connectivity (amongst ecosystems and between people and place). In assessing condition, health, resilience etc Council staff also need to apply methods for sustainable management that comply with tikanga standards."

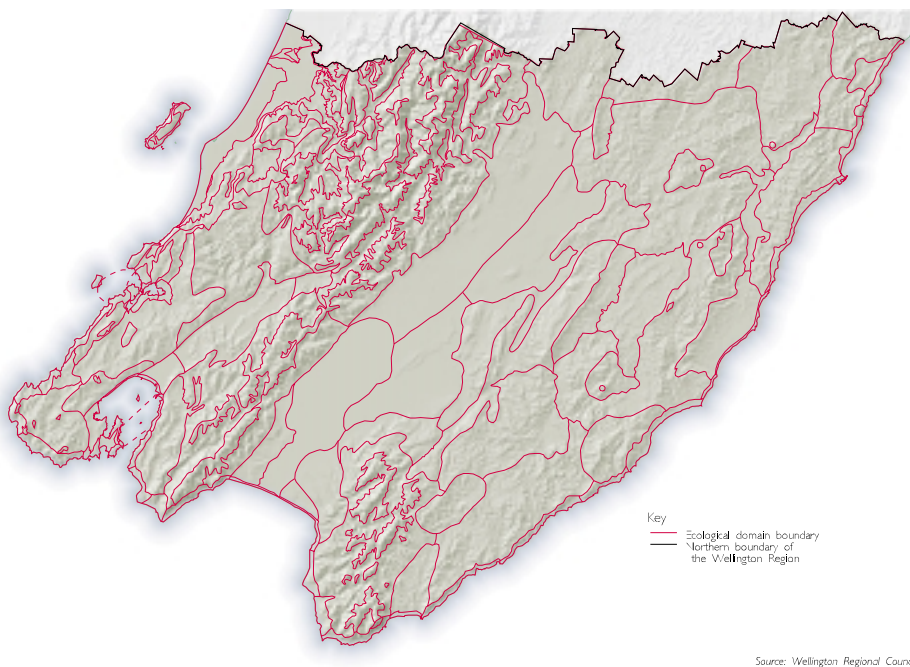
Te Runanga o Ati Awa ki
Whakarongotai

What have we found?

Our Region is a vast treasure trove of ecological diversity. Its mix of modified and indigenous ecosystems stretch from the high mountains to the sea. Indigenous ecosystems include forests on the uplands, lowland hill country and (remnants) on the plains; lakes, rivers, wetlands and estuaries; coastal escarpments, dunes, rocks and islands. The modified ecosystems are both rural and urban, and include farmed pastures, plantation forests, and the living parts of our cities and towns – including domestic gardens. Within these ecosystems are a host of habitats and species, indigenous and introduced, which make up our biodiversity.

This diversity can be simply demonstrated by analysing biogeoclimatic patterns. We have identified 64 'ecological domains', or areas with *distinctive, recognisable biological boundaries* within the Region. These are shown in Figure 15. Each domain displays a set of unique characteristics which make it different from its neighbours.

Figure 15: Ecological Domains within the Wellington Region



What do we know about these areas and the ecosystems which make them up? From the monitoring the Council has undertaken and from the experience and research of others, it is clear that:

- nearly all the basic building blocks of our ecosystems (water, soil, and air) are degraded to some extent – except in pristine areas such as mountain streams
- the natural ecological communities formerly adapted to the Region's various domains are under attack from introduced plant and animal pests, impeding the operation of natural food chains, community interactions, and patterns of succession

- rivers, streams and wetlands have been altered, constrained and redirected to serve human rather than ecological purposes
- the capacity of many ecosystems to regenerate, recover after disturbances, and maintain their long-term viability has been undermined by declines in species numbers, the isolation of remnants, competition from pests, and the loss of genetic material through extinction
- many ecosystems have lost their natural diversity and in-built resilience
- cycles of feeding, breeding, roosting and migration have been curtailed through the loss or fragmentation of remaining areas of habitat, polluted water, and barriers to movement created by human uses such as agriculture, dams, and drainage.



What is the state of our indigenous vegetation?

When asked about biodiversity, most people think first of New Zealand's unique native bush, scrub, and grasslands. Its key species are our icons – the kiwi, the silver fern, the kakapo and the tuatara. The picture painted in the Draft New Zealand Biodiversity Strategy is one of steady decline – for the bush, as well as for many species.

No-one can dispute the huge reduction in the amount and distribution of the Region's vegetative cloak (and with it, the species that make these habitats their home) since humans first arrived here around 1000 years ago. Maori fires and settlers land clearance for farming were the initial causes, with introduced pests and weeds (possums, deer, goats, pigs, wandering jew, old man's beard) continuing the job today.

The Department of Conservation describes large totara, kahikatea, and matai forests as the original landcover of the Wairarapa plains, along with raupo, sedges, and rush swamps in wetter areas. These are believed to have been lost to fires in the seventeenth century. By the mid-nineteenth century, the remaining forests were a large (9,000 acre) block between the Waiohine and Waingawa Rivers, and other smaller forests along the Waipoua, Ruamahanga, Tauherenikau and Tauweru Rivers, and around Lake Wairarapa. Forests were replaced by native grasslands, covering about half of the plains. In the Eastern Wairarapa hill country the dominant forest species were rimu, northern rata, and tawa. These to are thought to have largely gone in the fires mentioned above. Bracken, low scrub, and scattered pockets of forest were all that remained 150 years later.

On the Kapiti Coast the story is largely the same. Most of the district was covered in tall forest of one kind or another, dune forests close to the sea and swamp forests on the alluvial plains, dominated by kahikatea and pukatea. There was a high diversity of species, reflecting the fertile soils, mild climate and generally stable landforms of the area.

The current vegetative cover is revealed by satellite imagery (see Table 13). Indigenous forests and shrub-land make up the second and third most common classes, the forests being largely in the Taraura, Rimutaka and Aorangi mountain ranges. But the winner, with over half the land area of the Region, is pastoral grassland, reflecting the extent of farming in the Region, with its attendant highly modified monocultural ecosystem and exotic species.

Table 13: Area of selected vegetation types 1998 (land cover classes)

Class name	Description	Area in hectares	% of total area
Primarily pastoral	Pastoral (inc. croplands)	464,330	52.47
Indigenous forest	Indigenous forestry	174,803	19.75
Shrub land	Shrub & scrub species	159,200	17.99
Planted forest	Planted or exotic forest	43,154	4.87
Predominantly tussock	Tussock grasslands	5,159	0.58

Source: Land Cover Database, WRC GIS.

But then native species are not excluded from farm land: cabbage trees and other natives, flaxes, occasional small remnants and shrubs dot the landscape. There are also a significant number of pockets of native vegetation scattered across the Region which, although not big enough to be protected or considered a priority for management, are still important to the ecological processes at work here. These include the vegetation alongside roads, rivers and railway lines, small wetlands and farm dams, stands of trees in farm paddocks, domestic gardens, golf courses and public open spaces, regional park ecosystems, and coastal inlets, crevices, and dunes.

The value of these places lies in the way they connect one ecological system with another, provide food sources and habitat for transitory birds and animals, and give amenity, recreational opportunities, and other 'ecological services' to people.

What is the state of our wetlands?

As much as 90% of the Region's wetland area has been drained, filled, or otherwise lost but we have no completely reliable way of estimating both what has been lost and what is left. Wetlands may once have covered about 103,000 ha (12.7%) of the Region (this is excluding the surface water of Lake Wairarapa). Most were in the flood plains of our major rivers, and were made up of shifting mosaics of river bed, meanders, oxbows, bogs, swamps, lakes, and swamp forest. The floodplains of the Otaki, Waikanae, Hutt, Tauherenikau, Ruamahanga and Whareama Rivers contained much of the historical wetlands, totaling over 75,000 ha. On the Kapiti coast peat bogs extended in a nearly continuous strip from Paraparaumu to Foxton. Now only 300 ha remains.

The Council's 1993 survey identified just over 13,300 ha of extant wetland (1.6 % of the Region), of which the Lake Wairarapa complex, internationally significant for its bird life, accounts for about 9,000 ha. The average size of all other wetlands is under 30 ha, with half under 10 ha. Most are in private ownership. Apart from the 1993 survey, which is the most up-to-date information available, the state of our information about wetlands is very poor.

What is the state of our sand dunes and beach vegetation?

Coastal dunes make up a very small part of the Region and have diminished in size and quality since the turn of the century, now covering only 0.16% of the land area. The New Zealand Sand Dune Inventory identifies 12 dune systems on the western and southern Wellington coasts, and 18 on the Wairarapa coast. DoC has identified urban development, off-road vehicles, farming, forestry, pest animals and exotic plant species (such as marram grass) as being significant pressures in reducing the distribution of dune vegetation over the last 100 years.

The western dunes are rated poorly (none score higher than 7 out of 20 on the inventory's quality index) affected by urban development and by weeds (marram, lupin, boxthorn). The dunes north of Peka Peka are the most diverse, whilst the dune/wetland/forest association at Queen Elizabeth Park is suggested as a regional priority for management. DoC's monitoring of the health of dune vegetation in the Wellington Conservancy reveals that the highest rated dunes of the Wairarapa are at Uruti Point, Flat Point, White Rock, Te Humenga Point, and west of Cape Palliser. The dunes at Te Humenga Point are notable for their condition (an intact sequence of a dune vegetation community) and absence of weeds. DoC found the greatest concentration of its indicator species present at Uruti Point, and consequently sees its protection as a priority. White Rock is considered to be nationally important.

What is the state of our freshwater fishery?

Some 27 native species of freshwater fish and 17 introduced varieties are found in New Zealand. Nineteen indigenous species have been recorded in the Region. DoC considers all to be worthy of action to ensure their survival, with four categorised as high priority. They are distributed across 25 rivers and their tributaries, including the Waitohu, Waikanae, Otaki, Pauatahanui, Tauherenikau and Waingawa. Appropriate management regimes for these waterways are recommended in the Proposed Regional Freshwater Plan.

"This area was a once-wet place. Now the swamps, streams and ephemeral wetlands are drained, constrained and polluted to such a degree that they are seldom acknowledged as a typical landscape of this region. Our largest area of wetlands in the north Waikanae area has been converted to sewerage treatment ponds and all our waterways are polluted to some degree. Most waterways, including the beaches, are degraded to a point where kai cannot be safely taken."

Te Runanga o Ati Awa ki
Whakarongotai

How prevalent are our freshwater fish? A national study of 38 rivers by I. Jowett and J. Richardson (which included seven local rivers) found that both diversity and abundance were better than had been thought, at least in larger rivers. On the other hand, the well-known scarcity of freshwater fish fauna was apparent (they found only 19 of the 27 species and only nine could be classed as common). When all 38 rivers in the study were ranked in terms of fish density, three Wellington rivers (Pauatahanui, Ruamahanga and Akatarawa) appeared in the top 10, and six of the seven were in the top half.

Of course this is not necessarily an indicator of diversity so much as of total numbers of fish observed. Eels, for example, make up a significant proportion of the numbers of specimens counted in four of the rivers.

What is the state of our freshwater invertebrates?

Aquatic insects, crustaceans, worms and snails are among the freshwater macroinvertebrates living in the beds of rivers and streams. All are affected by changes in sedimentation, periphyton abundance, temperatures, dissolved oxygen, and toxins. The Council is working on an assessment of the numbers of macroinvertebrate species found in the Region's rivers over the last five years to estimate any changes in their distribution and diversity.

What is the state of our marine species?

If our knowledge of the state of biodiversity on land is meagre, our understanding of conditions and life under the sea within the Region could be ironically described as desert-like. The Council's responsibilities for the coastal marine area (the Region's boundaries extend 12 nautical miles out to sea) are set down in the RMA. These mainly relate to the control of discharges and takings, reclamation, noise, seabed disturbances and occupations. The Council is not responsible for the state of the fish life or mammals that inhabit this area. Marine ecosystems are watched over by the Ministry of Fisheries.

Marine mammals were relatively common along the Region's coast until harvesting in the nineteenth century substantially reduced their numbers. But as a consequence of recent protection (the Marine Mammals Protection Act 1978), marine mammals, particularly seals, are becoming a feature of coastal waters. Now New Zealand fur seals haul out regularly at Kapiti Island, Mana Island, Black Point, Cape Terawhiti, Tongue Point, Sinclair Head, Turakirae Head, Palliser lighthouse, Stone Wall at Cape Palliser, and less often at Castlepoint. Colonies of immature animals are found at Kapiti Island, Honeycomb Light and Turakirae head, and in the early 1990s seals established a breeding colony at Cape Palliser. Seal numbers fluctuate from a summer

"The ecology of the Kapiti coast – fragile because much of it consists of coastal dune systems – is very vulnerable to impacts of human development. Coastal dune landscapes receive little attention in conservation estates and parks but they are one of the most degraded landscapes in the country and one of the most at risk in terms of increasing trends for modification and degradation – particularly for suburban development."

Te Runanga o Ati Awa ki
Whakarongatai

low of about 350 to a winter high of 2500. DoC expects the number of seals to increase in its Wellington Conservancy and their distribution around the coastline to widen. Leopard seals, southern elephant seals and New Zealand sea lions also drop by, but these occasional visitors are usually wandering, non-reproductive animals.

The waters of the Region play host to sperm whales, pilot whales, orca, rare pygmy right whales and the southern right whale. The common dolphin is often seen, and the rare Hector's dolphin has been reported in the Wairarapa.

What are our threatened ecosystems?

It should come as no surprise that the most threatened ecosystems are in the Region's lowlands. DoC's Management Strategy for its Wellington Conservancy's ecology lists the following ecosystem types as those most in danger:

- lowland forests
- rivers, lakes and river margins
- wetlands
- dunes
- estuaries
- coastal escarpments.

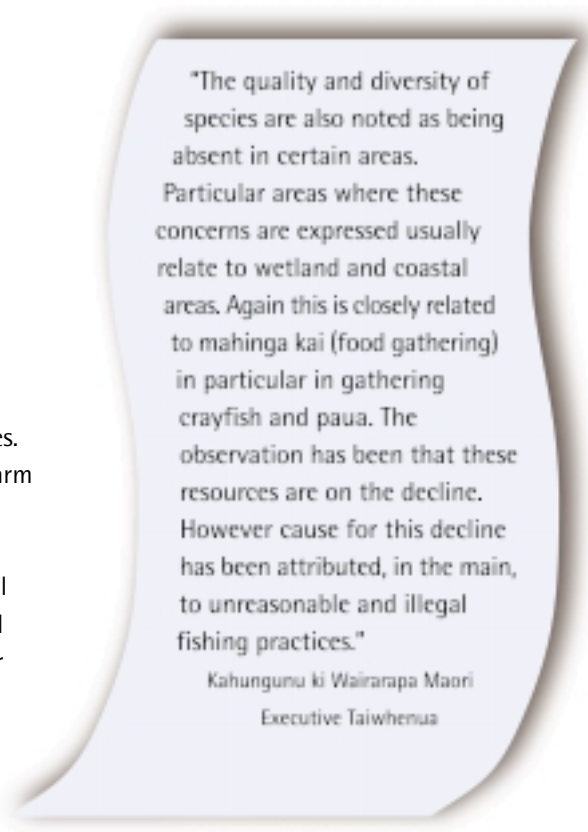
These ecosystems face a greater range of pressures from urban development and farming, and the diminution of habitats that accompanies these processes.

Most of the formally protected land in the Region lies in three mountainous areas – the Tararua, Rimutaka, and Aorangi Ranges. These areas have survived simply because it's hard to live and farm there. Lowland ecosystems are not well represented amongst protected land: barely 2% of all land below 100m from the Manawatu Gorge south is protected by DoC, whereas 93% of all land above 1000m is protected. The Council also has substantial natural forest holdings (30,400 ha), which it protects largely for water supply purposes, but most of this is also above 500m.

DoC does manage a large number of small areas at lower altitudes, but most of these are tiny remnants (35% are under 5ha). We can add to these a variety of local authority and other reserves (another 1% of the protected land), and perhaps 150 covenanted areas on private land. As a result, a greater range of higher altitude species and communities is represented in the protected lands than is the case for those limited to the lowland environments.

What are our threatened species?

DoC lists 135 indigenous species as priorities for conservation action in the lower North Island. These are judged either 'endangered' or 'vulnerable'. A further 268



"The quality and diversity of species are also noted as being absent in certain areas. Particular areas where these concerns are expressed usually relate to wetland and coastal areas. Again this is closely related to mahinga kai (food gathering) in particular in gathering crayfish and paua. The observation has been that these resources are on the decline. However cause for this decline has been attributed, in the main, to unreasonable and illegal fishing practices."

Kahungunu ki Wairarapa Maori
Executive Taiwhenua

species receive a lower priority but are still seen as deserving of action. Plants make up by far the largest group (53 high-priority species), followed by birds (12 high-priority and 21 medium-high priority), but some mammals, reptiles, marine mammals and freshwater fish are also threatened.

Some of our most threatened birds, animals, fish, and plants are shown in Table 14.

Not surprisingly, these threatened species are generally found in ecosystems that are themselves under threat. Coastal habitats contain the highest number of these species (55), followed by wetlands (28), then forest habitats (24).

What's being done?

Nearly all of the activities the Council undertakes to manage the Regional environment could be seen as contributing to the Region's ecological health, even if they are not carried out with this purpose in mind (for example, flood protection, regional parks, transport planning). The following are just some of the Council's direct approaches to ecosystem management.

The Council's Regional Policy Statement and regional plans cover rivers, soil, air and the coast. The regional plans also include rules designed to protect key ecosystems while allowing sustainable uses wherever possible. Programmes to monitor the quality and quantity of water in our rivers, lakes, and streams and targeted investigations to sort out problem areas are described elsewhere in this Report. Recent targeted investigations have focused on the Waikanae River, and the Waiwhetu Stream and Hulls Creek in the Hutt valley.

Work is currently underway on improving and restoring the ecological health of the Kakaho Stream at Pauatahanui, the Waiwhetu Stream at Te Whiti, and the Waikanae River at Otaihanga through reducing faecal inputs. In the Wairarapa the Whakawiriwiri Stream has also improved with the reduction of nutrients from dairy discharges. As part of managing the risks of flooding on the Kapiti Coast, the Council's Flood Protection Department has prepared long-term strategies for the surrounding river environs. The Otaki strategy uses the ecological domain concept to manage these riparian areas according to ecosystem principles.

Table 14: Some threatened species of the Wellington Region

Mammals:	long-tailed bat southern short-tailed bat
Marine mammals:	southern right whale
Birds:	North Island brown kiwi Cook Strait blue penguin sooty shearwater takahe Caspian tern North Island kaka red-crowned parakeet
Reptiles:	Whitaker's skink common green gecko
Fish:	giant kokopu banded kokopu short-jawed kokopu brown mudfish
Invertebrates:	flax weevil tadpole shrimp
Plants:	<i>Muehlenbeckia astonii</i> (shrubby tororaro) <i>Peraxilla colensoi</i> (scarlet-flowered mistletoe) <i>Pleurosorus rutifolius</i> (blanket fern).

The Wellington Regional Native Plant Guide, was designed to help residents champion the ecological processes in their backyards by showing them what native plants are best suited to local conditions. The Council puts a great deal of effort into controlling possums, rabbits, wasps, and rooks for both ecological and agricultural reasons. It recently received an environmental award for its work. Pest plant work includes old man's beard control along Wairarapa rivers, a reduction in nodding thistle sites, and requiring landowners to remove pest plants.



Key Native Ecosystems (KNE's) are areas of prime native habitat of regional significance. Most are native forest remnants, but wetlands and dunelands with significant flora and fauna may be included. Each KNE is given a priority ranking for possum control based on its flora and fauna, its susceptibility to possum damage, and its value to the people of the Region. About 400 sites have been assessed. In 1997/98 over 17,000 ha and in 1998/99 11,000 ha were treated by the Council to protect prioritised sites. Species such as kohekohe, titoki, ngaio and nikau have demonstrated a relatively fast response with improved flowering, foliage density and decline in 'die-back'. This should also allow honey and fruit eating birds such as tui, pigeon and bellbirds to prosper.

The Council owns over 30,000 ha of indigenous forest, which are now managed using an 'ecosystem approach'. Forest health surveys are being undertaken regularly, ecosystems within the wider forests are being identified, and pest control is being undertaken.

Trees next to rivers provide shade, shade lowers the temperature of the water, and with lower temperatures the in-stream ecology gets a good chance at surviving, even with high levels of nutrients (nitrates from animals) and biological organisms such as faecal coliforms. The Council favours this form of water quality management, and is working on how to put this into practice. A small section of the Horokiri Stream flows through Council land at Battle Hill, and a demonstration riparian plot has been established on the stream to serve as a practical example of how riverbank management can benefit water quality, the aquatic ecosystem, and help stabilise stream banks and prevent erosion.

Coastal ecosystem improvements are not currently a priority for the Council but a small restoration project is taking place on the east coast of the Wairarapa. The Council is helping local people to manage the dunes at Riversdale Beach.

Of course the Council is not alone in undertaking this work. DoC manages its estate to protect conservation values and works beyond its boundaries to protect key species and important places. Territorial authorities have carried out many restoration

projects. In Wellington, for example, special efforts have been made to rejuvenate the Lyall Bay dunes and other places along the south coast. In addition, concerned individuals and groups such as Kapiti Environmental Action, Forest and Bird, and the Guardians of Pauatahanui Inlet undertake much conservation work.

Prospects for managing biodiversity

The Draft New Zealand Biodiversity Strategy released this year highlighted the decline in New Zealand's biodiversity and the poverty of many of our ecosystems. The need for urgent action to 'turn the tide' was its compelling message. In the Wellington Region this need is no different, particularly in regard to lowland forest ecosystems, rivers, wetlands and coastal dunes. Indeed, this Region has considerably less of these vanishing ecosystems in protection (2%) than the national average: 10% of all land below 100m is protected nationally.

Are we meeting our ecological objectives? To some extent, the intent of the objectives is so ambitious that we may never be able to meet them. We do not monitor and know little about large parts of the biosphere, so cannot say how applicable these objectives are to a vast range of ecosystems, for example those below ground or in the marine environment.

What we can do is compare the essential message of these objectives (that our ecological systems should be healthy and life sustaining, naturally diverse, and widely distributed and with the special and unique protected) with what we've described above. That is: a decrease in the number and distribution of key species and habitats, the loss or endangering of other species, the impairment of the ecological processes of most ecosystems, and only the partial protection of the special places that remain. For as long as this situation carries on, the answer to our question must be 'no'. We should not underestimate the resilience of natural systems and their capacity to bounce back once the disturbances to their natural pattern are reduced or removed. This continues to replenish and restore the stock of some plants and animals (e.g., cleared land reverting to scrub, regenerating forest where possums are controlled). In addition, there are numerous examples of ecological restoration being undertaken around the Region, as people work to assist nature. But, in general, there remains a pressing need to act to halt the decline in the Region's biodiversity. How can this be achieved?

Four essential steps for ecological health: the big picture

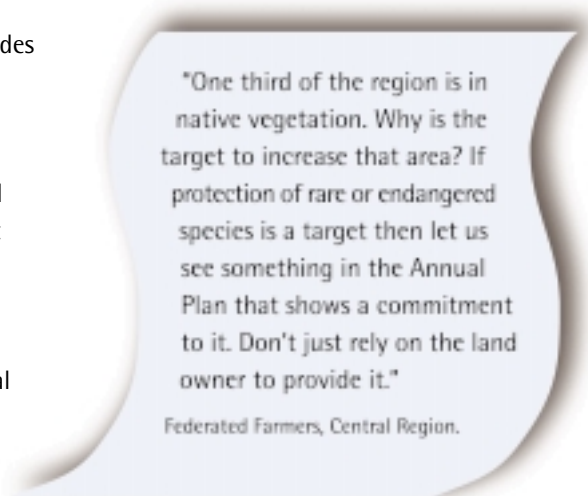
1. It is not enough to hope that biodiversity and the range of ecosystems the Region possesses will be safeguarded by existing protection arrangements. As we have seen, the areas beyond the protected uplands are the ones at risk and it's here we must intervene if we are to achieve the objective of protecting the full range of

"The runanga is concerned that inadequate consideration is being given to the maintenance and retention of ecosystems which allow for endemic freshwater species, particularly eels, inanga and whitebait to flourish in regional waterways. These species are an important food supplement for Maori but are generally disregarded in competing uses for riparian areas and waterways. We consider it important that the council consider methods for improving the habitats of these species and introduced regimes which will promote such improvements."

Te Runanga o Toa Rangitira

regional flora and fauna. We must not forget that this includes the ecosystems of the ocean as well as those on land.

2. We can't rely on agencies such as DoC to do it alone. Landowners and the community must become involved, and their good intentions need to be supported by Government and public agencies to ensure that healthy ecosystems are distributed throughout the Region. There is a reservoir of goodwill and activity amongst community groups and landowners who share a concern for the health of their local stream, beach or bush block and who are already restoring and replanting. This needs only to be tapped and encouraged with support, education, information, or other incentives, for it to flourish.
3. Little will be achieved unless local authorities take a more active role in ecosystem management. In one way or another, the Regional Council is involved in managing so many of our threatened ecosystems – rivers, lakes and their margins, coastal water quality, estuaries, flood control, and pest control across the vast bulk of lowland ecosystems. City and district councils also play a significant role, particularly in land management. Local authorities also own land that contains important ecosystems. These parks, reserves and forests need to be actively managed; many have high ecological values and are rare or unusual (e.g., many are "key native ecosystems" or remnants such as the Queen Elizabeth Park dune sequence).
4. We should do more to take an 'ecosystem approach' to resource management. This means managing resources for the role they play in the wider ecosystem of which they are part and managing, as far as possible, the processes that bind resources and organisms into living systems. Elements of an ecological approach could include:
 - Changing the focus of freshwater management to improving the ecosystems of rivers, streams and wetlands rather than managing water quality and quantity for human needs.
 - managing the life supporting capacity of entire river systems, including wetlands, to sustain indigenous species throughout their life-cycle.
 - using riparian management to foster local biodiversity and improve water quality for aquatic ecosystems.
 - tackling plant and animal pests on an ecosystem basis rather than a pest basis as at present. The complete pest profile of a particular area should be addressed to enable the ecosystem to regain its natural composition as far as possible (current legislation directs the Regional Council to adopt a pest-led approach through Pest Management Strategies).



"One third of the region is in native vegetation. Why is the target to increase that area? If protection of rare or endangered species is a target then let us see something in the Annual Plan that shows a commitment to it. Don't just rely on the land owner to provide it."

Federated Farmers, Central Region.

- supporting land owners who wish to protect or manage their ecosystems.
- further developing the Regional Council's programme of active restoration of degraded areas by involving the community in local restoration projects (e.g., stream care and beach care).
- protecting through better management key remnants which represent vanishing regional ecosystems (forest, wetlands, estuaries) and are the genetic "seed-beds" for biodiversity. With the Department of Conservation's resources stretched just to maintain its existing estate, there is little left to protect these highly valuable remnants. Local authorities could help with this work.
- working with the Ministry of Fisheries to safeguard harbour, inlet, and oceanic ecosystems.

Adopting this kind of approach would do much to increase the health of ecosystems.

Local authorities have tended to compartmentalise resources largely for administrative convenience when, in fact, they should be managed as living systems with ecological functions to perform. As the RMA makes clear, a more integrated approach is called for – across both resources and administrative agencies. Local authorities should consider reconfiguring the way they deliver services to ecosystems, perhaps on a catchment basis, in order to capture the full range of ecological needs. Where possible, councils, the tangata whenua, the Department of Conservation, and local communities also need to work together to address the problems of high priority "at risk" ecosystems. This approach is being on trial in the Pauatahanui Inlet now, but it has a wider applicability. The inter-relatedness of ecosystem components means no one agency can manage the whole of an ecosystem on its own and co-operation is essential.

A simple starting point could be for the Regional Council, local councils, and the Department of Conservation to integrate their biodiversity databases and undertake future monitoring and assessment of the state of our ecosystems. This would meet the reporting goals of these organisations, reduce duplication, and give a clear picture of our successes and what still needs to be done to achieve the Region's ecological objectives.

LANDSCAPE AND HERITAGE



GOOD NEWS

- Regionally significant landscapes have been identified.
- District plans include provisions for the protection of landscape.
- Major heritage buildings have been retained.

BAD NEWS

- No information is available about the state of outstanding geological features, landforms or soil sites.
- Heritage is at the bottom of the funding list.
- There is administrative uncertainty about the way heritage should be managed.

Introduction

Many children of the 1950s and 60s recall flickering newsreels of bulldozers knocking down trees and leveling land, and buildings collapsing into rubble at the onslaught of a steel ball. Mastery over nature and 'Out with the old, in with the new' were the catch-cries of progress and making a better world.

Today we are more aware of the importance of continuity in giving a sense of identity. We understand the need to preserve our physical environment – whether it be a familiar landscape or a historic building, a beloved fishing hole or a grove of trees. As a result, the Council has an important role to play in the management of those aspects of our landscape and heritage that we value.

Progress versus preservation?

Landscape

What do we mean here when we talk of valuing our landscapes? To answer this we need to look at its key *physical characteristics*: the way the land is used (for example, urban versus rural), the shape of the underlying land, and the land cover, which could range from water to high-rise offices. The values we associate with landscapes are aesthetic, natural and recreational, and the special values of tangata whenua.

Our landscapes can be adversely affected in many ways. Subdivision, mining and quarrying, reclamation, land clearance, afforestation, building, road and infrastructure development, tourism and recreation, and introduced animals have varying effects, depending on the scale and location of the activity. In some cases, cumulative impacts can be greater than that from a single large-scale development, where the immediate need to minimise environmental impact is obvious. Problems can also occur when there is a conflict between a landowner's desire (and perceived right) to change the use of their land, and public expectation for open space, uncluttered skylines and preservation of bush remnants.

The Council has identified six Regionally outstanding landscapes based on their characteristics and values. These are:

- Wellington Harbour
- Pauatahanui Inlet
- Kapiti and Mana Islands
- Cape Palliser
- Castle Point
- the Tararua, Rimutaka and Aorangi Ranges.

Objectives

Nationally and regionally outstanding geological features, landforms, soil sites and other natural features of the Region are protected from inappropriate subdivision, use and development.

Adverse effects of human activities on the Region's natural and physical resources are avoided, remedied or mitigated so that the quality of any regionally outstanding landscapes which those resources contribute to is maintained.

The cultural heritage of the Region which is of regional significance is:

- (1) recognised as being of importance to the Region;
- (2) managed in an integrated manner with other resources; and
- (3) conserved and sustained for present and future generations.

Regional Policy Statement

Around Wellington Harbour the key pressures come from urban development on the hills and coastline: one person's natural feature is another's ideal house site. There is also pressure on the regenerating native vegetation along the Wellington fault escarpment that links Wellington with the Hutt Valley.



The Pauatahanui Inlet suffers from its location on the fringe of a major urban area where there is a demand for the creation of both higher-density residential development and medium-density 'life style' block development. Economic trends also drive changes in land use; for example, rural landowners may plant forestry on land previously used for grazing. The upgrading of existing roads can also significantly alter the landscape.

In contrast, Kapiti and Mana Islands avoid these problems because both are actively managed as conservation areas. Similarly, much of the landscape encompassed by the Tararua, Rimutaka and Aorangi Ranges is being managed as natural areas. The areas of greatest potential pressure are on the foothills around the edges of the ranges, where there may be changes in land use from, for example, pastoral lands into forestry.

The main pressures on the Cape Palliser and Castle Point landscapes are from potential expansion and intensification of holiday settlement development, and from potential land-use changes on farmland.

Outstanding natural features

Outstanding natural features include geological features, landforms and soil sites. These are identified for the Wellington Region in inventories compiled by the Geological Society of New Zealand and the New Zealand Society of Soil Science, which classify the sites in terms of their importance, and also rate their vulnerability to damage by human actions.

Important landforms and geological sites are threatened by activities that disturb the land surface, such as earthworks for land development and roading, mining and quarrying, and ploughing. Ironically, several important geological sites are under threat from those who go specifically to see them or study them: geologists, collectors and fossickers who take 'just a little sample' can gradually destroy a natural resource. Farming practices, clearing vegetation, road sealing, and the stabilisation of cut faces can also take their toll.

Important soil sites are under pressure from activities that result in changes in soil structure, soil formation and nutrient flow. Logging is one culprit. Grazing and stock damage can cause pugging and compaction that damage soil structure (for example,

porosity). Cattle dung can increase nitrate levels and certain bacteria/micro-organisms. The removal of vegetation can cause a decrease in the organic litter layer, which affects soil nutrients and chemical properties and, subsequently, soil fertility. Burning is a drastic form of removal, which also results in an increase in carbon returned to the soil, altering the soil nutrient budget dramatically.

Heritage

The Region's cultural heritage (as opposed to its natural heritage) is made up of buildings, structures and places associated with human activity. These may range from the remains of long-abandoned Maori settlements, to intact buildings still in use. These places may have historic value as examples of human endeavour, art, culture, or ways of living that are no longer practiced, or they may have spiritual importance as tangible links with the people who once occupied the Region.

Buildings and sites can be rated for their local and for their Regional significance. It is this latter group that is covered by the Regional Policy Statement, which defines Regionally significant cultural heritage as being those places, buildings, or sites listed as Category 1 items in the NZ Historic Places Trust's Register of Historic Places.

The pressures on Category 1 buildings and sites comes from development or use, either of the heritage building itself, or the land it stands on in a way that does not allow for the continued existence of the building, or which changes it in some way. Many heritage buildings and places (usually those of lesser significance than Category 1) are simply demolished to make way for new structures, often because they are at the end of their lives and are unsuitable for their intended purpose. Others may be retrofitted or rebuilt to serve a useful purpose, and steps are taken to retain their historic values.

Where we are now

Landscape

What makes for an outstanding landscape – one that's worth preserving? Each of the six landscapes we identified in the first part has unique qualities that can be described by all the following.

1. The landscape is used, valued or appreciated by the regional community for one or more of the following:
 - dramatic experiences, due to the scale of landscape, its remoteness or exposure to the elements
 - diversity of visual experiences
 - opportunity for expansive scenic views
 - widely recognised recreational opportunities that draw people from outside the immediate area
 - heritage features and/or historical associations
 - perceived natural character
 - a strong influence on regional community identity.



2. The landscape contributes significantly to the distinctive landscape character of the Region because it:
 - is of such a scale that it is a visible backdrop to significant areas of the Region; or
 - is recognised for characteristics that are rare or unique in the Region.
3. The natural values of the landscape are regionally outstanding because they contain:
 - a visually distinctive landform, river, lake or wetland which is prominent, rare or unique in the region; and /or

- geological or ecological sites or areas that have recognised scientific merit of regional, national or international significance.

4. The landscape is considered by iwi to be of special value, with many sites of cultural or spiritual significance.

5. The landscape has high amenity value and/or landscape quality based on professional assessments.

Outstanding natural features

There are 98 geological features and landforms that have been identified as being of international, national or regional significance. Of these, 27 are assessed as being at risk from human activity. Table 15 lists the at-risk ones. There is no information about the current state of these features.

Regionally significant soil sites are listed in Table 16. Again, there is no information about the current state of these sites.

Heritage

The survival record of the Category 1 heritage buildings in the Region has been relatively healthy over the five years since the Regional Policy Statement was written. The trend has been to retain these buildings and to rebuild within or on top of them to continue their effective economic lives. This has been done with considerable success in many cases, such as the Old BNZ and the State Insurance building in Wellington. Some heritage buildings have been given a new lease of life through the addition of apartments, complementing or following the established trend towards inner city living which has transformed the downtown area of Wellington, and which has also allowed for the reuse of other, perhaps lesser, buildings (in heritage terms).

Table 15: Regionally outstanding geological features and landforms

SITE	PRESSURES
International Significance	
Turakirae Head uplifted beach ridges	Overstocking over visiting
Wairarapa boninite	Removal by geologists and collectors
West Wairarapa Fault,	Ploughing, burning, overstocking
Waiohine River faulted terraces	
National Significance	
Kaiwhata Holocene fossil forest	
Lake Kohangapiripiri raised beach	Cultural, farming, recreation (stock and motorcycles ruining the surface)
Lake Kohangatera raised beach	Cultural, farming, recreation (a mining operation is the obvious hazard as the ridge is gradually being covered by a talus pile; other hazards are stock and motorcycles ruining the surface)
Makara Pliocene sedimentary outlier	
Otaihanga Oligocene sedimentary outlier	Quarrying
Pukemuri Stream uplifted marine beaches	Farming practices
Putangirua Pinnacles and Miocene sediments	Clearance of surrounding vegetation (fire)
Red Rocks Permo-Triassic terranes, pillow lavas and thrusts	Quarrying, fossickers
Rock Point tube worms	Coastal erosion
West Wairarapa Fault, I855 scarp	Ploughing, burning, overstocking
Regional Significance	
Haywards hill Pleistocene kauri pollen	Covered by bitumen and instant grass
Kaiwhata Stream sills	Victoria University students
Kapiti Island beach ridges	
Kupe's Sail sandstone slabs	
Masterton Fault (Waingawa Fault)	Ploughing; overstocking
Ohariu Fault, Ohariu Valley Road	Ploughing; overstocking
Terawhiti goldmining sites	Further neglect
Waikanae Fault (Ohariu Fault)	Land development
Wairau (alpine) Fault, Cook Strait trace	
Wallaceville Quaternary swamp	Drainage; burning and stocking is damaging the fossilised vegetation
Wellington Fault, Harbour trace	Harbour development; land reclamation
Wellington Fault, Harcourt Park, faulted terraces	Park development
Wellington Fault, Pitarua Street	Urban development
Wellington Fault uplifted beach ridges, William Street, Petone	Road leveling
Whatarangi Bluff Miocene sandstone	Further road construction

Table 16: Regionally outstanding soil sites

SITE NAME	SOIL TYPE	PRESSURES
INTERNATIONAL SIGNIFICANCE		
Okoropunga	Antropic soil (Tamahere)	Surrounding area has been fenced for deer farming, stock damage.
Tararua Conservation Park	Yellow-brown earth (Rimutaka, Mangamahu) Yellow-brown loam, (Kapua), recent soil (Rangitikei)	Parts have been burned and logged
NATIONAL SIGNIFICANCE		
Nikau Scenic Reserve	Yellow-brown earth (Makara), intergrade between yellow-grey and yellow-brown earth (Porirua)	Still grazed by cattle
Te Hapua Road Swamp	Yellow-brown sand (Pukepuke Foxton), organic soil (Omanuka)	-
Te Harakiki Swamp	Yellow brown sand (Pukepuke Foxton), organic soil (Omanuka)	Adjacent sewage ponds; many weeds (including blackberry, gorse, crack willow, inkweed, jointed rush, Manchurian wild rice, pines and wattles); severe stock damage on edges
Waikawa Beach Road Forest	Yellow-brown sand (Foxton Pinaki)	Weed problem (Japanese honeysuckle, willow and blackberry)
Tuhitarata Bush Scenic Reserve	Recent soil (Ahikouka)	Most millable trees removed but vigorous regeneration of major species; grazed
Haurangi Conservation Park	Yellow-brown earth (Makara Tuparoa)	-
Hemi Matenga Memorial Park Scenic Reserve	Yellow-brown earth (Makara Judgeford)	Goat damage
Rimutaka Conservation Park	Yellow-brown earth (Rimutaka Makara)	Parts have been burned
Taita Research Station	Yellow-brown earth (Taita Tawai Wingate Buck Pomare Stokes), gley soil (Witako), recent soil (Pinehaven Waiwhetu)	Has been burned, no part of the present native forest was established earlier than the 1850s; still top-dressed and grazed
Turakirae Head Scientific Reserve	Recent soil (Turakirae)	Sheep and cattle grazing
Kapiti Island Nature Reserve	Yellow-brown earth (Makara), intergrade between yellow-grey and yellow-brown earth (Paremata Terawhiti), recent soil (Turakirae)	Farming removed forest from over half of the island; extensive possum damage
REGIONAL SIGNIFICANCE		
Kiripiti Scientific Reserve	Yellow-brown loam (Kawhatau)	Has been logged and grazed
Castlepoint Local Purpose Reserve	Yellow-brown earth (Wanstead); rendzina (Bluff)	Still grazed
Rawsthorn Open Space Covenant	Yellow-brown earth (Pahaoa)	
Tora Bush	Yellow-brown earth (Opouawe Whakaroro)	
Carter Scenic Reserve	Yellow-grey earth (Kokotau); recent soil (Ruamahanga)	Still grazed by cattle
Putangirua Pinnacles Scenic Reserve	Yellow-brown earth (Putanirua Kaikoura); yellow-grey earth (Tangoio); intergrade between yellow-grey and yellow-brown earth (Ponatahi)	Fire in 1940
Kaitawa Scenic Reserve	Yellow-brown earth (Ruahine); recent soil (Matamau)	Pigs and goats present; has been heavily logged
Lowry Bay Scenic Reserve and adjoining unnamed reserves	Yellow-brown earth (Tawai)	Parts have been logged and burned
Paraparaumu Scenic Reserve	Yellow-brown earth (Makara Judgeford Ruahine)	Parts have been logged and burned

Table 17: Changes to regionally significant heritage buildings, 1995–99

Building	Changes	Year
BNZ Manners St/Cuba St	Two floors of apartments built on top	1998
BNZ (Old) Lambton Quay	Interior of 4 buildings redeveloped for shopping arcades and offices	1998/99
Broadcasting House Bowen Street	Demolished by Government decree for redevelopment of site	1997
Former National Museum and Art Gallery Buckle Street	Interior alterations to provide space for Massey University/Polytech School of Design and Architecture.	1999
Richard Ellis House/MLC Lambton Quay	Redevelopment of interior for apartments	1996/97
State Insurance Lambton Quay	2-3 floors of apartments built on top	1998/99
Thorndon Brewery Tower Thorndon	Incorporation of old brewery tower into New World Supermarket	1998
Wellesley Club Maginnety Street	Interior and entrances altered for up-market restaurant/cafe, offices and retail	1998
Shed 7 Lambton Harbour	Former Wharf offices; major refit for apartments	1996
Wellington Railway Station	Interior altered to redevelop cafe, restaurant etc. plus minor alterations to Featherston St entrance.	1997/98/99
Wellington Rowing Club Buildings Waterfront	Interior alterations for bar/cafe facilities	1997/98

The range of changes to affect category buildings in the Region since 1995 is outlined in Table 17.

As the table shows, at least one listed building was completely lost – Broadcasting House in Bowen Street. This was removed, despite opposition from many interested groups, to make way for additions to the parliamentary complex. Eventually, however, the cost of the proposed new works proved too much, and this project was put on hold.

What's being done?

Landscape

The Council responded to the pressures on regionally outstanding landscapes by developing a Proposed Regional Landscape Plan. The Plan has subsequently been withdrawn, with the Council now favouring a less formal approach involving the development of non-statutory guidelines. Initial work on the format for the guidelines and the process for their development has been completed. District plans also include provisions for the protection of landscapes.

Outstanding natural features

About 40% of the outstanding geological features and landforms assessed as being at risk from human activity have been identified in district plans, providing a degree of protection. However, while a large number of the outstanding soil sites are within reserve areas, there appears to be no recognition of them in district plans or within the Conservation Management Strategy for the Region.

Heritage

The Council's involvement in the management of regionally significant heritage buildings has been small. It has restricted its role to the determination of regional policy (through the Regional Policy Statement) and to serving as a catalyst for discussion through the formation of a regional heritage forum. The forum meets irregularly when significant issues arise. The Council has also made a small number of submissions on resource consents relating to Category 1 buildings, but in many cases it has not been notified of the consent application.


Territorial authorities have shouldered the responsibility for heritage management and have responded well with regard to regionally significant buildings. Wellington City Council, in particular, has done much to foster the retention of these structures, as well as those of lesser significance through its District Plan and associated works.

Both the Regional Council and a number of territorial authorities in the Region have participated in the national debate over the future management of heritage matters and the place of the Historic Places Trust over the last two years. Uncertainty remains over the way heritage should be managed, which will be resolved only when the Government declares its intentions by legislative means.

Prospects for landscape and heritage

Significant progress has been made in identifying regionally outstanding landscapes and their values, and in working towards the protection of these values. The same cannot be said for ensuring that there is adequate recognition and protection of outstanding geological features, landforms and, in particular, soil sites. More effort is needed in this area if the objective of the Regional Policy Statement is to be met.

Territorial authorities, the Historic Places Trust, and the private sector have done much to protect the Region's highly valued heritage over the last five years. The challenge under a new heritage management framework will be to continue these successes, and to protect heritage at all levels in line with the expectations of both local and national communities.



"Steps may need to be taken to fairly assess the relationship that Maori hold with their heritage. Key indicators might include the use of appropriate protection mechanisms, the opportunities for effective participation and management, the establishment of heritage priorities, the development of identification maps, acceptance of management plans or strategies etc."

Ngati Kahungunu ki Wairarapa Maori
Executive Taiwhenua Wairarapa

NATURAL HAZARDS



GOOD NEWS

- No major earthquakes and few major floods have occurred in the Region over the past five years.
- A good floodplain management plan process is in place.
- Good flood warning systems are in place.

BAD NEWS

- More effort needs to go into identifying and mitigating the risks of new development.
- A significant drought was experienced in the Wairarapa over the past two years.
- Flooding in Kapiti in October 1998 lead to a state of emergency being imposed.
- Coastal erosion has caused on-going problems at Te Kopi, Whatarangi and on the Kapiti Coast

Introduction

Living in the Wellington Region means living on or near a fault-line, with earthquakes a regular topic of conversation. Insurance companies call earthquakes acts of God. This old-fashioned term also covers volcanic eruptions, tsunamis and storms, to name just a few of the natural hazards that are the topic of this chapter. By calling an event an 'act of God' we usually mean not only that no-one is to blame, but that nothing could be done to prevent it. So what role can the Council take?

The fact is many of the less spectacular natural hazards can either be prevented or, more usually, have their effects mitigated. The RMA defines a natural hazard as any atmospheric or earth or water related occurrence that adversely affects or may adversely affect human life, property, or other aspects of the environment. There are the already-mentioned earthquakes, tsunamis and volcanic and geothermal activity, but the term also refers to erosion, landslip, subsidence, sedimentation, wind, drought, fire, and flooding. Apart from geothermal activity, our Region is susceptible to the lot!

The natural hazards likely to cause the greatest damage are flooding and earthquakes. Many of the Region's floodplains are urbanised, so that considerable assets are at risk from major floods. Of particular concern to the Council are the Hutt, Otaki, Waikanae, Porirua, Waingawa, Waiohine and Ruamahanga floodplains. And as we all know (but try to forget), the Region sits astride the boundary of two chunks of the Earth's crust, called tectonic plates, and is cut by a number of large faults. Earthquakes often shake the Region, and there is no reason to think that this will change.

Standing on shaky ground

Human use and development of hazard-prone land creates pressures on the environment, so are we simply asking for trouble? Because 'disasters' are infrequent events at any particular location, they tend to get discounted in the business of day-to-day living, despite the fact that the occurrence of a natural hazard event has the potential to cause damage to property, deaths and injuries, and social and economic disruption.

Ironically, the protection of property from natural hazards can in itself create significant environmental side effects, as when river engineering works adversely affect river ecology, or seawalls spoil the natural character of beaches.

The pressure-state-response model we've been using does not fit natural hazards as well as some other topics: after all, hazards *are* pressures, and a description of state will inevitably be an assessment of risk. As a result, some of the natural hazards described only briefly in this section are covered more fully under 'Where we are now'.

Objective

Any adverse effects of natural hazards on the environment of the Wellington Region are reduced to an acceptable level.

Regional Policy Statement



Earthquakes

Our Region is sliced by a number of large active transverse fault lines that run northeast to southwest through the landscape. These include the Pukerua, Ohariu, Wellington, West Wairarapa and East Wairarapa faults. These large faults also have splinter faults associated with them. All have been active repeatedly over the last 10,000 years, and are potential sources of significant earthquakes. Unfortunately, the Region is also susceptible to earthquakes arising from the subduction zone where the edge of the Indian-Australian Plate is over-riding the Pacific Plate.

Earthquake effects can be divided into a number of different components: surface fault rupture, ground shaking, liquefaction and ground damage, slope failure and tsunamis. Ground shaking will affect all areas of the Region, with areas of soft unconsolidated sediments being susceptible to enhanced shaking effects. The other components will affect only limited areas.

Expansion and intensification of urban development means continuing demand to develop within areas particularly prone to earthquake hazard effects. For example, there have been development proposals for areas exposed to the surface fault rupture hazard in Wellington City, the Hutt Valley, the Kapiti Coast and the Wairarapa. Vulnerability to earthquake damage is a significant consideration in deciding on a location for the Region's new public hospital.

Flooding

Frequent heavy rainstorms and the steep gradients of many river catchments result in significant risks from flooding in the Region. The areas at greatest risk are those catchments that drain both west and east of the Tararua Ranges. Again, expansion and intensification of urban development means that there is a continuing demand to develop in flood-prone areas. In the Wairarapa, possibly as much as 70% of new subdivisions are subject to a potential flood hazard. There are also pressures to develop land in the Hutt Valley that is potentially prone to flooding.

A new urban development can actually heighten the risk of flooding, through increasing run-off. This is the situation with the Karori and Porirua Streams, although for the latter, two upper catchment detention dams help to mitigate the flood hazard.

Tsunami

The coastal parts of the Region are vulnerable to tsunamis, which may be generated from major events in the sea floor: fault movement, large-scale slides, or volcanic eruption. Tsunamis may be generated locally, or make their way right across the Pacific Ocean. The desirability of that perfect sea view and morning walk on the beach creates a high demand to develop coastal land, which creates additional risk from tsunami effects.

Coastal erosion

Coastal erosion is a hazard along some parts of the coast in the Region, including Paekakariki and Raumati, and areas of the Wairarapa. Land can simply disappear into the surf, reducing property and, at worst, undermining roads and houses. The local response has often been to dump rubble as protection works, which can spoil the natural character of the area. As noted above, there is a high demand to develop coastal land, with a consequential increasing risk from coastal erosion.

All river mouths on the open coast migrate in response to changing river and sea conditions, cutting into adjacent land and eroding dunes. In some places, properties built close to the river mouths are susceptible to erosion, and this is a problem at several locations on the Kapiti Coast, and in the Wairarapa.

Mass earth movements

Erosion, landslip, and subsidence may be triggered by high-intensity rainfall or by ground shaking as the result of earthquake. Mass movements of land can block transport links, endanger and destroy property, and cause sedimentation in rivers and estuaries as sediments move from high to low energy environments. Wind may add to erosion, especially in coastal areas, alpine zones, and where drought has reduced vegetation cover.

New developments on slopes susceptible to mass earth movements, or at the base of such slopes, are at risk from significant damage. Large-scale changes can also take place near rivers: that scenic spot to build a house or bach on a bend in the river may disappear slowly through erosion, or even overnight during a flood as the river changes course.

Drought

Traditionally hydrologists identify drought through rainfall totals and river flows. However, an agricultural drought may be influenced by additional factors such as temperatures, humidity, wind and sunshine. Drought is most significant in the eastern part of the Region due to the rain-shadow effect of the Tararua Range. Pressures arise from the extensive agricultural land use in the Wairarapa.

Fire

Wildfire is a hazard over the summer months, especially in steep parts of the Region that are covered in flammable vegetation. Pressures are increased when urban development expands into, and sometimes over and above, areas of scrub.

Volcanic activity

There are no active volcanoes that pose a direct threat. Volcanic activity may indirectly affect the Region if prevailing winds bring tephra south from either Mt Egmont/Taranaki or the central North Island volcanoes.

Where we are now

Assessing the state of the environment with respect to natural hazards boils down to presenting the kinds of risks to development and people from natural hazard events. Some information is also provided on recent hazard events.

SCENARIO I

Earthquake type:	large, shallow, distant
Degree of shaking:	moderate
Damage potential:	moderate
Return time:	20-80 years

EFFECT	REGION					
	Wellington	Porirua	Hutt Valley	Kapiti	Wairarapa	Total
Property damage						
Residential:						
None	41504	15022	32984	13028	9050	11158
Slight	3480	1175	7750	1843	1252	15500
Moderate	538	133	1234	194	132	2231
Extensive	154	35	359	49	33	630
Complete	3	0	7	0	0	10
Commercial/industrial:						
None	1809	600	1999	707	772	5887
Slight	618	125	735	39	139	1656
Moderate	122	35	170	4	18	349
Extensive	46	14	65	1	5	131
Complete	7	2	9	0	0	18
Cost or repair (\$ million)						
Residential:	29.4	8.4	66.9	11.6	6.8	123.1
Commercial:	149	18.3	62.0	0.9	3.6	233.8
Casualties						
Day:						
Injured	168	13	62	1	1	245
Dead	11	3	5	0	0	19
Trapped	48	7	19	0	0	74
Night:						
Injured	6	1	6	0	0	13
Dead	1	0	1	0	0	2
Trapped	1	0	2	0	0	3

Earthquakes

The risks to people and property in the Wellington Region are shown in Tables 18 and 19. These present scenarios for two possible kinds of earthquake. Scenario 1 is for a large, distant, shallow earthquake that would produce moderate levels of shaking in the Region. Scenario 2 is for a large earthquake centred right on the Wellington Fault.

Scenario 2

Earthquake type:	large, shallow, near
Degree of shaking:	very high
Damage potential:	very high
Return time:	600 years

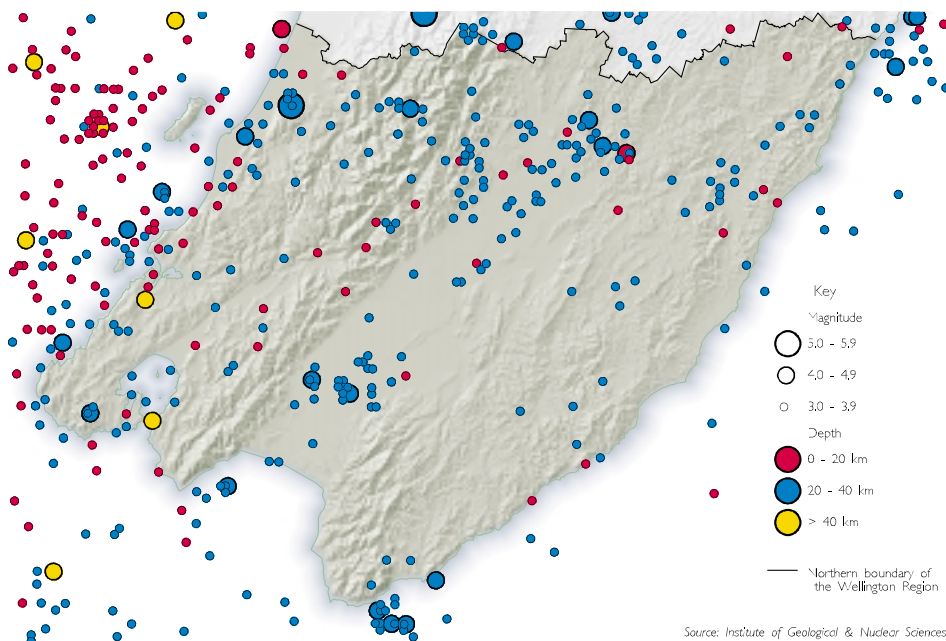
EFFECT	REGION					
	Wellington	Porirua	Hutt Valley	Kapiti	Wairarapa	Total
Property damage						
Residential:						
None	5582	5674	3456	3083	5221	23016
Slight	25265	8413	21051	7623	4474	66826
Moderate	9729	1685	11005	2887	605	25911
Extensive	4386	556	5571	1274	166	11953
Complete	900	54	1250	246	1	2451
Commercial/industrial:						
None	177	288	307	224	420	1416
Slight	1093	286	1324	367	395	3465
Moderate	664	101	712	108	83	1668
Extensive	462	76	445	45	31	1059
Complete	207	25	191	7	4	434
Cost or repair (\$ million)						
Residential:	765.6	115.9	837.4	204.6	32.2	1955.7
Commercial:	1486	85.1	425	27.4	17.9	2041.4
Casualties						
Day:						
Injured	2848	133	890	24	11	3906
Dead	346	33	146	4	1	530
Trapped	1283	91	464	11	3	1852
Night:						
Injured	174	10	160	15	1	360
Dead	24	1	17	1	0	43
Trapped	75	3	55	4	0	137

The second scenario is devastating. A total of 16,000 buildings are expected to suffer extensive or complete damage, with a repair bill of \$4 billion. There will be significant additional costs from damage to lifelines and other infrastructure (for example, roads, bridges and pipelines). If the event occurs during the day, 4000 injuries and 500 deaths are expected; if it occurs at night, significantly fewer casualties are predicted (400 injuries and 40 deaths). This is because people tend to be home at night, and on average residential buildings have lower damage potential than commercial and industrial buildings. Also, severely damaged houses, which are likely to be single-storey timber-frame construction, are less likely to cause injuries or fatalities than severely damaged commercial or industrial buildings, which may be several stories high and of heavy concrete or masonry construction.

A Whole Lot of Shaking Going On

Each year a large number of earthquakes occur in our Region, not all of these are felt by people living here. Figure 16 shows the location, depth and magnitude of earthquakes that have occurred in the Region since 1994.

Figure 16: Earthquakes Recorded in the Wellington Region 1994-99



Flooding

As an indication of the state of the environment with respect to flooding, the Region was hit by severe flood events only last year, when a Civil Defence State of Emergency was declared twice in one week on the Kapiti Coast during late October. The Waikanae River burst its banks, causing surface flooding and erosion to properties. Houses and properties were flooded in Otaihanga, the Wairarapa and the Hutt Valley and State Highways 1 and 2 were closed, as was the rail link. Sewage

overflowed in Paekakariki and Paraparaumu and water systems were contaminated, causing temporary closure. To give an indication of return periods, the initial event was an 82-year flood for the Ruamahanga, a 28-year flood for Waikanae and a 12-year flood for the Hutt Valley.

Table 20 gives the available information on the flood risk for the major rivers in the Region. It shows that 8800 hectares of land and 10,100 properties are potentially exposed to flooding during a 1 in 100-year event from nine major rivers. Damage estimates for such an event are only known for the Otaki, Waikanae and Hutt Rivers. For these rivers, the figures for damage in the table have been risk-adjusted to take account of the probability of breaches in the stopbanks – a form of damage averaging. Actual damage in a 100-year flood event could well be higher or lower than the risk-adjusted figures, depending on the number and nature of any stopbank breaches.

If a larger event occurred in the Hutt River, the expected damage rises significantly. For example, for a 1 in 1000-year event, damages could be as high as \$900 million – a 4-fold increase.

"The Waikanae River has been constrained and stressed through various flood-plain management activities, including residential development in that floodplain (though plans are now in place through the WRC's forthcoming ecological strategy to remedy some of this past work)."

Te Runanga o Ati Awa ki
Whakarongotai

Table 20: Risk from 100-year flood events

River	Annualised damage (\$ million)	Damage from an event (\$ million)	Number of people directly exposed	Number of properties exposed	Area of land exposed (ha)
Otaki ⁴	2 ¹	40 ¹	2000	500	280
Waikanae ⁴	1 ¹	10 ¹	1100	280	350
Porirua	Unknown	Unknown	2100	600	100 ³
Hutt ⁴	8.5 ²	200 ²	30,000	8000	1400
Upper Ruamahanga	Unknown	Unknown	Unknown	240	3350
Waiohine	Unknown	Unknown	Unknown	200	1300
Waingawa	Unknown	Unknown	Unknown	100	650
Waipoua	Unknown	Unknown	Unknown	80	390
Mangatarere	Unknown	Unknown	Unknown	120	970
Total	11.5+	250+	35,200+	10,120	8790

Notes

1. Includes damage to channel, etc.
2. Excludes damage to flood protection works, etc.
3. Includes flood retention dams.
4. Assumes stopbank breaching with risk-adjusted damages (refer to text).

Coastal erosion

There has been a long history of erosion on the Paekakariki–Raumati coastline, and there are ongoing problems in this area. While much of the developed shoreline is protected by seawalls, other areas are exposed to the full force of the elements. There has been localised erosion of unprotected areas of shoreline within Porirua and Wellington Harbour, but no major problems exist at present.

In the Wairarapa, erosion has threatened assets in Palliser Bay, and at Riversdale and Castlepoint. The worst problems are at Te Kopi and Whatarangi, where there are serious threats to the only road to Ngawihi and Cape Palliser, and where a number of baches have recently been lost to the sea. At Castlepoint there is a history of temporary sand loss from the beach that exposes the mudstone/siltstone base and removes the natural protection for the shoreline. At risk are a road-verge reserve and the road itself. The trend at Riversdale is for erosion at the southern and northern ends, with accretion of beach sands in the middle section. The erosion threatens the properties built on the dunes, and can make the area vulnerable to coastal flooding.

Fire

Approximately 10% (around 84 000 ha) of the Region is classified as having a significant ('high' or 'extreme') fire hazard. These areas are:

- south Wellington City from Makara to Owhiro Bay
- parts of the Paekakariki Hill Road
- east of Valley Road in Paraparaumu
- Kaitawa Scenic Reserve
- Ngaio and Ngauranga Gorges
- the eastern Hutt hills
- the south Orongorongo Valley
- the western Tararuas–Rimatakas
- the Cape Palliser coast
- an inland strip of the Wairarapa coast.

The areas at significant risk from wildfire are generally characterised by gorse and scrub vegetation, steep slopes, relatively low rainfall, and proximity to areas frequented by people. However, not all of these criteria are required for a site to be classified as having significant wildfire hazard.

The route of SH2 over the Rimutakas is particularly vulnerable to wildfire which can result in road closures and subsequent debris movement.

Drought

The 1997/98 drought in the Wairarapa was the driest on record, with a return period of 80 to 100 years. From November 1997 to April 1998 a total rainfall of only 154 mm was recorded at Purunui – 36% of the normal 424 mm for this period. However, the future may see a shorter return period for this type of drought event, given the potential impacts of climate change.

What's being done?

The Council's response to the threats posed by natural hazards covers the full spectrum of comprehensive emergency management, from reduction and readiness to response and recovery. These are summarised in Table 21.

The response is best developed with respect to the flood hazard, where it follows the principles of comprehensive emergency management. Floodplain management plans have been developed, or are being developed, for urban areas such as the Hutt Valley and the Kapiti Coast. River management schemes are developed and maintained for rural areas such as the Wairarapa. Each plan or scheme reflects the values, aims and responsibilities of those who would be affected by the flooding of a particular river. The community can then help make decisions on the level of risk they are prepared to live with, identifying ways to lessen the effects of flooding, and deciding what is affordable.

Table 21: Wellington Regional Council's response to natural hazard

Hazard	Reduction (mitigation)	Readiness (preparedness)	Response	Recovery
Earthquake	<ul style="list-style-type: none"> • Earthquake hazard and risk identification • Land-use management through advocacy on district plans and notified resource consents • Participation in Wellington and Wairarapa lifeline groups • Public education and awareness 	<ul style="list-style-type: none"> • Regional Civil Defence Plan • Regional Civil Defence Capability • Resource database • Inter-agency liaison 	<ul style="list-style-type: none"> • Emergency operations centres 	<ul style="list-style-type: none"> • Regional Recovery Manager
Flooding (major rivers)	<ul style="list-style-type: none"> • Flood hazard and risk identification • Land-use management through advocacy on district plans and notified resource consents • Land ownership • Proposed Regional Freshwater Plan provisions on flood hazard • Construction of stopbanks • House raising • Bridge raising • Gravel extraction • River mouth management • Channel maintenance 	<ul style="list-style-type: none"> • Flood procedures manual • Regional Civil Defence Plan • Regional Civil Defence capability • Resource database • Rainfall and river monitoring • Flood warning • Inter-agency liaison 	<ul style="list-style-type: none"> • Emergency operations centres • Emergency river works • Impact assessment 	<ul style="list-style-type: none"> • Regional Recovery Manager • Assistance to territorial authorities
Tsunami	<ul style="list-style-type: none"> • Tsunami hazard and risk identification 	<ul style="list-style-type: none"> • Regional Civil Defence Plan • Regional Civil Defence capability • Resource database • Inter-agency liaison 	<ul style="list-style-type: none"> • Emergency operations centres 	<ul style="list-style-type: none"> • Regional Recovery Manager
Coastal erosion	<ul style="list-style-type: none"> • Monitoring at Riversdale • Assistance with monitoring at Kapiti • River mouth management 	<ul style="list-style-type: none"> • Inter-agency liaison 		
Mass earth movements	<ul style="list-style-type: none"> • Earthquake induced slope failure identification 			
Drought		<ul style="list-style-type: none"> • Inter-agency liaison 		
Fire	<ul style="list-style-type: none"> • Wildfire hazard identification • Targeting of Urban/rural interface and defensible space areas of high hazard 	<ul style="list-style-type: none"> • Rural fire plan • Rural fire fighting capability • Inter-agency liaison 	<ul style="list-style-type: none"> • WRC Rural fire force for suppression • No response outside WRC Rural Fire District 	<ul style="list-style-type: none"> • Plantation areas: • Fell dead trees • Replant
Volcanic activity		<ul style="list-style-type: none"> • Volcanic hazard warning • Inter-agency liaison 		

Prospects for natural hazard management

Development pressures continue in some of the most hazard-prone areas of the Region, adding to the already substantial risk we face from significant natural hazard events. The estimated damage levels from flood events in the Hutt Valley demonstrate that when a flood protection scheme is put in place, there is an assumption that the area protected is 'safe' from any future event. As a result, development intensifies, thereby increasing the level of risk if the scheme fails, or if an event occurs that is larger than the design event.

Hazard investigations and risk assessment must be used to work with the community to ensure that the level of risk is acceptable; and if it's not, to ensure that appropriate risk-reduction measures are introduced. Preparation of floodplain management plans is a good way to involve the community in decisions about acceptable risk, and the methodology should be seriously considered for use with other hazards. Only when the community is fully informed about the potential impacts of hazard events, and ways in which the effects can be reduced, are they then in a position to choose a level of risk that is acceptable.

More care needs to be taken to ensure that the risks from natural hazards are fully understood and accepted before new subdivision and land-use activities occur. Because of their infrequent occurrence, it's too easy to put hazard events out of minds when development is being proposed and considered. Such an attitude only serves to increase the potential losses when the events do occur. Anyone making decisions about new development must ask the hard questions about potential hazards, and how they are to be avoided, remedied or mitigated.

ENERGY



GOOD NEWS

- There are eight wind turbines in the Region.

BAD NEWS

- We still rely heavily on fossil fuels to provide most of our energy needs.
- Energy efficiency gains have been modest

The State of the Environment Report for the Wellington Region 1999

Introduction

We drive home from an afternoon's shopping at Coastlands, flick on the lights and heater and boil the jug for coffee. And the only time we're likely to think about all the energy these every-day activities swallow is when the price goes up. Yet we use 100 times more energy per person than our ancestors did just a few generations ago.

Energy drives economies. New Zealand can boast a commendably high proportion of renewable energy sources (mainly hydro-electricity) compared with most other nations. But both the national and regional economies still have a heavy dependence on imported fossil fuels, particularly liquid fuels for transportation. We want to be mobile – go where we want, when we want – which points to a continuing problem with the environmental effects of burning huge quantities of fossil fuels.

We tend to think of energy as the thing we *use* – the petrol for the car, the electricity that powers the heater. But concern about energy and long-term supply extends to energy directly used for *products*, as well as that required to mine, transport and convert primary energy sources into this usable energy and products. To make things worse, the whole process of obtaining and employing energy is staggeringly inefficient: up to two-thirds of primary energy can be lost in conversion to usable forms, and there is further loss through inefficiency in how the energy is then used. For example, nearly 70% of the energy in petrol is wasted as heat in the vehicle combustion process.

A Regional strategy

So, what sort of Regional strategy should we have for managing energy? The overall direction for energy management in the Regional Policy Statement is to try to slow down the extraction rate and use of *all* energy sources and materials and be efficient in energy use. By doing this, we make these resources last longer and reduce or avoid unwanted effects on the environment arising from their extraction and use. Because our main source – fossil fuels – is limited, is getting harder to extract, and is non-renewable, we need to deploy alternative renewable sources of energy that also don't cause so many pollution problems. The Regional Policy Statement concluded that we should make the most of those renewable energy sources we have locally.

Both ends burning

Nationally, energy consumption increased 41% between 1980 and 1998. The biggest jump was in transport (which raised its share of total consumer energy from 35% to 40%). Agriculture's share was also up, while industry declined marginally. But for each of these sectors, even where the percentage share fell, actual energy consumption was up. During a similar period (1974–95) New Zealand's energy consumption increased by 53%, while population only increased by 17%.

Objectives

Energy demand is moderated and energy that is needed is produced, distributed and used efficiently so as to reduce impacts on the environment and to make effective use of limited energy resources.

An increasing proportion of energy is provided by sources that are renewable.

Adverse local and global environmental effects of energy production, transportation, transmission, conversion and end use are avoided, remedied or mitigated.

Regional Policy Statement

It's difficult to get comparable figures for our Region, but information from the 1996 Census reveals that:

- population and job density in Wellington is the highest of the main New Zealand cities, and car use (and energy use) is the lowest
- vehicle journey lengths (for all purposes) are lower than in Auckland but greater than in Christchurch
- public transport use/provision is the highest in New Zealand (15.5% of the workforce used public transport for their journey to work in 1996), and cycling/walking is also high (11.4% for journey to work)
- Wellington is by far the most transport-energy-efficient New Zealand city in per person terms; and the percentage of city wealth spent on transport-related services and infrastructure is correspondingly high (13% of rates).

Although the above figures indicate that transport energy use and consequent environmental effects on Wellington may be less than for other New Zealand cities, we still experience the same longer-term pressures for growth in mobility. The Ministry of Commerce has predicted that consumer energy is likely to grow by about 45% between 1995 and 2020, an annual growth rate of 1.5%, with transport energy increasing at 1.8% per annum.

Prices for conventional (mainly fossil fuel) energy sources are still relatively low, and not likely to rise much in the short term. This, together with the fact that the environmental costs of using fossil fuels are not included in their prices, works against the development and commercial availability of renewable energy sources, despite their lower environmental impacts. Certain renewable energy sources will become more competitive during the next decade – small hydro schemes, wind power, and bio-fuels, along with solar water heating. But the high level of investment in infrastructure for conventional energy production and use means that there is considerable inertia, and we are likely to see continuing use of conventional sources, and their associated effects, for at least the next 10 years.

These effects can be direct or indirect. The indirect pressures arise from things that energy enables us to do – such as driving to or through sensitive ecosystems and creating vehicle and visitor impacts on forests or dune systems. We also modify landscapes, clear forests and drain wetlands more easily because energy powers the equipment. Our use of energy often generates noise, and sometimes hazardous wastes.

Some of the more direct impacts of energy use arise from pollutants released in the extraction, storage, transport and use of fuels, and from landscape and habitat changes caused by dams, power stations and power lines. In New Zealand generally, and in some cases locally, these effects include:

- atmospheric pollution from burning fossil fuels, and consequent climate change effects
- local air pollution from fossil fuel emissions (for example, sulphur dioxide, carbon monoxide, nitrous oxide, particulate matter, volatile organic hydrocarbons –

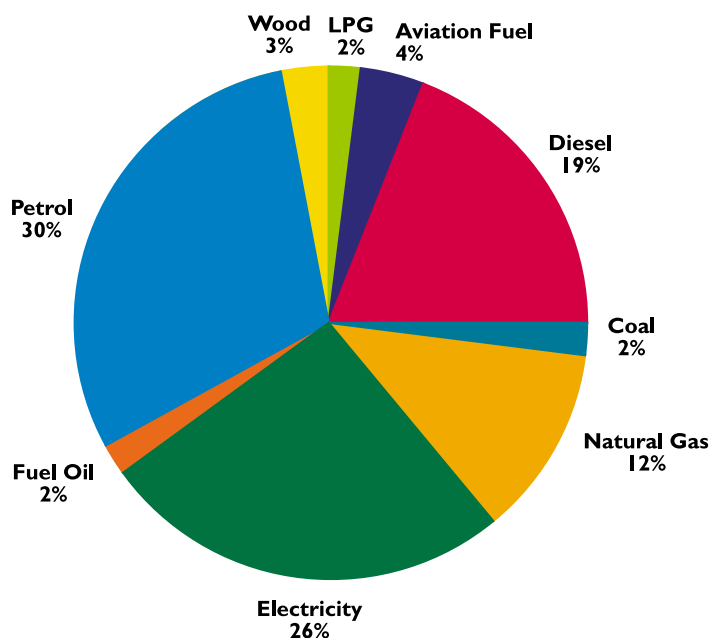
- primarily from the transport sector but also from household fires in some areas)
- electromagnetic radiation from power lines and communications transmitters
- water pollution by heavy metals from geothermal projects and oil spillage in coastal waters and stormwater systems
- soil pollution associated with the storage and transport of fuels
- habitat destruction from hydro-station construction and cooling water from thermal stations
- scenic and recreational impacts (from power transmission pylons and lines, hydro and geothermal development, and wind farms).

Where we are now

What follows is based on 'snapshot' information about use of fuels by industrial sectors for 1995 in the Region, set in the context of what is happening nationally.

Figure 17 shows the energy use by energy type for the Region during March 1995. The primary energy source is petrol, followed by electricity, diesel and natural gas. Totalling 49%, the liquid fuel group is by far the main form of consumer energy. New Zealand produces some of its own liquid fuel requirements, but the bulk is derived from imported oil. The overall picture for the Region is one of heavy reliance on non-renewable fossil fuel energy, sourced from outside.

Figure 17: Energy use by energy type for the Wellington Region, March 1995



We do produce some energy ourselves – the wind turbines at Hau Nui have a 3.5MW capacity, and the ECNZ turbine in Brooklyn has established a world record, generating 1000MWh per year. Together, the turbines generate about 14GWh per year.

Figure 18 shows the proportion of delivered energy used by each sector for the Wellington Region. The main consumers by far are households, followed by transport and storage, then commerce. The low level of agricultural energy use is proportional to the number of people involved in the sector, but also indicates that pastoralism is not a big user of primary energy.

Figure 18: Energy use by sector for the Wellington Region, March 1995

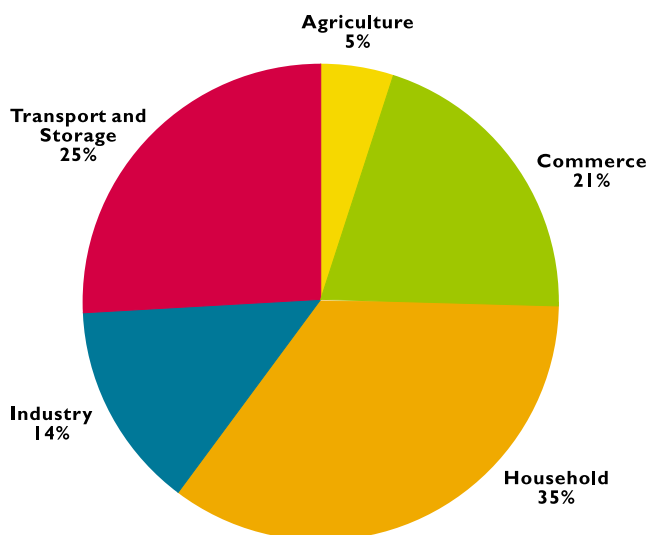
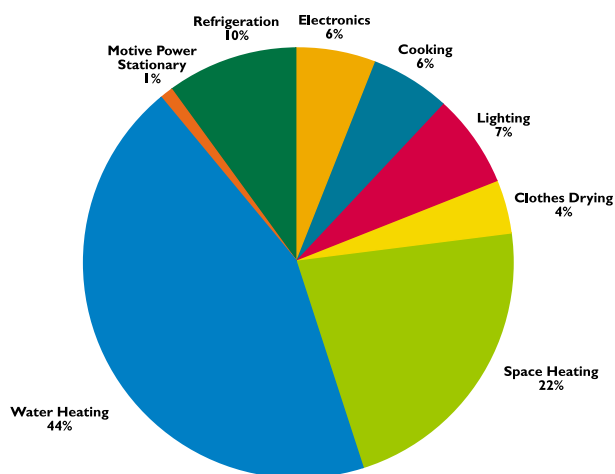


Figure 19 shows a breakdown of the household energy use for the Region. Water heating is top, followed by space heating then refrigeration. Significantly, over 66% of the household energy requirements are for some form of heating, indicating that there are opportunities to improve our dependency on energy in this sector by more improved delivery systems and conservation techniques.

On a wider scale, in 1996 New Zealand was about 87% self-sufficient in its *primary* energy needs, but only 39% self-sufficient in liquid fuels. Oil, natural gas and coal provide two-thirds of the total primary energy supply, while renewable energy sources make up the rest (mainly hydro and geothermal power). As noted earlier, most primary energy is lost during extraction and use, and the amount of energy actually providing energy services is lower still, due to conversion losses and other energy inefficiencies. Nearly half the *consumed* energy comes from oil, 25% from hydro and geothermal, 9% each from coal and gas, and 10% from renewable sources.

Obviously, greater efficiency in the extraction, production, transmission and use of energy is an important part of reducing the need for additional capacity, and for avoiding or postponing some of the adverse effects of fossil fuel use. The Energy Efficiency and Conservation Agency (EECA) is the organisation with a primary responsibility for promoting improved energy efficiency. Since its establishment in 1992, it has set up numerous programmes for improving end-use efficiency in all sectors of the economy. For example, in our Region, EECA's Energy Wise Companies campaign has some 150 participants, including eight local authorities.

Figure 19: Residential electricity end uses for the Wellington Region, 1995



It's still hard to gauge how much energy has been actually 'saved' through efficiency initiatives. There have certainly been some savings – both of energy and, for the participating companies, financially. But the continuing growth in demand for energy services has outweighed

gains made through improved efficiency. To give a simple example, car engines have become more fuel-efficient, but consumer preferences for larger vehicles and more energy-consuming features (such as air conditioning) have meant that actual vehicle fuel consumption figures have remained static. In addition, there are many more cars on the roads, travelling greater distances, and the overall effect is a considerable increase in total fuel use and consequential environmental impacts.

What's being done?

The Government is no longer involved in energy planning or production. Its energy policy objective is "to ensure the continued availability of energy services, at the lowest cost to the economy as a whole, consistent with sustainable development." As far as renewable energy is concerned, the Government aims to "facilitate the development of cost-effective renewable energy consistent with the Government's energy policy framework."

Among the actions taken by Government in pursuit of these aims are:

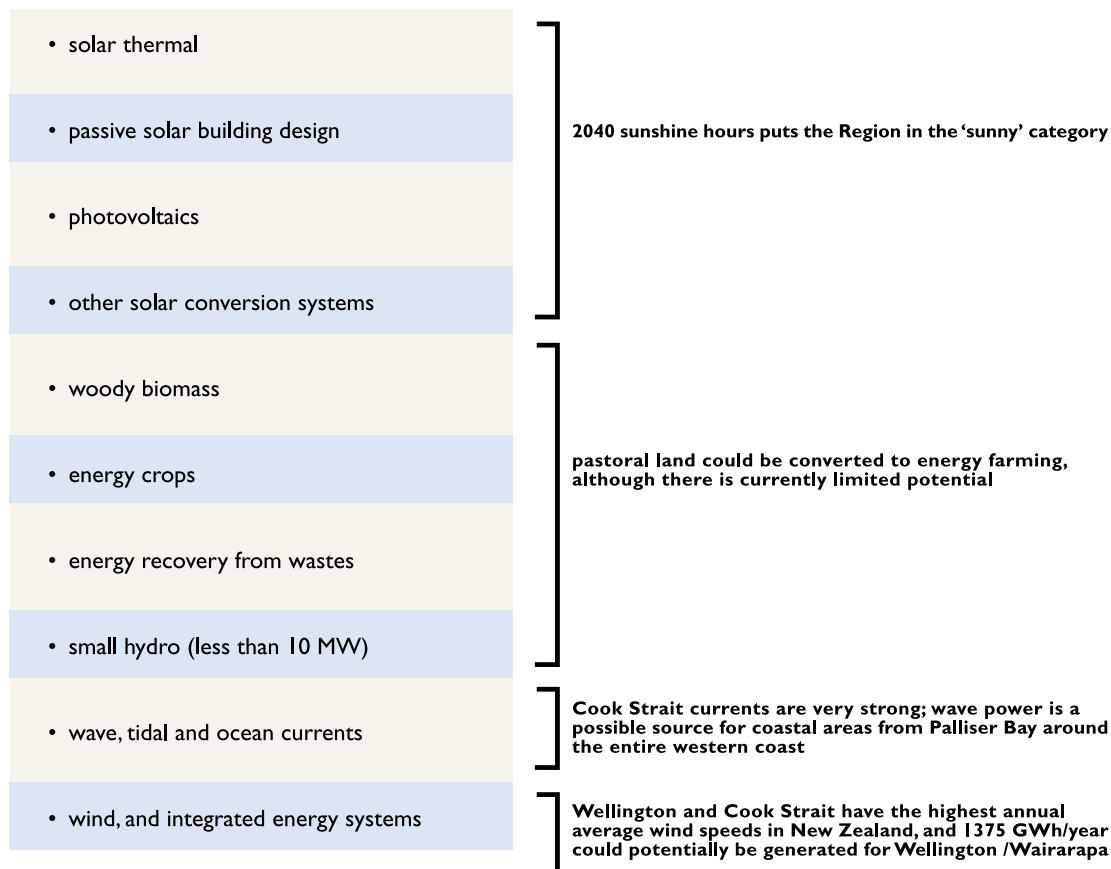
- development of the wholesale electricity market (intended in part to make electricity prices reflect full costs, including environmental costs)
- the Ministry for the Environment's Cleaner Production Programme
- EECA initiatives (such as the Energy Saver Fund, revision of energy efficiency provisions within the Building Code, Energy Wise Companies campaign, Energy-Wise Councils Partnerships, 'best practice' programmes for industry under which demonstration models/information provision promotes the adoption of energy-efficient practices and technologies)
- development of the Vehicle Fleet Emissions Control Strategy
- consideration of a carbon tax and tradable permits to meet greenhouse gas emissions levels developed for New Zealand's commitment to the International Framework Convention on Climate Change
- investigation into roading reform, with market-based proposals that seek 'full costs' (including, again, environmental costs) to be borne by the road user.

Prospects for energy management

The Region could provide more energy if renewable sources are further developed. In the last five years there have been proposals for wind farms at Baring Head and near Makara, reflecting the potential, but protests also highlighted the sorts of problems associated with any form of energy development. Renewable energy is not without its negative impacts, but they are of a different nature and scale compared to those associated with conventional sources.

Despite the exciting potential in these alternative renewable sources of energy, the picture for the foreseeable future is less rosy. The rate of increase in use of energy resources has slowed, but by how much is unclear. Energy efficiency gains are modest at best. The focus of interest is on what sort of extra capacity can be provided rather than how demand might be influenced to postpone, or prevent, the need for future capacity provision. The expected 1.8% per annum growth in demand for transport

A study by EECA and Centre for Advanced Engineering (CAE) identified the following possible 'new and emerging renewable energy technologies':

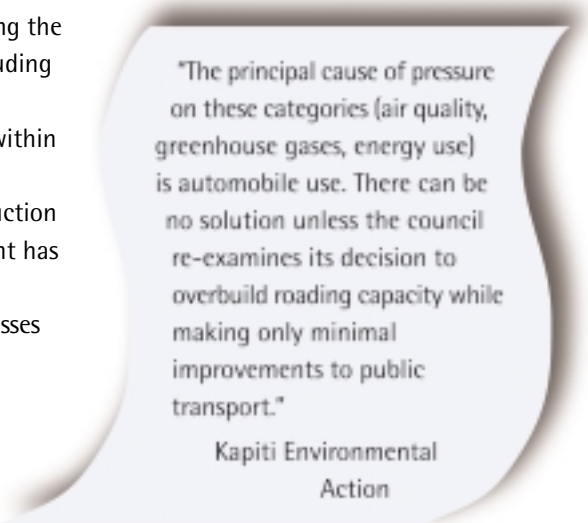


fuels is symptomatic of an attitude that passively accepts that growth in energy demand is automatically an economic 'good', despite lingering questions about longer-term energy security and the environmental impacts of use.

The new renewable sources offer some potential to provide the extra capacity required, but are unlikely to make a major contribution over the next decade. Consequently, we are likely to see a continuation of the sorts of environmental impacts associated with the extraction, distribution, conversion and burning of fossil fuels.

A key requirement for strategic management of a strategic resource – in this case energy – is clear policy direction, and clarification of roles. EECA currently provides advice on operational and policy issues affecting the uptake of energy efficiency and new renewables. However, no overall co-ordination or programme for the management of energy is currently in place, despite its central role in economic development and household well-being. Equally, there is no clear mandate for any other agency to take any sort of lead, locally or nationally, for thinking about energy needs and strategies for meeting those needs.

Under the RMA, local government has a part to play in promoting the sustainable management of natural and physical resources, including energy. But in terms of the longer-term management of finite (mineral) energy resources and efficient use of those resources within their areas, local government has no responsibilities. Energy management is limited to managing the effects of energy production and use. Given limited organisational resources, local government has shown no desire to take on a strong energy management role. Similarly, despite advances over recent years, many smaller businesses still don't have staff with assigned responsibility for devising and implementing adequately resourced energy efficiency policies. In summary, energy efficiency initiatives tend to be lowly funded and a random product of individual enthusiasm. The overall effect of such action, across many organisations, is not large.



"The principal cause of pressure on these categories (air quality, greenhouse gases, energy use) is automobile use. There can be no solution unless the council re-examines its decision to overbuild roading capacity while making only minimal improvements to public transport."

Kapiti Environmental
Action

Reliance on market mechanisms and personal enthusiasm alone – in the home and at work – will not produce the sort of energy policy shift outlined at the start of this chapter and spelled out in the Regional Policy Statement. Market prices of fossil fuels are still artificially low, giving them an advantage over renewable energy sources. Current market prices reflect many factors, including historical, technological, commercial and societal investments that have reinforced the primacy of fossil fuels as an energy source. By not taking environmental costs into account, continuing use of fossil fuels effectively postpones progress in the research, development, and investment in renewable sources.

Public interest in the use of renewable energy sources is growing – a survey commissioned by EECA indicated that up to a third of energy consumers would pay a premium for 'green energy'. The high quality, ready availability and magnitude of such energy resources means they should not be overlooked as a way to meet the continuing growth in demand. Our common challenge is clear: how can the various parties help bring about that vitally needed shift to greater use of renewable sources?

WASTE MANAGEMENT

and Hazardous Substances



GOOD NEWS

- Better controls over the effects of waste disposal activities have occurred through the resource consent process.
- All district plans include provisions controlling hazardous substances.
- Many territorial authorities have implemented recycling initiatives.
- High-risk contaminated sites are progressively being addressed.
- People recognise the Council's role in pollution control.

BAD NEWS

- Facilities available to treat or dispose of hazardous waste are limited.
- The quantity of waste generated is not being minimised.
- Our pollution control actions are still mainly reactive

Introduction

Every day, industries and households throughout the Region add to the nation's growing waste 'stream'. Today we accept that all human activity generates waste. Had we continued to roam in small nomadic groups with basic needs, no waste management problem would exist. Instead we jam ourselves together in the hundreds of thousands and enjoy sophisticated tastes – everything from dust-busters to takeaway lattes to mountain bikes – so that generating what we want and disposing of what we don't ends up being an environmental problem.

Despite our much-trumpeted clean and green image, New Zealand is among the highest generators of waste in the world. A Ministry for the Environment survey based on 1995 data reports an average rate of waste generated per person as a staggering 401 kg/year. We risk contaminating the land we live on and grow food in, the water we drink and the air that we breathe.

Hazardous substances are a separate problem. They are used for a variety of purposes, ranging from providing fuel for transportation to controlling animal and plant pests around the home. Their benefits to society, however, rely on their being contained: environmental problems can arise when substances are inappropriately used or disposed of, or accidentally spilled.

Waste not, want not

Solid waste

Most of the solid waste in the Region is disposed of in landfills. These can cause nuisances such as litter and odours and affect the amenity value of some areas. The degradation of waste in a landfill usually leads to the generation of landfill gas and leachate, and these by-products can cause environmental problems that persist long after the landfill operation has been closed down.

Liquid waste

When we flush the toilet or pull the plug in the kitchen sink do we know where this waste goes? Do we care? In urban areas most liquid wastes are disposed of through public wastewater treatment plants. Treated effluent is then discharged into rivers or the sea around the Region, with the potential for adverse environmental effects. Significant work has been done in the Region over the past 5–10 years to reduce the environmental impacts of these discharges.

In many rural areas septic tanks are used to dispose of domestic sewage. The success of this system relies on low-density living. Fast development in some areas has led to the cumulative effects of septic tank discharges posing a significant threat to the quality of the environment and to the health of people.

Objectives

The quantity of waste generated is reduced.

The quantity of residual wastes for disposal is minimised through reuse, recycling and resource recovery.

Adverse effects on the environment and human health from the inappropriate disposal of residual liquid and solid wastes are avoided or, where this is not possible, remedied or mitigated.

The potential for any accidental or unanticipated effects to arise as a result of the use, storage, transportation and disposal of hazardous substances is minimised and any adverse effects that do occur are remedied or mitigated.

Regional Policy Statement

Agricultural effluent

Agricultural activities, in particular dairy farms and piggeries, generate vast quantities of effluent. If not disposed of appropriately, this can affect the quality of surface water and groundwater, limiting their life-supporting capacity.

Hazardous substances

Hazardous substances cause environmental pressures when there are incidents involving their inadequate management – through spillage, inappropriate disposal or inappropriate use.

Where we are now

Waste and hazardous substances tend to be indicators of environmental pressure. But a peek at current data about the number of treatment or disposal facilities, and the quantities of substance used, produced and/or disposed gives us a useful snapshot of the state of the environment. Their effects will become evident through monitoring the state of our air, land and water resources.

Solid waste

The Region has 13 operational landfills, 30 operational cleanfills and 114 closed landfills. Territorial authorities run all of the operational landfills receiving municipal and industrial waste. Many of the cleanfill operations are privately run, while most of the closed landfills are owned by territorial authorities – many are now parks or recreational areas.

Table 22 summarises what we know about quantities of solid waste and how it's being dealt with. Historically we've had poor-quality information about waste quantities and management. The Waste Analysis Protocol, developed by the Ministry for the Environment in the late 1980s, now provides a nationally consistent way for measuring wastes, and over the past 10 years the quality of information has improved. But our knowledge about the quantities of waste actually generated is still scanty.

Table 22: Quantities of solid waste generated, recycled and disposed.

Territorial authority	Waste generated	Waste recycled	Landfill	Other disposal
Tonnes/year				
Kapiti	?	5590	45514	?
Porirua	?	3000	75000	?
Wellington	?	12,000	214,600 ¹	?
Lower Hutt	?	2660	132,070 ²	?
Upper Hutt	?	628		?
Masterton	?	11,700	11,700	?
Carterton	?		4250	?
South Wairarapa	?		4333	?
TOTAL	?	35,578	487,467	?

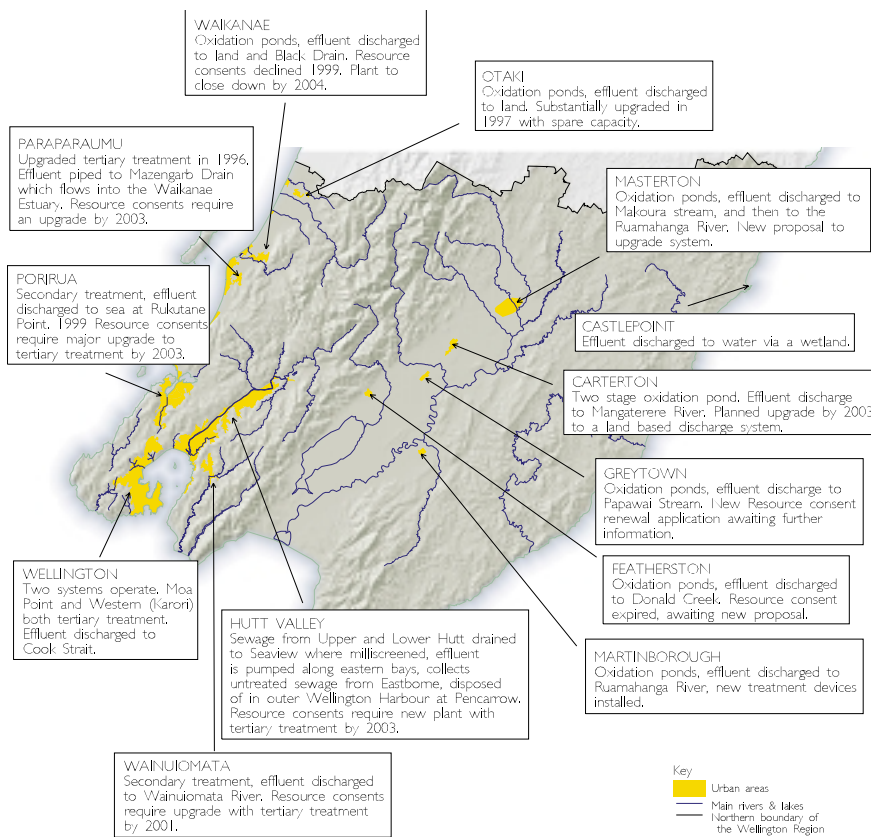
¹ excludes cleanfill
² includes Upper Hutt

The total amount of waste disposed of into landfills in the Wellington Region would fill the Wellington Regional Stadium twice each year.

Liquid waste

The 14 municipal wastewater treatment plants (Figure 21) throughout the Region discharge a total of 220,502 cubic metres of effluent every day. Moa Point leads the way with 79,200 cubic metres pumped into the Tasman Sea, followed by Seaview (63,072 into Wellington Harbour) and Porirua (24,000 into the Tasman).

Figure 20: The State of Municipal Sewage Discharges 1999



Source: Wellington Regional Council

Little information is currently available about the number and location of septic tanks throughout the Region, or how much waste is discharged into them. Discharges from septic tanks are a permitted activity in the Proposed Regional Discharges to Land Plan and therefore are not monitored.

The sewage effluent that is discharged from wastewater treatment plants in the Wellington Region would fill the Wellington Regional Stadium every 4.5 days. That's over 80 times a year.

Agricultural effluent

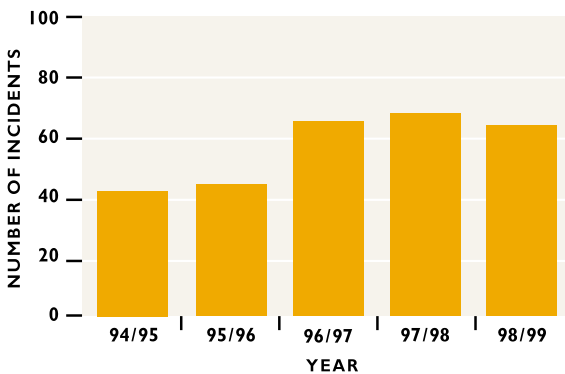
Statistics New Zealand has estimates of the Region's livestock population. Using average rates of agricultural waste production, we can calculate the overall quantity of waste generated by stock. Despite the fact that the Region is home to more than two million sheep, at 4121 tonnes/day they drop behind the frontrunners beef cattle (8972 tonnes) and dairy cattle (5001 tonnes), each of which produces the sewage waste of approximately 14 humans. Deer (557 tonnes) and pigs (109 tonnes) bring up the rear, for a grand total of 18,760 tonnes of animal waste, every single day!

The animal waste generated on farms in the Wellington Region would fill the Wellington Regional Stadium every 55 days. That's nearly seven times a year.

Hazardous substances

Figure 20 summarises the pollution complaints received by the Council over the past five years involving hazardous substances. While there appears to be a noticeable increasing trend, it is unclear whether this reflects an increase in the actual number of environmental incidents, or the public's increased willingness to complain.

Figure 21: Pollution complaints involving hazardous substances



What's being done?

Solid waste

Rules covering a host of activities involving discharge of solid waste to land are found in the Proposed Regional Discharges to Land Plan. Where the effects are not likely to be significant, as in the disposal of cleanfill, the activities are permitted. Where effects *are* likely, resource consents are needed. All but three operating municipal landfills in the Region have resource consents. Consents have also been issued for the discharge of landfill gases and leachate from some closed landfills.

In 1998 the Council assessed all known closed landfill sites in the Region to establish the risk caused by ongoing discharges of gases and leachate. Fifteen sites were identified as needing further investigation due to potential discharges of leachate, eight sites because of potential discharges of landfill gases. Work to determine the actual effects arising from these sites is progressing.

Territorial authorities throughout the Region have implemented measures to address solid waste issues, and many Councils have taken initiatives in waste recycling and waste reduction. For example, most Councils have kerb-side recycling and recycling drop-off centres; Wellington City Council established Environmart, a resource recovery and reuse system that encourages businesses and industries to recycle waste products; and Hutt City Council supports a group of local industries who have an interest in waste reduction. In the Wairarapa, the three territorial authorities have established a joint committee to investigate the potential for establishing a single landfill disposal facility to serve the eastern part of the Region.

Liquid waste

Rules that cover a range of activities involving the discharge of liquid wastes to land and water are included in both the Proposed Regional Discharges to Land and Proposed Freshwater Plans. Considerable effort has been put into resolving sewage-related issues in the Region over the past eight years, resulting in better sewage treatment and better-quality effluent being discharged. Further improvements are anticipated over the next five years.

Infrastructure maintenance and redevelopment work undertaken by some territorial authorities has significantly reduced the occurrence and effects of fugitive sewage discharges. Wellington City Council has worked hard to resolve problems with cross connections between their sewer and stormwater systems, resulting in much better water quality in the inner harbour.

Agricultural effluent

The Proposed Discharges to Land Regional Plan also covers the discharge of agricultural contaminants. Resource consents are generally required for discharges of collected animal effluent, and the plan has a policy that encourages the discharge of these contaminants to land rather than directly to water.

The Council regularly inspects agricultural effluent discharges to ensure they comply with resource consents or a regional rule. These inspections have led to a major drop in the number of discharges of agricultural effluent made directly to water. Environmental benefits are being seen as a consequence of this action; for example, the improvement in water quality in Whakawiriwiri Stream.

Hazardous substances

The RMA gives both territorial authorities and regional councils responsibilities for controlling the use of land for the prevention or mitigation of any adverse effects from

"As the regulating authority, WRC is in the best position to call for better waste management practices. In addition to more work on the basic 3R's (Reduce, Reuse, Recycle) an issue that would be best addressed on a regional level would be the development of a method for gathering potentially hazardous wastes in the region (apart from trade and industrial waste). An annual hazardous waste roundup for households would reduce both risk and occurrence of pollution, and educate the general public about the responsibilities of using and disposing of many common substances. A rural roundup focusing on redundant (and often unsafe) agrichemicals should also be organised."

Kapiti Environmental Action

hazardous substances. To resolve this overlap, the Regional Policy Statement for the Region clearly spells out the relative responsibilities. The Council alone is responsible for shaping objectives, policies and rules covering marine coastal areas and beds of lakes and rivers. For all other land, the Council carries out its responsibility through the Regional Policy Statement and regional plans. It does not write regional rules for this purpose unless any relevant regional objective or policy cannot be achieved through rules in district plans.

That means territorial authorities enjoy primary responsibility for writing rules for the control of the use of this other land with respect to hazardous substances, but these rules must not be inconsistent with the Regional Policy Statement or regional plans.

All territorial authorities in the Region have provisions in their district plans to control the quantities of hazardous substances that can be used and stored in their district. The discharge of hazardous substances remains the Council's responsibility. The Regional Coastal Plan, Discharges to Land Plan, Freshwater Plan and Air Quality Management Plan all have rules that control this type of activity.

The disposal of hazardous wastes continues to pose problems. The Council facilitates a Regional Waste Management Liaison Working Group that is currently developing recommendations for a coordinated approach to hazardous waste management in the Region. Some territorial authorities, such as Kapiti Coast District Council, are already setting up hazardous waste collection facilities at landfills in their districts.

Prospects for the management of hazardous wastes and substances

The Regional Policy Statement seeks to reduce the quantity of waste being generated and to minimise the quantity requiring disposal through reuse, recycling and resource recovery. It is difficult to determine whether these objectives are being met for solid wastes because no one monitors waste generation and because systems for monitoring waste disposal are not standardised. We need both a Region-wide adoption of a standardised monitoring system and a longer record of waste monitoring to find out if our aims are in fact being met.

As resource consents for discharging sewage effluent are renewed it has become apparent that the quantities of liquid waste for which consents are applied for are increasing. The clear implication is that we are failing to meet the reduction objective for the liquid waste element of the waste stream. Whether this objective is realistic with population and industrial activity increasing is questionable.



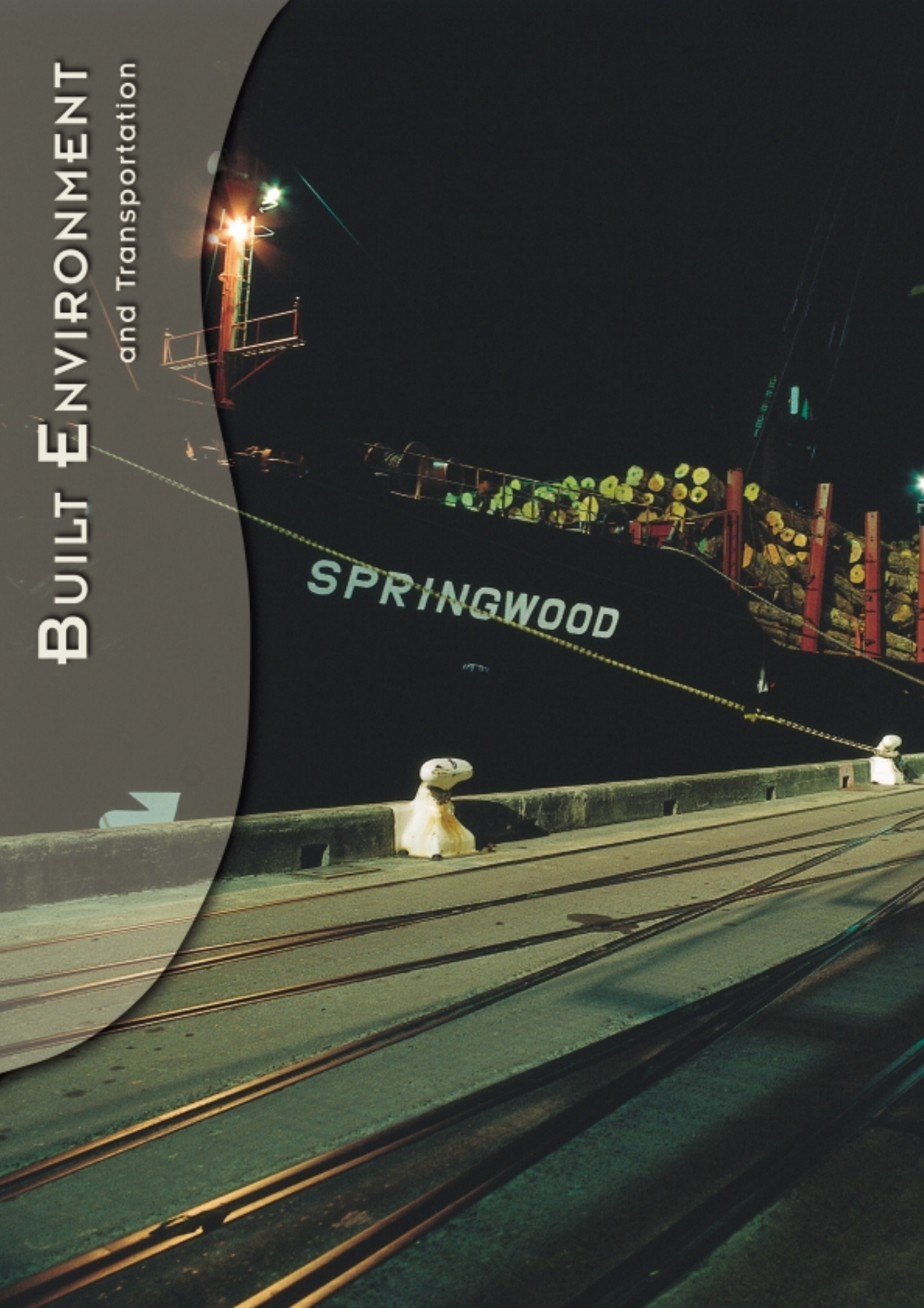
A study of the conditions imposed on consents issued over the past 10 years for waste discharges shows a trend towards more stringent controls. This is helping ensure the adverse environmental effects of disposal are avoided, or mitigated. We expect this to improve over the next five years as further consents are issued, required improvements are completed and current consent conditions are stringently enforced.

The District Plan and resource consent processes are acting to ensure that the potential for accidental or unanticipated effects arising from the use, storage, transportation and disposal of hazardous substances is minimised. Education and awareness programmes focusing on pollution prevention will help us achieve this objective.

While territorial authorities are responsible for delivering waste management services, the adoption of a regionally coordinated and consistent approach to waste reduction, and disposal of hazardous wastes could have substantial benefits.

BUILT ENVIRONMENT

and Transportation



GOOD NEWS

- The Wellington Region is on the up – a place to come to now!
- Public transport is the best in New Zealand, and use is growing.

BAD NEWS

- Where we live and the way we live create environmental pressures.

The State of the Environment Report for the Wellington Region 1999

Introduction

Although our Region contains vast tracts of rural land, hardly anyone lives there. About 95% of our 415,000 population live in communities greater than 1500 people, and most of us are crammed in with over 20,000 neighbours. And the trend is continuing: the rural areas continue to shed population, while particular urban areas, notably on the Kapiti Coast and the apartment culture of inner-city Wellington, blossom. These migrants bring additional pressures on infrastructure and other resources.

But we're not only changing where we live – we're also changing how we live. People are burning up more energy, piling up more waste, and getting more mobile. To do this we rely on efficient infrastructure systems: rail and roads for transport, pipes and power lines to supply water and energy, and drains to dispose of sewage and stormwater. So even if population levels stayed the same we would still be putting greater pressure on the environment to supply the sorts of goods (like clean air) and services (such as hiding our rubbish and decomposing it) that we have come to expect as urban dwellers.

But cities and towns are more than just collections of different land uses and infrastructure systems. We can see them as a dynamic cocktail of social and economic activity, of community groups, of varying cultures and histories, and of distinctive environments. We pride ourselves on the fact that the Wellington Region has made great progress in terms of its entertainment and urban lifestyle attractions – a place to visit and stay in rather than endure while waiting for the ferry. But how do we measure these intangible aspects? It turns out to be much more difficult than counting yachts on the harbour.

In the end we must look to indicators determined more by their ability to measure particular resources (water, or air quality, for example) than by their suitability as indicators of the overall 'state' of the urban environment. This chapter provides a very general overview of trends in and pressures on the Region's urban areas. Where appropriate it refers to more specific information about particular resources contained elsewhere in the Report, and how this information enhances our understanding of our urban environment. In the coming years we may begin to be able to take a more integrated approach to seeing how big a 'footprint' we are leaving on the landscape as a result of our urban lifestyles.

Treading a fine line

A big problem facing New Zealand's urban environment is the lack of any over-arching framework for managing urban areas and promoting sustainable urban living. Cities, and urban areas generally, are dynamic groupings of people, places and activities that can combine to have a dire effect on their surrounding environment.

Objectives

Urban areas, the built environment and transportation systems are developed so that they, and their associated activities, use resources efficiently and demand for the use of finite resources is moderated.

The adverse environmental effects that result from the use of urban areas, transportation systems and infrastructure are avoided, remedied or mitigated and, in particular, any effects that result from the concentration and scale of activities in urban areas are recognised and provided for.

The environmental quality of urban areas is maintained and enhanced.

Regional Policy Statement

Understanding and managing these complex areas requires, in the view of the Parliamentary Commissioner for the Environment, a pro-active and comprehensive approach, positively promoting sustainable development through vision and purpose rather than by reacting to development as it happens.

The Commissioner's 1998 report (*The Cities and Their People*) identified the following pressures on urban areas:

- increasing per-person resource demands for land, water, energy, transport, housing and services
- increasing air pollution and discharges of sewage and stormwater
- consequential losses of heritage and pressures on amenity values
- adverse effects on the general health and wellbeing of people who live, work in or visit cities, and (significantly for sustainability) on the health and viability of ecosystems and environmental services that underpin our ability to live in such high-density communities.

The list highlights the resource management aspect of sustainable development.

While our report does not attempt to talk about the socio-economic aspects of urban living, frequently identified attributes include:

- a healthy and pleasant environment
- a good social infrastructure and cultural identity
- business opportunities and employment choice
- affordable housing choices
- awareness of and action on sustainability issues.

Other attributes identified relate to transport, urban growth, infrastructure and waste generation.

Transport

Within the Region, transport – or more precisely, community demands for mobility – continues to be a major source of environmental and socio-economic pressures. Growing numbers of vehicles are on the roads, and people are making more trips, for more varied purposes, using both private and public transport, stretching through longer and longer periods of the day. While the Region does have a higher proportion of public transport services and use than other cities, the last few years have seen numerous proposals to extend, upgrade or construct new roads.

As noted in the Energy chapter, the transport sector is the major user of energy, producing local and global climate impacts through its associated emissions. Transport-related use of land is also a problem. For example, of the 900,000 ha of 'urban' land in New Zealand, some 170,000 ha are roads (and a few railways) and transport-related infrastructure. These and other environmental effects of transportation activities are summarised in Figure 22.

Figure 22: Causes and Effects of Transportation Activities

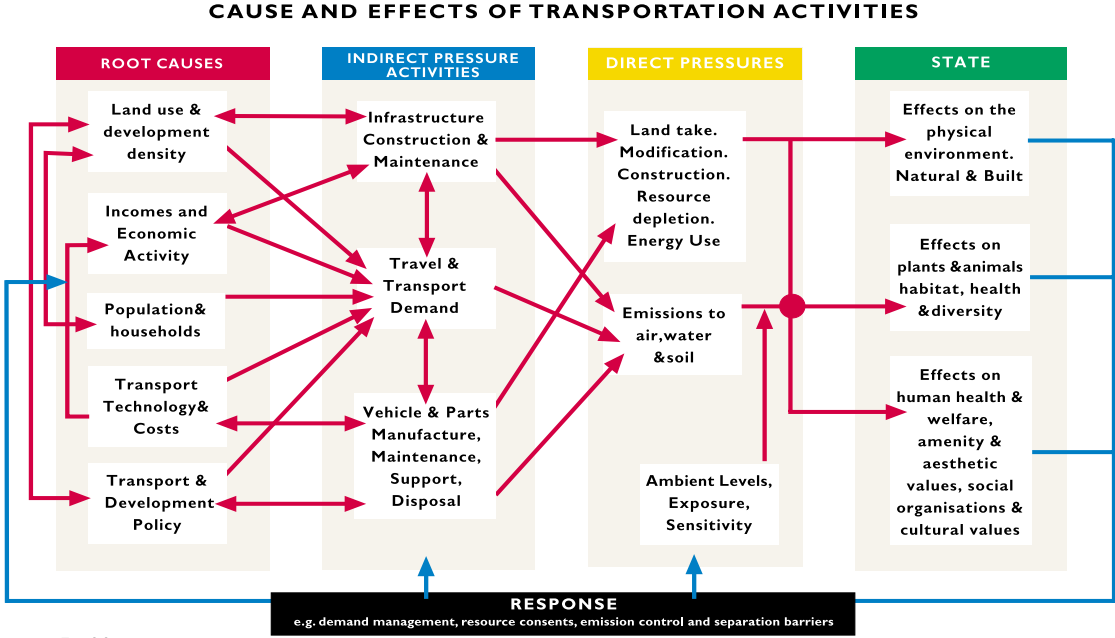


Fig 22

Source: Based on Ministry for the Environment "Summary of proposals for indicators of the environmental effects of transport".

As urban drivers, we tend to only think in terms of getting where we want to go as quickly and easily as possible. Road proposals do have benefits for road users, easing congestion and opening up opportunities to travel more safely to different places, but they also carry costs, which vary from scheme to scheme (see Tables 23 and 24).

Table 23: Environmental impacts for proposed roading schemes on State Highway 1

Location	Environmental impact
Te Aro/inner city motorway	Heritage impact
Paremata to Plimmerton	Community severance/noise; conflicting use/access
Plimmerton to Pukerua Bay	Impact on Taupo Swamp
Pukerua Bay to MacKays Crossing	Wetlands; access (to QE Park and Paekakariki); cyclist access/safety; impacts on coastal environment
Waikanae and north	Disruption of dune system/landscape; iwi concerns
Transmission Gully	Impact of sediment during construction on Pauatahanui Inlet; local community concerns about the Linden interchange; noise, and other impacts on use of Regional Parks; ecology and landscape aspects along the route.

Table 24: Environmental impacts for proposed roading schemes on State Highway 2

Location	Environmental impact
Kaitoke to Te Marua	Effects on significant bush remnants and reserves, private property, and on Te Marua water supply facility/drainage;
SH2/SH58 junction upgrade	Impact on Keith George Park

Urban expansion

Pressures from urban expansion have not so much arisen from major developments as cumulatively, in small increments over a wide area. In the Wairarapa, for example, subdivision activity has been relatively high, but it's difficult to calculate the cumulative effects because each proposal is considered, piecemeal, on its merits. There has been relatively rapid growth in the Kapiti Coast area between 1986 and 1991, but the rate has slowed during the 1990s. Work carried out for the local district council suggests that there are not likely to be big increases in the next 20 years. Nonetheless, the level of subdivision along the Kapiti Coast has been putting pressure on limited water supplies, remnant ecosystems, and the ability of the environment to cope with the wastes produced by a growing population. The District Council has recently released an issues and options document to plan for urban growth in Kapiti.

The progressive subdivision and development of land around Pauatahanui Inlet has been a continuing source of sediment, which washes down into the Inlet and places extra pressure on an ecosystem already made fragile by other land uses in the catchment. The pattern of small-scale, cumulative pressure is likely to be a feature of urban-related development across the Region in the coming years.

Infrastructure


We are using more resources and generating more wastes, which means we put more pressure on existing infrastructure, which can then have adverse effects on the environment. For example, Wellington's water consumption increased by 25% between 1970 and 1990 (although it has stabilised during the 1990s). Kapiti has some of the highest figures for water use in the North Island. The Hutt Valley and Wellington are two of the last urban areas in the country to reduce pressures on aquatic environments through development of modern sewage treatment systems. (Information about water quality and management of wastewater are discussed further in the Freshwater chapter.)

Waste generation

On average, every individual in our Region produces about 1.2 tonnes of waste per year. If you're doing a quick calculation on the basis of the number of rubbish bags you leave at the gate, relax. This includes commercial and industrial waste. All that waste has to go somewhere, but nobody wants a landfill in their area, and discharges

of liquid wastes have to be carefully managed because of their potential effects on neighbouring environmental systems, particularly aquatic systems. Hazardous waste is also growing in volume. Recycling only accounts for a small part of our total waste production, so the problem of finding places to bury, burn or otherwise dispose of our rubbish will continue.

Consideration of energy, heritage, landscape, and natural hazard pressures are separately discussed in their respective chapters.



"It is significant that Auckland recently rejected \$140 million of road funding for a new motorway and instead opted in favour of public transport solutions."

Kapiti Environmental Action

Where we are now

Transport

Compared with the citizens of Christchurch and Auckland, urban Wellingtonians have a relatively low car ownership and use, and a relatively high public transport use. As a result, the Wellington area has the lowest per-person energy use of the three cities. This favourable comparison is repeated in the way we travel to work, although this varies around the Region. For example, while 11% of commuters from Porirua used the train in 1996, the overall Regional figure was 5%, but this still compares well with the national figure of 0.8%.

Wellington metropolitan area also has the lowest vehicle ownership figures (48 per 100 people in 1997 compared to the national average of 55). But it is increasing – from about 190,000 vehicles in 1991 to nearly 204,000 in 1996, and most of the increase is in cars and station wagons. And we're chock-full of car parks compared with other New Zealand cities and, particularly, overseas cities (966 parks per 1000 workers in 1991 in Wellington, compared to 600 in Auckland and 230 in Europe). During the early 1990s this number increased, but more recently Wellington has started to try to influence commuter numbers through its parking policy.

We've seen a steady growth in bus and train usage (nearly 30% between 1992/93 and 1996/97). Of this use, about 60% is bus and 40% rail. Perhaps it's because we've got such an extensive system: people in Wellington have double the distance served by public transport than people in Christchurch (largely because of the rail network in Wellington).

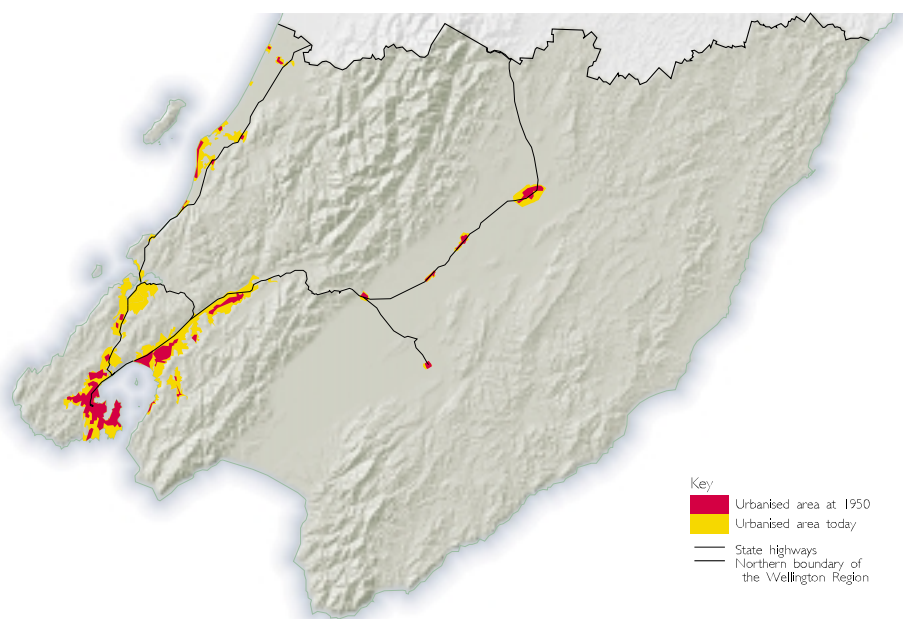
Thinking ahead, we're not likely to see much of a change in the relative balance of public transport/private vehicle use. Public transport use is increasing, but so too are the total number of trips by vehicle, for all sorts of purposes. The development of large suburban shopping centres, expanding recreational opportunities and the consolidation of various essential services into larger centres are all factors likely to make people rely even more on car travel.

Urban expansion

As we've seen, the effects of urban expansion can be obscured by the gradual rate of change, so let's look at what has happened over the last 50 years. Figure 23 shows a

comparison of the built-up areas in and around Wellington, the Hutt Valley and Porirua in 1949 and 1995. The transformation of the Pauatahanui Inlet and development on the hills in the Hutt Valley especially stands out.

Figure 23: Comparison of Builtup Areas



Source: Wellington Regional Council

Areas of recent ongoing expansion are Whitby/Pauatahanui, Kapiti, and parts of the Wairarapa (notably around Greytown and Martinborough). In 1997/98 the number of building consents for new dwellings in Kapiti exceeded that of all other districts except Auckland and Tauranga. Most of the subdivision is taking place in Paraparaumu/Raumati (mainly in-fill, with four or fewer lots), and around Waikanae (green field, with more than four lots). The land east of State Highway 1 north of Wellington has also been subject to pressures for further development. Although the District Plan "intends to contain new development within the existing urban area as continuously expanding the city's edge will not promote sustainable management", this area has been identified as a possible future growth area of the city.

Overall, the Region is showing some increase in urban density, from 17.9 persons per ha in 1986 and 1991 to 18.4 in 1996. This slight increase is mainly attributable to Wellington City's increase, from 22 to 23.2 persons per ha. The Wellington lifestyle, and particularly inner-city living, has been a feature of change in the last decade.

Infrastructure

As we noted earlier, the road network continues to expand, and there are the cars and people to fill them, with consequent direct and indirect impacts on the environment.

But there are some good tidings about infrastructure. Demand for water for human use has stabilised in recent years. Wellington City Council has, for example, been using water meters as a way of limiting consumption rather than simply increasing supplies, and consumption has reduced during the 1990s. Also, major progress has either been, or is soon to be, made in sewage treatment across the Region. The environmental benefits for aquatic ecosystems – marine and freshwater – of these trends in water use and quality may be seen in the future, but as noted in the Freshwater chapter, there continue to be various other pressures on water quality, and there aren't many signs of improvement.

Waste

As already mentioned, every year we produce about 488,000 tonnes of waste for the Region, or 1.2 tonnes per person. Although two-thirds of that waste comes from the commercial or industrial sectors, as individuals we shouldn't feel too smug. Why? Because we buy the products and services from these sectors, so we can't really avoid some role in the overall waste total.

Hazardous waste includes such nasties as toxic sludge, acids and alkalis, solvent-based paints, medical wastes, pesticides, asbestos and contaminated oils. Some 15,000 tonnes of solid hazardous waste are generated by business each year – that's 36 kg for each person in the Region. Businesses produce nearly 385,000 cubic metres of hazardous liquid waste, enough for about three baths-full per person, per day. Another pleasant thought is that 500,000 litres of grease trap and septic tank waste are generated each month.

What's being done?

Local authorities have responded in various ways to Agenda 21, the community-based vision for sustainable management of urban areas idea that came out of the 1992 Rio Environment Summit. Agenda 21 underpinned the process Wellington City Council has used in developing *Our City Our Future*, which sets out a whole series of proposals across the range of environmental, social and economic aspects of urban living, aimed at making Wellington a sustainable and enjoyable city in which to live. The results are that:

- Wellington is a cosmopolitan, beautiful and vibrant city
- the built and natural environments are interwoven at all scales
- the health of people and ecosystems is sustained, and prudent use is made of resources
- the built environment reflects and enhances community spirit, values and well-being
- there is increased visibility of iwi culture in the environment
- there is conservation of heritage areas, buildings and features.



The Parliamentary Commissioner's report, *Cities and Their People* (mentioned earlier), recommends a more holistic approach to urban management. The Ministry for the Environment has published indicators for the environmental effects of transport, and is developing other indicators relevant to urban living. Taken together, these documents point the way to a wider appreciation of urban areas, and the links between their social, economic and environmental components.

Prospects for our built environment and transportation

If we accept the notion of our urban areas as having an ecological footprint, then it would probably be fair to say that our feet are currently very large! The impact of our resource use and generation of waste may not be well documented for specific urban areas at present, but collectively we use – and waste – many of the resources provided by the environment. It's time we put on smaller shoes, and trod more gently on the earth.

CONCLUSIONS

So how are we measuring up?



The aim of *Measuring Up* is to issue a report card on whether we are reaching the goal of sustainably managing the natural and physical resources of our Region. Throughout the document the objectives of the Regional Policy Statement, arising from the Vision for the Future, have been our yardstick for making this assessment.

But have we got the right objectives? Might we be achieving the wrong things? It's important to realise in this context that the process of achieving sustainable environmental management remains an evolutionary one. As we continue to monitor our environment and report back on its state, we may have to adjust the objectives themselves to ensure that we keep on the right track. The review processes included in the Regional Policy Statement and all the regional plans give us the chance to make these changes should we need to.

To assess how we are measuring up, information relevant to our current objectives has been pulled together from a variety of sources. This has allowed us to determine the current state of resources and pinpoint the activities and uses that put pressure on them.

By comparing the objectives and the current state, we have been able to draw some conclusions about how well we are managing our precious natural and physical resources. It has also allowed us to consider the implications of pursuing or not pursuing certain actions and to identify areas where more effort or a change of tack may be needed in the future.

With reference to our Vision, we can conclude the following.

- Overall the quality of our streams, rivers and lakes and groundwater is good. Water is generally available in sufficient quantity to meet our foreseeable needs. However, discharges of stormwater, non-point source discharges and surrounding land uses are causing localised contamination of water in some places.
- Wetlands, lakes and river margins are among the least protected and most degraded ecosystems in the Region. Public access along important freshwater bodies is good.
- The effects of recent floods were mitigated by existing flood-protection measures. However, our ability to mitigate the effects of the 1997/98 drought in the Wairarapa was limited. To reduce the effects of natural hazards, we must ensure that appropriate risk-reduction measures are in place.
- Access to the coastal environment is good in the western part of the Region but is limited north of Cape Palliser. The natural character of the coast has been affected at Waikanae, Otaki, Paekakariki and Raumati Beaches, north of Hongoeka Bay, Porirua Harbour, Wellington Harbour, Fitzroy Bay, Te Kopi, Castlepoint and Riversdale. If the current trend to approve developments continues, we can expect further loss of natural character of the coastal environment.

- There has been a limited amount of rehabilitation or restoration of degraded coastal areas. Coastal waters are generally of good quality. In some areas, discharges of rivers and streams, stormwater and sewage effluent are degrading coastal water.
- We don't have enough information to assess whether soils can maintain their desirable physical, chemical and biological characteristics. Suitable monitoring programmes need to be implemented urgently to make this assessment in the future.
- The quantity of waste generated is not reducing. However, the resource consent process has led to better control of the effects of waste-disposal activities. The potential of waste products to be reused and recycled is not being fully realised. Uncertainties exist about whether raw material use is sustainable and production processes are clean.
- Many species and habitats within the Region have been lost or are now under serious threat. In most ecosystems, ecological processes are impaired.
- Regionally significant landscapes have been identified and district plans include provisions for their protection.
- The nature and rate of development in the Region generally meets the needs of people, but doubt remains about whether it is occurring in an environmentally sustainable way.
- We still rely heavily on fossil fuels to provide most of our energy needs. Energy efficiency gains are modest at best.
- Delays in implementing a comprehensive baseline monitoring programme for ambient air quality means its overall state remains uncertain. In some areas and under certain weather conditions air pollution can reach undesirable levels. Vehicle and domestic sources are the main causes of poor air quality in the Region.
- The Region has well-established transport systems that allow for diversity in modes of transport. Safety remains an issue. Although use of public transport is high by national standards, we still rely heavily on privately owned vehicles for mobility. This compromises energy conservation and urban air quality.
- While not specifically monitored by the Council, the Region provides a wide range of recreational opportunities with few adverse effects on the environment.
- Urban areas have become more attractive places for people to live and work.

- Maori culture and heritage continue to be affected by development that does not appropriately recognise the values of tangata whenua. District plans have helped the retention of heritage buildings. However, legislative uncertainty remains over the way heritage should be managed
- Regional public works and services, and network utilities may not be environmentally sustainable because under existing processes their effects don't have to be assessed.

These findings contain both good and bad news about the condition of our Region's environment. They reveal some variation in how effectively environmental issues are being addressed.

Identifying these extremes in performance is vital to our future efforts in managing the Region's resources. The good news and successes offer a ray of hope that we are on course for sustainably managing our natural and physical treasures. The bad news and failures should focus our minds and provide a firm direction for the tasks ahead.



Photographs by Lofty

Lofty (a.k.a. Robin Blake), is the Natural Forest Management Ranger for the Wellington Regional Council. In his day to day work he is involved in catchment vegetation

management, natural forest management and protection services, animal and plant pest control programmes and ecosystem management on Council lands. He has worked for the Council and its predecessor organisations for over 35 years.

He is a self-taught photographer and prefers scenic and natural history photography. Lofty was a keen hunter but has traded in most of his rifles for additional cameras. He has won several national photography competitions and has had a photograph included in the New Zealand Photography Yearbook. A number of his photographs can be found around the Council's Upper Hutt office.



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