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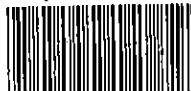
# *Environment 2010 Strategy*

*A Statement of the Government's  
Strategy on the Environment*

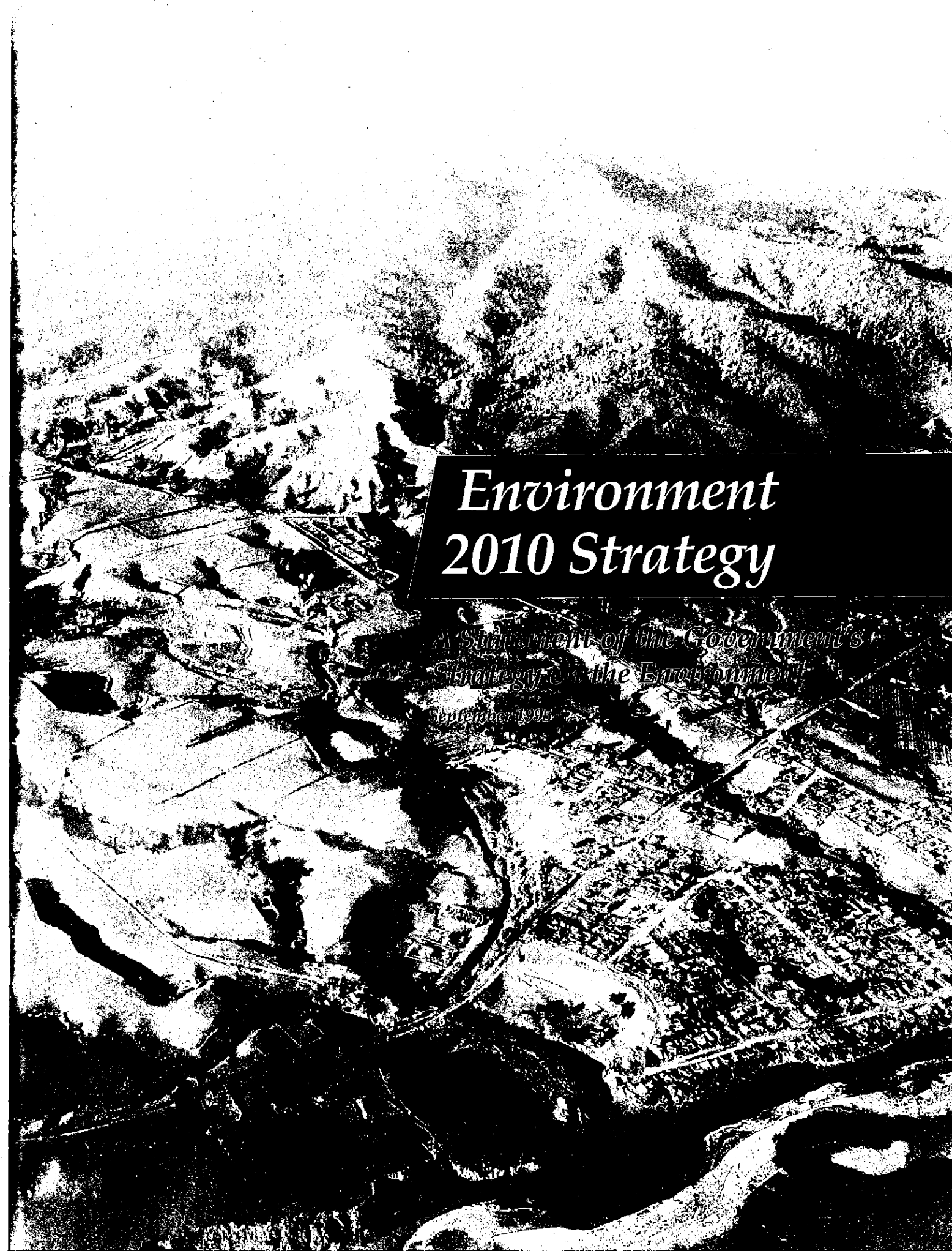
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*September 1995*

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## Foreword

The *Environment 2010 Strategy* is an attempt to take a longer term view of New Zealand's environmental priorities and how the Government regards them. Environmental issues demand, by their very nature, a long term perspective. The Resource Management Act 1991 requires us to take account of the needs of future generations. It is the cumulative effects of the way that we live over time that will determine whether future generations inhabit a more or less sustainable world.

But political action is, of necessity, bounded by the electoral cycle. When I was appointed Minister for the Environment, I became aware that our approach to environmental management lacked a coherent focus. Why were we concentrating on the issues that we were? Why did some pressure points receive generous resources while others were all but ignored? In the same way that local government was being asked to integrate its resource management responsibilities, there seemed to be a need for central government to integrate its own work programme.

That involved looking across every portfolio and asking whether the consistency of approach that had been applied to economic reform was being applied to achieving the Government's environmental goals. The writing of this Strategy has involved a stocktake of many policies, programmes and goals that have been added to one another over the years, not always with regard for how they fit together.

Even now, the *Environment 2010 Strategy* does not offer an assessment of risks and priorities for action – that work remains to be done. But it does provide a basis for ongoing review and priority setting. It provides a coherent framework against which to judge new proposals and a context in which to establish environmental goals alongside economic and social goals.

Many of the issues described in this document have a biophysical foundation. They will not change as governments change. What will change are the goals and their relative importance. So too will some of the value judgements that underlie each action plan. With that in mind, I must take particular responsibility for Chapter 2, which is a statement of the values this Government will bring to bear on the environmental issues that confront us. Naturally, a different government would wish to state its own set of values. But pressing matters of environmental priority are likely to be recognised as such by successive governments.

The *Environment 2010 Strategy* provides the framework for an agenda for action while accepting that, in a democracy, different values will from time to time be brought to bear on those priorities.



Simon Upton  
Minister for the Environment

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## Executive Summary

### 1 Vision

The vision for the New Zealand environment to 2010 is:

**'A clean, healthy and unique environment, sustaining nature and people's needs and aspirations.'**

The key conditions needed to underpin achieving the vision are:

- A competitive enterprise economy
- Effective laws and policies
- Information
- Social participation

### 2 Values

This *Environment 2010 Strategy* acknowledges the complex inter-relationships between the environment, the economy and society. It also identifies the important links between environmental goals and the Government's two major strategic priorities, economic opportunity and enhancing social cohesion.

It recognises that the market economy is an efficient and flexible means of allocating resources to meet individual preferences. But the market will not necessarily deliver on other values and objectives that society may have, such as meeting basic human needs, environmental quality, and access to resources for future generations.

Environmental values are an important part of the values that bind our society together. Giving effect to these values through the actions outlined in this Strategy will help to strengthen our communities and build social cohesion.

### 3 Principles

The following 11 principles will guide the Government's approach to shaping the market to improve environmental outcomes, and at the same time reinforce the links between environmental values and a cohesive society:

- Sustainable management
- The Precautionary Principle
- Environmental bottom lines
- Internalisation of external environmental costs
- Sustainable property rights
- Least cost policy tools
- Social costs and benefits
- Pricing of infrastructure
- Research, science and technology
- Defining the limits of resource use and substitution
- Protecting our international competitiveness



### 4 Our environment today

Environmental strategy needs to be based on realism about where we start from – our strengths, weaknesses, opportunities and threats. Our strengths include a unique endowment of natural resources, and a tradition of enterprise and innovation among our people. A weakness is the extent of change wrought on the natural environment in a short time.

In the relationship between society, the environment and the economy, there are many examples of 'win-win' opportunities. Environmental quality is essential for quality of life. But there are threats to the environment, in particular from unsustainable resource use practices.

*The vision for the New Zealand environment to 2010 is: 'A clean, healthy and unique environment, sustaining nature and people's needs.'*

## 5, 6 Goals and Agenda for Action

If we look at the environment as it is today, globally, nationally and locally, it is nothing like its pristine, natural state. Human activity has caused major modifications. The only direction for environmental quality is upwards. Just how much of an improvement we aim to achieve is a matter of social and political choice.

The Goals and Agenda for Action refer to 11 priority issues for the New Zealand biophysical environment. Together they relate to the quality of both the rural and urban environment. This Strategy takes the view that it is unhelpful to divide environmental issues into 'urban' and 'rural', but recognises that in urban settings the different pressures may lead to different priorities for action within the Agenda for Action.

The following goals support the vision:

- Managing our land resources
- Managing our water resources
- Maintaining clear, clean breathable air
- Protecting indigenous habitats and biological diversity
- Managing pests, weeds and diseases
- Sustainable fisheries
- Managing the environmental impacts of energy services
- Managing the environmental effects of transport services
- Managing waste, contaminated sites and hazardous substances
- Reducing the risk of climate change
- Restoring the ozone layer



The environment today is nothing like its pristine, natural state.

## 7 Responsibility for action

The roles and responsibilities of the following groups in implementing the Strategy are identified:

- Central government
- Local government
- Industry
- Iwi
- Non-governmental organisations
- Communities and individuals

## 8 Environmental Management Agenda

The six-part Environmental Management Agenda to build on the key conditions is:

- Integrate environmental, economic and social policy
- Establish a coherent framework of law
- Sharpen the policy tools
- Build up the information base
- Promote education for the environment
- Involve people in decision making

## 9 Risk, priority setting, planning and review processes

This document is a step in the process of strategic thinking on the environment, in the context of the Government's overall strategy. It needs to be put into operation through actions with a one year time-frame, such as annual planning, Budget and review processes by central government agencies, and through action with a longer time-frame, particularly comparative risk assessment, four yearly State of the Environment reporting and strategic review.

This Government strategy for the environment also provides a framework within which the private sector, local government and non-government organisations can carry out their strategic and operational planning.

# 1 A Vision for the New Zealand Environment

The vision for the New Zealand environment to 2010 is:

**'A clean, healthy and unique environment, sustaining nature and people's needs and aspirations.'**

This vision is for an environment where:

- the life-supporting capacity of air, water, soil and ecosystems is safeguarded;
- biological diversity and spectacular scenery are conserved;
- the basis is provided for sustainable development that meets the needs of present and future generations;
- people are able to meet their needs, especially for employment, food, clothing, shelter, and education;
- it is safe and healthy;
- natural, renewable resources are not consumed faster than they can regenerate;
- the natural treasures or taonga of Maori are protected, and the cultural practices of Maori associated with the environment are provided for;
- leisure and recreational opportunities are provided for those who enjoy the outdoors.

This vision for the environment is holistic. It recognises the interdependence and interaction of people and the natural and physical environment. It is consistent with a Maori world view. It respects and supports the core values of a democratic, free and responsible society including 'voice', 'choice' and 'personal security'.

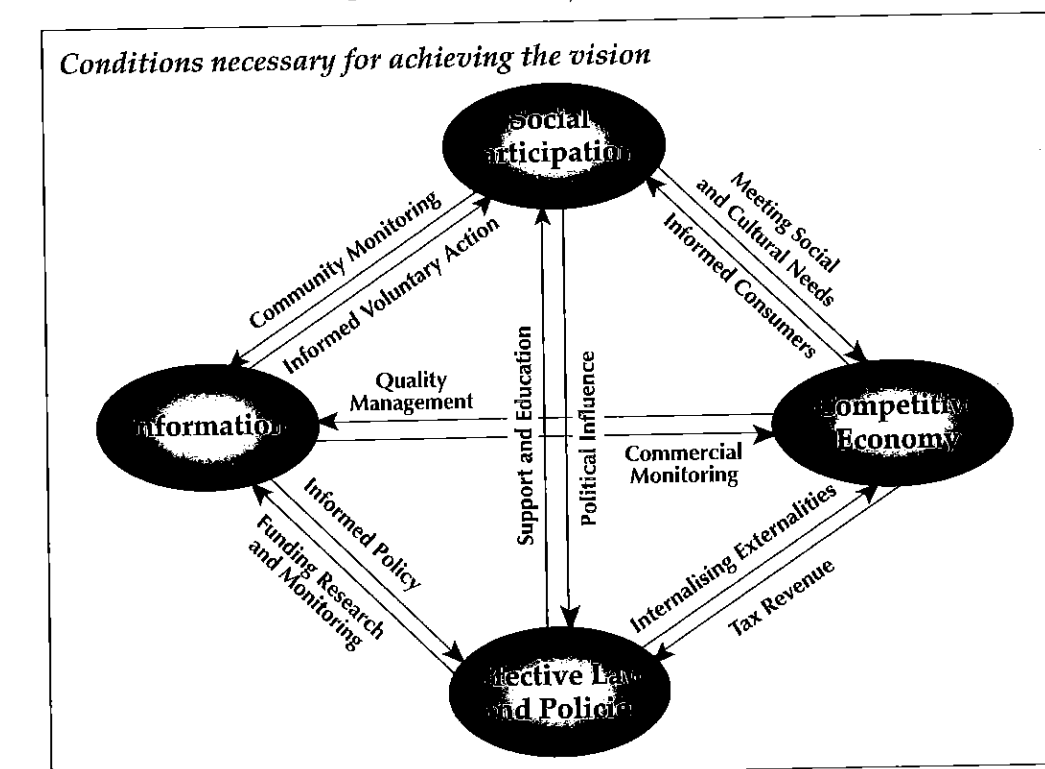
## Achieving the vision

To achieve the vision, several key conditions must be met. There are important interactions between these conditions – improvements in one key condition can often improve the effectiveness of other conditions.

The key conditions for achieving the vision are:

**A competitive enterprise economy** – a growing economy that can compete internationally and provide the resources for social needs and for protection of the environment.

**Effective laws and policies** – a body of laws and government policies that provide certainty and achieve environmental goals effectively and efficiently.



**Information** – information about the environment, and the economic and social links with it, from research, monitoring and other sources to assist sound decision-making by individuals, central and local government and business.

**Social participation** – the active and informed contribution by people to processes whereby central and local government and the community establish the laws and policies that govern the management of the environment; and people participate as informed and responsible citizens and consumers in the marketplace.

Each of the key conditions affects and often supports other key conditions. (See diagram on page 9.)

The following are dynamic interactions between each of the conditions:



People need to contribute to the central and local government processes that govern environmental management.

A competitive enterprise economy generates revenue to fund government. Economic measures and market forces can assist in achieving environmental goals. Businesses and individuals can operate efficiently and confidently within an established framework of environmental laws and policies. Forward-looking laws and policies provide the basis for business activities that make good use of our high environmental standards.

Research, including public good research funded by the government, increases understanding of the relationship between our actions and the environment. The Official Information Act helps ensure that information is made available to the public. Good information contributes to high quality policy analysis, advice and lawmaking, and provides a basis for consultation and debate.

Good environmental information enables people to make informed choices and to be involved constructively in issues. The research and communication activities of individuals and community groups contribute to the information that helps shape decisions.

Social participation, for example, consumer communication of concerns about environmental quality, encourages businesses and individuals to take environmental goals into account when making business and buying decisions. A competitive enterprise economy supports community activities and meets people's needs for employment, goods and services.

A prosperous economy funds research that provides information about the effects of government, business and individual activities. This research gives the government, business and individuals the information on which to base choices about products and processes.

Effective laws permit freedom of speech and expression. They give people standing under the law to be involved in statutory processes that affect their interests. Consultation informs the government of community attitudes to existing and proposed policies. Access to official information and the right to vote help shape policy.

## 2 Environmental Values

The *Environment 2010 Strategy* supports the two major strategic priorities of the Government, economic opportunity and enhancing social cohesion.<sup>1</sup> Environmental values can be advanced in a way that contributes to economic opportunity and prosperity. Environmental values are also an important part of the values that hold our society together, and promoting them contributes to social cohesion.

### *Environmental values in a market economy*

New Zealand is a pluralistic society. We hold widely differing values and cherish the freedom to organise our own lives and make our own choices. We rely on a market economy to meet many of our needs, gain access to a wide range of goods and services, and allow us the freedom to pursue our diverse goals and interests.

Our experience is that a market economy is a very efficient and flexible means of allocating many resources to meet individual needs and preferences. Society benefits from the innovation and dynamism that the market secures. These unplanned benefits are sometimes described as flowing from an 'invisible hand'.

But not all of the outcomes of a market economy are necessarily beneficial. The 'invisible hand' can create unforeseen harm as well as benefits. Where the unplanned or unforeseen outcomes of a market economy are judged to be undesirable, citizens will seek to change them through political processes.

For example, concern about distributive outcomes has led governments to become increasingly involved in delivering social services, and providing a safety net to ensure that some basic human needs are met.

Concern about continuing environmental degradation has also led governments to intervene to protect and enhance the quality of the environment. We face a greater degree of ignorance about the consequences of using natural and physical resources than we do about many other decisions in a market economy. For example, few people envisaged the effects of CFCs on the ozone layer when they were first manufactured some 60 years ago. Further, individuals and companies sometimes have limited incentives to minimise environmental harm, or have inadequate ways of enforcing their right to a clean environment.

Environmental policy must recognise that markets have some difficulty with the following issues:

- Future generations are not 'traders' in the market, yet many consider that they should have fair access to resources. Their ability to meet their own needs should not be compromised by decisions taken today.
- The links between economic activity and ecosystem damage are often indirect and highly uncertain. Cumulative and indirect impacts on the life-supporting capacity of ecosystems can arise if appropriate limits are not in place.
- Environmental effects and risks are not evenly spread and unforeseen impacts may be irreversible. This uneven impact is not easily resolved either through the market or by regulation.
- 'Spillover' effects (that is, impacts on third parties) are very common.
- Many consider that the environment and non-human species have intrinsic value (that is, they are 'valuable' in their own right).

This is not to say that government intervention would necessarily achieve better results. Governments are severely limited in the information available to them; they face difficulties in knowing the preferences of individuals, and may be unduly influenced by sectional interests.

Both central and local government need to evaluate the social, economic and environmental costs and benefits of any proposed intervention. They need to be reasonably certain that the suggested 'cure' is not worse than the 'disease', and that it does not create undesirable side effects.

The Government's goal is to gain the greatest possible benefits from a market economy, consistent with society's present demands for environmental quality and the carrying capacity

<sup>1</sup> See the Government's 1995 Budget Policy Statement, page 5.



of the environment to sustain the needs of future generations. Economic growth must not occur at the expense of environmental quality.

The Government's task is to design rules and institutions that promote good environmental outcomes within the framework of a pluralistic society and a market economy. This may require amending the rules governing existing property rights or the creation of new ones. In other instances it will involve introducing rules and regulations designed to protect environmental values that are not easily secured by market exchanges.

### *Environmental values for a cohesive society*

A cohesive society is one in which there are common understandings. But it is not a monolithic society. The pluralism we have spoken of means that there will be many different communities of interest. They may be based on cultural, work place, religious or family affiliations. These communities of interest are dynamic – individuals join or leave them as their needs and values evolve. But both individuals and communities rely for their survival and coherence on shared understandings about the way our society functions and perpetuates itself. A society that is dysfunctional and jeopardises the interests of future generations will not be cohesive.

In the same way that the institutions of a market economy are widely understood as a means of securing access to goods and services and a way of enabling individuals to transact businesses, the institutions that protect the life-supporting capacity of our natural resources and safeguard the interests of future generations are understood as a source of cohesion. A sense of good 'environmental manners' is as important to social cohesion as a sense of commercial integrity and social responsibility. In fact, both are closely linked: citizens and corporations that have a concern for the smooth functioning and durability of society know that commercial and environmental honesty are essential.

A healthy view of individual and community responsibility for environmental values will depend on our response to a number of issues, which are discussed below.

#### *Access and Opportunity*

A defining feature of the New Zealand lifestyle is proximity and access to our coasts, mountains, forests, lakes and rivers. New Zealanders are, in a very physical sense, people of the land. That access is enhanced by low population density. Solitary access to the outdoors is still easily achievable in New Zealand. Continued access to our natural and physical environment is a source of physical and spiritual strength to individuals and to broader social cohesion.

#### *Education*

Being able to understand, interpret and challenge our economic, social and environmental circumstances is essential for anyone who wants to contribute to his or her society. Social cohesion requires well informed citizens who can make judgements about issues as they arise. The past 20 years have seen a widespread environmental consciousness develop: residential

communities are concerned about the environmental quality of their surroundings; businesses know that a good environmental record can win competitive advantage while a poor one can literally destroy the business; non-governmental organisations are highly effective in mobilising public opinion on behalf of environmental causes.

Now that concern for environmental values is maturing, environmental education needs to become increasingly sophisticated. Citizens need to be able to assess competing claims and understand the trade-offs that will frequently be required. Planners and policy makers need to be able to cope with new, flexible resource allocation mechanisms. Rapid economic and technological change requires constant innovation in the design of institutions and mechanisms for coping with environmental problems. Education that enables people to respond and contribute to this challenge will supplement an appreciation of shared environmental values necessary to assess and solve highly complex economic, social and ecological interactions.

with the analytical tools

#### *Participation*

A cohesive society will be one in which citizens feel able to influence the rules and institutions that govern their community. The Resource Management Act provides the means for New Zealanders to contribute to the development of environmental goals and rules. It is

important, in thinking about participation, to keep in mind the practical limits that apply to public participation and consultation in decision making. Many New Zealanders are suffering from submission fatigue. They simply do not have the time or the resources to make use of opportunities to make submissions. And of course many simply are not interested – even though their rights and interests are just as important. The result is that submission processes tend to be dominated by vested interests.

For that reason it is important that the frequency and the focus of public participatory processes are pitched at a level that will generate genuinely wide interest. This will frequently be when broad, boundary-setting issues are at stake. For the allocation of resources and the resolution of disputes at the micro-level, alternative mechanisms – including property rights – may well better protect the interests of individuals and communities.

#### *Security*

Social cohesion will be undermined if individual and environmental health are at risk. Health and the environment are intimately connected. Examples range from the association of diseases with socio-economic disadvantage and the disintegration of traditional forms of social and family organisation, to lead and benzene poisoning associated with the use of motor vehicles.

The ability of communities to preserve their cultural and physical heritage and control the rate and scale of development is closely associated with community cohesion. People's sense of security and comfort is often strengthened by maintaining a sense of place and connection, and the continuity between past and future. Moreover, people will invest in a community only if they have the security of knowing that the social or physical assets they build up will be protected and nurtured.

#### *Heritage*

Contact with the fabric of our cultural heritage is a vital part of people's identity. A society in which individuals are severed from their cultural roots will be an impoverished one; an important force for social cohesion will be lacking. People will be less likely to respect public and private assets alike if they have no sense of being part of an unfolding culture. Noise, pollution, litter and environmental vandalism are in part a symptom of cultural impoverishment. Conversely, someone with a sense of the history and culture of their community is likely to be sensitive to the need to nurture resources for future generations. A sense of being culturally located in time binds together the inheritance of our ancestors with our responsibility to those generations who will follow us.

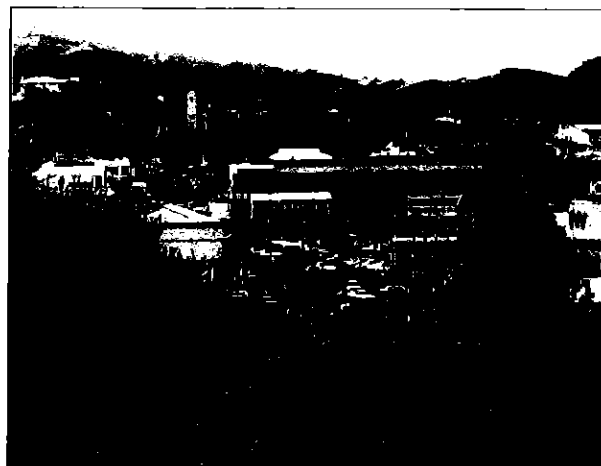
This sense is keenly felt by Maori. A thousand years' settlement in Aotearoa has built up a close identity with the land and other natural resources. The maintenance of the cultural affinity of Maori with this land is an important dimension of social cohesion in New Zealand.

#### *Globalisation*

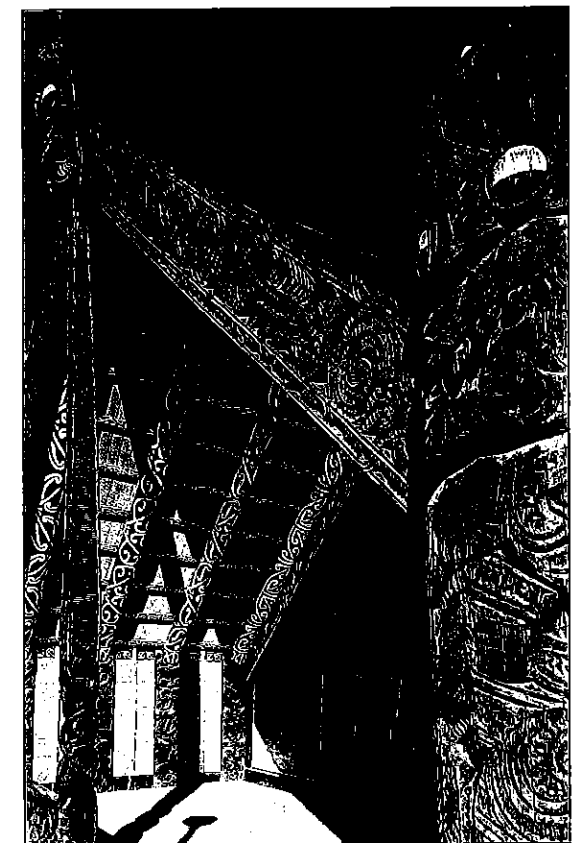
Communication technologies and increasing economic interdependence have started to knit the world together as a genuinely integrated community. Globalisation has been made possible through the workings of the market-place. As a trading nation, New Zealand stands to benefit significantly from the development of a genuinely global economy. One consequence of globalisation is an increasingly rapid rate of change in economic, environmental and cultural consciousness. Rapid change can undermine social cohesion if our institutions are not able to adapt to new risks. New Zealand must ensure that as globalisation deepens, its biosecurity and other environmental protection mechanisms can maintain the unique environmental quality that we enjoy as a distant island nation.

In setting out this Strategy, the Government is facing the fact that it has limited and indirect control over environmental outcomes. Inevitably, a tension arises between maintaining economic growth, achieving desired environmental outcomes, and enhancing social cohesion. This Strategy reflects that tension.

Principles are described in the following chapter that will underpin the Government's actions in seeking to minimise or resolve conflicts between environmental, economic and social objectives. The overall aim of the Strategy remains to improve environmental outcomes within the framework of a market economy and a cohesive society.



*Businesses know that a good environment record can win competitive advantage.*



*Maori affinity with the land is an important dimension of social cohesion.*



# 3 Principles for Integrating Environment, Society and Economy

## Principle 1: Sustainable management

Use of natural and physical resources should be carried out in a manner that sustains the resources and services that society values.

This principle recognises that:

- The Government is committed to the principle of sustainable management as expressed in the Resource Management Act. The sustainable management of natural resources is best thought of as a guiding principle that defines constraints and duties in respect of the way we use natural and physical resources. Sustainable management includes options of use, development and protection. The purpose of these constraints and duties is to ensure the continuance of longer term benefits from those resources. It is likely that these constraints will change over time and also reflect different local conditions.
- While the Resource Management Act 1991 is the principal general legal framework through which the promotion of sustainable management is carried out in New Zealand, a range of other legislative instruments, including the Fisheries Bill (expected to be passed in 1995), the Forests Act 1949, and the Biosecurity Act 1993, provide for similar management requirements in the case of particular resources.

- These duties and constraints are typically based on ecological, ethical and cultural concerns, although other social and economic considerations can also be factors. Key concerns are the well-being of future generations and the integrity of ecosystems.
- The environment performs many functions at the same time. It contains many different stocks of resources that provide a variety of services to people, plants and animals. Sometimes it is the stock of the resource that is important. For example, an ancient rimu forest is a storehouse of indigenous biological diversity and brings pleasure to those people who visit it. To maintain these characteristics the forest itself must be preserved. In other cases, it is sufficient to sustain the flow of services that society obtains from resources (eg energy services), without insisting that a particular stock (eg gas) be maintained.

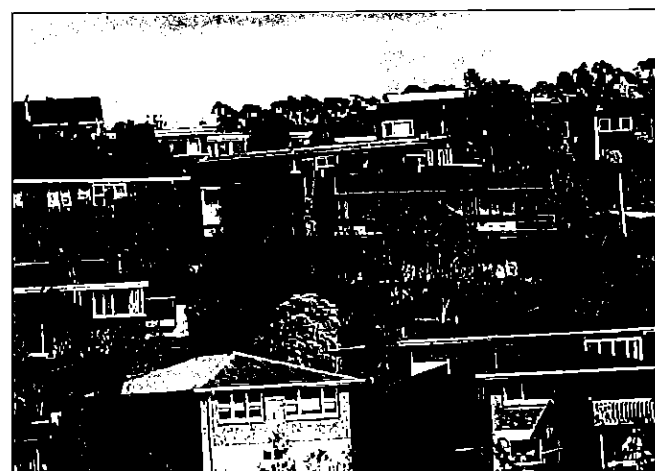
- Sustainable management has a cultural component. For example, natural resources may be used for traditional purposes (eg medicine, food gathering, crafts) and traditional methods of resource management may be used such as a raahui (ban or reserve) and whakatupu (growing time).

## Principle 2: The Precautionary Principle

The Precautionary Principle should be applied to resource management practice, where there is limited knowledge or understanding about the potential for adverse environmental effects or the risk of serious or irreversible environmental damage.

This principle recognises that:

- Principle 15 of the Rio Declaration on Environment and Development (to which New Zealand has acceded) states that, in order to protect the environment, the precautionary approach should be widely applied: 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.'
- We cannot anticipate all possible environmental effects of our actions. Where there is limited information available to decision makers, or limited understanding of the possible effects resulting from an activity and there are significant risks or uncertainties (for example, over the extent of environmental damage), a precautionary approach should be applied.



The Resource Management Act provides the framework for urban planning.

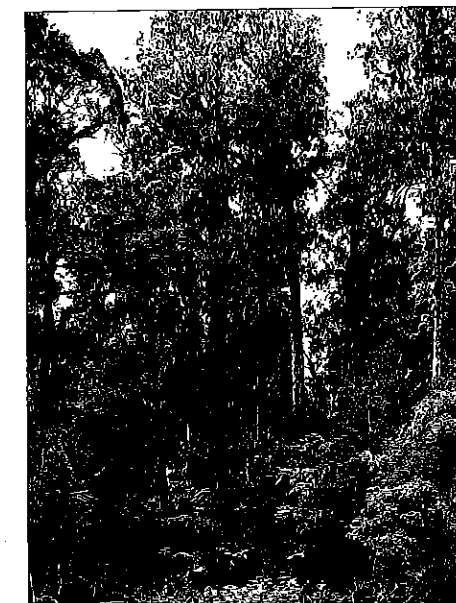
- Significant risks are particularly likely to arise where the scale of the ecosystem is large, or the ecosystem is complex, such as in the case of the climate system. In such instances, there is a strong case for applying the Precautionary Principle.
- In assessing risk, the wide range of different people's perceptions of environmental, economic and social risks should be recognised.
- Policies in areas of significant environmental risk or uncertainty should also acknowledge the dynamic nature of, and difficulties in precisely defining, sustainable ecological limits.

## Principle 3: Environmental bottom lines

Resource management should be assisted by defining 'environmental bottom lines' in situations of special sensitivity and high risk, and where adequate information exists on which to base such a definition.

This principle recognises that:

- 'Environmental bottom lines' are the thresholds below which there is an unacceptable risk that the resources and services that society values will not be sustained. Such thresholds may refer to damage to natural ecosystems, or to resource qualities desired for human use (eg waters of swimmable quality). They are defined in biophysical terms. There is a need to give specific operational expression to environmental bottom lines in real world situations.
- The principle of environmental bottom lines also encompasses the notion of 'ecological integrity', which has been defined as protecting total native diversity (species, populations, ecosystems) and the ecological patterns and processes that maintain that diversity.
- 'Environmental bottom lines' are not always easy to determine accurately and may vary from region to region, and over time. This can be because of lack of knowledge of the relevant natural systems. It can also be because a range of impacts (or rates of change), rather than a particular level, defines the boundary between acceptability and unacceptability. In defining an environmental bottom line, principles such as the Precautionary Principle (see Principle 2 above) and the balancing of benefits and costs may be relevant, as are the value judgements of those affected.
- Because environmental bottom lines can be costly to develop, priority should be given to developing them in respect of resources whose use entails significant risks of serious environmental consequences. (See discussion of comparative risk assessment in Chapter 9 and Principle 9 below.)



Environmental bottom lines refer to thresholds of acceptability, for example, in respect of damage to natural ecosystems.

## Principle 4: Internalisation of external environmental costs

Resource management should ensure that the unpriced environmental effects (or external costs) associated with the production, distribution, and consumption of goods and services are 'internalised', that is, they are assessed and consistently charged to users and consumers who benefit from them.

This principle recognises that:

- Markets give businesses a strong incentive to conserve rather than over-exploit those natural and physical resources for which they have to pay. However, the market provides little or no incentive to conserve resources when they can be used and degraded without charge. Consider a business that releases polluted industrial water into a stream. In the absence of intervention, the business and its customers pay no price for the vital waste assimilation services of the water, despite the fact that the stream and downstream users may be harmed. The damage associated with the pollution does not affect the business (it is not an internal cost) but instead affects other parts of the community. This is neither fair or efficient; the polluting industry is in effect being subsidised by the rest of the community.
- The external environmental costs of economic activity should be borne by those firms or consumers who benefit from the activity. This principle, known internationally as the 'internalisation principle' or 'polluter-pays principle', involves accounting for all the environmental costs of production and use, and ensuring that they are charged to the producer and user wherever possible. The arguments applying to external environmental costs also apply to external social costs (see Principle 7).
- Even when environmental damage is partly avoided or mitigated through internalisation, some residual damage may still occur (eg some pollutants still enter the river). With a high level of overall economic activity in an area, such residual damage can be quite significant.

In such situations we must decide whether or not we are willing to pay the extra economic costs associated with extended environmental protection.

- Internalisation through a price incentive is not always feasible. However, other policy mechanisms are available to achieve internalisation of environmental costs, including education, adoption of voluntary codes by industry, and regulation. The objective is to find the 'least cost' mechanism (see Principle 6), taking into account the range of costs, such as transaction and compliance costs, to achieve this.
- Compensation is a resource management option that can be used to internalise the external costs of adverse environmental effects when these effects cannot reasonably be avoided, remedied or otherwise mitigated. From a resource management point of view, financial compensation cannot be the generally preferred approach where it would lead to progressive, irreversible conversion of natural capital to financial capital.
- The benefits of a resource management regime that consistently applies an internalisation policy are:
  - It translates external environmental costs into incentives, such as financial costs, which resource users take notice of. The behaviour of these users will tend to change in response to these incentives, so that environmental quality and economic efficiency are enhanced.
  - It ensures that external environmental costs are reflected in the prices of the goods and services, thereby giving a competitive advantage to cleaner producers.
  - It ensures that existing industries and resource users are not given a privileged status compared to new entrants, who can often offer environmentally improved production technology or better land management. It is clearly important that the resource management system does not create barriers to renewal and improvement in any resource-using sector.

### ***Principle 5: Sustainable property rights***

**Specifying property rights in terms that ensure private and collective decisions achieve sustainable outcomes should be encouraged as a resource management tool.**

This principle recognises that:

- Many existing property rights had their origins at a time before environmental issues were of widespread public concern. Subsequent legislation – such as the Resource Management Act 1991 or the 1993 amendment to the Forests Act 1949 – has significantly redefined some of those property rights. Equally, many property rights were traditionally associated with concepts such as guardianship or stewardship.
- Sometimes the effect of legislation is to transfer rights from property owners to local or central government authorities, which then allocate them in a discretionary way. This is done as a means of achieving sustainable management. An alternative approach to achieving sustainable management is to provide a new and more detailed specification of property rights, sufficient to ensure that use of a resource in those terms is sustainable. In practice these two approaches will tend to be complementary, and the way they are combined should be governed by considerations of whether the perceived benefits exceed the costs and social acceptability.
- Better specification of property rights can encourage property owners to be responsible and accountable for the sustainable management of the resources in their ownership. In some situations it can also reduce administrative costs, increase community and investor certainty, reduce transaction costs and encourage ecologically sustainable innovation and entrepreneurship.
- There is considerable scope for utilising property rights to manage resources previously regarded as common property resources. For example, this has already been done with many fisheries. The Resource Management Act contains provision for tradeable water permits; and other possibilities are under investigation.
- Such systems are based on the concept of collective decision-making about the trading framework (eg the amount and quality of water to be available for trade) and individual choices about resource use within that framework.
- Where property rights are established, entitlements should be clear, they should run for a sufficient time to give certainty for investment, they should be readily transferable, they should be enforceable, and they should be able to be modified as new environmental information comes to hand. Liability for environmental risks should be clearly defined and should be borne by people capable of managing risk rather than transferred to the environment and/or future generations.

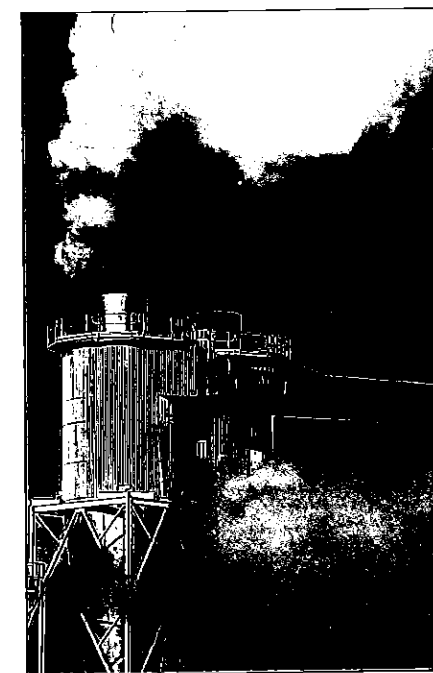
- Aligning property rights with ecological constraints is an important means of promoting sustainability. Environmental damage has often occurred where property rights have been inadequately or inappropriately defined or enforced. Clearly defined property rights also enable duties and liabilities to be clearly defined. Sustainable management requires that these duties embody the limits necessary to allow living systems to adapt and sustain themselves.
- Many resource decisions will not be capable of resolution in property rights frameworks. There may be considerable uncertainty about the nature of environmental effects, making the specification and enforcement of duties difficult. Further, the costs of creating such frameworks may be high, relative to the number and value of the transactions likely to occur. Such cases will continue to require discretionary decision-making systems.
- However, there is scope to increase considerably the use of property rights approaches, and this should be developed as far as possible. Clarification of the natural resource entitlements of Maori under the Treaty of Waitangi will also be needed. Waitangi Tribunal inquiries and Crown negotiations with iwi are progressively clarifying these matters.

### ***Principle 6: Least-cost policy tools***

**Central and local government interventions should be evaluated to ensure that they are necessary and, if so, that 'least-cost' policy tools are adopted to achieve the desired environmental result.**

This principle recognises that:

- Section 32 of the Resource Management Act requires that any government intervention under the Act should pass the tests of being necessary, and being the most efficient and effective way to achieve the desired result. This requires the evaluation of alternatives, and their costs and benefits, not just to those immediately affected but to the wider community as well.
- In some situations, it is important in terms of risks to sustainable management that a given outcome is attained (eg because of concern about risks such as going beyond a biophysical bottom line or foreclosing an important option for future generations). For example, it may be considered essential to maintain a certain in-stream river flow, or phase out CFC use. In these cases, the preferred approach is to proceed from the 'agreed' outcome and to choose a cost-effective means; in short, to use a least-cost approach.
- In other situations, it will be unclear precisely what outcome is required for sustainability (eg because there is debate about the trade-off between environmental and social or economic objectives, or there is little risk of infringing biophysical bottom lines). For example, it may cause a loss of amenity or create an extra burden on social or physical infrastructure when a suburb is extended, or when an increase in aircraft noise is permitted. In such cases, the preferred approach is to assess systematically the cost, risks and benefits (in terms of sustainability as well as economic and social effects) of a given policy or objective, and to select the option with the greatest net benefits. The choice of option should also take into account uncertainty and the need to maintain flexibility to respond to new information.
- Depending on the situation, 'least-cost' policy tools can include statutory controls and incentives (such as economic instruments and regulations), partnerships (such as voluntary agreements, public/private joint ventures and facilitation of community decision making), and educative measures (such as provision of information). Durable policy solutions are likely to require combinations of these types of mechanisms.
- Economic instruments, such as taxes, user charges and performance bonds, and market mechanisms, such as tradeable abstraction or emission permits, can be 'least cost' policy tools in appropriate applications. Economic instruments have a number of benefits compared with rules and regulation:
  - They encourage efficiency across the economy. Those polluters who can do so most cheaply will tend to make the biggest reductions.
  - They encourage technological innovation, because they do not prescribe any particular method or technology. This provides a continuing incentive to develop cleaner processes in order to reduce pollution charges.
  - They allow a shift from taxing economic 'goods' (such as income and savings), into taxing environmental 'bads' (such as pollution and congestion), thereby providing for a 'double dividend' of encouraging economic development at the same time as enhancing environmental quality.



*Economic instruments provide continuing incentives to develop cleaner processes.*

- Economic instruments are established within a regulatory framework which establishes property rights by setting the rules. This framework includes methods of enforcement and related penalties.



Market gardening relies on large quantities of water. The Resource Management Act provides for transferable water abstraction permits.

- An example of market mechanisms in New Zealand is the system of tradeable permits to import ozone-depleting substances. The permits were issued within the phase-out schedule required under the Montreal Protocol. New Zealand's Individual Transferable Quota system for sustainable fisheries management is another example. A mechanism which has been applied overseas with varying degrees of success is the 'bubble concept.' Under this system, air emission permits are traded within environmentally sustainable limits.
- The Resource Management Act provides for use of some market mechanisms, for example, transferable water abstraction permits in section 136(2), charges for permit applications and a variety of charges in section 108, including performance bonds and financial contributions as conditions of permits. At the direction of the Government, the Ministry for the Environment, in consultation with other central government departments, the Local Government Association and users, is monitoring the use of economic instruments under the Act and investigating any impediments to their use.

- Educational or voluntary measures, such as campaigns to promote cleaner production, or industry codes of practice, are increasingly seen as positive ways in which partners of government, such as industry, can take the initiative or be involved. High environmental standards are more likely to be achieved where industry is self-motivated. However, the development of codes of practice should be an open process, and voluntary agreements should be accompanied by close monitoring of performance.
- Regulation will continue to be necessary where economic instruments, market mechanisms or voluntary measures are not effective or are too costly.
- An important example of regulation is the establishment of national environmental standards, where the benefits of standards exceed the costs, for example, guidelines or standards for air quality and water quality.

### Principle 7: Social costs and benefits

Policies should be formulated and implemented to ensure that environmental and social goals are mutually supportive. The likely social impacts of environmental policies should be appraised and alternatives that maintain or enhance environmental quality in a manner that promotes social cohesion should be advanced.

This principle recognises that:

- Social and environmental policies are inextricably linked. Environmental policies may, for example, impose social costs even though they will also entail social benefits (especially during the transition to sustainable activities).
- Some environmental policies may disadvantage the poor. The tax on lead in petrol, for example, can adversely affect those who own old cars. On the other hand, the urban public transport subsidy helps those who have no car at all as well as those who choose to use public transport for other reasons.
- Some people may have their property rights affected by environmental policies. Given the nature of natural resources, property rights are not immutable. Some people may lose employment and wealth, as unsustainable activities, such as clearfelling of indigenous forests, are phased out. Many communities may undergo fundamental change and displacement causing stress for the individuals and groups involved and affecting some people's well-being.

If environmental or other policies disadvantage some groups, the government will need to consider addressing the issue of social equity through its 'redistribution' role.

From an environmental point of view, it is important that price signals or policies that aim to elicit environmentally-oriented behavioural changes are not watered down. Rather, the best overall approach is likely to be providing separate, targeted assistance to help those who are disadvantaged to cope. This assistance may include information and advice, and direct services (eg energy efficiency installation in homes of those on low incomes, to reduce exposure to energy price rises).

In addition, people should preferably be given time for adjustment. For example, the transitional provisions in the 1993 amendment to the Forests Act 1949 were intended to help reduce the social costs of moving from large-scale clearfelling to the new era of sustainable management of indigenous forests.

At the same time, environmental policies can also have positive social benefits for many people. These benefits may include, for instance, improved health, enhanced cultural and spiritual well-being, increased recreational opportunities, alternative sources of employment and the recognition of the needs of future generations.

### Principle 8: Pricing of infrastructure

Public utility infrastructure pricing should follow full cost pricing principles.

This principle recognises that:

- State or community-owned utility infrastructure services, such as roads, water supply, solid waste disposal, sewerage systems and energy services, are often implicitly subsidised by virtue of there being an inadequate asset valuation, and/or no requirement for a normal commercial rate of return on capital invested, and/or no user pays policy. The result of these policies is that such infrastructure services are overused, and the associated environmental impact is artificially increased over what it would be if the infrastructure services were correctly priced.
- This long-established problem has been reduced through the reforms of state and local authority trading enterprises. Significant steps are being taken by regional and territorial authorities towards valuation of infrastructural assets, eg water supply and sewerage systems. The Local Government Law Reform Bill 1994 introduces a requirement to account for the deterioration in the service potential of assets. The problem may be further reduced with the establishment of a wholesale electricity market. The Government's Land Transport Pricing Study is designed, among other things, to address a major anomaly in the pricing of infrastructure in the road transport sector.
- The appropriate approach to public utility valuation and pricing is full cost pricing. This involves accounting for unpriced environmental and social costs of infrastructure, as well as economic (commercial) costs. Full cost pricing helps reveal any hidden environmental and social subsidies associated with public utility infrastructure.
- Crown-owned natural resources have also been traditionally underpriced or free of royalties. It is important that resource rentals should be charged, to achieve realistic pricing for exclusive use of natural resources in Crown ownership, for example, minerals and timber resources.

### Principle 9: Research, science and technology

In determining publicly funded research priorities, consideration should be given to local, national and international dimensions of sustainable resource management.

This principle recognises that:

- Publicly funded research is important in fostering a sustainable, innovative and technologically advanced society. For example, research should further increase our understanding of ecosystems and their interactions with the economy and communities. Such research can also add value to our strong base of biological production.
- A particular difficulty with developing and implementing environmental policy is the lack of adequate local environmental and scientific information. This information is needed, for example, to facilitate standard-setting and the design of sustainability indicators; to provide a basis for effective policy formulation and enable resource users to develop effective response strategies in many areas. Scientific effort focused on understanding local systems, and on designing sustainability indicators and policy mechanisms, is particularly important to enable the Resource Management Act to succeed in its purpose.
- Research related to sustainable management needs to be accessible to resource managers and users, and should include indigenous knowledge and methodologies.
- Research is crucial to gaining a better understanding of a wider variety of environmental risks, both at the national and local levels. Only when this research material is available can we proceed to develop coherent risk management strategies.



Research should further increase our understanding of ecosystems and their interactions with the economy and communities.

## Principle 10: Defining the limits of resource use and substitution

To achieve sustainable management, we need to recognise opportunities for substitution of mineral resources such as coal or gas, while accepting our limited ability to substitute for the myriad services provided by natural and physical resources.

This principle recognises that:

- We can no more sustain an economy by depleting its capital stock than a business can survive by depleting its own capital. Any development path involves consideration of the optimal levels of different capital asset stocks. But assets in this context must be construed broadly: they include the conventional human-made (or 'reproducible') capital assets such as roads and schools, human capital (in the form of the stock of knowledge, skills and capabilities), and environmental assets comprising natural ecosystems and natural and physical resources, including cultural heritage assets.
- There is good reason for the community to take a different view about the depletion of largely substitutable natural resource assets such as gas or coal on the one hand, and natural resources such as soil, forests and fish stocks on the other. Society may allow gas, coal or other mineral resources to be depleted because of the availability of close substitutes, whether available now or expected to become available with technological progress. The price mechanism can provide the signal to assist substitution as resources are depleted.
- However the rising price of a resource that is being depleted will only reflect information available at the time. Uncertainties about the needs of future generations, future opportunities, and unexpected environmental effects associated with resource extraction will not necessarily be reflected in price signals. Only rarely is enough known about environmental risks for there to be one sensible 'price' parameter that summarises all relevant constraints. For this reason we should be cautious about severely depleting any resources.
- Further, many natural and physical resources are 'produced' jointly by living systems and the interactions between them. Decisions about the use of one resource generally affect the availability and quality of many others, including those not currently seen as a resource. For example, sustained yield forestry may provide a steady supply of timber but will reduce the recreational value of the forest, the stock of biodiversity, and the variety of trees available for small-scale human use. Hence the 1993 amendment to the Forests Act 1949 specifies 'sustainable management' of the forest ecosystem, not just 'sustained yield' of the timber.
- With regard to these natural and physical resources, the community is likely to require limits on depletion for at least the following reasons:
  - Irreversibility. Where a species is lost, for example, the resilience of an ecosystem is damaged, intrinsic values are lost irretrievably and options for the future are closed off. Similarly, when groundwater is contaminated by toxic materials that cannot be recovered except at huge expense, essentially irreversible losses are being imposed on future generations.
  - Utility. Our largely natural resource-based economy is dependent on continuing sustainable supply and quality of natural resources, which it would be counterproductive to impair.
  - Cultural and community values. Many resources, ranging from national parks and waahi tapu to wild rivers and fishable estuaries, are valued by communities for cultural, recreational and other reasons. In such cases, the view is strongly held that their loss, or conversion to monetary equivalent, should not be permitted.

## Principle 11: Protecting our international competitiveness

New Zealand will assist in protecting the international competitiveness of its businesses by improving its clean green image, working with its trading partners to advance common interests, and playing a positive and

active role internationally without getting out of step with other countries where this would significantly affect competitiveness.

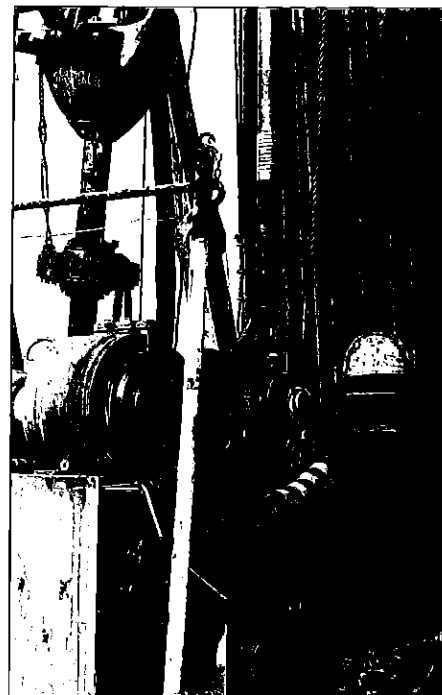
This principle recognises that:

- A mutual dependence exists between business and the environment. Just as the long term viability of New Zealand business depends on sound environmental policy, so does protection of environmental values rely on an economy that is able to support them.
- New Zealand's initiatives on global environmental issues, for example, climate change and biodiversity, should be in a time frame consistent with international conventions and the actions of other countries. This is necessary to maintain international competitiveness.
- Our clean, green image is increasingly important to the international competitiveness of our enterprises. We should continue to improve environmental quality to underpin this image, especially where these resources are an important part of our economy, for example, shellfish affected by toxic algae.
- It is important for industry to have time to adjust constructively to local and global environmental initiatives. This does not prevent New Zealand from taking a leading role in conventions on international issues, as it has, for example, on drift-net fishing, but commitment to change should be well signalled in advance and generally not be unilateral.



New Zealand's 'clean, green image' is increasingly important to the competitiveness of our products in overseas markets.

There is good reason to take a different view about depleting minerals on the one hand, and natural resources such as soil on the other.





# 4 Our Environment Today

Environmental strategy should be based on realism about where we start from. This section provides an overview of our strengths (including our natural advantages), and the problems, threats and opportunities we face. In considering our strengths and problems, a 'New Zealand' focus is adopted, whereas in considering opportunities and threats, the analysis is more externally focused. The analysis is dynamic: for example, problems or threats may be turned into strengths and opportunities through innovation, enterprise and careful management. Conversely, current advantages can be squandered or lost through poor management.

## 4.1 Natural advantages

New Zealand enjoys a unique endowment of natural resources, which gives us some substantial advantages.

The country's turbulent geological history, mountainous terrain and location on the Pacific 'rim of fire' give it an amazing diversity of natural landscapes.

The climate, tempered by latitude and the proximity of the ocean, supports dense rainforest and lush grass.

New Zealand's isolation as an island nation in the South Pacific protects it from the pollution of the more industrialised world. The relatively small population of 3.5 million people and few heavy industries, in a country the size of the United Kingdom or Japan, are other major reasons for our generally clear and unpolluted air. These factors, along with the spectacular scenery in areas such as Milford Sound, contribute to our 'clean, green' international image.

## 4.2 Strengths of our own making

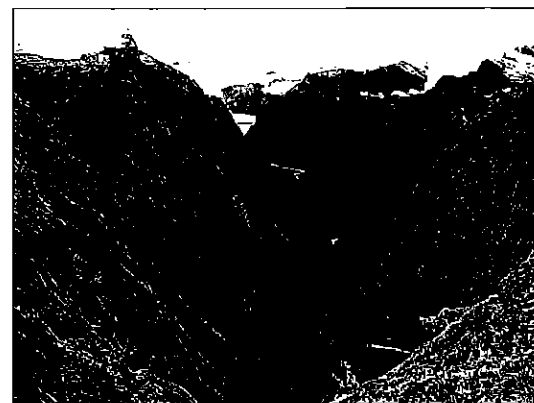
New Zealanders have capitalised on the natural advantages of our environment and developed some particular strengths. These include:

- A tradition of enterprise, innovation and practicality that has made our farm and forest products internationally competitive.
- A tradition of public pride in the beauty of New Zealand and a commitment to protect our cultural and physical heritage.
- A high profile internationally as a small but independent nation that is prepared to stand tall on environmental issues such as drift-net fishing, whaling, ozone layer protection and nuclear energy.
- The establishment in the 1920s and 30s of extensive planted forests and further plantings from the 1960s, which provide 97 percent of New Zealand's needs for wood fibre today (and have taken pressure off indigenous forests).
- The withdrawal of direct support and subsidies for agriculture and other sectors since the mid-1980s, contributing to a range of economic and environmental benefits such as less pressure on marginal land.

- Innovative resource management policies, such as the Individual Transferable Quota system for sustainable fisheries.
- The comprehensive, integrated and innovative Resource Management Act, the purpose of which is to promote sustainable management of natural and physical resources.
- A reformed system of local government, including regional councils with ecological boundaries (natural river catchments) appropriate to their resource management functions.
- Reform of central government, which included establishing one organisation with all of the heritage protection functions, the Department of Conservation, and the framework for citizen involvement through the Conservation Boards and the New Zealand Conservation Authority.

- Research institutes in forestry, agricultural science, soil science, atmosphere and fisheries, which have a deserved reputation as international leaders.

New Zealanders have a tradition of public pride in the country's beauty.



- Sources and use of indigenous knowledge.
- Specific provisions in the Resource Management Act, which provide the opportunity for greater participation by iwi in the management of natural resources.
- A small country in which government, business, environmental NGOs and other groups are sufficiently close to build agreements on environmental policies.
- Active public environmental groups that interact effectively with government and are able to mobilise public opinion in support of conservation goals.

## 4.3 Current problems

New Zealanders are justifiably proud of their environment, but it is vulnerable. The natural environment has been subjected to substantial change over a short time.

Before people arrived, over 80 percent of this country was covered in indigenous forest. Largely as a result of burning and clearance for agriculture, that figure is today only 23 percent.

Much of the vegetation and wildlife was unique, since the land mass 'drifted' away from the ancient Gondwanaland some 100 million years ago. Flightless birds and other indigenous plants and animals were entirely unprepared for the predators that people brought with them. Since people first settled here, half of our endemic bird species have become extinct. There are over 400 species of indigenous birds, plants and animals listed as threatened, including the kiwi. The number of endangered species has increased 25 percent in the past two years.

Problems to be overcome include:

- Our knowledge about the state of New Zealand's natural and physical environment is often scattered and patchy. Rarely is it consistent across regions, or for the country as a whole.
- There is increasing pressure on natural resources in urban areas, with for example, loss of high quality soils, air quality and water supplies.
- We continue to lose biological diversity in our indigenous flora and fauna, in part because of introduced pests such as possums, rabbits and goats.
- Ninety percent of our wetlands have been drained or degraded; lowland forest areas have been reduced to 15 percent of their pre-Maori extent; and only 10 percent of the tall tussock grassland that existed in 1840 still remains, the rest having been largely replaced by short tussock.
- Clearance of tall hillside vegetation to make way for agriculture has resulted in soil erosion, which degrades land productivity and water quality.
- In some areas, there is continuing damage to river, lake and coastal ecosystems through unsustainable rural and urban land-use practices. These can include excessive or inappropriate application of chemical pesticides and fertiliser, sediment run-off from subdivision, run-off from roads and stormwater.
- Degradation of groundwater resources through over-abstraction from aquifers is causing permanent lowering of water levels, salt water intrusion, and loss of geothermal resources for activities such as recreation and energy production.
- New Zealand could have up to 7800 contaminated sites, according to a preliminary study in 1992. These range from timber treatment sites and old agricultural chemical dumps to leaking underground petrol storage tanks. Follow-up work by regional councils will physically identify sites and reduce risks.



Today, only 23 percent of New Zealand is covered in indigenous forest.

## 4.4 Opportunities

If maintaining environmental quality is seen as an essential part of economic and social strategies, environmental quality can go hand-in-hand with economic growth and increased employment. People regard environmental quality as essential to their quality of life. They value the natural environment for recreational, aesthetic, cultural and spiritual reasons.

In the relationship between environment and economics there are many examples of 'win-win' outcomes for both. These include:

- Environmentally aware consumers in North America, Western Europe, Japan and elsewhere are demanding high environmental quality.

- An increasing market exists for our organically grown produce. For example, one New Zealand company is expecting that by 1998, 40 percent of its frozen vegetable products produced for retail sale in Japan will be organically grown.
- Surveys have shown that tourism and its future growth is dependent to a large extent on our unique environmental assets. Careful management is required if the opportunities afforded by tourism are to be maintained.



*There is an increasing market for organically grown produce.*

- TRADENZ and the New Zealand Tourism Board have registered Brand New Zealand in 44 countries with the objective of gaining a premium position for our products based on quality, innovation and environmental values.
- Policies to enhance environmental quality may provide a trigger for technology innovation to deliver internationally competitive products and services.
- The environmental technology business, now estimated at \$US200 billion per year in OECD countries, has outstripped computers and aerospace as a fast-growing industry sector. New Zealand has a reputation for innovative technology in areas such as waste water treatment and alternative fuels.
- Environmental policies that encourage energy efficiency and waste minimisation can reduce production costs and enhance competitive advantage.

- The development of farming, horticulture, fishing and forestry is enhanced by enlightened natural resource management policies to enable clean water, clean air, sustainable land use and low contamination by industrial pollutants.
- Environmental quality is becoming part of quality management through both Total Quality Management and ISO 9000 quality standards. With the development of the ISO 14000 Environmental Management System Standards, integration of environmental management into overall business management will be even greater.

#### 4.5 Threats

The threats to our biophysical environment include:

- Our indigenous, agricultural, forestry and fisheries ecosystems are threatened by imports of pests and diseases, for example, the German wasp, Asian Gypsy Moth, giardia, toxic dinoflagellates and algal bloom.
- The further spread and intensification of pests, weeds, and diseases, including rabbits, possums, gorse, old man's beard and TB, which threaten indigenous ecosystems and harm exports.
- Degradation of the productive potential of soil through erosion, nutrient decline and chemical residues.
- Contamination of water bodies (for example, rivers, lakes, aquifers or estuaries), from leachate from landfills and industrial sites, urban stormwater and agricultural run-off.
- Degradation of groundwater resources through over-abstraction from aquifers causing permanent lowering of water levels, salt water intrusion, and loss of geothermal resources, affecting activities such as recreation and energy production.
- Depletion due to persistent over-fishing, possibly leading to a collapse in a commercial fishery.
- Local air pollution through the emission of sulphur dioxide, carbon monoxide and nitrous oxide.
- Damage to sensitive areas, such as fragile alpine ecosystems, as the result of inadequate management of a dramatic increase in the number of visitors.
- Global climate change, including possible changes in rainfall patterns, frequency and severity of extreme events such as floods, storms and droughts, rising sea levels threatening low-lying coastal areas, and the creation of conditions that allow establishment of exotic plants and insects.
- Ozone layer depletion, causing increased human health problems such as skin cancer, eye cataracts and suppression of the immune system, and reduced livestock and marine production.

The current environmental problems and threats provide the agenda for action to maintain and enhance our environmental quality for the future. The Agenda for Action in Chapter 6 of this Strategy is designed to address the problems and to seize the opportunities identified above.

## 5 Environmental Goals

### 5.1 Where we start from

The environment today, globally, nationally and locally, is nowhere near its pristine, natural state. Human activity, particularly since the agrarian and industrial revolutions, has modified it dramatically. The changes to the New Zealand environment have been set out in Current Problems (section 4.3) and in Threats (section 4.5).

We need to improve the state of our environment, for present and future generations. The only acceptable direction for environmental quality is upwards. Just how much of an improvement we aim to achieve is a matter of social and political choice.

This chapter spells out some goals that the Government believes New Zealand can and should aspire to. Environmental goals and targets are difficult to specify in isolation from other considerations. If they are set at the level of the environmental 'bottom line' they may be set too low: they will protect future generations from damaging effects, but may be too low to satisfy the non-economic needs of the present generation adequately. For example, a river system protected from irreversible damage may still be unsuitable for swimming and fishing.

On the other hand, if environmental goals are set at a level that offers the highest natural outcome, the cost to society's non-environmental objectives may be considered too high by some groups. How far, for example, should the process of establishing protective water conservation orders over wild and scenic lakes and rivers be extended to cover waters that are or may be economically valuable for other uses? Why not restore all New Zealand rivers to their pristine condition?

This problem is made more complex by virtue of the fact that the cost of setting national environmental goals is not usually known with any certainty.

For these reasons, setting environmental goals at the national level is inevitably somewhat arbitrary. The goals proposed here will need to be refined in their application to particular situations and localities over time. They indicate a broad sense of direction and a state of the environment that is to be aspired to overall, rather than a standard that will be achieved in every case. Most importantly, they provide a starting point against which we can begin to measure the successful application of the principles spelt out in Chapter 3.



*The only acceptable direction for environmental quality is upwards.*

### 5.2 Goals

The following goals refer to 11 priority issues for the New Zealand biophysical environment. Together, they relate to the quality of both the rural and urban environment. The goals support the vision in Chapter 1. Each of these goals needs to be progressed in a way that is consistent with the Government's economic and social policies and that imposes least cost on society. The goals will be able to be pursued only to the extent that the Government, the private sector and the community are prepared to commit resources to them.

- 1 To maintain and enhance the quality, productivity and life-supporting capacity of our soils, so that they can support a variety of viable land use options.
- 2 To manage the quality and quantity of surface water, groundwater, coastal and geothermal water so that it can meet the current and future needs of ecological systems, communities (including Maori), primary production and industry, by:
  - maintaining sufficient water in water bodies to meet these current and future needs;
  - ensuring New Zealand's surface freshwaters and coastal waters are of a quality suitable to meet community needs such as swimming, fishing and shellfish gathering, and that aquatic life is not significantly affected by discharges;
  - restoring, and preventing further degradation of, groundwater quality and quantity;
  - preventing degradation of quality and flow of water resources that are identified as having national significance to New Zealanders for recreational, scenic, scientific or cultural reasons.

- 3 To maintain air quality in parts of New Zealand that enjoy clean air, and improve air quality in places where it has deteriorated.
- 4 To protect indigenous habitats and biological diversity by:
  - maintaining and enhancing the net area of New Zealand's remaining indigenous forests and enhancing the ecological integrity of other remaining indigenous ecosystems;
  - promoting the conservation and sustainable management of biological diversity so that the quality of our indigenous and exotic ecosystems is maintained or enhanced to guard against extinctions and permit adaptation to changing environmental conditions.
- 5 To manage pests, weeds and diseases by reducing the risks they pose, to levels consistent with New Zealand's established objectives for:
  - biological diversity of ecosystems;
  - people's health;
  - biosecurity of the economy.
- 6 To conserve and manage New Zealand's fisheries for the benefit of all New Zealanders by providing for sustainable utilisation of fisheries resources, including commercial, recreational and Maori customary take.
- 7 To manage sustainably the environmental effects of producing and using energy services.
- 8 To manage the provision of transport services in a manner that minimises adverse effects on the natural and physical environment and human health.
- 9 To manage waste, contaminated sites and hazardous substances by:
  - managing waste to reduce risks to environmental quality and public health to levels that are widely agreed as being socially acceptable;
  - cleaning up contaminated sites to reduce risk to the environment, people and the economy;
  - managing or preventing the harmful effects of hazardous substances in order to protect the environment and well-being of people and communities so as to enable the maximum net national benefit to be achieved.
- 10 To take precautionary actions to help stabilise atmospheric concentrations of greenhouse gases, in order to reduce risk from global climate change and to meet New Zealand's commitments under the UN Framework Convention on Climate Change, including:
  - to return net emissions of carbon dioxide to no more than their 1990 levels by the year 2000 (but aim for a reduction in net carbon dioxide emissions to 20 percent below their 1990 levels by the year 2000 if this is cost-effective and will not harm our trade) and to maintain them at this level thereafter;
  - to reduce net emissions of other greenhouse gases – particularly methane – by the year 2000 where possible, and maintain them at those levels thereafter.
- 11 To help achieve the full recovery of the ozone layer and constrain peak levels of ozone destruction by phasing out imports of ozone-depleting substances as quickly as possible and at rates no less than those agreed internationally, and by limiting, where practical, emissions of those substances that are imported.



One of the 11 goals is to conserve and manage our fisheries for the benefit of all New Zealanders.

## 6 Agenda for Action

This Agenda for Action sets out *preliminary* steps towards achieving each of the goals in Chapter 5 by the year 2010. It does not attempt to identify 'by whom' and 'by when'. These are questions for the next stages of this strategic process. They are properly addressed in the strategic and action plans of individual government departments, industry, local government and other resource users.

The connections between different issues must be recognised in developing environmental policies. If this is not done, solving one issue may merely aggravate another problem. Conversely, improvements in managing one part of the environment may help improve the quality of another part; for example, a reduction in soil erosion helps improve water quality.

The 11 topics set out below have been derived from a combination of public submissions and expert opinion. As such, they represent an initial assessment of the priority environmental issues with which New Zealand must deal. The issues relate to the quality of both the rural and urban environment.

### Urban environmental issues

Most New Zealanders are urban dwellers. It is no surprise, then, that many people believe the *Environment 2010 Strategy* should attempt to tackle urban environmental issues as a special case. The Government has examined this matter and concluded that, while urban environments face many significant environmental challenges, these typically do not transcend the cross-cutting environmental challenges, such as water pollution, air quality and land management, addressed in this chapter.

Environmental problems can have more concentrated effects in an urban setting. This can give issues a sharper edge. Sewage disposal, water supply and noise are examples. However, the large number of people affected also means that a greater rateable base and economies of scale can more readily allow investment to address the problems. In addition, there may be a stronger case, in cities, for incurring the costs of introducing market measures such as road pricing, water metering and charging for refuse to better signal to people the costs of using environmental resources.

A challenge facing most communities in New Zealand today is how best to upgrade and renew infrastructure. In some urban areas, there are particular strains on the infrastructure, such as traffic congestion, and pressures on sewage and water services arising from new subdivision and infill housing development. The public ownership of infrastructure, together with its management and pricing, need to be carefully addressed to ensure that changing needs are efficiently and equitably met.

Preserving our built heritage is a challenge throughout New Zealand: we need to retain enough of our older structures to maintain links with our past. However, the large number of built structures in urban areas with heritage, cultural and amenity value makes this a matter of particular emphasis in towns and cities. There is more work to be done by urban authorities in addressing these vital issues.

In short, although the emphases in cities may be different, the environmental issues that arise are essentially the same. This Strategy takes the view that it is unhelpful to divide environmental issues into 'urban' and 'rural', but recognises that in urban settings, the different pressures may lead to different priorities for action within the overall Agenda for Action set out below.

### Priorities within the Agenda for Action

The issues within this Agenda have not been ranked in priority order (see right). As the Foreword notes, this Strategy does not offer an assessment of priorities at this stage. While a methodology for reviewing and comparing environmental risks is currently being developed, a rigorous assessment of priorities is a larger exercise. A process is outlined in Chapter 9. Once undertaken, the results will be used to assist in establishing which issues require the greatest effort first. Meanwhile, action on the current 11 issues is underway and will proceed in tandem with assessment of priorities.

### Agenda for Action

- 6.1 Managing our land resources
- 6.2 Managing our water resources
- 6.3 Maintaining clear, clean breatheable air
- 6.4 Protecting indigenous habitats and biological diversity
- 6.5 Managing pests, weeds and diseases
- 6.6 Sustainable fisheries
- 6.7 Managing the environmental impacts of energy services
- 6.8 Managing the environmental effects of transport
- 6.9 Managing waste, contaminated sites and hazardous substances
- 6.10 Reducing the risk of climate change
- 6.11 Restoring the ozone layer





## 6.1 Managing our land resources

### Goal

To maintain and enhance the quality, productivity and life-supporting capacity of our soils, so that they can support a variety of viable land use options.

### Issues

Agricultural, forestry and horticultural products are vital to the continued prosperity of New Zealand. Together they make up 69 percent of total exports, worth over \$13 billion per year. Our reputation for 'quality products from a quality environment' depends on environmentally sustainable land use practices. If we are to seize opportunities to sell new and innovative products, we must improve technology, land management skills and understanding of land management issues.

Many land management issues have been resolved by changing technology and management practices. Considerable progress has been made in achieving sustainable land production.

While much has been achieved, some significant problems still have to be resolved. This is particularly critical for southern North Island hill country and the South Island high country. Pastoral land use is threatened in up to 80 percent of the South Island high country because of overgrazing, burning, and pests. Land degradation, weeds and pests are serious issues for many areas of New Zealand. Between 1986 and 1990, natural disasters and adverse climatic events cost the Government more than \$175 million in direct assistance to primary producers. The costs to individual businesses and to communities were considerably greater.

Protected areas, especially forests and wetlands, play an important role in limiting vulnerability to flooding, erosion and other damage.

In New Zealand, the estimated loss of soil through erosion and transport by rivers to the sea is estimated to be 400 million tonnes per year. Voluntary and government-subsidised soil conservation programmes over the last few decades have achieved only a localised reduction in soil erosion on hill country farmlands.

### Risks

Sustainable land management in rural and urban areas can be threatened by inappropriate subdivision and associated activities, management decisions leading to over-grazing, under or over-application of fertiliser, and other practices which may result in land being used beyond its capability. These practices are influenced by factors that include the financial returns from land, the information available to land managers, and the natural variability of climate.

Land management in urban communities can be threatened by poor landscape design, such as covering large expanses of ground with asphalt, or bad subdivision practice, resulting in sediment run-off. The sustainability of a community may also be adversely affected if important 'patterns of relationships' (such as access by the elderly to institutions like the bowling club and the library) are disrupted by insensitive land use decisions.

The continuing risks to long-term productive capacity and environmental quality include:

- land degradation as the result of
  - soil erosion
  - decline in soil structure
  - soil compaction
  - site contamination;
- run down in soil health caused by
  - declining nutrient and organic matter levels
  - increasing acidity and aluminium toxicity, which limits some land uses
  - reduced soil fauna activity;
- vulnerability to weeds and pests;
- effects on water quality and flood capacity;
- damage to the landscape and habitats, and contamination of water supplies, as the result of mining operations;



Our reputation for 'quality products from a quality environment' depends on sustainable land use.

- the likelihood of significantly increased environmental pressures in the agriculture sector, attributable to expansion and intensification of grazing and horticulture following the successful conclusion of the GATT Uruguay Round and the increases in product prices that will emerge over the next few years;
- the growing pressure in our export markets for the imposition of non-tariff barriers based not on the quality of the product, but on the method by which it was produced.

### Actions

Actions required to achieve the goal include:

- encouraging efficient land management practices that reduce soil loss, and maintain or enhance the quality of waterways, groundwater and coastal waters and protect them from suspended sediments, nutrients, harmful microorganisms and other contaminants;
- avoiding, mitigating and remedying the impacts of land-related hazards, including flooding, subsidence and erosion;
- establishing accountability mechanisms, including land user groups, with responsibility for meeting sub-catchment water quality discharge standards.

### Priority

Priority will be given to developing and implementing a sustainable land management strategy for New Zealand.

*The coast is an important and often highly valued part of our land resource. The Government accepts that the Precautionary Principle (see Principle 2 of Chapter 3) applies to proposed activities 'because there is a relative lack of understanding about coastal processes and the effects of activities on coastal processes' (see Policy 3.3.1 of the New Zealand Coastal Policy Statement).*

*The New Zealand Coastal Policy Statement and Regional Coastal Plans are statutory instruments under the Resource Management Act for managing the coastal environment. The Coastal Policy Statement sets out policies on: national priorities for the preservation of natural character including inappropriate subdivision; the protection of those characteristics of special value to tangata whenua; the Crown's interests in its land in the coastal marine area; international obligations; matters to be included in Regional Plans; and procedures to monitor and review such plans. Regional Coastal Plans set out the objectives, policies and methods a regional council will adopt in managing the coast under the Resource Management Act.*

## A Sustainable Land Management Strategy for New Zealand

The proposed New Zealand Sustainable Land Management Strategy will define individual and collective responsibilities. The statutory framework for this is the Resource Management Act 1991 and the Biosecurity Act 1993. The Government's sustainable agriculture strategy *Quality Products from a Quality Environment* is an important component. The commitment of all parties will be required to achieve the goal of more sustainable land use.

The key elements of the Sustainable Land Management Strategy are likely to be:

- defining the nature and extent of land management problems (including physical, social and economic factors), priorities, risks of irreversible damage, and 'environmental bottom lines';
- establishing the primary responsibility of landowners, and the supporting roles of communities;
- identifying current initiatives contributing towards sustainable land management;
- research (including through the Public Good Science Fund) to establish key indicators of sustainable land management;
- establishing a monitoring programme driven by local government and land owners, with central government involvement to monitor national interests;
- developing land management skills and land use systems that will enable people and communities to provide for their social and economic well-being.



### Case study: Control of soil erosion

Severe soil erosion in the catchment area of the Torepatutahi Stream, east of Reporoa and Broadlands, has been stabilised and the land returned to productivity through a co-operative effort. The integrated approach taken is consistent with that proposed above for the Sustainable Land Management Strategy.

The land was developed for farming during the 1930s, and more intensively during the 1950s and 60s, with little thought to contour or drainage patterns. Stock pressure altered soil characteristics, which resulted in increased run-off. Severe gully and stream bank erosion affected land, roads, bridges, wildlife, and the viability of farms.

A severe cyclonic storm in 1967 triggered the preparation of a comprehensive catchment control scheme, which has been very successful. Landowners, the community, the Waikato Valley Authority and the Government co-operated to adjust farm boundaries, fence and plant stream banks, and convert the more erosion-prone lands into protection/production forest.



## 6.2 Managing our water resources

### Goal

To manage the quality and quantity of surface water, groundwater, coastal and geothermal water so that it can meet the current and future needs of ecological systems, communities (including Maori), primary production, and industry, by:

- maintaining sufficient water in water bodies to meet these current and future needs;
- ensuring New Zealand's surface freshwaters and coastal waters are of a quality suitable to meet community needs for activities such as swimming, fishing and shellfish gathering, and that aquatic life is not significantly affected by discharges and abstractions;
- restoring, and preventing further degradation of, groundwater quality and quantity;
- preventing degradation of quality and flow of water resources that are identified as having national significance to New Zealanders for recreational, scenic, scientific or cultural reasons.

### Issues

Water resources, including marine ecosystems and geothermal fluids, are a significant part of our natural heritage and our recreational activities. Low water quality in rivers will affect water quality in the coastal marine environment, in turn affecting marine vegetation and inshore fisheries.

In addition to being essential as drinking water, and for many parts of the economy, water also has important practical and spiritual value for Maori and the wider community.

New Zealand has substantial rainfall and an extensive lake and river system, but water is distributed very unevenly. In some places water is plentiful, but in other areas demands sometimes cannot be met. The best sites for hydro-electric power schemes are already used, and developing most remaining sites would conflict with other uses.

While having high quality fresh and coastal waters has major benefits, achieving it everywhere will incur considerable costs. For example, it has been estimated that providing secondary treatment schemes for all urban communities around the New Zealand coasts could cost \$1 billion over

the next decade. There will be a need for choices by communities on how quickly they can meet the above goal, taking account of other priorities.

### Risks

The most significant risks to the sustainable management of the quality and quantity of New Zealand's waters are:

- deteriorating water quality as a result of
  - unsustainable land use practices, such as sediment loss from over-grazed areas, damage to riparian strips, and inappropriate management decisions
  - inadequate treatment or disposal of urban sewage and industrial and agricultural effluents (from both point sources and non-point sources), for example, sediment, microbiological and nutrient contamination and hazardous waste such as organochlorines
  - untreated stormwater discharges, particularly from urban areas;
- inefficient or inappropriate uses of water, which in some cases have reduced water levels below the ecological 'bottom line' needed to maintain species diversity;
- biosecurity risk to water quality, for example, the introduction and spread of water weeds and giardia;
- over-abstraction and contamination causing damage to groundwater and geothermal systems, for example, through saltwater intrusion and aquifer collapse;
- changes to natural river and lake systems from further hydroelectric development;
- fluctuations in climatic conditions with the possibility of increased incidence of drought and flooding associated with climate change.



Low water quality in rivers will affect the coastal marine environment.

### Actions

The Resource Management Act will continue to be central to the promotion of sustainable water management. Regional councils will be encouraged to use opportunities under the Act, for example, to develop plans that specify appropriate water quality and quantity standards, and require users to bear the costs of their impacts on others and the environment, where this is efficient.

### Priority

Priority will be given to:

- establishing guidelines and standards that maintain the biophysical 'bottom line' needs of water quality and quantity;
- promoting integrated land and water management, because catchment management influences water quality and quantity;
- promoting 'land care' type of approaches to management of non-point source discharges;
- establishing accountability mechanisms that require land owners to adopt sustainable land management practices that maintain soil resources and minimise effects on freshwater and marine ecosystems;
- developing and promoting management techniques, such as tradeable water permits, which give users clear incentives to conserve the quality and quantity of water;
- encouraging agriculture and industry to adopt techniques such as the recycling of waste water, so that they use water more efficiently and produce less waste;
- funding and advocating the research and monitoring necessary for effective water management.

### Case study: The Waitaki Power Project

The Electricity Corporation of New Zealand (ECNZ) was seeking water rights for its Waitaki Power Project, which generates about one-third of New Zealand's electricity.

The situation had the potential to create a major conflict. The catchment, which is the main breeding area for the endangered black stilt, has high conservation, recreational and tourism values.

Hydro operations had already created problems for other users. Low flows had seriously affected the annual salmon spawning run, and farmers wanted more water for their irrigation schemes.

Rather than battle it out in the Courts, those with interests in the Waitaki catchment discussed their objectives and identified options. Often the venue for their meetings was the Kurow Hotel. An information strategy was developed, and the appropriate experts hired jointly.

It culminated in a two-day, non-confrontational hearing, which produced a successful outcome. ECNZ retained the existing minimum flow and obtained adequate storage in Lakes Pukaki and Ohau. Although wading bird habitat along the Tekapo River was not recovered, the habitat along the Ahuriri River was enhanced – the endangered black stilt may well have been saved. The Acclimatisation Society (now the Fish and Game Council) secured a modified flow regime and a comprehensive, ECNZ-funded study into the effects of flow fluctuations on the fishery. The farmers seeking irrigation water received a more comprehensive flow information system, and a commitment from the corporation to fund work on intake structures needed by operational flow fluctuations. Canoeists obtained special releases of water through a river bed enhanced for canoeing. The catchment board (now the regional council) had a solution to a long-running water management problem.





### 6.3 Maintaining clear, clean, breathable air

#### Goal

To maintain air quality in parts of New Zealand that enjoy clean air and improve air quality in places where it has deteriorated.

Historically, New Zealand has enjoyed good air quality. We are distant from upwind sources of pollution. Our remote location, relatively low level of industrialisation, maritime climate, and the force of prevailing westerlies have allowed us to use dilution as our solution to locally-produced air pollution. As a result, New Zealand has yet to develop the sophisticated air quality management programmes that have evolved in most other developed countries.

#### Issues

While poor air quality is commonly associated with urban areas through, for example, increased levels of carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), smoke and other particulates, poor air quality also affects rural areas. Issues such as dust from roads, eroded land and agricultural activities, odour from agricultural processing plants, and smoke from burn-offs are some examples.

Reduced air quality can adversely affect:

- human health (for example, acute and chronic effects, especially in vulnerable groups such as asthmatics);
- visual amenity, particularly in urban areas;
- vulnerable species of plants and animals;
- ecosystems through cumulative biotoxic damage and worsening the impact of other threats;
- physical structures (eg culturally important buildings) by corrosion due to acid gases, such as SO<sub>2</sub>, causing accelerated deterioration;
- commercial agricultural crops.

Ambient air quality monitoring has historically been restricted to a few sites in New Zealand. Consequently, the development of appropriate air quality standards is hindered by uncertainty about the extent of air quality problems. The Resource Management Act introduced the concepts that are central to developing programmes of air quality management. Before we can successfully manage air quality, we need to:

- assess existing air quality and fill any gaps in information on effects of contaminants;
- identify priority pollutants;
- devise cost-effective objectives and strategies for managing air quality;
- develop a strategy for improving air quality by targeting priority pollutants and estimating how future trends will affect air quality.

#### Risks

Since 1993, some regional councils have begun to survey their air quality. They have uncovered a number of air pollution problems. Studies in cities such as Gisborne and Whangarei have shown CO levels near traffic exceed levels known to affect human health. In Auckland, for example, photochemical smog is becoming more common and carbon monoxide levels have reached 90 percent of the World Health Organisation's health guideline levels on at least 20 percent of the 240 days monitored. Given current rates of traffic growth, safe levels of CO could be exceeded 20 percent of the time within three years.

Other surveys have shown that domestic heating can produce levels of pollution that threaten human health. Fireplaces and coal stoves put smoke, SO<sub>2</sub>, and hydrocarbons into the air. Heating is needed most on cold winter nights when air tends to be calm and remain stationary. New Zealand towns affected by cold air from mountains are especially prone to these winter inversions. At these times, pollution can reach or exceed guideline levels that have been developed to provide some protection against adverse health effects.

However, levels of lead in air have dropped significantly since lead levels in petrol were reduced and unleaded petrol introduced, accompanied by a tax differential in favour of unleaded petrol.

In rural areas, burn-offs can produce smoke and noxious gases. Use of agrichemicals, especially pesticides and herbicides, can result in off-target spray drift. This has the potential

to cause adverse effects on human and animal health. Heavy traffic on rural roads, overgrazing and other land misuse, and dry weather and high winds can cause significant dust problems.

Air pollution from industries, homes and cars may also damage New Zealand native flora and fauna. Little is known about the sensitivity of indigenous species to air pollutants because almost no research has been conducted in this field.

Another risk from air pollution is loss of visibility. New Zealand's clear vistas and high visibility contribute to our sense of well-being and are integral to our clean, green image.

#### Actions

To sustainably manage air quality, we need to:

- encourage regional and territorial authorities to establish ambient air quality monitoring networks, customised to meet local needs;
- fund research into indicators which signal ecosystem stress (including native species vulnerability) and develop guidelines based on the results of this research;
- develop an air quality management framework to deal with matters such as spray drift and human health effects from noxious emissions, which can be implemented by regional councils.

#### Priority

Priority will be given to establishing and implementing a national ambient air quality monitoring network.

#### Case Study: Canterbury Regional Council's Vehicle Emission Testing Programme

In Canterbury, motor vehicle emissions are of concern because they contribute significant amounts of pollution (carbon monoxide, particulates, hydrocarbons, and nitrogen oxides) to the local environment. In addition, engines that are improperly tuned waste fuel and produce excessive carbon dioxide, which contributes to global warming.

To address this issue, Canterbury launched a vehicle testing programme in September 1992. Free emissions testing is offered to motorists at vehicle servicing agencies and warrant of fitness centres. The Canterbury Regional Council set emission standards at levels that could be readily met by a reasonably tuned engine and that took into account the age of the vehicle. The council made sure that the testing agencies had proper equipment to measure emissions and that the operators could both run the tests and diagnose the causes of emission problems.

The effort has involved the local polytechs, the motor trade and transport industries, local councils and motorists. By the end of 1994, the programme had tested approximately 30,000 vehicles. The overall failure rate is 37 percent.

The most common problem is excess carbon monoxide, which occurs in two-thirds of the vehicles that fail. It is also the most easily corrected, usually at low cost (tuning alone usually costs less than \$20). This repair also reduces excess hydrocarbon emissions for several of the vehicles.

The programme has succeeded in raising the public's awareness of their contribution to the problem. It has set an example that has already been picked up by Waitakere City in the Auckland region. Canterbury's programme has also provided the first data gathered on emissions from vehicles in New Zealand. The programme is being studied by central government to assess the extent of excess emissions from vehicles and it provides an excellent case study of the effectiveness of voluntary measures for reducing vehicle emissions.



Domestic heating contributes to air pollution. Wearing warm clothing reduces the need for heating.



## 6.4 Protecting indigenous habitats and biological diversity

### Goal

To protect indigenous habitats and biological diversity by:

- maintaining and enhancing the net area of New Zealand's remaining indigenous forests and enhancing the ecological integrity of other remaining indigenous ecosystems;
- promoting the conservation and sustainable management of biological diversity so that the quality of our indigenous and productive ecosystems is maintained or enhanced.

### Issues

New Zealand's geographical isolation and diverse terrain have contributed to a unique range of habitats and species of plants and animals. The indigenous habitats of New Zealand include our forests, tussock grasslands, waterways, alpine tops, estuaries and coastal ecosystems.

In the occupation and settlement of New Zealand, many indigenous habitats were modified, leading to a loss in biological diversity. Today, our economic prosperity depends on productive ecosystems including our agricultural land and much of our commercial forest land. Maintaining and enhancing biological diversity is a vital step in protecting both our native and productive ecosystems.

The term 'biological diversity' (or biodiversity) encompasses the variety and abundance of plants, animals and microorganisms and their associated ecosystems. The larger, more diverse and complex a habitat is, the more resilient it is to change and stress. The possibility of global climate change, drought, and the introduction of invasive plant and animal species are some examples of the many stresses placed on the New Zealand environment.

During the 1980s and early 1990s, New Zealand protected significant areas of indigenous forest, or required its sustainable management. More effective protection is now possible for wetlands and many other lowland habitats under the provisions of the Resource Management Act.

The protection and enhancement of important habitats and of indigenous biological diversity is not free of cost, and this needs to be recognised. At the same time, New Zealand benefits economically from clean air, productive soils, and the many other services that healthy ecosystems and habitats provide.

### Risks

The risks differ between those types of ecosystems that are relatively well protected and those that are not.

The risks are:

- loss of some types of ecosystems, such as wetlands and tussock grasslands;
- loss of biodiversity and decline in health of protected ecosystems caused by introduced plants and animals, such as possums;
- damage to ecosystems and reduction in biodiversity because people do not understand how ecological systems and processes operate;
- loss of taonga Maori, such as pingao, which grows in sand dunes and is used for weaving;
- damage to sensitive areas, such as fragile alpine ecosystems, as the result of a dramatic increase in the number of visitors;
- damage to ecologically valuable sites and/or ecosystems from developments such as prospecting and mining, siting of telecommunication facilities, hydroelectric power stations and farms;
- damage to the unique flora and fauna that makes New Zealand so distinctive for visitors.

### Actions

The legislation governing conservation, protected areas and species, and resource management provides a strong basis for protecting biological diversity and indigenous habitats. Specific legislative amendments may be required over time. However, the key lies in the following actions:

- preparing a national strategy setting out clear goals for maintaining indigenous biodiversity as the first stage in implementing the International Convention on Biological Diversity, and considering the development of a national policy statement on biological diversity under the Resource Management Act;



The tui and the kowhai are part of New Zealand's unique biodiversity.

- preventing further loss of habitats and species and damage to ecological processes on the mainland, and restoring habitats on offshore islands by
  - controlling, and where possible eradicating, animal pests and problem plants
  - ensuring funding such as Nga Whenua Rahui and the Forest Heritage Fund is well prioritised and targeted to protect forest and other important habitats, such as wetlands, tussock grasslands and dune lands in Maori and other forms of private ownership
  - giving greater priority to research that enhances our knowledge of New Zealand's ecological processes and indigenous ecosystems rather than focusing on individual species in isolation
  - continuing programmes of researching and managing individual declining species on offshore islands;
- developing a priority setting and risk assessment framework to guide conservation management and research;
- broadening public understanding and appreciation of the working of natural systems by providing education programmes, and by encouraging people to visit, and help protect, conservation lands;
- addressing the role of sustainable management (eg customary harvest of various native plants and animals) in the context of the conservation and sustainable management of biological diversity;
- developing innovative processes for exploring and resolving conflicts between conservation and 'consumptive' land uses, such as tourism, mining and telecommunications.

### Priority

Priority will be given to:

- completing the terrestrial protected areas network, including wetlands, grasslands and other ecosystems under-represented in reserves, developing a comparable network of marine protected areas, and ensuring that coastal ecosystems are protected through the implementation of the New Zealand Coastal Policy;
- containing and controlling plant and animal pests, incorporating any environmentally safe new technologies and control agents, to improve habitat and species protection and retention;
- achieving a broad consensus of public and iwi support, understanding, awareness and involvement in biological diversity conservation;
- meeting the tourism needs of residents and visitors while maintaining the integrity of the environment.

### Case study: Hoiho

Hoiho, the yellow-eyed penguin, is one of the world's rarest penguins. It breeds only on the south-east coast of the South Island, Stewart Island and some sub-Antarctic islands. Unlike most other penguins, hoiho nest in separate pairs in shady coastal forest or scrubland.



Yellow-eyed penguins were not believed to be at risk on the mainland until a couple of bad years in the mid-1980s halved the population to possibly as little as 150 breeding pairs. Sudden population drops such as this can happen every few years and are thought to be linked to changes in the food chain at sea, possibly as part of global climate cycles.

The vulnerability of the penguin is increased by other more controllable factors: the clearance of coastal areas for farmland, predation by stoats, ferrets, cats, dogs and feral pigs, and drowning in nets set for fish. The greatest hope for increasing breeding numbers, therefore, is through stricter controls on set netting, control of predators, legal protection of remaining coastal forest, revegetation to restore habitats, and other measures needed to physically protect habitats, all underpinned by continued research and monitoring.

Hoiho recovery work since the late 1980s demonstrates the way in which the Department of Conservation (DOC), voluntary conservation groups, industry and local communities can work together on the protection of indigenous habitats and biodiversity, consistent with this Strategy.

As DOC's recovery programme got under way in the mid-to-late 1980s, a group of concerned individuals in Otago also set up the Yellow-Eyed Penguin Trust. Trust members advocate for the species, fundraise for special projects to assist the recovery work, and co-ordinate volunteers to help with taking censuses, revegetation and other projects. The trust arranged sponsorship with a local cheese-marketing company, Mainland, which generated a great deal of local and national interest and support as well as substantial amounts of funding.

Since then, a network of local people has also developed. This provides further support and maintains links with the community. Support for the recovery programme also comes from the tourism industry in Otago. Various tours to see hoiho are operating public hides developed by DOC at key vantage points along the Otago coast. These encourage visitors to see the birds without disturbing them.

### Biological diversity

The Convention on Biological Diversity signed by New Zealand in 1992 defines biological diversity as 'the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexities of which they are part...'

It is important, for many reasons, that we protect all elements of biological diversity. For example, biological diversity is valuable because variety adds resilience and robustness to our ecosystems, so that they can more readily adapt to human induced or natural environmental change. Future uses and values of ecosystems, species, and genetic material are unpredictable; and our understanding of ecosystems is insufficient to be certain of the impact of reducing or altering biological diversity.





## 6.5 Managing pests, weeds and diseases

### Goal

To manage pests, weeds and diseases by reducing the risks they pose to levels consistent with established objectives for:

- biological diversity of ecosystems;
- people's health;
- biosecurity of the economy.

### Issues

Pests, weeds and diseases of plants and animals damage the New Zealand environment and the economy. The costs of prevention, control, damage to human health and lost production cannot be calculated precisely but are likely to add up to billions of dollars. Regional and territorial authorities and the Department of Conservation have had some success in controlling pests and weeds at the local level. But in many instances it may be neither practical nor economic to attempt to eliminate existing pests, weeds and diseases. In the end, pests, weeds and diseases must be managed in ways that balance the benefits and costs to our environment and society.

### Risks

Unless weeds, pests and diseases are controlled, they could further damage the economy and the environment. The principal risks are:

- the introduction of new exotic pests, weeds and diseases, such as foot and mouth disease, Asian gypsy moth, Asian pin mussels and the Asian tiger mosquito;
- the spread and intensification of newly introduced or established pests, weeds, and diseases including rabbits, possums, gorse, old man's beard, giardia and TB, which may threaten indigenous ecosystems and harm our export and tourism sectors;
- the high number of garden weed and ornamental plant escapees, and the naturalisation of new species in New Zealand, which leads to a new generation of weeds;
- the unavailability of effective poisons because pest resistance increases, or the use of chemicals becomes unacceptable to domestic and overseas consumers;
- unknown implications of genetically modified organisms;
- the spread and increased impact of pests as a consequence of increased variability in the climate due to global climate change;
- the decline and eventual extinction of indigenous biological diversity.

### Actions

Actions required to achieve the goal include:

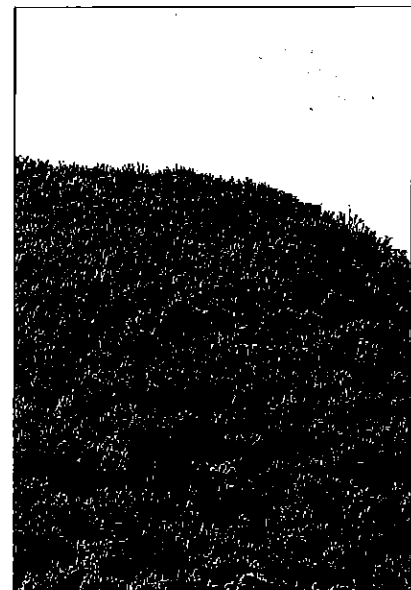
- preventing the introduction of exotic species with the potential to damage the environment or the economy;
- sufficiently understanding pests and their impacts, and being clear about the values that are to be sustained, so that full use can be made of the range of tools available for their control;
- using integrated techniques that incorporate pest tolerant species or biological control to reduce the environmental impact of controlling agricultural diseases;
- better assessing the impact of new species, especially plants and their potential to become pests and weeds;
- encouraging greatly enhanced public awareness about the importance of biosecurity, for example, in support of border control services.

The actions will be based on a number of Acts including the forthcoming Hazardous Substances and New Organisms Act, the Biosecurity Act 1993, the Wild Animal Control Act 1987, and the Wildlife Act 1953. These Acts define the responsibilities of central government, regional councils and individual landowners and establish the basis for pest management.

### Priority

Priority will be given to:

- developing national and regional pest management strategies, and wild animal control plans, which will specify the desired outcomes and the measures necessary to achieve these;
- monitoring pests to ensure that management strategies are effective, and providing assurance that exports meet the phytosanitary requirements of importing countries;
- maintaining a rigorous system of border control and an effective emergency response;
- focusing research on the development of innovative pest management, including management techniques that reduce impacts on the environment.



Weeds such as gorse may threaten indigenous ecosystems.

### Case study: Rabbit and Land Management Programme

Many animals have become pests in New Zealand because of the favourable habitats we have created, such as the dry tussock grasslands for the rabbit. In most areas, predators, disease and rainfall now keep rabbit numbers low. Rabbits in the dry tussock areas breed intermittently, thus sustaining fewer predators and requiring more extensive control.

The increasing cost of this control during the 1980s led to intense debate regarding the nature of the rabbit problem, what the solutions were and who should pay. This resulted in the formation of the Rabbit and Land Management Programme to take a holistic approach to rabbit management and land use.

The programme encompasses 97 most-affected properties, covering approximately 400,000 hectares. Under the programme, landowners, regional councils, research scientists and the Ministry of Agriculture and Fisheries have worked together to:

- reduce rabbit numbers drastically by a mixture of control methods;
- develop farm plans that integrate rabbit control into overall farm management;
- enable farmers to do their own control;
- study the complex web of ecological, economic, social, institutional, farm management and legal matters affecting communities, farm families and the sustainability of land use.



The programme has resulted in a marked reduction in rabbit numbers, but at a high cost which involves a 70 percent subsidy for all approved rabbit control work. Rabbit control is now better integrated into farm planning and carried out by many farmers. Understanding of the complex factors, other than rabbits, which affect the sustainability and viability of dry tussock grasslands has greatly improved as a result of the monitoring and research programmes.

The programme has resulted in the following issues being highlighted:

- There has been a serious decline in the livestock carrying capacity of the extensive pastoral farming systems of the tussock grasslands. This is the result of land-use practices, aided by subsidies, past government policies, and a 'techno-fix' approach to the ecological problems that were created.
- Many of the farms in the dry tussock grasslands are not profitable.
- Landowners, as major beneficiaries, may be unable to sustain the continuing costs of rabbit control because of the current financial position of many of the farm businesses.
- 1080 poison is the most effective toxin available, although some rabbits are bait and/or poison-shy. Changing public attitudes towards the use of chemicals make its future use uncertain.
- Additional, more cost-effective forms of control, particularly biological, are needed to assist the transition to more sustainable land uses. Rabbit Calici Virus is being researched.
- Alternative land uses/businesses are needed in the rabbit-prone, dry tussock grasslands if the ecological and economic declines of the past 100 years are to be reversed. Current data indicates that, ultimately, large areas will be unable to sustain pastoral use. Uses that will allow a recovery of these fragile lands must be found urgently – among them may be forestry, conservation, recreation and tourism.
- It appears likely that ferrets and cats are spreading TB to domestic livestock: if this becomes certain, there will be pressure to kill them, thus reducing the number of rabbit predators and increasing the need for other forms of control.
- Reform of land tenure would provide sufficient security to encourage rural communities to explore more sustainable and diversified land uses.

The Rabbit and Land Management Programme has demonstrated that pest control is only one part of a set of complex interactions among environmental, social and economic factors. The programme's achievements are attributed to the formation of a forum of stakeholders to assist with policy development and decisions, and the unique, integrated approach of the programme's semi-arid lands research team.

The basis has been laid for finding ways to maintain rabbit populations at a sufficiently low level to enable conservation of the dry tussock grasslands and provide a living for those who run businesses in the area. The formation of community or landcare groups is an encouraging sign of a new approach to the complex issues, one which involves collective action at the local level.



## 6.6 Sustainable fisheries

### Goal

To conserve and manage New Zealand's fisheries for the benefit of all New Zealanders by providing for sustainable utilisation of fisheries resources, including commercial, recreational and Maori customary take.

'Sustainability' means maintaining the potential for the fisheries resource to meet the reasonably foreseeable needs of future generations; and avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.

### Issues

New Zealand's fishing industry is export oriented. In recent years the value of fish exports – \$1.2 billion in 1993 – has grown much more than the volume of fish exports. Fisheries policy supports a long-term future for the industry by setting sustainable catch limits and providing secure harvesting rights. This provides a framework that allows our fishing industry to be both competitive and sustainable.

The major policy mechanism for commercial fishing is the Quota Management System (QMS). Each year a Total Allowable Commercial Catch, based on sustainable harvesting limits, is set for each fish stock in the system. Management plans have been developed for some QMS fisheries and there are some voluntary codes of practice.

Controls should take into account any effects of fishing on ecologically related species and biological diversity. Precautionary approaches should be applied in cases of uncertainty. These approaches are likely to be required by the United Nations Conference on straddling stock and highly migratory fish species, including within the Exclusive Economic Zone (EEZ).

Fisheries need to be seen in the context of the marine environment. We need to know more about the relationship between the population dynamics of species and sustainability of the ecosystem. Some fish stocks are dependent on a healthy near-shore coastal ecosystem. For example, mangrove and other inshore ecosystems are important nurseries for some commercial fish stocks. Fisheries policy also encompasses the management of recreational fisheries; provision for customary fishing (including taiapure and mataitai); and input into public processes under the Resource Management Act to ensure fisheries management objectives are taken into account in the management of the coast.

### Risks

The most significant risks to sustainable utilisation of fisheries are:

- depletion due to persistent over-fishing, leading to a collapse in a commercial fishery or a recreational fishery, and attendant social and economic dislocation;
- contamination of fisheries by natural events (eg algal bloom or disease) or human activities (eg oil pollution or sedimentation);
- introduction of new harmful species and diseases, for example, through the discharge of ballast water from ships;
- potential long-term damage to habitat caused by fishing;
- damage to threatened and endangered species and habitat from fishing activities;
- risks to recreational fishing from inappropriate levels and location of commercial fishing;

- risks to Maori customary fisheries;
- high levels of non-compliance with fisheries laws.

Uncertainty is a significant problem in managing these risks. It arises from both variation in the environment and difficulties with measurement.

### Actions

The Government has agreed on the focus of future fisheries policy, which is reflected in the provisions of the Fisheries Bill presently under consideration. Under the new legislation, the Government will focus primarily on setting sustainability measures that provide for sustainable use of fish stocks and protect the environment. Opportunities for quota holders to collectively manage commercial fisheries will increase private sector investment in stock management.

Specific objectives to achieve the sustainable utilisation of fisheries are to:

- set catch limits such that stock sizes are maintained at, or move towards, levels which can support maximum sustainable yield – and where necessary reduce current catch limits to ensure long term sustainability;
- set sustainability measures including Total Allowable Catches (TACs) to avoid, remedy or mitigate adverse effects on the aquatic ecosystem;

- take into account the Treaty of Waitangi (Fisheries Claims) Settlement Act when establishing fisheries policy;
- apply the precautionary approach in cases of uncertainty;
- improve the understanding of the fisheries ecosystems;
- ensure that research programmes estimate sustainable yields based on the best available information;
- extend the QMS to all commercial fisheries as soon as practicable;
- improve processes for stakeholder input into the setting of sustainability measures and resolution of disputes;
- promote self-management by quota holders while ensuring that harvesting is sustainable;
- enable the enhancement of fisheries;
- reduce incidental death of seabirds and marine mammals, such as the death of fur seals in hoki fishing operations and other species in the marine environment, including non-target fish species without commercial value;
- encourage the highest possible levels of voluntary compliance with fisheries laws and to actively deter non-compliance;
- under the Resource Management Act, regulate the discharge of ballast water from vessels arriving from overseas.

### Case study: The Hauraki Gulf snapper fishery

Snapper are prized by Maori, commercial and recreational fishers alike. The national commercial catch expanded rapidly in the 1970s, with a peak of 18,000 tonnes in 1978.

Despite the use of a wide range of controls, including limited licensing, closed areas and seasons, mesh size limits for nets, and a controlled fishery in the Hauraki Gulf, by the mid 1980s landings had declined to about 8,500 tonnes. Some stocks showed signs of overfishing.

Since the introduction of the Quota Management System (QMS) in 1986, the overall decline in snapper fisheries appears to have been halted. However, areas such as the Hauraki Gulf – New Zealand's largest snapper fishery for both recreational and commercial fishers – are still under pressure.

When the QMS was introduced, the Total Allowable Commercial Catch (TACC) for the 'Snapper 1' area was set at 4,600 tonnes to allow the fishery to rebuild. (Snapper 1 includes eastern Northland and Bay of Plenty as well as the Hauraki Gulf.)

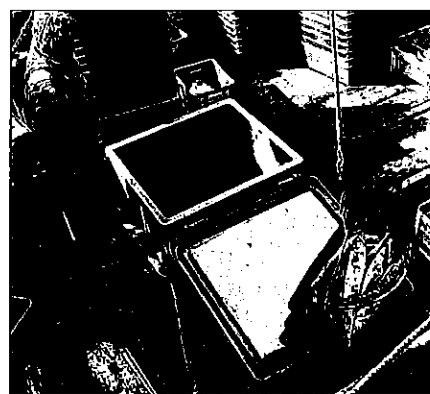
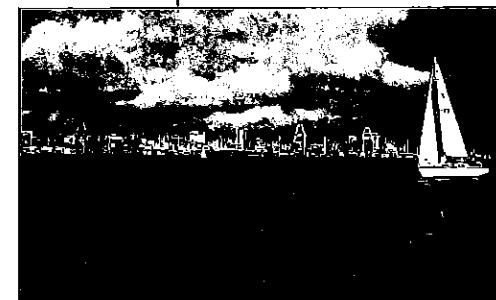
Quota was allocated on the basis of each fisher's catch history. In the Snapper 1 fishery, the sum of the catch histories exceeded the recommended TACC. The necessary reduction was achieved by a combination of government 'buying back' and retiring quota, and pro-rata administrative cuts over the remaining quota holders.

The effectiveness of reducing catching rights in Snapper 1 was substantially undermined by the quota allocation appeal process. Successful appeals resulted in fishers being granted quota over and above the initial TACC.

Thus, by 1991 the actual TACC had risen from 4,600 tonnes to more than 6,000 tonnes and the fishery continued to decline. In 1992, the TACC was reduced to 4,900 tonnes to allow the fishery to begin rebuilding. Recreational take in the Hauraki Gulf is also significant, and in the last two years the daily bag limit has been reduced from 30 to 15 fish. A Ministry of Agriculture and Fisheries survey provisionally estimated that amateur fishers caught about 1,000 tonnes of snapper in the Hauraki Gulf in 1994.

The Hauraki Gulf is an important nursery area for young snapper, and the Ministry of Fisheries has directed attention to measures to increase the protection of juvenile snapper. In 1994, the minimum legal size for snapper was increased from 25cm to 27cm for recreational fishers. This measure will help protect juveniles and, with the reduced daily bag limit, help the fishery rebuild over time.

A revised biomass estimate from the 1994 snapper tagging programme will be available for the forthcoming TACC review of Snapper 1. This estimate will provide a benchmark on which to base future management steps to ensure stock recovery.



Fisheries policy supports a long-term future for the fishing industry by setting sustainable catch limits.



## 6.7 Managing the environmental impacts of energy services

### Goal

To manage sustainably the environmental effects of producing and using energy services.

### Issues

The Government's Energy Policy Objective is:

'To ensure the continuing availability of energy services, at the lowest cost to the economy as a whole consistent with sustainable development.'

We need energy in some form whenever we undertake any activity. However, it is the services we obtain from energy – heat, light and motive power – that are important rather than the energy itself. The more efficiently a nation uses energy, the more cost-competitive are its goods and services.

The international measure of 'energy intensity' is the energy used to produce a unit of Gross Domestic Product (GDP). The figure shows that while other OECD countries have reduced their energy intensity in recent years, New Zealand's rose steadily over the last decade. Since 1980, the average energy intensity of OECD countries has fallen 17 percent, while New Zealand's has risen 37 percent. This trend appears to have halted, with New Zealand's energy intensity reaching a peak in 1992 and showing a four percent decline in the year to March 1994.

There were a number of factors that contributed to this increase including:

- establishment of large energy-intensive projects such as the aluminium smelter at Tiwai point;
- increased processing onshore in the forestry and agriculture industries;
- the combination of large transport distances in a spread-out country like New Zealand, and transport sector deregulation;
- the low rate of economic growth over the period.

The impact of these factors on New Zealand's energy consumption peaked in the early 1990s. Recent work suggests that energy intensity in New Zealand could now decline in a similar fashion to the trends experienced by other OECD countries. Various studies have concluded that New Zealand could substantially improve its energy efficiency within sectors and across the economy. This would have both environmental and economic benefits.



Terrestrial habitats and natural river systems can be lost in the construction of hydro stations.

It is possible to maintain our current consumption of energy services while lessening impacts on the environment. This can be achieved either by producing, converting and consuming energy more efficiently, avoiding the use of energy or, in some instances, by switching to more environmentally friendly energy sources, such as solar and wind power. Greater efficiency would improve environmental quality and reduce the costs of providing energy services. More energy-efficient equipment is not cost free. Often, however, these environmental benefits are not fully considered when decisions are made in relation to energy.

New Zealand is reasonably well endowed with energy resources, but there are challenges ahead if we are to provide future energy services in a sustainable manner. Our major natural gas resource, the Maui gas field, will be depleted early next century. New electricity generation stations will be needed by the turn of the century if current consumption patterns continue. Decisions on energy must take account of these factors and New Zealand's commitment to reduce its emissions of carbon dioxide (see section 6.10).

The transport sector is a substantial fossil fuel user and has a significant impact on the environment, particularly through land use, emissions and congestion associated with using motor vehicles. Private vehicle use is continuing to rise, leading to increased fuel use and emissions. To reduce these impacts, it will be necessary to ensure that environmental effects are consistently incorporated in the analysis of transport investment options and all transport modes are treated in a consistent manner. Urban planning should provide for environmentally friendly transport options such as public transport, cycling and walking. Efficient use of energy in long-distance freight transport should be encouraged.

### Risks

Increased production and use of energy services will affect the environment. The challenge is to develop our diverse energy sources in a sustainable manner. If we do not produce and use energy more efficiently, and switch to more environmentally friendly fuels, the related environmental risks will increase. These risks include:

- inability to meet New Zealand's international commitments on climate change because of increasing greenhouse gas emissions;
- loss of terrestrial habitats and natural river systems in the construction of hydro-electric power stations;
- reduced urban amenity (for example, more of our cities' land devoted to motorways) and increased local air pollution from vehicle use and other sources of sulphur dioxide, carbon monoxide and nitrous oxide emissions;
- pollution and risks to health from the storage and transport of fuels.

Providing energy services in an inefficient manner also carries economic risks, including:

- higher energy costs in overall and per unit terms;
- distorted patterns of investment due to inadequate account being taken of environmental costs and inconsistent investment criteria (eg between transport modes);
- premature development or exhaustion of energy sources.

### Actions

Actions required to achieve the goal include supplying energy services with the least practicable impact on the environment by:

- providing for full environmental costs to be internalised into decisions on producing, transporting, storing and using fuels and electricity;
- providing for the cost of additional energy sources to be signalled in the price of the additional energy supplied;
- implementing institutional reforms that lead to investments in conventional energy sources, energy efficiency and renewable energy being made on a neutral basis, taking full account of environmental and other benefits and costs and, in the longer term, allowing consumers the choice of buying from 'greener' electricity suppliers;
- removing or otherwise overcoming barriers to investment in energy efficiency and renewable energy (including through the measures currently being developed by the Energy Efficiency and Conservation Authority);
- encouraging effective research and technology development in energy efficiency, renewable energy, such as wind, solar, biomass from trees, and the environmental effects of energy use;
- encouraging local and regional authorities to facilitate energy efficient land use patterns, buildings and transport systems;
- completing the Land Transport Pricing Study, on measures that will take better account of the environmental costs, including those directly and indirectly related to energy use, of land transport; and implementing the marine environment protection measures, including management of oil spills, contained in the Marine Transport Act 1994.



The challenge is to develop our diverse energy sources in a sustainable manner.





## 6.8 Managing the environmental effects of transport

### Goal

To manage the provision of transport services in a manner that minimises adverse effects on the natural and physical environment and human health.

### Issues

Transport is a vital part of our economy and society. We have become increasingly dependent on the flexibility and convenience of modern means of transport. But along with dependence have come environmental and social costs, some of major significance. These need to be addressed if our lifestyles and economic activity are to become sustainable.

The transport sector and the environment are interconnected and interdependent. Environmental effects arising from the provision of transport infrastructure and use must be explicitly considered when developing and implementing transport strategies and proposals, and operating transport systems. Environmental policies and rules, particularly those under the provisions of the Resource Management Act, also affect transport. For both these reasons, environmental policies and rules need to be considered as part of road transport planning and operations.

The growth of our transport sector over the past three decades has reflected the growth of the economy. Increasing economic activity, population and urban development have all been important factors in this growth. The private use of motor vehicles has increased steadily while the use of public transport has diminished. In recent years, deregulation has brought major changes in the commercial transport sector and further changes are likely.

The transport sector and its cross-sectoral impacts have led the Government, through agencies such as Transit New Zealand and the Ministry of Transport, to consider the following environmental issues:

- the impacts of transport systems on the environment;
- planning, designing, constructing and maintaining a transport system in an environmentally sensitive way;
- the effect of vehicle emissions, shipping, and aircraft on the local and global environment.

Along with the energy sector, the transport sector is one of the most pervasive in our modern society and economy. Many of the environmental and health issues raised in this section echo those raised in other parts of this chapter, including those concerned with air quality, water resources, urban sustainability, energy services, land management and climate change. It is important that the links between these issues are recognised, and that the identified risks and proposed actions are not seen as independent of one another.

### Environmental and public health risks

Two interrelated categories of transport's environmental effects can be identified: those that affect natural and physical resources and those that affect human health, and hence urban sustainability.

### Environmental effects of transportation

These include:

- local effects such as noise, dust, glare from lights, vibration, land stability effects, and visual intrusion;
- loss of indigenous habitat, forest, coastal resources, and other land (especially in cities) to roads, airports, port reclamations and other transport infrastructure;

- direct emissions to the air, including carbon monoxide, sulphur dioxide, nitrous oxides, particulates, etc. In some urban areas, these emissions can lead to the creation of smog. Congested stop-start travel on urban roads leads to inefficient burning of fuel, and hence to more undesirable emissions. The transport sector is also a major contributor to rising carbon dioxide levels, which in turn, increase the risk of global warming. Aircraft emissions are also thought to be a cause of ozone depletion;
- contamination of soil, ground water, fresh and salt water, river beds, lake beds, estuaries, harbours and coastal areas from oil, rubber, heavy metals (eg lead), and the accidental discharge of substances being transported. Marine transport carries additional risks including the introduction of pests and diseases in ballast water, and the risk of oil spills from collisions or groundings.



The private use of motor vehicles has increased steadily while the use of public transport has diminished.

### Human and community health effects of transport

These include:

- respiratory and related problems caused by carbon monoxide poisoning, smog and fumes (especially in people living or working near busy roads or with vehicle fuels);
- possibility of cancers caused at least partly by the inhalation of known carcinogens such as benzene and formaldehyde;
- road accidents and stress caused by driving on congested roads;
- disruption of sleep, hearing, and social activities by traffic, airport and port noise;
- various other risks to health, such as lead poisoning, depending on levels of exposure to exhaust fumes;
- social and commercial disruption created by the building of transport infrastructure;
- damage or disturbance to archaeological sites, heritage buildings and other special areas such as waahi tapu.

### Actions

Actions required to manage these risks include:

- making users fully aware of all the costs of transport activities (including environmental impact costs). In conjunction with Transit New Zealand, the Ministry for the Environment and The Treasury, the Ministry of Transport is carrying out research into land transport pricing. Incorporating these costs into transport pricing would promote fair competition between private and public transport;
- encouraging efficient use of urban public transit systems where economically feasible and socially desirable;
- seeking public input to, and support for, future transport options;
- educating people about the environmental and health effects of their transportation choices;
- the inclusion of measures dealing with the environmental effects of transport in regional policy statements, regional plans, and district plans;
- improving the fuel efficiency of our transport fleet and reducing transport emissions. The Ministry of Transport is undertaking a study into vehicle emissions testing. The aim is to increase fuel efficiency and to reduce air pollution and carbon dioxide emissions.

### Case Study: Actions to reduce environmental effects of land transport

Every day in New Zealand, nearly 800,000 people travel to work by privately owned or company vehicles. In contrast 127,000 people walk or cycle and 50,000 use the public transport system (refer Figure 1). Eighty-one percent of all individuals not working at home thus choose to travel by private or company car. The environmental impacts of this choice are huge.

As individuals, we can reduce these impacts by:

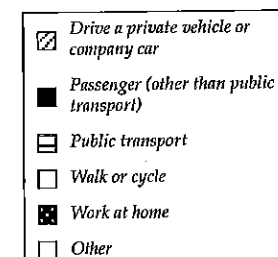
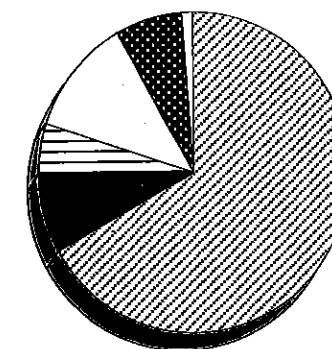
- walking or riding a bicycle for short trips;
- using public transport for longer journeys;
- combining trips, such as grocery shopping on the way home from work;
- car-pooling.

When we need to drive a car, we can reduce the environmental effects of this choice by:

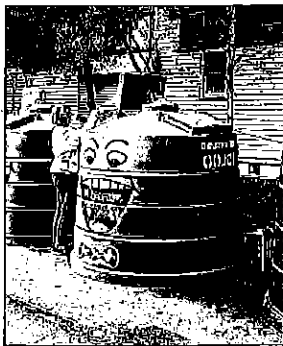
- examining the need for two or more cars per household;
- using a fuel efficient car and keeping its engine tuned;
- travelling at fuel efficient speeds (obeying speed limits);
- driving smoothly.



Figure 1: How we get to work.



Source: Table 21.19, p445, 1994 Yearbook.



## 6.9 Managing waste, contaminated sites and hazardous substances

### Goals

To manage waste, contaminated sites and hazardous substances by:

- managing waste to reduce risks to environmental quality and public health to levels that are widely agreed as being socially acceptable;
- cleaning up contaminated sites to reduce risk to the environment, people and the economy;
- managing or preventing the harmful effects of hazardous substances in order to protect the environment and well-being of people and communities so as to enable the maximum net national benefit to be achieved.

### Issues

All human activity generates waste. Managing the generation and disposal of waste is central to ensuring that the pollution and loss of amenity caused by waste is kept to a socially acceptable and environmentally sustainable level.

Wasteful use of resources leads to increased pollution and unnecessarily high production costs. Increasing the efficiency of resource use and reducing waste at source can reduce both these effects.

A 1993 Christchurch survey found that an average of 480kg/person/year of municipal waste was generated. This is comparable to average OECD figures. Total waste could be minimised through national, local and individual action to reduce waste at source, reuse resources, recycle and adopt alternatives to disposal (such as making compost).

Industry is also a major waste producer. Reducing industrial waste has the dual benefits of using resources more efficiently, and reducing the impact of industrial activity on the environment. One person's waste can be another person's raw material. What is good for the environment can also be good for business.

Hazardous substances have become an essential part of people's lives (eg dishwasher detergents, bleaches, petrol and so on) and it is only recently that we have become aware of their long-term effects on the environment. We are only just becoming aware that past domestic and industrial activities have led to significant contamination of land and water. Cleaning up imposes a price that will have to be paid by the community over the longer term.

To ensure good environmental, social and economic outcomes, we need to address waste, hazardous substances and pollution issues in an integrated way. Any actions should be firmly based on an assessment of environmental risk, as well as the costs and benefits.

### Risks

Pollution of land, air and water presents a risk to the environment and public health, now and in the future. It also creates increased economic costs associated with wasteful production and the need for clean-up. Examples of specific risks include:

- a reduction in urban air quality caused by particulate emissions and carbon monoxide emissions from vehicles;
- run-off from roads and domestic activity contaminating stormwater thereby affecting water quality in rivers and coastal areas near urban centres;
- leachate from landfills and industrial sites contaminating water bodies (eg aquifers and estuaries);
- land-use practices – such as excessive or inappropriate use of chemical pesticides and fertiliser, agricultural run-off, and point source pollution from cow sheds, piggeries, feed lots and silage pits – causing damage to ecosystems, contamination of drinking water and reduced recreational opportunities;
- potential risks to humans and native flora and fauna from bioaccumulative toxins (eg PCBs);
- loss of land-use options because of site contamination (eg of former timber treatment sites) and land degradation;
- injuries to people and property resulting from the misuse of hazardous substances (leading to higher insurance costs – in 1992 ACC paid out \$6.8 million for accidents due to chemicals alone);



Landfill leachate can contaminate water if the landfill is not managed properly.

- lead in petrol, paint and waste oil resulting in high lead levels in the environment and associated risks to health;
- damage to taonga Maori (eg traditional shellfish collection areas);
- rubbish in the marine environment, on beaches and from boats;
- damage to our 'clean, green' image, affecting tourism and a wide range of exports.

### Actions

The Government's Waste Management Policy is two pronged: first, to ensure that, as far as practicable, waste generators meet the costs of managing the waste they produce and second, to encourage implementation of the internationally recognised hierarchy of reduction, reuse, recycling, recovery and residual management (the '5 Rs').

Actions required to achieve the above goal on waste include:

- implementing the Government's 'generator pays' policy for producers of waste, to provide clear incentives on resource users to encourage waste reduction, reuse, recycling, and recovery;
- promoting minimisation of domestic and municipal waste (eg through 'green' labelling);
- establishing waste reduction targets with major industry groups and bringing about a progressive reduction in waste needing treatment or disposal;
- designing and establishing systems that will hold resource users accountable for effective waste reduction and management;
- achieving high standards for waste disposal (eg by encouraging all regional and territorial authorities to adopt the Landfill Guidelines);
- achieving high standards for the land disposal of sewage sludge (eg by encouraging all local authorities to adopt the Ministry of Health guidelines).

Actions required to achieve the above goals on hazardous substances and existing hazardous wastes include:

- promoting an assessment of contaminated sites on the basis of risk, and removing barriers to clean-up (eg through developing disposal techniques, and establishing a liability framework);
- identifying hazardous wastes, and appropriate management strategies for them, starting with those wastes that pose the highest risk.

### Priority

Priority will be given to:

- reducing the amount of waste and pollution generated per unit of production, especially through wide acceptance of cleaner production and economic instruments such as 'polluter pays' charges;
- establishing a national waste data set based on the Waste Analysis Protocol to monitor the waste stream;
- incorporating the '5Rs' into local government's statutory responsibilities through the Local Government Law Reform Bill 1994;
- developing an agreed approach to who will fund the management of existing hazardous wastes;
- managing the ongoing risks from hazardous substances through the development of Hazardous Substances and New Organisms legislation and the establishment of an Environmental Risk Management Authority.



Composting is one way of minimising domestic waste.

### Case study: Cleaner production

Cleaner production is an internationally recognised way to increase profits by using energy and raw materials efficiently. This helps reduce waste and pollution, while producing environmentally sound products and services.

Nissan Manufacturing Ltd improved the efficiency of its autophosphate machine used to prepare car bodies for painting, resulting in reduced use of energy and water and labour cost savings. The 29 percent water saving for the autophosphate machine has led to a 10 percent water saving for the plant. By running the machine only when needed, electricity use has been reduced by 39 percent and gas use has reduced by 23 percent. Labour costs have also been reduced because the machine no longer needs to be turned on early every morning, and because the tanks do not need to be cleaned so frequently.

The installation of the monitoring system cost less than \$2,000 as Nissan already had much of the necessary equipment. The system is saving \$667 per week in energy, water and labour (\$32,000 per year), giving a payback period of less than one month.



## 6.10 Reducing the risk of climate change

### Goal

To take precautionary actions to help stabilise atmospheric concentrations of greenhouse gases, in order to reduce risk from global climate change and to meet New Zealand's commitments under the UN Framework Convention on Climate Change.

### Subgoals

- To return net emissions of carbon dioxide to no more than their 1990 levels by the year 2000 (but aim for a reduction in net carbon dioxide emissions to 20 percent below their 1990 levels by the year 2000 if this is cost-effective and will not harm our trade) and to maintain emissions at that level thereafter.
- To reduce net emissions of other greenhouse gases, particularly methane, by the year 2000 where possible, and maintain them at those levels thereafter.

### Issues

Gases released into the atmosphere as the result of human activities are likely to be enhancing the natural greenhouse effect at a rate that could extensively damage our biophysical, economic and social systems. Atmospheric levels of carbon dioxide and methane – two of New Zealand's major greenhouse gases – have been growing at unprecedented rates and will continue to do so in the near future.

Growing concentrations of such gases are projected to cause global average temperatures to rise by 1–2°C by 2050. While it sounds small, this warming is faster than at any time in the last 10,000 years. Small variations in temperature can result in large changes in climate; for example, the temperature during the last Ice Age was on average only 5°C colder than it is now. It is also projected that sea levels will rise by an average of 17 to 35 centimetres by 2050.

Catastrophe re-insurance premiums in New Zealand have increased by over 300 percent since 1990. This reflects the outcome of a number of events at a global level. It is possible that the increase in extreme climatic events has resulted from the enhanced greenhouse effect.

The challenge is to reduce the long-term risks of climate change to levels that are acceptable to the global community. However, this must be done in the face of uncertainty over just how severe the impacts of climate change will be. While the Intergovernmental Panel on Climate Change (IPCC) estimated in 1990 that a 60–80 percent reduction in CO<sub>2</sub> emissions was required to stabilise atmospheric concentrations at current levels, the uncertainties associated with predictions of climate change in response to different concentrations mean that the global community is not contemplating emission reductions of this magnitude, at least at this stage.

In order to be effective, all countries must take actions needed to curb climate change. Our commitments under the United Nations Framework Convention on Climate Change (FCCC), to which New Zealand is party, are expected to strengthen in the coming years.

### Risks

The risks associated with climate change cannot be predicted with any certainty and will vary across regions and across economic and social groups. These risks include:

- increases in the variability of weather patterns and in the frequency and severity of extreme events such as floods, storms and droughts;
- more frequent high temperatures, increasing forest fire risk and heat-stress risk to plants and people;
- rising sea levels threatening low-lying coastal areas;
- changes in ecosystems (including already threatened species and indigenous ecosystems) and agricultural, horticultural and silvicultural production;
- conditions that allow the establishment of exotic plants and insects that could damage New Zealand's indigenous plants and animals;
- surprise impacts, possibly abrupt or severe, arising from cumulative climate impacts or from climate change occurring too fast for systems or species to adapt;
- 'environmental refugees' in the event of significant climate change (eg from sea level rise);
- changed international trading conditions, including possible adverse impacts.



New Zealand has made a commitment to return net emissions of carbon dioxide to 1990 levels by the year 2000.

### Actions

Specific objectives are to:

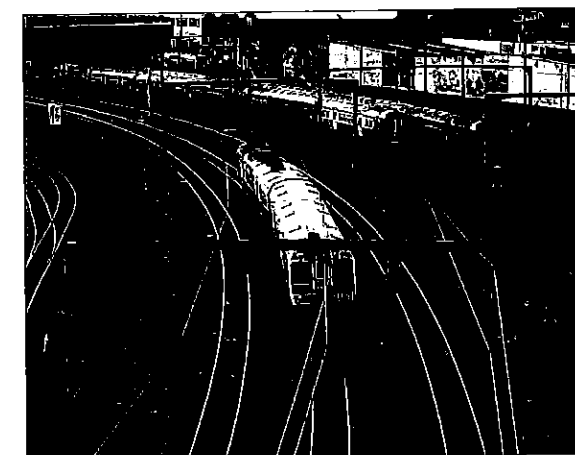
- encourage all sectors of the economy and society to contribute to reducing emissions;
- improve energy efficiency to levels comparable with similar OECD countries;
- have low carbon energy sources, especially renewable energy and natural gas, replace high carbon energy sources over a realistic time frame;
- advocate effective international action and meet New Zealand's obligations under the United Nations FCCC, with particular consideration for the position of Pacific Island countries, with whom New Zealand enjoys a close relationship and who face disproportionate costs from climate change;
- promote changes to institutional arrangements, such as in land transport pricing and the proposed wholesale electricity market, which create incentives to lower emissions;
- encourage investment in physical infrastructure, such as public transport and energy efficiency, which leads to lower emissions over the long term;
- encourage regional and territorial authorities to take into account the ability of changes in urban form and land use to contribute to reduced energy use and hence greenhouse gas emissions;
- establish successful research and development programmes that assist in reducing net emissions of greenhouse gases, particularly methane and nitrous oxide;
- adapt to climate changes as they occur and plan ahead for further changes; for example, by designing infrastructure for possible sea level rise, recognising the value of natural systems to protect against inundation, and avoiding development in areas prone to possible sea level rise.

The Government is developing a comprehensive strategy on climate change based on the principles of environmental effectiveness, economic efficiency and equity, and recognising that scientific uncertainties weaken the case for incurring substantial economic and social costs in order to reduce emissions in the short term.

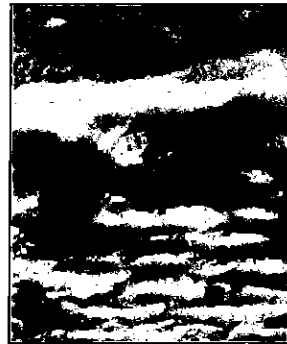
### Priority

Priority will be given to:

- developing and implementing policies to achieve a comprehensive strategy that will reduce emissions and enhance sinks of all greenhouse gases over the long term;
- implementing the package of policy measures, announced by the Government in July 1994, to return net emissions of carbon dioxide to their 1990 levels by 2000 and maintain them at that level thereafter – including energy efficiency measures, possible strengthening of these and renewable energy measures, voluntary agreements with industry, and a carbon charge from the end of 1997 if New Zealand's CO<sub>2</sub> emissions are not on track to be 20 percent below the projected growth of 'business as usual' emissions between 1990 and the year 2000;
- participating in the further development of the United Nations FCCC, including continuing to advocate a comprehensive (all greenhouse gases) approach and a 'net' approach based on provision for offset credits for carbon dioxide 'sinks', such as new forest planting;
- implementing the national science strategy that provides the basis for informed decision making by government and other parties;
- monitoring sources of emissions, absorption in sinks (such as new forest planting), climate change impacts and responses to these impacts;
- developing policies that will assist communities adapt to the impacts of climate change.



Encouraging investment in infrastructure such as public transport can lead to lower greenhouse gas emissions.



## 6.11 Restoring the ozone layer

### Goal

To help achieve the full recovery of the ozone layer and constrain peak levels of ozone destruction by phasing out imports of ozone-depleting substances as quickly as feasible and at rates no less than those agreed internationally, and by limiting, where practical, emissions of those substances that are imported.

### Issues

Ozone is concentrated in a 'layer' about 25 kilometres above the earth and screens out most of the Sun's ultraviolet (UV) rays. Destruction of this ozone reduces the Earth's protection from dangerous UV radiation.

Chlorofluorocarbons (CFCs), (which are used in a range of applications such as refrigeration), and halons, (which are used in fire extinguishers), are the most significant of the ozone-depleting substances. Once released, these substances remain in the stratosphere for decades and continue to destroy ozone.

Until a few years ago, CFCs were regularly used as propellants in aerosol spray cans. The CFCs released from each can could potentially destroy two tonnes of ozone.

Damage to the ozone layer is expected to get worse until at least 2000 as the result of CFCs already released.

Hydrochlorofluorocarbons (HCFCs) are rapidly replacing CFCs in many uses. They, too, deplete ozone, but they do not remain in the atmosphere for as long as CFCs. Methyl bromide, which is used as a fumigant, also destroys ozone.

Even with full international co-operation in phasing out the use of ozone-depleting substances, the ozone layer is not expected to fully recover until at least the middle of next century.

### Risks

Destruction of the ozone layer increases the amount of UV radiation reaching the Earth's surface. The main risks from increased UV radiation are thought to be:

- increased human health problems such as skin cancer, eye cataracts and suppression of the immune system;
- reduced livestock production because of increased cancers and cataracts;
- reduced marine production, particularly in surface-dwelling species;
- reduced growth in plants;
- increased damage to materials such as plastics and textiles exposed to solar radiation;
- the possibility of other, unknown, impacts.

### Actions

Importing of bromine-containing compounds, such as halons and hydrobromofluorocarbons (HBFCs), has already been phased out.

Schedules for phasing out importing of CFCs, methyl chloroform and carbon tetrachloride as required under the Montreal Protocol are already in force. Priority is being given to meeting timetables for phasing out HCFCs and methyl bromide, and incorporating them into the Ozone Layer Protection Act 1990. In some cases, we expect to be able to phase out substances in advance of the internationally agreed rate.

Further education is required on the dangers posed to public health and avoidance measures that can be undertaken to reduce the risks.

Actions required to achieve the goal include:

- phasing out importing for all but a few 'essential uses' (eg asthma inhalers) of non-recycled bulk CFCs, methyl chloroform and carbon tetrachloride by 1 January 1996;
- progressively restricting imports of HCFCs and ceasing imports for all but essential uses by 2015;
- reducing consumption of methyl bromide by at least 25 percent by 1998;
- encouraging industry-led programmes for
  - recovery, recycling, storage and safe disposal of ozone-depleting substances
  - developing technologies for the safe disposal of ozone-depleting substances



Wearing a hat and using sunscreen help guard against the damaging effects of UV radiation.

- training programmes for operators using ozone depleting substances;
- resolving issues, such as liability and funding, relating to the recovery and disposal of halons;
- actively participating in ongoing international efforts to address the problem of ozone depletion.

The parties to the Montreal Protocol will meet again to amend the Protocol in Vienna in 1995. It is expected that tighter controls will be agreed on.

### Case study: Ozone depleting chemicals

Chlorofluorocarbons (CFCs) were first manufactured 65 years ago. They seemed ideal chemicals for uses such as refrigeration, as they vaporise easily at low temperatures, are non-toxic, colourless, odourless and don't burn.

It was not until the early 1970s that scientists began to suspect CFCs might be depleting the ozone layer. CFCs were then subjected to considerable scientific scrutiny, which led to international political action.

In 1985 an international agreement, the Vienna Convention, was signed. The international community agreed to carry out further research on CFCs and to establish a protocol for action if necessary. That same year the 'ozone hole' in the Antarctic was discovered, though re-analysis of the data showed it had been present since 1979. (See Figure 2.)

The Montreal Protocol was signed in 1987. It required Parties to reduce CFC use to 50 percent below 1986 levels by 1998, and to freeze halon consumption at 1986 levels from 1992.

At a meeting in Helsinki in 1989, scientific evidence led Parties to pledge a 100 percent phase-out by 2000. In 1990, further scientific evidence of the damaging effects of ozone-depleting chemicals resulted in a binding agreement to phase out CFCs and halons by 2000, and to include two new groups of chemicals in the Protocol.

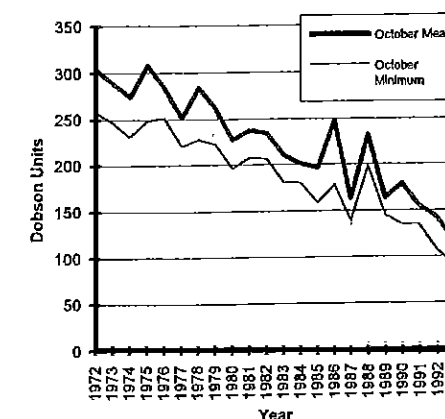
After consultation with affected parties, New Zealand passed the Ozone Layer Protection Act 1990. This required consumption of CFCs to be 90 percent phased out by 1995, and 100 percent by 1 July 1998.

In 1991, evidence of ozone depletion in the northern hemisphere and the possibility of an Arctic ozone hole spurred many countries, including European nations and the United States, into faster domestic action.

At a meeting in Copenhagen in 1992, the phase-out programme for all substances was tightened and three further groups of chemicals were added. The Ozone Layer Protection Act was amended in 1993 to comply with the more stringent requirements.

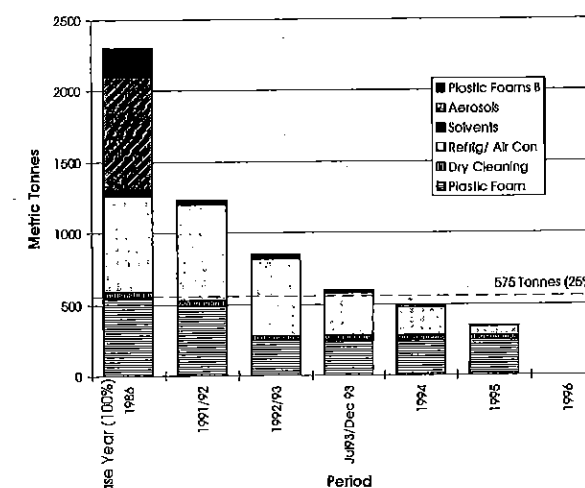
Figure 3 shows New Zealand's phase-out programme, which was negotiated with industry and complies with the Montreal Protocol.

Figure 2:  
Total Ozone, Halley Bay, Antarctica



Data from I. Shanklin, British Antarctica Survey

Figure 3:  
CFC Phase Out Programme



*The relationship between major cross-cutting issues affecting the sustainable management of the New Zealand environment, and the Environment 2010 Strategy's Agenda for Action.*

Major Cross-Cutting Issues Affecting the Sustainable Management of the New Zealand Environment	Agenda For Action (Chapter Six) Sections										
	Land (6.1)	Water (6.2)	Air (6.3)	Biodiversity (6.4)	Pests (6.5)	Fisheries (6.6)	Energy (6.7)	Transport (6.8)	Waste (6.9)	Climate Change (6.10)	Ozone (6.11)
Protecting Biodiversity	•	•	✓		•	•	✓	•		•	
Climate Change		•	•	•	•	✓	•	•	✓		✓
Coastal Management	•	•		✓		•		✓	•	•	✓
Community Health		•	•		•		•	•	•	•	
Protecting Cultural Heritage	•	•	✓	•	✓	•	✓	•	•	•	
Energy Production & Consumption		•	•	•				•	•	•	
Forestry	•	✓		•	•		•	✓		•	
Meeting International Obligations	•			•		•	•		✓	•	•
Protecting Physical Heritage	✓		•					•	•		
The Resource Management Act	•	•	•	•	•		✓	•	✓	✓	✓
Tourism Growth and Management	✓	•	✓	•	•	✓		✓	✓		
Transport	•	✓	•	✓			•		•	•	
Treaty of Waitangi	✓	✓	✓	✓		•					•
Urban Sustainability	•	•	•	✓	✓		•	•	•	•	✓

Key to Symbols: • Explicit Reference to Issue in Section in Chapter Six  
✓ Implicit Linkage to Issue in Section in Chapter Six

## 7 Responsibility for Action

The Environment 2010 Strategy will depend on the actions taken by the people, groups and sectors whose decisions together shape our environmental, economic and social well-being. These groups and their roles are as follows.

### Central government

Central government provides leadership by establishing the policy and legislative framework for action. It accepts as its responsibilities the provision of a national environmental policy framework. To do this, it establishes what kind of environment New Zealanders want; that is, the environmental outcomes they desire. It has then to translate these aspirations into environmental policies and programmes. It facilitates implementation through consultation, education and funding arrangements such as the Sustainable Management Fund. It ensures that property rights and entitlements are defined and enforced. In shaping these policies, central government has regard to the principles of sound policy design (see Chapter 3). It engages in international agreements for actions on global environment and development issues.

### Local government

Under the Resource Management Act regional, district and city councils develop resource management policies and plans. They are required to find the most cost-effective means of achieving sustainable management of resources in their communities.

Territorial authorities (ie district and city councils) have important roles in providing basic services such as local water supply, sewerage, roading, waste management, and local parks and recreation, all of which have significant impacts on our quality of life. They also have wider roles in identifying and responding to a range of social and economic issues affecting people locally. Regional councils and territorial authorities have important roles in informing local groups and in facilitating local consensus.

### Iwi

Maori have a special relationship with the Crown through the Treaty of Waitangi. This has been recognised in resource management legislation including the Resource Management Act 1991, which requires early and effective consultation with iwi during the preparation of policies and plans.

### Industry

Industry must comply with the law in its use of resources. Increasingly, industry is acknowledging its responsibility as a good corporate citizen to care for the environment, and has an increasing role in developing and implementing environmental policy. Environmental quality is now seen as central to business decision making and an essential component of quality management. Environmental quality is recognised as a competitive advantage in the market, rather than as just a cost to the 'bottom line'.

### Non-government organisations

Environmental, professional, scientific and industry non-government organisations are important in focusing public debate and political attention on issues. In the past, such groups have frequently pursued sectional interests on 'single issues' in a confrontational manner. Groups must now look at broader interests and 'problem-solving' approaches.

### Communities and individuals

Government reforms in recent years have moved society away from centralised decision making towards greater individual responsibility. Those who use renewable resources often have a long-term interest in maintaining them in a sustainable way, as they have to live with the consequences of their decisions. As long as individuals have good information and strong incentives to look after community interests as well as their own, they are often the best placed to manage environmental resources sustainably.

This Strategy sets out the broad strategic framework of central government for addressing environmental policies. It can only be put into operation as each of the above groups translate the vision, principles and goals into specific policies and action plans.



## 8 Environmental Management Agenda

The six-part Environmental Management Agenda to help achieve the vision of 'a clean, healthy and unique environment, sustaining nature and people's needs and aspirations' is:

- 1 Integrate environmental, economic and social policy
- 2 Establish a coherent framework of law
- 3 Sharpen the policy tools
- 4 Build up the information base
- 5 Promote education for the environment
- 6 Involve people in decision making

This Environmental Management Agenda builds on the 'conditions necessary for achieving the vision' in Chapter 1 and the Principles in Chapter 3.

### 8.1 Integrate environmental, economic and social policies

#### Goal

To integrate environmental, social and economic factors into the mainstream of decision making in all sectors, at all levels.

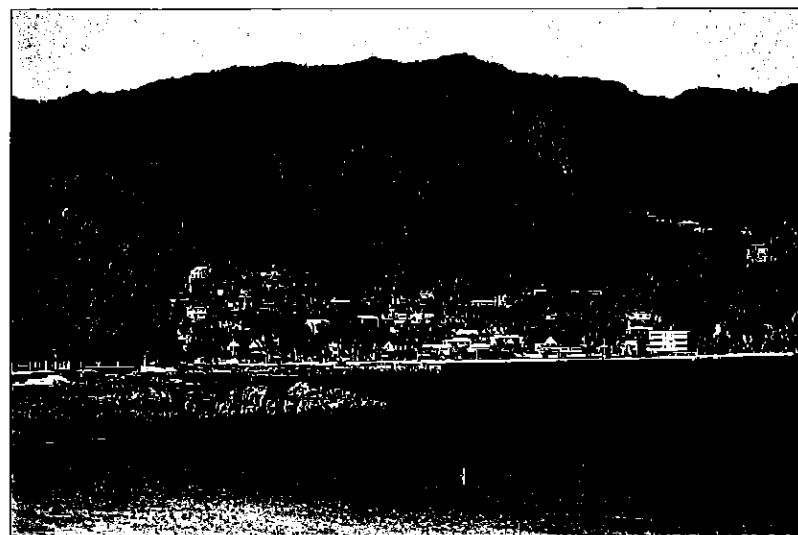
Integration of environmental, economic and social policies is at the heart of achieving well-being for New Zealanders. The Government's sustainable development strategy is based on improving the quality of life for present and future generations. This includes raising living standards through sustainable economic growth, while maintaining and improving environmental quality. We should not burden future generations with either financial or ecological debt.

We need to improve the state of our environment, for present and future generations. The only acceptable direction for environmental quality is upwards. Just how much of an improvement we aim to achieve is a matter of social and political choice.

Sustainable improvements in environmental quality are unlikely to be achieved without changing current patterns of production and consumption. For environmental policy to achieve lasting improvements in environmental quality, it must also be consistent with achieving the other important components of quality of life—employment, education, health, income, identity and security. Policies must also be consistent with the principles of the Treaty of Waitangi. The same applies to economic and social policy. Informed decisions are more likely to be made when economic, social and environmental policies are integrated—that is, when competition for the use of resources is recognised, and the trade-offs are made by those best placed to make them.

Resource users should face the environmental costs as well as the commercial costs of development proposals. Identification of environmental costs should be based on the preferences and trade-offs acceptable to the individuals and communities affected while recognising the needs of future generations and other living systems. This is likely to result in new investment being increasingly concentrated in projects that both provide commercial returns and maintain and enhance environmental quality.

There is international evidence that growth need not mean more resources are consumed. The intensity of resource use, for example energy intensity, can reduce at the same time as standards of living are rising. The concept of 'eco-efficiency' is based on greatly increased efficiency of resource use and reduced pollution for a desired volume of product.



energy intensity, can reduce at the same time as standards of living are rising. The concept of 'eco-efficiency' is based on greatly increased efficiency of resource use and reduced pollution for a desired volume of product.

As noted in Chapter 2, the links between social well-being and the environment are also important. Environmental quality contributes to public health, New Zealanders' cultural identity, and to outdoor recreational opportunities. Also, the safety of people and property is enhanced through sustainable land management by reducing risks from natural hazards, such as erosion, floods and droughts.

#### Proposals for action

##### Integrated government policy decisions

New Zealand cannot afford to make economic, social and environmental decisions without considering their impact on each other.

- Explicit consideration should be given in all government decision making to the links between environmental, economic and social policies, both through work at 'officials' level and by effective use of established Cabinet decision making processes.
- The relationship between economic growth, jobs, environmental quality and social well-being should be explored to enhance policy making, including higher level policy 'tradeoffs' inherent in major issues such as climate change, and trade and the environment.

##### Corporate decision making

Firms are now recognising that environmental management needs to be central to business decision making, including strategic planning, capital budgeting, human resource management, and marketing.

- Companies should be encouraged to adopt formal environmental procedures or policies, such as management accountabilities, corporate environmental policies or guidelines, environmental assessment, monitoring and audit systems. For example, companies could develop an Environmental Effects Plan similar to the health and safety plans required under the Health and Safety in Employment Act 1992.
- The Government should encourage corporate environmental commitment, through programmes such as the Energy Efficiency and Conservation Authority's (EECA) Corporate Commitment Programme and voluntary CO<sub>2</sub> emission reduction agreements.



*New Zealand's indigenous habitats and landscapes help conserve soils, protect waterways and sustain life through their role in the cycling of nutrients, oxygen, carbon and other chemicals. They support our economy, our recreation, and our cultures. They also contain the natural taonga, or treasures, of Maori.*

## 8.2 Establish a coherent framework of law

### Goal

To develop and maintain an effective, coherent body of law and practice for achieving efficient and sustainable management of the environment.

An effective and coherent body of law and practice is essential for achieving better environmental management and improving environmental quality. These laws should meet the other criteria for good legislation, such as clarity, certainty and ease of administration.

Recent governments have largely completed a series of reforms that establish the legislative framework for sustainable management of the environment. These include:

- Environment Act 1986. This Act established the Ministry for the Environment as a policy advisory agency, and the Parliamentary Commissioner for the Environment as an independent officer of Parliament.
- Conservation Act 1987. This Act provides for the preservation and protection of New Zealand's natural and cultural resources, including its system of national parks and reserves.
- Ozone Layer Protection Act 1990. This Act sets out domestic requirements in respect of the elimination of ozone depleting substances.
- Local Government Amendment Act (No 2) 1989. This Act provides for regional and territorial authorities, which have important roles in the administration of the Resource Management Act.
- Resource Management Act 1991. This Act controls the environmental effects of activities on land, air and water, including the coast. It is the core of the legislation that will help achieve sustainable management of the environment. The purpose of this Act is to promote the sustainable management of natural and physical resources.
- Biosecurity Act 1993. This Act prevents the introduction of unwanted organisms and provides for strategies to manage pests, weeds and diseases present in New Zealand.
- 1993 amendment to the Forests Act 1949. The Forests Act now promotes the sustainable management of New Zealand's indigenous forests on private land.

### Proposals for action

#### Develop legislation

The following environmental legislative reforms are to be completed:

- The passage of the Hazardous Substances and New Organisms Bill, which establishes the Environmental Risk Management Authority.
- The passage of the Fisheries Bill.
- Amendment to the Land Act 1948 (to provide for tenure reform and improved provision for sustainable land management and habitat conservation).

#### Implementation

No matter how sound the law, it will not achieve its goals unless it is implemented effectively and administered efficiently.

Central and local government should implement the Resource Management Act and other environmental legislation in a manner that is consistent with the letter and spirit of the law; and administrators and users should take the innovative opportunities offered by the new law.

It is important that central and local governments maintain their commitment to enforcing environmental legislation. Such legislation can only be effective if it is properly enforced.

#### Monitoring and review

Laws cannot remain static. Changing circumstances, judicial interpretations, unanticipated flaws and differing values will require the effectiveness of the legislative framework to be continually assessed.

Monitoring and amendment to laws, as necessary, should be undertaken to ensure sustainable environmental outcomes are being achieved in a way that promotes certainty of process for economic development and social cohesion.



The Forests Act now promotes the sustainable management of indigenous forests on private land.

## 8.3 Sharpen the policy tools

### Goal

To develop a range of policy tools, to be used within the framework of law, to achieve the desired environmental outcomes that most benefit society and the economy.

Now that a new legislative framework is largely in place, emphasis will be given to developing and encouraging the use of effective policy tools. Particular attention will be given to the appropriate mix of policy tools. This includes using policies that work with market forces and encouraging voluntary co-operation by businesses and individuals.

### Proposals for action

Emphasis will be given to developing the following types of policy tools.

#### Market mechanisms and economic approaches

Market mechanisms such as tradeable rights for taking water, and economic instruments such as charges, taxes or deposit refund schemes, can encourage least-cost solutions to environmental problems. They can stimulate innovation by, for example, giving companies the incentive to go beyond existing standards, to improve efficiency and develop new technology.

- Local government should make full use of economic tools available under the Resource Management Act, where these are appropriate.
- Central government should further develop economic tools to achieve good environmental outcomes, where these are least cost measures, and ensure effective consultation and explanation before implementation.

#### Voluntary codes of practice

Self-regulation by industry can improve environmental quality with little, if any, intervention by government. Voluntary codes of practice have been produced by the chemical, petroleum, agriculture, forestry, pork, and tourism industries, and by vegetable growers. In several cases the codes have been adopted by local government as meeting the requirements of district plans under the Resource Management Act.

- Industry should be encouraged to develop, implement and monitor voluntary codes of practice and standards.

#### Partnerships

An effective role of central government in some circumstances may be to act as a catalyst for partnerships between the private sector, local government, iwi, environmental groups, and other parties to achieve environmental goals.

#### Guidelines and standards

Guidelines and standards that help define desired environmental outcomes are being developed in consultation with sector groups. In particular, guidelines will assist local government to develop plans and administer resource consents under the Resource Management Act.

- Guidelines for environmental standards are being developed on water quality, air quality, timber treatment chemicals, and hazardous wastes.

#### Negotiation and mediation in resolving disputes

The techniques of negotiation and mediation can help resolve environmental disputes or reduce the range of issues under dispute. These techniques have great potential with issues that are the responsibility of local government under the Resource Management Act.

- Industry, iwi, environmental groups, local government and central government should try to resolve environmental or natural resource conflicts by negotiation and mediation.



The pork industry has developed a voluntary code of practice to cover all aspects of pig farming.



## 8.4 Build up the information base

### Goal

To achieve a comprehensive and reliable information base on the environment that will aid informed and sound decisions on the protection and sustainable management of New Zealand's natural and physical resources.

Decisions about the environment are made by people every day. Some decisions are simple, some are complex – but all require information. Complex decisions may require social, economic, and environmental information that takes a lot of time and money to acquire.

Fully informed decisions can rarely be achieved because of the complexity of environmental systems, resource constraints, uncertainty over future developments, and the time lag between actions and their consequences.

### Proposals for action

#### Research

New Zealand's publicly funded and private sector research can foster a sustainable, innovative and technologically advanced society, which adds value to our strong base of biological production. Environmental information covers a wide span of research activities. It must be integrated into the whole research programme.



- Priority setting for environmental research funding should be consistent with a risk-based approach and the Agenda for Action in this Strategy, both for long-term Public Good Science funding and 'output' research to support policy advice.
- A Sustainable Management Fund has been created to assist the uptake of policies consistent with the Government's long term environmental objectives and priorities. Through the operation of the fund, the Government will support projects, outside the mandatory responsibilities of local and central government agencies, which accelerate the adoption of methodologies or technologies that promote or enhance sustainable environmental management.

#### Monitoring the environment

Adequate monitoring is essential in understanding the effects of economic activities and the trends in environmental quality. It helps establish whether activities are environmentally sustainable. Though environmental monitoring is principally a local government activity, the Government has a role in encouraging standard approaches that provide an accurate picture at a national level. Hard information will also aid business decision making.

- Central government is co-operating with local government to develop a core set of environmental indicators that assist in monitoring key aspects of environmental quality, to standardise the measuring techniques and to develop a four-yearly State of the Environment reporting system and electronic database, co-ordinated with systems being developed internationally.

#### Environmental accounting

Conventional national accounts based on Gross National Product (GNP) do not measure changes in the stocks and quality of natural resources. Therefore, they are an incomplete basis for assessing the success of the Government's sustainable development strategy.

Work has been done by the United Nations, World Bank and many countries on complementing conventional national accounts with systems of environmental accounting that measure changes in stocks of natural resources and therefore ensure that the environment is literally 'taken into account'. They can be a powerful policy tool for monitoring sustainable management of the natural resource base.

- The feasibility and usefulness of developing systems of environmental accounting is being examined by central government. The production of accounts in physical units for resources such as forests, land, water and energy is being investigated, co-ordinated with systems being developed internationally.

*Publicly funded and private sector research can foster a sustainable, innovative and technologically advanced society.*

## 8.5 Promote education for the environment

### Goal

To encourage environmentally responsible behaviour and informed participation in decision making by promoting environmental education throughout the community.

Sustainable management of our environment will be advanced only through all New Zealanders understanding and accepting responsibility for the quality of our environment and our impact on it.

Good environmental education should not only increase understanding of the natural and physical environment but can also be expected to bring about changes in behaviour. It is a process that extends far beyond the formal education sector.

Environmental education can be defined as 'a multi-disciplinary approach to learning that develops the knowledge, awareness, attitudes, values and skills that will enable individuals and the community to contribute towards maintaining and improving the quality of the environment'.

### Proposals for action

#### National approach

- A New Zealand environmental education strategy should be developed to establish an integrated national approach to environmental education across all sectors of the community.

#### Guidelines for schools

The formal education sector, particularly at primary and secondary school levels, is central to developing environmental awareness and the attitudes that will encourage environmentally responsible behaviour.

- A guideline statement for schools on environmental education is being developed and will be widely circulated to assist teachers in integrating environmental issues into the curriculum.

#### Tertiary education

Business people and students in many disciplines increasingly need an understanding of environmental issues, resource management law requirements and international environmental agreements to ensure that they meet legal obligations and the expectations of the community.

- Education providers in the tertiary sector should offer study programmes and research opportunities that will improve understanding of sustainable management of the environment.

#### Education in the community

It is important that people in the community now making decisions about resource management and environmental issues continue to increase their understanding of the environment and the environmental consequences of their decisions.

- Central government agencies, local government, professional organisations, environmental organisations, iwi, trade associations and employers should be encouraged to develop policies and action plans that acknowledge their roles and responsibilities in environmental education.



*Environmental education helps people to understand the world around them so that they can participate effectively in managing our resources and helping achieve a quality environment.*

## 8.6 *Involve people in decision making*

### *Goal*

To ensure that people have the opportunity for effective participation in decision making that affects the environment.

People make decisions every day that affect the environment. Individually and collectively, these decisions can have important consequences for sustainable management. Government, business and personal decisions should take account of the values of New Zealanders and the consequences for the environment.

The active participation of people in decisions that affect the environment is critical to achieving a quality environment. The Government has a number of roles in ensuring that people are involved in decision making. These roles include:

- providing information;
- funding the provision of information;
- providing informal opportunities for consultation;
- promoting environmental education to inform people of the consequences of their choices;
- providing opportunities in law for public involvement;
- ensuring that, wherever possible, environmental costs are included in prices so that the correct signals are sent to consumers and businesses.

### *Proposals for action*

#### *Providing information*

- Environmental information should be made more available and accessible so that people have the opportunity to be well informed about Government policy and environmental issues. A balance should be struck between any price charged for such information and the costs and benefits involved.
- Empowering people with information to make decisions based on fuller knowledge of environmental implications can reduce the need for Government intervention.

#### *Consultation on policy development*

Informed public involvement in government decision making and policy development requires that information and approaches be suitable for the affected communities and interest groups. For example, when policy that affects the interests of Maori is being considered, the consultation process should use approaches that are appropriate for Maori.

- Central and local government should provide opportunities for consultation based on the principles of adequate information, opportunity to influence final decisions, honesty of intention, and certainty of purpose.

#### *Providing opportunities in law for public involvement*

Under the Resource Management Act, central government and regional and territorial authorities are obliged to consult widely with the public, and specifically with iwi, in making policy decisions affecting the environment. Public participation is a part of the framework for establishing environmental policies in regional policy statements and regional and district plans. Processes for public participation should be both 'user friendly' and efficient.

- Regional, city and district councils should ensure that public consultation on resource management decisions meets statutory requirements and is 'user friendly'.

#### *Environmental information in prices*

Where the full costs, including environmental costs, of goods and services can be incorporated in prices, consumers and businesses have financial incentives to make environmentally sound decisions.

Companies then have a stronger incentive to reduce waste and resource use, and to develop more environmentally friendly technology in order to gain competitive advantage. The result is both environmental and economic benefits.

- Resource management law and policies should provide where possible for environmental costs to be borne by developers/users and to be reflected in prices.

## 9 *Risks, Priority Setting, Planning and Review Processes*

The quality of our environment makes an important contribution to our way of life. It is also an important competitive advantage because we depend on trade and tourism for our economic well-being. This Strategy has created a vision for the future, which includes making sure our current advantages are protected or enhanced.

The monitoring and review procedures outlined below will help make this happen.

### *Establishing environmental priorities*

Until now, priorities for environmental policy development have been established in a way that has tended to be arbitrary and reactive. The publication of this Strategy marks an important turning point in the Government's thinking about environmental policy making and priority setting. However, while this document provides an initial strategic framework, it does not presume to establish priorities among the 11 areas of environmental action described in Chapter 6. All the areas (and perhaps some yet to be identified) involve a significant degree of risk to our natural and physical environment.

Unfortunately, not all risks can be addressed at once. Priority setting is necessary, both across the 11 areas and within them. Any plan of action from here requires an assessment of the benefits and costs of particular environmental policies. To assess costs requires an identification and appraisal of the risks of environmental *inaction*.

A comparative environmental risk assessment would provide a useful tool for helping to decide which issues merit immediate and urgent attention and which can be dealt with later, or demand a smaller allocation of scarce resources. Such an assessment would cover the ecological, human health, safety, social, and economic dimensions of environmental risks.

Establishing the most appropriate comparative environmental risk assessment framework for New Zealand will be a significant research project for the Ministry for the Environment. Implementation of the preferred framework would require considerable resourcing and involve extensive co-operation between government agencies and with other stakeholders.

The creation and implementation of a comparative environmental risk assessment framework would be closely linked to other important environmental policy initiatives including State of the Environment reporting, work on environmental indicators, and monitoring of Resource Management Act implementation.

An important caveat on comparative environmental risk assessment is that it would not be sufficient in itself to determine priorities. It can be an important input into priority setting but not the only factor to be taken into account. Other factors will include, for example, political constraints and preferences as expressed through documents such as *Path to 2010*, and the fiscal costs of policy action.

Comparative environmental risk assessment attempts to answer three related questions that are central to determining the appropriate administrative, political, and economic actions required for sustainable management of the environment. These questions are:

- Which of the vast number of environmental risks facing society should be evaluated and managed with the limited funds available? For example, the risks identified include loss of indigenous biodiversity; spread of pests, weeds and diseases; environmental effects of land transport; and unsustainable land management practices.
- What are the appropriate criteria for comparing environmental risks to our individual well-being and risks to society as a whole? For example, effects on human health, ecological integrity, and on community sustainability are all possible criteria by which to compare environmental risks.
- What is the relative importance of each of the selected environmental risk evaluation criteria? For example, does society rank potential economic losses higher than impacts on human health or ecosystem health? Establishing these weightings is a 'political' exercise, since they depend to a large extent on people's perception of what issues are important.

These three questions may be best addressed through consultation with a wide range of stakeholders. The outcome of this process could help guide policy and decision makers in establishing priorities between, and within, identified environmental issues.

The outcome of the comparative risk assessment process would subsequently inform other government policy development and review processes. Some of these processes are repeated annually while others are longer-term review processes, as illustrated in the diagram below. The main policy and review processes are as follows.

### Annual policy and review processes

#### Annual Government and departmental planning

The annual Government Budget cycle provides an opportunity to consider environment strategy in the broader context of the Government's overall strategy and priorities.

The Budget cycle now includes a phase for establishing the Government's strategic priorities in the short, medium and long term. These strategic priorities are 'bedded in' through Budget appropriations, purchase agreements, and Strategic Result Areas and Key Result Areas in chief executives' performance agreements.

Chief executives of government departments that have responsibilities in relation to the environment have been asked to take into account in their annual planning the goals of the *Environment 2010 Strategy* that are relevant to their responsibilities.

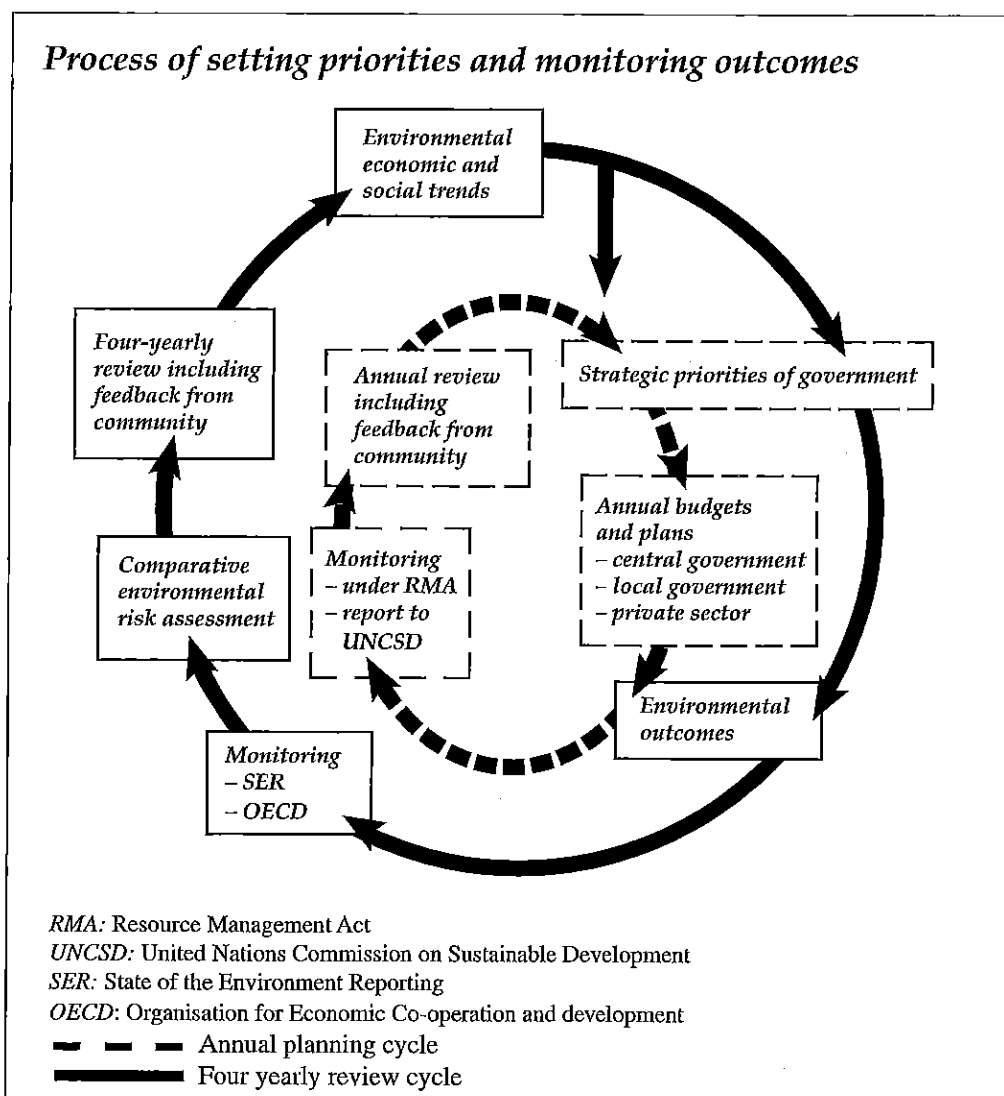
#### Annual planning in local government and the private sector

There is also an opportunity for local government and the private sector to build this strategic thinking on the environment into their annual planning processes.

### Longer-term policy and review processes

#### State of the Environment reporting system

In collaboration with local government, the Government will develop environmental indicators and standardise the gathering of key environmental information. This will provide the basis of a system that can measure trends in environmental quality and provide 'feedback' for policy design.



Specific State of the Environment reports will be prepared every four years. They will formally report on characteristics and trends in the New Zealand environment. The first of these reports is to be published in 1996.

#### OECD reviews

New Zealand will be part of a system of environmental performance reviews undertaken by the OECD. The first review of New Zealand took place in 1995. The reviews will provide an independent assessment of the environment and the effectiveness of existing policies.

#### Commission on Sustainable Development

New Zealand will report regularly to the Commission on Sustainable Development. This Commission, which is part of the United Nations, was established to monitor the implementation of Agenda 21 and other agreements reached at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil, June 1992.

#### International agreements

As international environmental issues in areas such as forestry, agriculture and conservation evolve, New Zealand will develop policies consistent with international environmental conventions, agreements, obligations and treaties.

#### Review of *Environment 2010 Strategy*

This *Environment 2010 Strategy* will be formally reviewed and updated every four years. The review cycle will be timed to follow the production of the *State of the Environment Report*. The Strategy, therefore, will build on our continually improving information and awareness of the quality of our environment.

#### Link to Government strategy

This *Environment 2010 Strategy* is linked to the Government's *Path to 2010* and *Investing in Our Future*. To achieve the economic and social targets in the *Path to 2010* will require careful stewardship to conserve the inherent values of the environment and natural resources and their capacity to support the people of New Zealand, our economy, and our communities. This *Environment 2010 Strategy* will influence, and be influenced by, our journey down the *Path to 2010*.



Many environmental issues have international implications.

# 10 Glossary of Terms

## Biological diversity

Biological diversity includes diversity within species (also known as genetic diversity) which reflects the frequency and diversity of different genes and/or genomes; the frequency and diversity of different species (also known as species diversity); and ecosystem diversity, which refers to the variety and frequency of different ecosystems.

## Environmental quality

Environmental quality includes:

- sustainable management of natural and physical resources;
- maintenance of biodiversity, including protection of intrinsic values;
- retention of the features that give New Zealand its unique character, including landscapes, the natural character of the coast, and wild and scenic rivers;
- access to natural areas for recreation (maintenance of access, free public access, provision of facilities);
- protection of cultural and historic values;
- mitigation of natural hazards;
- aesthetically attractive and healthy urban environment.

## Environmental bottom lines

Environmental bottom lines are the thresholds below which there is an unacceptable risk that the resources and services that society values will not be sustained, for example, the reduction of water flows in a river to such a level that river ecosystems will not fully recover. It is recognised that such thresholds are frequently difficult to ascertain scientifically. Also, in practice, the threshold may be a range of ecosystem change rather than a 'line'. (See Chapter 3, Principle 3).

## Externalities

Externalities are those unpriced environmental effects associated with the production, distribution, and consumption of goods and services (see Chapter 3, Principle 4).

## Internalisation

Internalisation of external environmental costs (externalities) is a process of ensuring that the environmental costs of production and consumption are fully assessed and consistently charged to users and consumers who benefit from them. These costs should preferably be reflected in prices. A well known example of 'internalisation' is the 'polluter pays principle' (see Chapter 3, Principle 4).

## Local authority

Local authority means a district, city or regional council.

## Natural capital

Natural capital refers to the stock of resources, such as forests, fisheries, land and minerals, which yields a flow of valuable goods and services into the future.

## OECD

Organisation for Economic Co-operation and Development

## Precautionary principle

Principle 15 of the Rio Declaration on Environment and Development states that, in order to protect the environment, the precautionary approach should be widely applied: 'Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.' (See Chapter 3, Principle 2.)

## Property Rights

While property is often thought of as something tangible (eg land or car), a 'property right' implies a socially accepted claim to the exclusive use of, rather than possession of, some object. For example, the property right in a stolen car remains with the owner, irrespective of who is driving.

The holder of a 'property right' can call upon the state to protect the holder's claim to a stream of benefits (eg the right to use a piece of land you own). A right is stronger than a claim; it implies a duty on all other parties to respect that right. Property rights are initially defined and allocated by collective decisions through mechanisms such as Acts of Parliament, or iwi and hapu decisions about access to tribal resources. (See Chapter 3, Principle 5.)

## Risk

Risk is the possibility of incurring damage or loss. Some adverse events may have a very low probability of occurring but a very high potential impact (for example, a nuclear reactor disaster), and risk could still be high. Calculating risk implies a reasonable degree of knowledge. Risk is the product of probability times the magnitude of the impact. Sometimes damage or loss is clearly apparent and measurable in economic and environmental terms, but often it is not easy to assess. In some cases, as with the risk of climate change caused by greenhouse gas emissions, the risks, though substantial, are uncertain and the consequences are unlikely to be measurable for years.

## Sustainable development

The term 'sustainable development' was defined by the World Commission on Environment and Development, in its 1987 report *Our Common Future*, as:

'Development which meets the needs of the present generation without compromising the ability of future generations to meet their own needs.'

Sustainable development is a broad concept that encompasses integration of economic objectives, such as efficiency and prosperity; social objectives, such as equity and social justice; and environmental objectives, such as sustainable management of the environment.

This is illustrated in the diagram below.

## Sustainable management

For the purposes of the Resource Management Act, 'sustainable management' means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people or communities to provide for their social, economic, and cultural well-being and for their health and safety while –

- (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
- (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
- (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

## Territorial authority

Territorial authority means district and city councils.

