



THE STATE OF
NEW ZEALAND'S
ENVIRONMENT

CHAPTER ONE

INTRODUCTION



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INTRODUCTION

This report to the nation describes New Zealand's natural environment, what we have done to it, and what we are doing now. It is written in the hope that, confronted by the available evidence, we can learn both from our successes and from our failures. In the short time that humans have been in New Zealand, we have dramatically changed the environment through such activities as harvesting, deforestation, wetland drainage, the introduction of pests and weeds, and the generation of pollution. The changes have generally led to economic improvement, but have been devastating for many indigenous species. In some cases, they have also had an economic backlash (e.g. through soil erosion, flooding, soil and water contamination, and air pollution).

It has to be said at the outset that much of this had to happen. Humans simply could not have survived here without making changes. Most of the indigenous plants were of limited use for food or fibre and most of the large edible animals were too slow breeding to be sustainably harvested. It is a tribute to the ingenuity and tenacity of classical Maori society that people survived here at all, and it is a tribute to the European settlers who came later that a prosperous and stable economy was built in such an apparently hostile environment. Today's New Zealand stands largely on the achievements of those vanished generations.

We may legitimately ask whether it was necessary to destroy quite so much forest, drain quite so many wetlands, introduce quite so many alien species, create quite so much pasture, and extinguish quite so many native species, but we cannot undo history. We can only learn from it and try to do better. In so doing, we must appreciate that our predecessors, both Maori and European, did not value the environment in quite the same way we do today. Like us, they valued species and environmental features that had economic, cultural or spiritual significance (i.e. resource or instrumental value), and they sometimes tried to sustain these as far as their knowledge and technology allowed, but they rarely valued nature for nature's sake. The ideas of protecting other species for their intrinsic value (i.e. their value to themselves rather than to us) or of sustaining complex ecological processes for their life-sustaining 'services' are largely twentieth century concepts that owe much to modern scientific thinking.

The Government's environmental strategy, *Environment 2010*, incorporates these new ethical and ecological dimensions, as do our key environmental laws, such as the Resource Management Act 1991, the Fisheries Act 1996 and the 1993 amendment to the Forests Act. These laws are explicitly based on the ethic of sustainability which obliges us to sustain the natural environment not just for our use, but for its ecological functions, its intrinsic value and its potential value to future generations. Under this ethic, the environment is no longer the economy's servant but its host, and extinctions and environmental degradation are no longer acceptable prices to pay in the pursuit of economic growth.

Putting the sustainability ethic into practice requires good information as well as good intentions. New Zealanders are familiar with the sophisticated battery of economic indicators and progress reports that regularly chart the state of the economy. The social and environmental spheres, however, are less well served. This was highlighted recently by the Organisation for Economic Cooperation and Development in its review of New Zealand's environmental performance (OECD, 1996). The OECD review noted that, despite our innovative environmental legislation and our clean, green, marketing image, New Zealand's lack of high quality environmental data is a significant barrier to effective environmental planning and management. The review recommended that high priority be given to producing this State of the Environment Report and to developing national environmental indicators. It also recommended that consideration be given to dramatically increasing the amount of environmental monitoring, and improving its coordination.

The limitations of New Zealand's environmental data were a frequent challenge in preparing this report. Although a considerable amount of information does exist, it is often of limited value for assessing national, or even regional, trends. This is because it is often out of date, confined to one particular time period or location, or gathered using different methods in different areas. Also in some cases information is simply non-existent. Progress is now being made toward overcoming these deficiencies through the Ministry for the Environment's national environmental indicators programme (see Box 1.1).

Box 1.1

Environmental Indicators: monitoring the vital signs

New Zealand's unique environment has become a major component in marketing strategies for both our primary produce and our tourist attractions. In addition to our unusual birds, bats, frogs, and lizards, we do have clean air, fresh water, and green pastures compared to many countries. However, our environment has undergone massive changes in a very short time, and it is under constant pressure from human activities. In many cases, we do not know what changes are occurring within the atmosphere, our rivers, and our soils, why they are occurring, and the best way of stopping them. Good information is needed to make good decisions about the environment.

One form of information is the **environmental indicator**. An indicator is something that is measured regularly to show trends or sudden changes in the state of a system, population or individual. Simple indicators measure a single characteristic (e.g. the concentration of ozone in the atmosphere) while composite indicators combine information from several characteristics. The 'ecological footprint' is an example of a composite indicator. It combines information on land area, land use, consumption of land-based resources and population size to show how much land is needed to maintain the lifestyle of an average member of the population. The power of an indicator, whether it is simple or composite, lies in its ability to tell us whether things are getting better or worse.

Economists have used indicators to monitor the 'health' of the economy for many years. They have watched the fluctuations in economic indicators, such as food prices, house prices, the CPI (Consumer Price Index) and the GDP (Gross Domestic Product), to show the pressures on the economy, the state of the economy, and the effectiveness of any responses. Volumes of economic information are produced each month. Environmental scientists are not so well off. A number of nationally coordinated monitoring programmes do exist for such things as weather, some

rivers, shallow lakes, groundwater, atmospheric ozone and greenhouse gases, marine toxic algae, and commercial fish catches. But the vast majority of environmental monitoring is not coordinated or standardised across the nation. One of the reasons for this is the decentralised nature of New Zealand's environmental management system.

The Resource Management Act 1991 requires the Minister for the Environment to monitor the effect and implementation of the Act and to monitor and investigate other matters of environmental significance as necessary. It also requires the Minister of Conservation to monitor the effect and implementation of coastal policy statements and permits. However, the main responsibility for environmental monitoring under the Act falls to local authorities. Because these are only required to monitor aspects of the environment relevant to their region, national environmental information is often difficult to assemble.

A national *Environmental Indicators and Monitoring Programme* is now being developed for New Zealand by the Ministry for the Environment (1996a and 1996b). The idea is to standardise the key indicators being monitored throughout the country so that monitoring costs and expertise can be shared among local authorities, useful comparisons can be made between localities, and national trends can be identified. The programme has focused initially on indicators for land, water, and air and will then proceed to develop indicators for: waste; indigenous habitat and biodiversity; pests, weeds, and diseases; fisheries resources; energy; climate change; ozone depletion; and transport. The intention is to have the core set of indicators in place by the turn of the century allowing the environment to stand alongside economic and social considerations in the development of sound policy and equitable laws in the new millennium.

About this book

This report is organised in three parts. The first part provides contextual information for understanding the interaction between New Zealand society and the natural environment. It contains three chapters which describe: the land, people and cultural heritage (Chapter 2); production and consumption patterns, and the economic and social trends associated with these (Chapter 3); and the legal and institutional arrangements for managing the environment (Chapter 4).

The second part describes the state of our natural environment. It contains five chapters which focus respectively on: the atmosphere (Chapter 5), ambient air (Chapter 6), marine and fresh water (Chapter 7), land (Chapter 8), and biological diversity (Chapter 9). Each of these chapters has a standard format based on the OECD's 'Pressure State Response' framework (see Box 1.2). They are each divided into sections describing the state of the data, the nature of the environment, the pressures on it, its current state, and society's responses to it.

The concluding chapter reflects the report's main findings.

Every effort has been made to include the best available information up to mid-1996, though, in many cases, we have had to settle for data from earlier years or even decades. A considerable amount of information and comment was provided free by scientists, research organisations, regional councils and government departments. Although the report is scientifically based, the editors have tried to keep technical language to a minimum and have sometimes simplified complex information for ease of understanding. Any resulting inaccuracies are the responsibility of the editors, not the scientists and peer reviewers who contributed to each chapter.

All chapters were reviewed in their entirety by the following government departments whose factual corrections should not necessarily be taken as endorsements of the report's perspective or interpretive comments: the Ministry of Agriculture; the Ministry of Commerce (including Energy and Tourism); the Department of Conservation; the Ministry of Fisheries, the Ministry of Forestry; the Ministry of Health; Land Information New Zealand; the Prime Minister and Cabinet's Department; Te Puni Kokiri (the Ministry of Maori Development); Statistics New Zealand; the Ministry of Transport; and the Treasury.

Although this report is about the current state of the environment, the present is a child of the past and cannot be fully understood without some knowledge of the evolutionary, geological and historical processes that contributed to it. For this reason, all chapters review the recent past and some dig into the deep past, at times going back to the origins of life and of Earth itself. The point of this is to underline the vast evolutionary timespans that produced our natural environment and the very short timespans that can destroy it.

The deep history perspective also has the cautionary effect of showing that human existence, much less industrial society, is a very short and recent event in Earth history. If Earth's time were compressed into a single year, our ancestors would only have parted company with the chimpanzee at about two in the afternoon on the last day of that year. Modern humans would have evolved just 15–20 minutes before midnight. On this timescale, civilisation and agriculture are barely one minute old and the era of mass production and consumption is a mere second—so brief and unprecedented that its sustainability cannot be taken for granted, however 'natural' it may seem to us now.

Box 1.2

The Pressure-State-Response framework

Much of our information on the environment is unconnected. Sorting through it and making sense of it is difficult without some organised framework or plan of attack. For this report, we have decided to use an approach developed by the OECD in which information is organised according to its ability to tell us about the pressures on the environment, the state of the environment and society's responses to environmental problems. The **Pressure-State-Response (PSR)** framework is based on a concept of causality. Human activities exert **pressures** on the environment, changing both its quality and the quantity of natural resources. These changes alter the **state**, or condition, of the environment. The human **responses** to these changes include any organised behaviour which aims to reduce, prevent or mitigate undesirable changes.

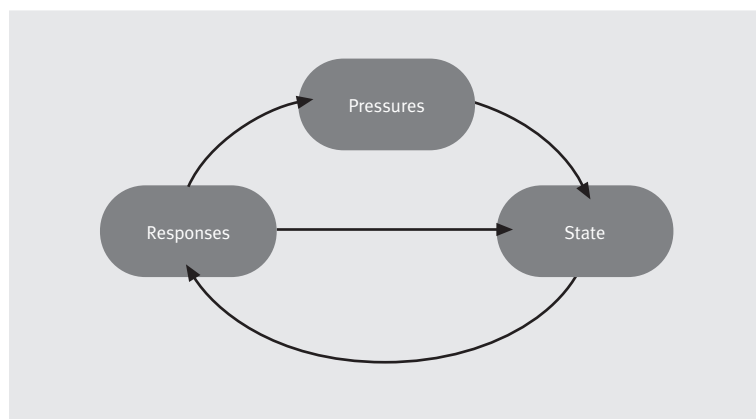
Under the PSR framework, a **pressure** might be a pollutant discharged from a factory, or draining into a river from the land; it could be the removal of forest from the land or over-harvesting by fishers and hunters; and it could be the release of gases into the atmosphere. The critical factor is the human element: environmental changes occurring through human activity, not simply as a natural process. This distinction may seem an arbitrary one to birds dislodged from a fallen tree. Whether the tree was felled by wind or a chainsaw, its impact is the same. From an environmental management perspective, however, the distinction is important. Pressures caused or abetted by human activity can, in principle at least, be controlled or modified. For this reason, the PSR framework tends to highlight human pressures more than natural pressures.

The **state** of the environment is its condition at a particular time. This is assessed by measuring various aspects of the atmosphere, air, water, land and biota (living things) to see whether they are changing (Chapters 5 to 9).

Responses are the organised actions people take to either reduce environmental pressures, or directly improve environmental conditions. These can include scientific monitoring and research, the imposition of laws and rules to make people change their behaviour, and the use of economic penalties or incentives to bring about voluntary behaviour change (such as taxes, fees, grants, subsidies, tradeable permits and quotas etc.).

In this report each of the core chapters (Chapters 5 to 9) contains separate sections on pressures, states and responses. While some pressures are mentioned only in a single chapter (e.g. CFC gas emissions into the atmosphere), others have multiple impacts and so recur in several chapters (e.g. fossil fuel burning by vehicles and industry, land and water use by pastoral agriculture). In some cases, the multiplicity of environmental impacts, and the interactions among different pressures are more complex than they appear in our discussion. The report tends to confine itself to **proximate** pressures (i.e. those which have the most direct impact on the environment). But proximate pressures are often influenced by more indirect social and economic factors (**distal** pressures) which are harder to expose. In developing responses to environmental problems it is important to consider the roles played by both proximate and distal pressures.

Figure 1.1
The Pressure - State - Response model of environmental change



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