



# **Sustainability Report 2007**

## **promoting practical research in sustainable development**

**This NIWA Sustainability Report 2007 has been verified by ERM New Zealand Ltd. A summary version is included in both the electronic [[www.niwa.co.nz/ar/2007](http://www.niwa.co.nz/ar/2007)] and printed versions of the 2007 NIWA annual report.**

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# **Introduction**

As a responsible and accountable corporate citizen, NIWA is committed to maintaining the health of our environmental systems through the provision of sustainability advice and services, and operating in a socially and environmentally responsible manner. We firmly believe that socially and environmentally sound behaviour contributes to sustained economic growth and value creation. These principals are progressively being embedded throughout the organisation.

## **Environmental performance**

NIWA's science staff and engineers know a lot about the environment we live in, and how our actions affect it. We believe in pragmatic sustainable development. We are guided by the basic principle that prevention is better than cure.

## **Social performance**

We seek to create safe, supporting, enriching environments for our staff. This helps our staff reach their full potential, be innovative, and actively contribute to the communities in which they live and work. The quality of life and benefits from working at NIWA encourage us in the quest to become an employer of choice.

## **Cultural performance**

We are developing relationships between environmental science and Māori interests that reflect a working partnership for the future benefit of all New Zealand.

## **Economic performance**

We are making progress on ensuring that NIWA's growth is sustained while contributing and adding value to larger-scale economic benefits and improvements to our community, the environment, and the whole of New Zealand.

Our research directly helps New Zealand reduce its environmental footprint, and make informed decisions on the sustainable use of its natural environment and its living resources.

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## Leading by example

The profile of sustainable action in NIWA took a giant step forward in 2007 with the preparation of sustainable development initiatives and the commitment to progression towards even greater leadership in sustainable development.

Since its formation in 1992, NIWA has progressed steadily with a commitment to operating in a socially responsible manner. Our progress had been hampered by a lack of a defined sustainability philosophy, time availability for key staff, and competing demands for limited resources to develop sustainability initiatives. All that is changing; with NIWA management committing to continuously improving our capacity for operating with minimum environmental impact, at both corporate and individual level.

This sustainability report provides an outline of our sustainable development initiatives, and describes our performance in the financial year 2006–07.

## Our philosophy

NIWA recognises that it is only possible to achieve a vibrant, sustainable, and economically robust company when all four pillars of sustainability (economic, environmental, social, and cultural) are all improved collectively. The sustainability ethos is therefore broad ranging.

NIWA seeks to facilitate all New Zealanders with maintaining the health of our environmental systems (including social and cultural). The most important role for NIWA in this regard is to actively define, develop, and support sustainable advice and services.

NIWA must also demonstrate leadership in environmental responsibility, by constantly seeking to reduce the environmental impact of all operations, and in social responsibility, by improving the working environment of staff. To achieve this goal NIWA is developing a continuous improvement system that directs adequate resources towards sustainability initiatives. These include:

- committing to directing 0.5% of revenue towards capital equipment for sustainability initiatives internally;
- maintaining employee safety;
- reducing our environmental footprint;
- reducing greenhouse gas emissions and hydrocarbon dependence;
- playing a leading role in, and increasing the range of, sustainable advice and services in our core areas;
- reducing consumption of non-renewable energy;
- supporting cultural enrichment;
- enhancing employee morale.

## **Our performance**

As a model corporate citizen, with an intimate understanding of the health of New Zealand ecosystems, NIWA has a responsibility greater than many to operate in a sustainable manner. Our impact on New Zealand sustainability has two forms:

- the consequence of actions taken by others in light of advice and services offered by NIWA;
- the consequence of actions taken by NIWA in its operations.

The range and breadth of NIWA's research and services that provide sustainable solutions and advice grew considerably in 2006–07. We significantly increased our public outreach associated with climate change, ecosystem health, water management, and energy systems. We continue to achieve international recognition for our innovative and ground-breaking research and are represented internationally at the highest level in panels such as the IPCC. We are responding to the much increased demand for sustainability related research and analysis.

We continued to improve levels of socially responsible operation, and took some small steps on what will be a much longer journey. We purchased another two hybrid vehicles, so we now have three in our vehicle fleet, and we have increased the capacity of our bicycle racks. We expanded our videoconference facilities to reduce travel and increased the uptake of recycling. We have undertaken and responded to energy audits of key sites. Our building renovation programme now includes an allowance for the use of environmentally-friendly construction materials and improving the insulation capacity of buildings. Our human resources group has improved services and undertaken culture reviews as we aspire to become an employer of choice.

## **Our future plans**

Our sustainable development planning in 2006–07 identified the following actions for 2007–08:

- The development of an action plan which identifies the intended direction for NIWA sustainable development.
- Realign the existing Sustainable Development Committee to a Continuous Sustainability Improvement Committee with defined budget and capacity. The group will meet regularly (videoconference) to adjudicate on and manage new initiatives. The group is represented by all major sites, facilitating improvements across NIWA.
- Progress towards financial transparency by: nominating the percentage of revenue that will be directed towards sustainable development initiatives; adding sustainability as a sub-category in the capital expenses register; and considering undertaking quadruple bottom line reporting.
- Progress towards social responsibility by including sustainability concepts in employee induction processes and by posting of policies on the intranet and internet.

- Developing a green purchasing policy and guidelines to address issues such as: an acceptable premium (% , \$/tCO<sub>2</sub>, total annual budget, paint standard, cleaning fluids, etc.) for more sustainable products; consider whether vendors should be required to provide a record of greenhouse gas tracking of products (as Tesco has); discounts for bulk purchasing; favourable consideration of vendors who accept or remove all packaging materials and demonstrate good sustainability reporting.
- Introduce mentoring schemes that improve an understanding of an individual's role in NIWA, assist with their integration, and reduce stress on key staff. This mentoring must be undertaken at all levels and be incorporated in succession planning.

In summary, NIWA is making the transition towards leadership in sustainable action. We have the understanding and motivation that is required to make significant gains in this area, and we are ready to make this commitment.

# Section 1

## Our history of sustainable action

### 1. About NIWA

NIWA is a Crown Research Institute (CRI) formed in 1992. Our mission is to be an internationally respected research organisation dedicated to creating and delivering innovative and excellent science that enables New Zealanders to make informed decisions on the sustainable use of their natural environment and its living resources.

It is appropriate, therefore, that the science and analysis we undertake for our clients represents our greatest influence on the sustainability of New Zealand. We have made a considerable contribution to, and developed leading roles, in:

- mitigating and adapting to climate change;
- ensuring New Zealand has a secure and sustainable energy supply;
- developing new sustainable aquaculture through the farming of high-value species;
- wise allocation of freshwater resources and protection of water quality;
- better responses to impending water-related hazards.

NIWA's vision and values clearly demonstrate our commitment to sustainability:

#### **Vision – We aim to have a reputation for:**

- providing objective science-based advice and leadership to enhance the sustainable management of natural resources;
- producing new tools and providing information that enables enhanced environmental management, improved wealth creation, and increased public safety;
- working with the fisheries and aquaculture sectors to create new business opportunities and optimise returns;
- partnering with others to ensure our science positively influences environmental, economic, social, and cultural outcomes;
- operating a financial strategy that ensures both a continual investment in our people, facilities, and equipment to ensure appropriate science capability in areas of strategic benefit to New Zealand while also providing an appropriate return on shareholders' funds.

#### **Values – We are committed to:**

- ensuring national capabilities in core aquatic and atmospheric sciences are appropriately staffed and supplied with sufficient equipment and resources;
- encouraging a workplace culture which is empowering, collegial, adaptable, and openly communicative;
- providing a safe and healthy working environment, including appropriate work-life balance;
- ensuring that all staff are treated in a fair and equitable manner;

- taking social responsibility, valuing our environment, and operating in a sustainable manner;
- encouraging staff and stakeholder participation in the setting of our research strategies;
- working collaboratively with others where this adds value and enhances benefits to New Zealand;
- honouring the principles of the Treaty of Waitangi.

At a corporate level, we monitor, discuss, and actively undertake actions that improve the well being of the company and its employees. A Sustainable Development Committee was set up in 2003 to improve and promote awareness and buy-in on sustainable development activities and reporting in NIWA, to promote and align recycling efforts, and to monitor, report on, and encourage reductions in emissions, waste production, and energy use. This committee now reports monthly to the NIWA Board on initiatives and progress towards sustainability targets.

In this Sustainable Development Report we illustrate how NIWA's pragmatic approach to corporate sustainability is gaining traction, and improving the overall performance of both the company and New Zealand. The document reports on how well NIWA has achieved its economic, environmental, and social performance objectives, measures, and targets as required by the Crown Company Monitoring Advisory Unit (CCMAU). These demonstrate the role and effectiveness of NIWA in its target sectors and its impact on New Zealand's society, environment, and economy.

## **1.1 Business overview**

The NIWA Group consists of the parent body NIWA Science and its subsidiaries NIWA Vessel Management, NIWA USA, NIWA Australia Pty Ltd, Unidata Pty Ltd, and NIWA Natural Solutions (folded back into NIWA Science during 2006–07). NIWA Group now has 681 permanent staff spread over 15 sites in New Zealand and one in Perth, Western Australia.

### **1.1.1 Corporate leadership**

The Crown Research Institutes Act 1992 sets out the principles under which CRIs operate. NIWA is committed to these principles, which include:

- undertaking research for the benefit of New Zealand;
- pursuing excellence in all its activities;
- complying with all ethical standards while carrying out its activities;
- promoting and facilitating the application of the results of research and technological developments;
- being a good employer;
- maintaining financial viability.

NIWA continues to demonstrate adherence to these principles, as evidenced by feedback from CCMAU and the acceptance of our 2007–08 Business Plan.

One of NIWA's major internal challenges is to provide economic growth through alignment with industry while continuing to play our part in sustainable use of resources, operating in a responsible manner, and remaining socially responsible. NIWA is occasionally seen as taking sides (for example, in aquaculture industry

development), and it is a constant challenge to maintain impartiality and provide independent advice while adding value to developments that will benefit New Zealand overall.

Our major contribution will be improving the current state of knowledge of natural resources and energy systems and the human impact on these resources, as well as how we can ensure the sustainable use of, and mitigate major changes (whether human induced or natural) to, these systems, while meeting the country's needs.

### **1.1.2 Corporate governance**

In accordance with our mission statement, we are committed to operating in a sustainable manner and working with others to achieve both NIWA's and the government's economic, environmental, and social goals.

The NIWA Board achieves this by ensuring that the government receives sound advice and is aware of NIWA's capabilities; the investment in human and physical resources is adequate to meet economic, environmental, and social goals; and that sustainability issues gain a high profile in Board meetings, reports, and the Business Plan.

We take particular care to minimise the impact of our activities on the environment, and to ensure that individuals and communities potentially affected by our actions are well informed and consulted about how we plan to proceed.

A growing component of our work is directed at creating new business and job opportunities, both in the main city centres and in rural areas. We support, and are actively involved in, extensive interactions with non-government organisations and community groups, and we contribute significantly to the education of primary, secondary, and tertiary students; local and central government agencies; and the wider public. Involvement with universities and international networks is essential in developing human capital for New Zealand's wider long-term interests in our key science sectors.

Internationally, we are actively involved in, and represent New Zealand at, a vast array of scientific meetings and inter-government forums. Recent involvement in the preparation of IPCC documents clearly demonstrates the internationally recognised contribution NIWA makes on global issues.

Ultimately, the governance of NIWA is directed by the CCMAU operating principles, and the NIWA vision, as indicated in our Statement of Corporate Intent, which is prepared annually for our shareholding Ministers.

### **1.1.3 Feedback systems**

NIWA recognises the importance of continuously improving internal operations. It is committed to regularly monitoring progress towards economic, environmental, social, and cultural targets and, where necessary, taking action to improve internal performance. These activities are managed through a national committee with representatives from all major sites. Greater effort in 2007–08 will focus on getting feedback from staff, and developing action plans to identify and implement initiatives to improve our performance in this area.

#### **1.1.4 Improved monitoring**

As our business evolves, so must our monitoring. Each year we revise and increase the set of performance criteria used to evaluate our economic, environmental, and social performance. In addition to the new performance indicators developed by CCMAU, we have completely revised and extended our list of voluntary indicators. We feel that these will provide added focus, improve understanding of our performance and where the challenges lie, and more closely link with stakeholder requirements. During 2007–08 more effort will go into ongoing monitoring of performance measures and achievements towards the action plans.

#### **1.1.5 Sustainability philosophy**

NIWA recognises that it is only possible to achieve a vibrant, sustainable, and economically robust company when all four pillars of sustainability (economic, environmental, social, and cultural) are improved collectively. The sustainability ethos we are trying to achieve is therefore broad ranging.

NIWA seeks to help all New Zealanders maintain the health of environmental systems (including social and cultural). The most important role for NIWA in this regard is to actively develop and provide sustainable advice and services that will benefit New Zealand.

NIWA must also demonstrate leadership in environmental responsibility, by constantly seeking to reduce the environmental impact of its own operations, and in social responsibility. To achieve this goal NIWA is developing a continuous improvement system that directs adequate resources towards the sustainability initiatives. Initiatives for 2007–08 include:

- committing to directing 0.5% of revenue towards capital equipment for sustainability initiatives internally;
- maintaining employee safety;
- reducing environmental system contamination;
- defining our environmental footprint and taking measures to work towards carbon neutrality;
- reducing greenhouse gas emissions and hydrocarbon dependence;
- playing a leading role in, and increasing the range of, sustainable advice and services in our core areas;
- reducing consumption of non-renewable energy;
- developing and implementing environmentally friendly guidelines for new infrastructure;
- supporting cultural enrichment;
- enhancing employee morale.

#### **1.1.6 Economic policy**

NIWA is first and foremost a provider of scientific advice and services.

Foundation for Research, Science & Technology-funded research has been subject to significant volatility on a portfolio basis, and to stabilise revenue and employment

opportunities NIWA has had to increase its level of commercial activities. This has been assisted by NIWA's flexibility and adaptability to new opportunities and its response to hazard and biosecurity events. Maintaining critical mass in some core areas where funding has declined in real terms is becoming more of a challenge for NIWA. Our success also depends on continuing to operate in a financially disciplined way while implementing our human resources strategies to recruit and retain high quality staff, investing in core infrastructure (e.g., information technology platforms) to improve the working environment and increase efficiencies, and providing new equipment to advance our science and meet stakeholder expectations.

Building revenue sources through commercialisation of NIWA's intellectual property has continued to present challenges as we innovate through the use of science and technology.

### **1.1.7 Environmental policy**

The long-term survival of humankind will depend partly on reducing the impact on the biosphere to a level with which we can cope to provide a sustainable environment for future generations. The recent IPCC reports indicate that unless there is a substantial change in global behaviour, there is a risk that climate change will significantly reduce quality of life and life support structures before the end of the century.

NIWA, as a science-based organisation and environmental CRI, has an even greater responsibility to the sustainable management and enhancement of New Zealand's environment. Activities by NIWA staff in the field and at research sites are dedicated to help people live in a sustainable manner. We endeavour to conduct all activities with a high standard of environmental awareness by:

- complying with all environmental legislation relevant to our activities;
- taking all practical steps to minimise the adverse effects of our activities on the environment;
- minimising the likelihood of accidental discharges of pollutants, and having contingency plans in place to deal with these situations should they occur;
- minimising consumption of resources and minimising waste;
- striving to continually improve our environmental performance.

### **1.1.8 Social policy**

NIWA's success can be attributed to the high quality skills, adaptability, and dedication of our staff. Our future success will depend on recruiting and retaining the skills we need by being an employer of choice.

NIWA is committed to providing staff with a safe and healthy working environment that is collegial, enhances career development, promotes work/life balance, rewards staff for performance, and encourages innovation and excellence.

To achieve this NIWA is committed to:

- promoting creativity, innovation, and opportunity-seeking;
- encouraging a workplace culture which is empowering, collegial, adaptable, and openly communicative;
- providing a remuneration system that attracts, retains, and rewards high quality staff;

- providing a safe and healthy working environment, including appropriate work/life balance;
- ensuring that all staff are treated in a fair and equitable manner;
- taking social responsibility, valuing our environment, and operating in a sustainable manner;
- honouring the principles of the Treaty of Waitangi.

# Section 2

## How our research and advice supports sustainable development

### 2. NIWA's influence

Many of our core business activities contribute directly to the sustainable development of New Zealand's natural environment and its living resources, through the provision of scientific advice, products, and services.

Sectors that we contribute significantly to include agriculture, aquaculture, energy, fisheries, and marine and freshwater resources. Because we operate across New Zealand and in a wide range of sectors, direct involvement with stakeholders is imperative. These stakeholders include the New Zealand public; national, regional, and local government; industry; and customers who purchase our products and services.

Key issues facing these stakeholders and sectors include concerns about water quality and allocation, which is fast becoming one of the major global environmental and health issues, increased atmospheric and aquatic pollution, declining fish stocks, and increased pressure on freshwater and marine resources.

Some examples of how we contributed to sustainability in these sectors are given below.

#### 2.1 Vision

NIWA recognises that it can have a significant influence on sustainability as a consequence of actions taken by others in light of advice and services offered by NIWA as well as actions taken by NIWA through its own operations. Consequently, a key platform of NIWA's sustainability ethos is the continued support for New Zealand's capacity to operate sustainably. This support includes:

- continuing to provide, lead, and improve high-quality research services in the impact, understanding, and mitigation of climate change, and the reduction of greenhouse gas emissions and air pollutants;
- providing underpinning advice and sound knowledge for the wise allocation of freshwater resources and sustainable management of freshwater, coastal, and estuarine resources;
- divesting acquired knowledge through publication and support of public policy development and public education in our core areas;
- actively promoting the use and development of sustainable and renewable energy systems;
- actively helping New Zealand agriculture find sustainable solutions;

- actively supporting publication, research, and policy development that encourages sustainable development and use of New Zealand's fish stocks and the development of aquaculture potential;
- ensuring New Zealand possesses a nationally integrated environmental data and information network.

NIWA acknowledges that as an influential corporate member with in-depth knowledge of environmental system health, it is obliged to act in the best interests of the public good. This includes active publication and policy support, endorsing the precautionary principle and acting accordingly, and constantly improving its own operating practices.

## **2.2 What was achieved**

There are numerous examples of the research and advice that NIWA provided through the year; some of these are highlighted below. Many more can be found in our Annual Report.

### **2.2.1 Coping with climate change**

The first suite of NIWA's simulations of future New Zealand climate change have been made using a global climate model and a high-resolution regional climate model (NZRCM). These will allow much more detailed analysis of future changes in means and extremes of climate in the New Zealand region, and they have many applications in understanding and planning for the effects of climate change.

The initial simulations included a control run of past climate from 1970 to 2000 and a future climate change run under a middle-of-the-road emissions scenario. In the control run, the NZRCM matched very well with the regional temperatures seen in observations, and it also successfully captured the seasonal and spatial variability of rainfall. These simulations will provide essential information in helping New Zealand prepare for changes.

Climate model runs being completed to provide projections for the Ministry for the Environment (MFE) predict climate change will bring New Zealand stronger winds, a wetter west, and a drier east. This, combined with temperature rises, a reduction in frosts, more severe droughts, and more frequent heavy rain, will have a big impact on farming and other parts of the New Zealand economy. Being prepared for and adapting to these changes will be a major challenge.

NIWA staff played a leading role in meetings and reports prepared by the IPCC aimed at assessing the impacts of, adaptation to, and vulnerability to climate change at a global and local scale. The reports, released in April 2007, provide the latest state-of-the-art assessments of how New Zealand and other countries are already experiencing impacts from recent climate change, especially on water supply, agriculture, natural ecosystems, and glaciers, as well as changes expected in the 21st century climate and the identification of the most vulnerable regions to climate change. Impacts of particular importance have been identified for water, agriculture and forestry, coasts, infrastructure, indigenous people, and health. These will help New Zealand be better prepared for future change. NIWA staff, in collaboration with the Royal Society of New Zealand and the Ministry for the Environment, have taken a lead role in disseminating this information within New Zealand and the Pacific region,

taking part in panel discussions, media events, publications, and workshops, including over 100 presentations to government officials, stakeholders, and the public, and through the publication and distribution of the four page leaflet 'Climate Change – IPCC Fourth Assessment Report'.

Measurements of vertical ozone profiles made using the ozone lidar at Lauder have provided the first ground-based verification of the effectiveness of the Montreal Protocol in controlling the production and emissions of ozone-depleting substances. This measurement programme has operated at Lauder since November 1994 in collaboration with counterparts in The Netherlands. Ozone concentrations measured in the upper stratosphere (35–45 km altitude) have shown that the long-term decline above New Zealand did not continue beyond 1997, and since 1997 ozone concentrations in this altitude region have shown small but significant increases. The timing of this change in ozone trend coincides with the peak of chlorine and bromine concentrations in the stratosphere. Stratospheric chlorine and bromine concentrations are now declining as a result of the emissions controls implemented by the Montreal Protocol.

### **2.2.2 Sustainable management of marine resources**

NIWA participated in a number of stock assessments and working parties for the Ministry of Fisheries. Species targeted because of current or potential sustainability issues included hoki, orange roughy, snapper, southern blue whiting, and black oreo. Previous assessments for a number of other species were reviewed. An example of the surveys carried out is the annual acoustic survey of spawning hoki in Cook Strait. This is the 13th in the time series that started in 1991. The main aim of the survey is to estimate the biomass of eastern stock adult fish. This hoki stock is currently estimated to be in a more healthy state than the western stock (which spawns on the west coast of the South Island), and the survey is an important monitoring tool for this fishery.

A number of recreational fishing surveys have been carried out by NIWA during the year. The Kaikoura recreational fishery is an example and includes coastal inshore waters between the Clarence and Conway Rivers. The 2314 fishing trips reported in diary surveys and 758 boat ramp surveys completed between 1991 and 2001 identified main target fisheries for blue cod and sea perch by line fishing, paua by diving and hand gathering, and rock lobster by potting and diving. Boat fishing was most common, due to the relatively harsh nature of the coastline, and most fishing took place during summer. Most fishing occurred around the Kaikoura Peninsula and in southern Kaikoura (Goose Bay to Oaro). Diary survey data will be used to assess catches between 1991 and 2001 to provide better information on the state of fish and shellfish stocks.

Beach sediment volume information is vital for assessing the sensitivity of coasts to environmental changes, such as rising sea levels and reduced supplies of river gravels due to dams and flood harvesting for water storage and supply. The traditional approach is to measure beach thickness by mechanical excavation, an expensive, time-consuming, and, in many locations, impractical process. During December 2006, NIWA, in collaboration with scientists from the University of Wisconsin, completed 25 Ground Penetrating Radar (GPR) beach transects spanning 50 km of coast along the North Otago and South Canterbury coasts. One startling result was the shallowness of the beach between Oamaru and the Waitaki River, a finding which indicated that this beach provides little protection from coastal erosion.

Another important finding was the uniformity of the ancient substrate surface under the modern beach gravel. Data from these investigations will be used as important inputs to numerical modelling to predict the sensitivity of gravel coasts to environmental changes, such as sea-level rise and sediment supplies.

The CD 'New Zealand's Estuaries: How They Work and the Issues that Affect Them' (NIWA Information Series No. 59, 2006) has been very popular, and steps were taken to get it into secondary schools. A short presentation on the resource was made at the New Zealand science teachers' conference, SciCon 2006. The CD was subsequently examined by a committee of science teacher advisors, whose role is to alert teachers to resources and help them with implementation.

### **2.2.3 Sustainable use of freshwater resources**

NIWA has developed a prototype web portal (<http://edenz.niwa.co.nz>) for viewing plots of real-time river flows and levels at over 70 river locations around New Zealand. The data are provided by those hydrological stations that are 100% FRST-funded stations and have telemetry facilities. The web page will be promoted through NIWA's *Water Resources Update*, and a web link will be set up on the National Centre for Water Resources web page. Ultimately, the prototype will be either upgraded or superseded by new and improved access to NIWA's data, but in the meantime it gives satisfactory and timely access to information on New Zealand's river flows. This will provide essential information for managers involved in allocation and monitoring of limited water resources and help them deal with hazards such as flooding.

NIWA has continued to develop a detailed understanding of the structure and functioning of groundwater ecosystems through research in aquifers around New Zealand. A key component of this research is the transfer and translation of this understanding to groundwater resource managers. A recent review by NIWA scientists has shown that groundwater ecosystems receive a very low level of explicit protection in current regional plans, most of the emphasis being placed on protecting groundwater for human uses (e.g., domestic water supply, agriculture, industry). The virtual absence of objectives, policies, and rules that incorporate the life-supporting capacity of aquifers is a result of a very low level of recognition of the intrinsic value of groundwater. This work is already starting to provide greater awareness of groundwater ecosystems and ensure that regional council scientists, policymakers, and resource managers are fully informed of these values, and the risks to these values posed by resource use, so that future management policies and plans can provide more explicit protection of these ecosystems.

The content and mapping engine of the web-toolbox 'Water Resources Explorer' was enhanced during the year. The toolbox already contains models to estimate mean annual stream suspended sediment yield, water runoff, and water quality from catchments selected by mouse-clicking on any stream segment in the national drainage network. New models that are being added include identifying kayaking reaches, recreational fishing streams, flood magnitudes by return period, and more water-quality parameters. A major enhancement is the integration with Google Maps, which will provide the map imagery and navigation controls that underlie the results layers generated by the various modelling tools. These advancements will considerably improve the value of this tool to water resource managers and the general public.

Good progress has been made in developing a numerical model to predict the downstream impacts of water-allocation operations (e.g., hydroelectric power dams or flood-harvesting on to off-channel reservoirs) on river channel morphology, substrate size-grading, and gravel bedloads. Such operations typically reduce the magnitude of floods and alter the balance between river sediment supply and transport capacity. The model is currently able to simulate the response of river lengths of the order of 100 km over time scales of 10-10,000 years. A novel finding was that many gravel-bed rivers undergo a relatively rapid adjustment in the size-grading of their bed-surface material (armouring or de-armouring) over a time-scale of a few decades, followed by a much slower adjustment of their bed levels lasting centuries to millennia. The time-frame of the bed textural adjustment is most relevant to water resource consents, which are typically provided for several decades. This river numerical model should eventually be able to interface with a similar model being developed to predict shoreline erosion, so that catchment-to-coast effects of water allocation proposals and decisions can be predicted.

#### **2.2.4 Sustainable management of biodiversity and biosecurity**

Didymo continues to pose a major threat to New Zealand's freshwaters. Field trials were undertaken of the chelated copper formulation called Gemex™ for the removal of didymo from natural waterways in Southland. NIWA worked closely with MAF Biosecurity New Zealand to refine the plans for an urgent response if didymo were found in the North Island. The discovery of didymo in the Takaka River demonstrates the spread of this species, but fortunately it has not yet been found in the North Island, despite extensive surveys by NIWA and other organisations.

Good progress was made during the year in the development of tools to predict the likely New Zealand ranges of several unwanted marine species. Global distribution data have been acquired on six unwanted species: the European green crab, sea squirt *Styela clava*, Asian paddle crab, Mediterranean aquarium weed, a new alga, and *Undaria*. Environmental predictors have been assembled for these species from the World Ocean Atlas. The potential distribution of several of the species will now be modelled using novel statistical methods in the coming year.

Concerns over the impacts of exotic fish introductions in New Zealand have focused mainly on the decline in native fish and loss of biodiversity in affected lakes. Recent work by NIWA has found a more insidious impact related to the fact that exotic fish introductions into New Zealand lakes usually involve two, three, or even four species to create 'coarse fish' fisheries. A BACI (Before-After, Control-Impact) approach, complemented by case studies simulating pseudo-manipulations of fish abundance, has revealed that multiple-species introductions have caused a decline in the water clarity of many northern New Zealand lakes. Although limnological studies in northern hemisphere lakes have generally focused on the impacts of either planktivores, benthivores, or herbivores alone on lake water quality, this study has shown that such a single-species approach is too simplistic to apply to New Zealand lakes, and that a multi-species, guild-based approach will be required. Regional councils will now need to acknowledge the impact of coarse fish on both lake water quality, and the restoration potential of lakes, as well as on biodiversity if they are to effectively manage these waterways.

#### **2.2.5 Improving the quality of life in urban and rural areas**

Modelling contaminants in stormwater in the Central Waitemata Harbour (CWH) is a complex process. Using the contaminant load model, annual stormwater loads of metals and sediments were predicted at 13 outfalls in the CWH for years 2006 to 2106. The development of assumptions to predict current and future trends in contaminant loads required a detailed assessment of land-use type, identification of contaminant sources, treatment device efficiencies, replacement material such as roofs over time and population growth trends. Assumptions of how these trends are likely to affect contaminant accumulation in the CWH were developed. This contaminant study is part of a larger programme and will allow Auckland Regional Council to estimate the effects of urbanisation on receiving environments and develop policy to manage development more sustainably.

NIWA research has helped characterise the deposition and dispersion pathways of particulate metals derived from Auckland's northern motorway (SH1). The results confirm that the motorway is a significant source of zinc and copper. The next step will be to complete an assessment of the mitigation strategies available for treating particulate metals in road runoff from the motorway and other major roads. A monitoring programme that involves measurement of flow and collection of water samples at sites on the motorway (SH1), State Highway 17, and at a major intersection of these two roads has also commenced. A critical component of this next phase of the study will be to assess the performance of existing treatment devices in response to variations in factors such as road types, vehicle numbers, and traffic behaviour in order to provide management options.

### **2.2.6 Renewable and alternative energy sources**

NIWA was involved in seminars on solar water heating in collaboration with Sustainable Wanaka. Our major input has been to quantify the solar energy resource in New Zealand, how it is affected by the state of the atmosphere, and how this influences solar collector configuration.

The second field trial of a prototype wave energy device being developed by a consortium (with Industrial Research Ltd and Power Projects Ltd – see [www.wavenergy.co.nz](http://www.wavenergy.co.nz)) took place outside Lyttelton Harbour in mid December. A number of developments were tested. The next stage is to design a working mooring system and trial the device in substantial waves.

### **2.2.7 Working with Māori**

In 2006–07, Te Kūwaha comprised a general manager and 14 Māori staff members, including scientists, technicians, support staff, and postdocs. A key role of Te Kūwaha is to provide tikanga and te reo Māori training courses so that NIWA staff are more confident and able in their interactions with Māori. The NIWA marae-based training courses for 2006–07 were held at Waipoua (Matatina marae), Māhia (Tuahuru marae), and Lake Waihora (Taumutu marae). A total of 38 NIWA staff attended the noho marae courses. In addition, Te Kūwaha celebrated Māori language week (July 2006) by encouraging NIWA staff around the country to attend one of four, 1-hour teleconferences in Auckland, Wellington, Christchurch, and Hamilton.

Te Kūwaha and NIWA staff continued to be engaged in numerous hui and wānanga with iwi research partners, users, and stakeholders. Three new memoranda of understanding are currently in their final stages of discussion. Particular highlights

included the workshop on 'Knowledge for customary coastal and kaimoana management', held in Wellington and hosted in conjunction with NIWA's National Centres for Coasts & Oceans and Fisheries & Aquaculture. Over 100 registrations were received for this event, with attendees from a broad range of organisations including government, consultancies, iwi, hapū, and whānau. Presentations from NIWA, the Ministry of Fisheries, the Department of Conservation, Te Puni Kōkiri, regional councils, Māori organisations, and Māori customary fisheries representatives described projects and techniques which have been used to aid research for customary kaimoana management, monitoring, and enhancement.

NIWA developed a series of aquaculture roadshows for Māori. The initial roadshows, funded by TechNZ, identified that several iwi and Māori business organisations wanted the most up-to-date scientific information available to help them understand, alongside the planning and environmental requirements, the opportunities available to them. NIWA and Te Puni Kōkiri additionally completed 4 of 10 nationwide hui providing Māori organisations with regional information for five key species and the economics of farming them. Te Ohu Kaimoana and Te Puni Kōkiri discussed in detail the Māori Commercial Aquaculture Settlement and other recent aquaculture reforms.

The 'Traditional Māori Weather and Climate Forecasting' poster, *NIWA Poster No. 4 (2006)*, was translated into te reo Māori and is currently available for distribution, 'Ngā Tikanga Māori o te Tiro Huarere, me te Āhuarangi', *NIWA Poster No. 6 (2007)*.

Progress with the joint NIWA-Ngāti Porou Whanui Forests Ltd (NPWFL) project: 'Developing land-use decision support tools to cope with climate variability and change' was progressed during the year. NIWA climate and Landcare Research soil and terrain data have now been incorporated into the new system, with training on how to manipulate, interrogate, and interpret the information being provided to local iwi. Ensis (a joint venture between Scion and CSIRO) have been working on the growing requirements for selected forestry species, and when this information is available NIWA will start producing crop suitability maps. This digital system will enable NPWFL to investigate new and improved land-use options to promote sustainable forestry and sustainable land-use in the Ngāti Porou region.

Several projects are now underway to increase iwi use of SHMAK (Stream Health Monitoring and Assessment Kit). NIWA is also involved in the development of the State of the Takiwa database with Ngai Tahu and ESR. This database provides a storage house of catchment-specific information, as well as input and calculation of the Cultural Health Index, which is an iwi-focused assessment method for deriving measures of culturally important natural values. NIWA's role has been to assist in the integration of the SHMAK-derived data into this database. NIWA is also revising SHMAK to make it more amenable to iwi. Modifications are likely to include a bilingual manual and incorporation of mahinga kai species into the assessment process. Ngai Tahu will trial the revised version within their State of the Takiwa database.

Discussions are also underway with Tuwharetoa to undertake a similar trial as part of their marae-based stream monitoring programme.

# Section 3

## How we achieve sustainable development

### **3. NIWA Performance – Overview and Situation Analysis**

2006–07 has seen NIWA continue its track record of strong financial growth and achievement of financial targets while maintaining a commitment to environmental and social goals.

Improvements to internal operations of NIWA are progressed through the Sustainable Development Reporting Committee. Initiatives included purchasing of more energy-efficient low emission hybrid vehicles, enhancing staff awareness of energy consumption and alternative transport options, improving paper and plastic recycling, undertaking waste and energy audits, expanding the video-conferencing system to reduce travel, and undertaking Sustainable Development Reporting beyond the requirements of CCMAU.

To demonstrate our commitment to social responsibility in 2006–07 we developed a new human resources framework, continued to be actively involved in community events and education, and developed new social performance measures for NIWA in areas such as staff training and development, financial and non-financial benefits for staff, and the creation of job opportunities in city centres and rural areas.

While significant progress has been made with reducing waste, increasing recycling, and minimising energy consumption as we grow, it is unlikely we can make further substantial gains without affecting business operations. Hence, the focus will now move to making continuous improvements, investing in more environmentally friendly infrastructure, and mitigating our activities.

A major step towards more actively promoting and managing sustainable development was the drafting of a NIWA sustainable development philosophy with the aim of further minimising our impact on environmental systems, but in a more structured and transparent manner.

The government (Prime Minister's Statement 13/2/07) has identified the need for New Zealand and all government departments to act more boldly and with greater commitment to sustainability. The government is looking towards imposing sustainability targets on crown entity procurement and waste management systems as part of a drive towards carbon neutrality. As a responsible corporate citizen, and key provider of information on global climate change implications for New Zealand, alternative energy sources, and greenhouse gas emissions, as well as being a leading provider of environmental assessments and advice for sustainable

management, NIWA has a responsibility greater than many to show leadership in the provision of this advice and the way it manages its operations internally.

In 2007–08 we will reaffirm NIWA’s commitment and corporate responsibility by:

- communicating our philosophy on sustainability development;
- providing advice to the public and government bodies on major sustainability issues;
- demonstrating alternative energy sources;
- investing in more energy-efficient systems at our regional offices;
- defining our carbon footprint and investigating and taking initiatives towards carbon neutrality;
- continuously monitoring our performance for structured improvements.

### **3.1 NIWA Performance – Economic**

Economic sustainability addresses our effect on the economic circumstances of our stakeholders and their economic systems. As a Crown Research Institute, NIWA is required to be financially viable and undertake research for the benefit of New Zealand. Economic sustainability is not just about attaining economic growth from year to year, but also about providing benefits and improvements to our community, the environment, and the whole of New Zealand, as well as satisfying customer needs so that they request services in future.

For NIWA to meet its obligations of economic sustainability, it needs to generate sufficient operating surpluses to enable it to continue to grow and invest in capital expenditure and areas that extend our current base beyond fee-for-service. As a Crown-owned company, NIWA has a nominal 9% return-on-equity target to meet the shareholders’ expectations over the long term. NIWA continues to strive to meet this target, while retaining the capability to reinvest profit and surpluses into improving infrastructure. This encompasses sustainable development initiatives and enhancing sustainable practices, including developing skills and tools to ensure future financial viability.

Our direct customers are those who fund our science. The government is our largest customer, but we also conduct research for, and provide advice and information to, many others, ranging from international conglomerates to local commercial fishers and schools. We consider the New Zealand public to be our most important customer. Revenue from all sources – Foundation for Research, Science & Technology, Ministry of Fisheries, and commercial revenue from central and regional government – all showed strong growth in 2006–07.

NIWA exceeded its financial targets in 2006–07. Highlights included:

- a record high revenue of \$113.9 million;
- a net surplus of \$10 million, producing a return on average equity of 22.6%;
- a record high international revenue of \$7 million.

NIWA will continue to provide the best possible science for all its customers. The continued increase in revenue demonstrates an ongoing growth in demand for our research and services and our ability to respond to new opportunities and the issues facing New Zealand.

### 3.2 Status

NIWA's economic performance, including technology transfer, for 2006–07 is summarised below:

	Target 2006–07	Outcome
Total revenue NIWA Group for the year ended 30 June	\$102,627,000	2004 \$84,631,000 2005 \$91,137,000 2006 \$106,414,000 2007 \$113,911,000
Revenue NIWA Group for the year ended 30 June 2006		
FRST	\$41,642,000	\$44,324,000
Capability funding	\$9,094,000	\$9,094,000
Ministry of Fisheries	\$16,500,000	\$17,183,000
Other Crown Research Institutes	\$1,300,000	\$1,424,000
Central government	\$7,938,000	\$13,618,000
Local government	\$6,160,000	\$6,035,000
Private sector	\$6,750,000	\$7,672,000
Other sales	\$13,243,000	\$14,561,000
Contracts to supply information to New Zealand users NIWA Group for the year ended 30 June 2006	\$24,000,000	2006 \$35,196,000 2007 \$34,530,000
Achievement of technology transfer objectives in FRST contracts	95%	97%
TBG contracts	\$1,000,000	\$322,000
External requests for information from our nationally significant databases and collections*		
National Climate Database**	10 000	21 740
Water Resources Archive**	1 200	55 920
NZ Freshwater Fish Database	1 400	1 457
Science outputs and collaboration (including international connectedness)		
Commissioned reports to users* <sup>1</sup>	580	479
Presentations on technical information and research results* <sup>1</sup>	800	977
Publications on technical information and research results* <sup>1</sup>	150	346
Peer-reviewed articles* <sup>1</sup>	320	291

Keynote and plenary presentations <sup>*,1</sup>	30	15
Research monographs or books <sup>*,1</sup>	70	114
Popular books <sup>*,1</sup>	2	11
Number of representations on international committees	110	96
Number of patents granted*		
New Zealand	1	1
Overseas	1	1
Licensing arrangements entered into*	15	10
Number of significant new or improved products, processes, and services*	20	4
Joint ventures or formal associations*	1	6

\* Research Application Metrics and Relationships/influencing role indicators as required by CCMAU.

\*\* Total automated and manual requests serviced.

\*.1 measured for a calendar year.

The significant increase in database requests serviced reflects the move to more automated delivery and the heavy demand for environmental data. There were some slight changes to indicators this year, so some are not directly comparable with those from previous years. The number of commissioned reports (479) was slightly below the average over the last 5 years (538). The number of presentations (996) was similar to last year (1020), and has grown substantially over the recent years. Peer-reviewed publications (9291) were down on last year, but research monographs increased from 83 to 114. Staff wrote 11 popular books this year, compared with the usual output of 1 or 2.

### **Contracts to supply information to international users**

NIWA Group for the year ended 30 June 2007

2006 \$4,444,000

2007 \$7,232,000

### **Cost of all goods, materials, and services**

NIWA Group for the year ended 30 June

2004 \$36,153,000

2005 \$38,071,000

2006 \$42,824,000

2007 \$47,712,000

### **Employees**

Total payroll and benefits

NIWA Group for the year ended 30 June

2004 \$41,864,000

2005 \$43,214,000

2006 \$47,188,000

2007 \$48,571,000

### **Providers of capital**

NIWA had interest-bearing debt at 30 June 2007 of nil (2006: \$600,000).

Changes in economic value to our shareholders are:

**Operating surplus before tax**

NIWA Group for the year ended 30 June

2004 \$7,036,000

2005 \$9,654,000

2006 \$15,706,000

2007 \$15,843,000

NIWA Group has had two exceptional years. The challenge facing us is how to maintain this level of growth with increasing competition and rising costs.

**Return on average equity (%)**

NIWA Group for the year ended 30 June (net surplus/average shareholders' funds)

2004 10.7

2005 13.5

2006 24.4

2007 22.6

The return on equity target for our shareholders is a nominal 9%. The NIWA Group is confident that this target will remain achievable in the long term.

**Public sector**

Most of our research is aimed at addressing issues of relevance to the general public – the sustainability of our society and civilisation.

As a commercial entity, we also contribute by paying tax. Taxes paid in other countries were minimal.

**Taxes paid**

NIWA Group for the year ended 30 June

2004 \$1,506,000

2005 \$3,000,000

2006 \$5,606,000

2007 \$6,063,000

### 3.3 Future challenges

The future economic challenges include:

- continuing to meet NIWA's economic targets in the face of increasing competition and increasing resource costs;
- continuing to find new investment and growth opportunities that add value to our organisation and extend beyond straight fee-for-service;
- maintaining our profitability and continuing to produce acceptable returns to our shareholders balanced against the increasing costs of retaining the best scientists in an increasingly tight labour market and rising operating costs;
- increasing commercialisation and adding value that turns our research outcomes into new products, services, and industries for New Zealand;
- better meeting client needs by improving use of the project management system to increase our responsiveness and our identification of client requirements;
- improving our ability to track and follow-up opportunities.

### **3.4 NIWA Performance – Environmental**

Environmental sustainability identifies the need to meet NIWA's internal and customer needs while minimising the impact on the environment. NIWA acknowledges this responsibility and acts accordingly by taking all practical steps to:

- minimise any impact;
- have contingency plans in place for accidental spills;
- minimise the consumption of resources and waste production;
- improve environmental performance.

As part of NIWA's earlier commitment to environmental sustainability it became a member of the New Zealand Business Council for Sustainable Development. NIWA also has members on national and international environmental and conservation committees, and is a member of the EnergyWise government programme, which is administered by the Energy Efficiency and Conservation Authority (EECA).

We strive to be energy efficient in all our premises, plant, and equipment, wherever it is cost-effective. However, making significant improvements in this area, while not affecting business growth, presents constant challenges. During 2006–07 an EECA software package 'Energy Achiever' was used to assess our energy consumption and initiatives to become more energy efficient. Areas for improvement were identified in this exercise, along with audits in May 2006 at major sites. Implementation of these recommendations was started during 2006–07 and will continue in 2007–08. EECA's report rated NIWA above average for managing energy use and for its awareness programmes.

### **3.5 What was achieved**

Highlights for 2006–07 included:

- purchase of two further hybrid vehicles at Hamilton and Auckland;
- waste audits at the Hamilton and Greta Point sites;
- staff competing in the 'Bikewise' business challenge in February/March 2007 – Hamilton staff won the upper North Island large business category and Greta Point staff were second in this category;
- staff were involved with BioBlitz at Hamilton;
- staff at Greta Point held a meeting to discuss their carbon footprint from commuting; action points will be followed up with management in 2007–08;
- continued increase in paper and cardboard recycling;
- the high cycling commuter ratio among staff results in high use of cycle sheds;
- drafting of a sustainability philosophy;
- EECA's review of energy management and planning rated NIWA above average for managing energy use and for its awareness programmes;
- Positive feedback from visitors to NIWA over the awareness of saving electricity (e.g., non-essential lighting is turned off when a room is not in use, signs and posters around the buildings reminding staff to conserve energy);
- continued staff awareness and involvement in minimising negative effects of NIWA's activities.

	Target	Outcome
Gas consumption per FTE (kWh)	Reduce NIWA's use of gas by at least 5% by June 2007 (from baseline for 2001–02)	2001–02 1437 2002–03 1387 2003–04 1504 2004–05 1570 2005–06 1387 2006–07 1294
Electricity consumption per FTE (kWh)	Reduce NIWA's use of electricity by at least 5% by June 2007 (from baseline for 2001–02)	2001–02 7446 2002–03 7239 2003–04 7292 2004–05 7469 2005–06 7659 2006–07 7677
Greenhouse gas (CO <sub>2</sub> ) emissions (t)	Reduce NIWA's total annual contribution to greenhouse gas emissions, based on FTEs, to the baseline level for 2001–02	2001–02 5.06 2002–03 4.94 2003–04 5.06 2004–05 6.99 2005–06 7.49 2006–07 6.19
Vessels' greenhouse gas (CO <sub>2</sub> ) emissions	Reduce carbon dioxide emissions by <i>Tangaroa</i> and <i>Kaharoa</i> , based on tonnes of fuel per sea-day by reducing vessel speed when practical	Carbon dioxide emissions increased from 9.83 t per sea-day in 2005–06 to 10.7 t per sea-day in 2006–07
Change in recycling and solid waste production	10% reduction in solid waste and paper use by 2008	Recycling of paper increased by 17.7% and solid waste production was reduced by 2.5% compared with 2005–06; reams of paper per FTE increased by 8.0%

Electricity and gas use per FTE increased by 2.5% in 2006–07 compared with the baseline in 2001–02. However, without the efficiency efforts in place during the last few years the increase would have been considerably higher. Although some of this increase may be attributed to colder weather and high productivity (as measured by increased billable hours in the last two years), additional initiatives are being investigated to ensure use does not increase further in 2007–08.

In addition to auditing our use of electricity and gas, we gathered information on our use of motor vehicles, hire of taxis, and air travel to enable an assessment of the equivalent greenhouse gas emissions produced by our activities. We estimated that the consumption of fossil fuels to support NIWA Science activities emitted 2983 tonnes (t) of carbon dioxide in the year ending 30 June 2002, 3030 t in 2003, 3373 t in 2004, 4039 t in 2005, 4407 t in 2006, and 3776 in 2006–07 (using the protocol made available by the New Zealand Business Council for Sustainable Development). The use of motor vehicles, hire of taxis, and air travel are essential to enable us to carry out our business.

Based on FTEs of 588 in 2005–06 and 610 in 2006–07, carbon dioxide emissions decreased from 7.49 t per FTE in 2005–06 to 6.19 t per FTE in 2006–07. The main reason for this was that electricity use by one of our clients at Bream Bay is now metered separately, so that use is not included in NIWA's consumption figures.

### 3.6 NIWA Vessels

NIWA Vessels manages two research vessels – *Tangaroa* (deepwater) and *Kaharoa* (inshore and coastal). Both operate on diesel fuel, and the equivalent carbon dioxide emissions were:

2001–02	6682 t (12.7 t per sea-day)
2002–03	6091 t (12.5 t per sea-day)
2003–04	5522 t (11.7 t per sea-day)
2004–05	6954 t (13.3 t per sea-day)
2005–06	5172 t (9.8 t per sea-day)
2006–07	6185 t (10.7 t per sea-day)

A policy was put in place for 2005–06 to reduce the maximum speed for *Tangaroa* and *Kaharoa* by 1.5 knots. As a result, we significantly reduced the amount of diesel used: by 19.8%. In 2006–07 there was an increase of 10% over 2005–06, which can be partly attributable to a broken gearbox and the consequent requirement for a different gear setting, and the use of a stand-by generator for 2 months. Furthermore, the use of the vessels varies according to the type of voyage.

We also ensure the level of emissions from diesel fuel is minimised by continually reviewing work schedules and updating servicing and maintenance plans. Both vessels are classified with Det Norske Veritas (DnV), an internationally recognised classification society, and both are maintained in accordance with the society's rules. These require the vessels to comply with stringent, planned maintenance routines and high levels of operational practice. NIWA Vessels carries out underwater hull inspections of *Tangaroa* at about 9 monthly intervals to help improve fuel consumption.

Every 6 months the vessels are inspected for introduced species, such as *Undaria*, and are cleaned. This is also done before they enter areas where *Undaria* and other noxious plants have not been recorded, such as Antarctica. A waste separation station has also been established on *Tangaroa* for recycling glass, paper, cardboard, cans, and plastics.

### 3.7 Paper use

Paper is the most significant area of waste for NIWA and we have developed strategies to reduce its use. Although use increased by 828 reams, or 2070 kg, this was mitigated partly by our paper recycling increasing by 5332 kg.

### 3.8 Performance indicators

Sustainability performance targets need to be constantly reviewed as the business changes and NIWA reviews its achievements and aspirations in sustainable development. The targets reported on above were set in 2001–02 and baselines were set using data from that year. During 2006–07 our performance targets were extensively reviewed, and existing ones were updated and new ones were added to focus effort on reducing our footprint.

A major undertaking in 2007–08 will be to establish NIWA's carbon footprint and start implementing measures that will move us towards carbon neutrality. Once our footprint is defined, a target will be set for 2008–09. New performance measures that have been added for 2007–08 include:

- improvement in building efficiency of 5 kWh/m<sup>2</sup> by 2010;
- reduction in total greenhouse gas emissions per FTE to less than 2006–07 levels by 2010;
- reduction in total greenhouse gas emissions (vehicle fleet, gas, electricity) to less than 2005–06 levels;
- achievement of 200 hours of video-conferencing per year;
- 70% of staff using alternative modes of transport by 2009;
- 70% of staff believing sustainability is core to NIWA's ethos.

Future environmental challenges include:

- minimising waste production as the company grows and there is more demand for its services and products;
- maintaining and enhancing staff awareness of the need to conserve energy and develop alternatives – significant progress has been made, but ongoing improvement is required, and more effort will be made to recognise achievement in this area of the business;
- continuing investment in energy saving infrastructure and equipment (e.g. video-conferencing, energy-efficient buildings) while competing with the heavy demand for capital equipment; for 2007–08 there is a commitment to investing 0.5% of NIWA revenue, as a separate capital expenditure category, in sustainable business initiatives and energy demonstration projects such as wind or solar energy at one of our sites;
- developing building standards for all new building and renovations to consider: double-glazed windows, roof insulation, wall insulation, minimum passive solar input targets, total building energy targets;
- NIWA undertaking an audit of its current environmental footprint, and setting targets for moving towards carbon neutrality;
- revising and raising of the profile of the Sustainable Development Committee and developing a sustainability action plan;
- encouragement staff to change to more environmentally friendly methods of transport, facilitating greater use of car pooling, and, where possible, using

tele-conferencing and video-conferencing instead of air travel (with a levy on overseas travel).

### **3.9 NIWA Performance – Social**

Social sustainability is a measure of the capacity of an organisation to attract and maintain quality staff and maintain a high level of staff morale.

NIWA has a policy of extending science to the community in many ways, including: sponsorship of the NIWA Interactive Room at Kelly Tarlton's Underwater World, sponsorship of Science & Technology Fairs, the Sea & Learn shipboard education programme, supervision of university and postgraduate students, and via public training courses and workshops. Encouraging community understanding of NIWA's activities and outcomes enriches community knowledge and increases the community's capacity to act, as well as promoting a sense of satisfaction for NIWA employees.

In support of our mission and vision, our values include:

- taking social responsibility and valuing our environment;
- ensuring that our staff are treated fairly and equitably, and that their work and lives are appropriately balanced;
- attracting, retaining, and rewarding high quality staff;
- maintaining a culture that is adaptable and provides opportunities;
- providing staff with a safe and healthy work environment.

### **3.10 What was achieved**

Our staff are proud to work at NIWA. We provide an environment where staff can work among leaders in their field and where they have the ability to work with freedom and autonomy.

To further understand and enhance NIWA's culture we ran a series of workshops to identify which parts of NIWA's culture should be retained and encouraged and which needed to change.

Staff overwhelmingly reported enjoying the interesting, challenging, high quality, and variety of work. Another common theme was the esteem with which staff considered their colleagues, both in terms of their calibre, attitudes, commitment, and pride in working for NIWA.

The 'One NIWA' philosophy and the multi-disciplinary approach that this supports was highly valued, as were the flexible working hours and other staff benefits.

Staff would like:

- more interaction with senior management;
- more input into decision-making;
- more communication at all levels and in all directions;
- an increase in professional idea sharing forums and networking opportunities with colleagues;
- salaries increasing in line with inflation or market rates.

Overall, we maintained our position at or above the science market median for all science levels and increased the margin our top level scientists have above the science market median. Our remuneration system has an annual review provision that recognises individual performance. Staff also benefit from an annual profit share scheme, which reflects the performance of the organisation, with all staff sharing equally in the overall success. This year saw the largest profit share in NIWA's history.

In addition to cash remuneration, permanent staff have access to many other benefits, including:

- subsidised superannuation or KiwiSaver;
- life insurance;
- access to reduced premium medical schemes, and in some cases a health care subsidy;
- generous leave and allowance provisions;
- long service leave

Our ability to reward and retain staff underwent sustained pressure this year as the ongoing effects of the skills shortage became more evident. Continuing to attract and retain high quality staff is one of our key challenges. Offering competitive remuneration packages within our financial constraints is one of the tools available to address this issue.

We also provide an enjoyable work environment. Regular social functions and social events are organised, giving people the opportunity to interact in a less formal setting. Events range from the action-packed Auckland go-carting challenge and Wellington's 'winter poultice' to more sedate events, such as wine tasting.

In some centres our offices have been improved and rejuvenated so that they receive more sunlight. Most staff have access to high quality computing and laboratory facilities, as well as state-of-the-art equipment and services.

The work environment must be sustainable as well as pleasant. Each of our sites actively encourages recycling, and provides space for cycle storage and showers to encourage the use of alternative transport. Our Nelson office excelled this year and won the medium employer SPARC Push Play Award Cycle Challenge, with 100% of staff cycling to work.

As part of our ongoing commitment to social responsibility, and as a new initiative for this year, we provided staff with free financial information and advice sessions. These ran on a quarterly basis at all major campuses and covered topics such as managing your mortgage, 'retirement planning', insurance and risk, and the KiwiSaver scheme.

Ongoing investment in the development of our staff is crucial for our future success. We provided staff with capability funding to pursue ideas and generate tools, invested significantly in both technical and non-technical training, and provided the opportunity for staff to participate in overseas conferences and workshops.

Every staff member in NIWA has the opportunity to have an individual career development and planning discussion, and 57% of staff now have individual development plans on file.

As high achievers driven by excellence and commitment, our staff are dedicated and passionate about the work they do. Therefore, it is important that we continue to be committed to ensuring a balance is maintained between work and private lives. To help achieve this, we have flexible working hours and flexible work arrangements; generous sick, annual, and parental leave provisions; and the opportunity to join a discounted health insurance scheme. Towards the end of the financial year we launched 'Health by Choice', a programme designed to increase the health and wellbeing of staff. A series of voluntary on-site health checks that measured cholesterol, blood sugar levels, blood pressure, and body mass index were provided, and staff have access to self-paced programmes covering stress management, smoking cessation, health observation, and a personal trainer module. During the year, 1839 paid days were allocated to NIWA's personal development and training programme. Staff can use a combination of leave and reimbursement to participate in activities ranging from yoga and golf lessons to car racing and sailing.

Reported workplace incidents increased from 93 to 113, with lost-time incidents rising from 5 to 18. Most lost-time incidents were the results of soft tissue damage, strains, and sprains. Although the number of reported incidents increased, the time lost to workplace injuries dropped slightly from 73.9 days to 73.5 days, less than 0.05% of total work days per year for our science staff. Our goal is to have no lost-time injuries and to reduce all incidents.

NIWA's two collective employment agreements were ratified. A positive problem-solving approach to employment relations was maintained with all NIWA's active unions – the PSA, the NZ Maritime Union, the Merchant Services Guild, and the Marine and Aviation Engineers. 58% of staff belong to the PSA.

Despite our achievements this year, we still have significant challenges. We need to continue moving our culture forward by increasing our communication at all levels, ensuring that our senior management teams are visible leaders, and consolidating staff career development. The revision and redrafting of our Equal Employment Opportunities plan has also highlighted that we need to re-establish our energy and commitment in this area.

### 3.11 Status

NIWA performance in social sustainability is summarised below:

	Target	Outcome
Total staff FTEs (permanent and fixed term)*	720	711
Staff composition (number of staff)*	675 permanent staff 473 researchers 46 research support 110 general support 26 management 20 postdocs	681 permanent staff 491 researchers 43 research support 104 general support 26 management 17 postdocs
Achievement of a desirable work/life balance	70% of staff are positive about working for NIWA and see themselves	[This survey is not scheduled to be run until the end of this

	working for NIWA in three years time	financial year. The 2005 figure was 48%.]
Staff turnover	<10%	12.8%
Number of new jobs created main city centre rural areas	5 5	24 4
Staff with personal development plans	90%	57%
Staff days allocated to personal development	400	1839
Lost time from injuries or accidents	<0.05%	0.04%
Number of Noho Marae attendees	60	44

\*Research Application Metrics and Relationships or influencing role indicators as required by CCMAU.

### 3.12 Education

NIWA's influence on the wider community and dissemination of information is summarised below for 2006–07.

	Target	Outcome
Number of postdocs funded, teaching fellowships awarded, PhD and MSc students supervised, scholarships awarded		
PhD and MSc students supervised	60	63
Postdocs funded	20	18 postdoc fellows
Number of external training courses	20	10

NIWA contributes significantly to the promotion of science in our schools and universities and with the public.

In 2006–07 we relaunched the Sea & Learn programme, in collaboration with the Sir Peter Blake Trust. Sea and Learn is a 'hands-on' shipboard education programme for senior high school students. In March 2007 more than 150 students and 15 teachers from Taihape to the Bay of Islands participated in the programme. We also continued our sponsorship of the school Science & Technology Fairs (to promote science in intermediate and secondary schools), with NIWA providing major sponsorship for the Auckland, Waikato, Bay of Plenty, Wellington, and Nelson regional fairs. We also provided prizes for five other regional science fairs.

For younger students, NIWA's sponsorship of the NIWA Interactive Room at Kelly Tarlton's Underwater World provides hands-on activities for primary school students, including the microscopic examination of corals and other marine organisms. NIWA has also provided scientific information and display material for special exhibits at Kelly Tarlton's. NIWA is also involved in increasing the scientific knowledge and skills of teachers by hosting recipients of New Zealand Science, Mathematics, & Technology Fellowships. In the past year we have hosted three fellows investigating

stream ecology, shark genetics, and the impacts on the ocean of increasing atmospheric carbon dioxide.

The joint postgraduate Centres of Excellence with Otago (chemical oceanography), Canterbury (aquaculture and marine ecology), Auckland (aquatic and atmospheric sciences) universities are key to NIWA's support for university education. Staff are actively involved in the supervision of 63 postgraduate students at 13 universities, 53 at PhD level. NIWA also provides infrastructure and operational support for jointly supervised students funded by FRST's Enterprise Fellowships, Tūāpapa Pūtaiao Māori Fellowships, and Bright Futures Fellowships.

Postdoctoral fellowships are a very important stepping stone for recent PhD graduates. NIWA funded 22 fellowships in areas where we need to develop a new skills base or ensure that there are fully trained staff to meet future skills shortages. These areas include coastal processes, water resources, bioactive chemicals, simulation modelling, and biodiversity. We have also provided supervision and operational support for four postdoctoral fellows who are supported by FRST.

NIWA's training course programme ran 10 courses in 2006–07, with 135 participants from a range of regional councils, government departments, and consulting companies, as well as NIWA staff. The courses ranged from electric fishing to managing coastal hazards and included identification of native fish and data quality for environmental management. We ran seven workshops that attracted more than 500 participants. We also provided internal training for eight staff through our overseas technical training programme.

### **3.13 Use of animals in research**

NIWA scientists study fish in environmental research and aquaculture for such purposes as understanding the ecological requirements of indigenous species, assessing the impacts of proposed developments on environmental health, and in the development of new aquaculture techniques. All this research with live animals is conducted in accordance with the Animal Welfare Act (1999). This Act requires projects to be approved by our Animal Ethics Committee (AEC).

In compliance with the Act, our animal-based research is conducted in accordance with NIWA's Code of Ethical Conduct for the Use of Live Animals in Research. Our code permits the use of animals only when the AEC considers that the benefits of the research outweigh the suffering imposed on the animals. Only the minimum number of animals needed to produce statistically sound results can be used. The total number of animals and the range of species used (mainly fish) depends entirely on the spectrum of funded projects. Consequently, use varies from year to year.

In 2006–07 our animal use figures were mostly classified in the little suffering or no suffering categories. These were experiments with fish and lobsters involving studies on natural rock lobster reproductive behaviour, assessment of food grade tags in finfish, respiratory studies on kingfish and toxicity testing on fish.

The number of animals used for research purposes has continued to drop following the changes in research priorities and funding.

### 3.14 Key challenges

Key challenges during 2007–08 include:

- demonstrating corporate commitment through improved communication at all levels and investment in sustainability initiatives;
- demonstrating NIWA's commitment to external customers and New Zealand through the provision of sound advice, tools, and applications in our core sectors, and showing leadership in economic, environmental, social, and cultural sustainability;
- acting as a responsible corporate citizen by reducing waste and energy consumption while meeting the economic requirements of the business, defining and then reducing our carbon footprint, and continuously improving our internal performance;
- improving our social sustainability performance through improved internal communication, contributions to community activities, and improving and enhancing the work/life balance and work environment for NIWA staff;
- maintaining our strong links with Māori and our commitment to cultural responsibility through improved relationships and partnerships with iwi groups, and continued staff awareness programmes.

## 4. Verification Statement

ERM Independent Verification Report to the National Institute of Water and Atmospheric Research Limited

Environmental Resources Management NZ Limited (ERM) was engaged by the National Institute of Water and Atmospheric Research Limited (NIWA) to provide independent verification of its Sustainability Report 2007 (Report), to the scope of work outlined below.

### Scope of Work

The Report covers NIWA's operations for the 12 months to 30 June 2007, unless stated otherwise in the text. This work was performed in accordance with ERM's verification methodology, which is based on the international assurance standards: ISAE 3000, AA 1000 AS and ISO 19011. ERM reviewed NIWA's use of the AA1000 Principles of Completeness and Materiality in reporting performance. To do this, ERM interviewed a number of personnel and reviewed relevant documentation at NIWA's Wellington, Auckland, and Hamilton offices regarding:

1. *Data accuracy*, including data trails from original site-based data retrieval to the final Report, for a representative sample of material parameters.
2. *Robustness of data capture processes*, including collation, transcription, internal reporting and controls in place, such as internal data verification checks.
3. *Adequacy and relevance of key statements* made throughout the Report, including cross-checking of reported data, for a representative sample of key statements.
4. *Effectiveness of mechanisms in place for Report preparation*.

The scope specifically excluded data and statements relating to financial information and previous financial years.

### ERM's Independence

NIWA was responsible for preparing the Report, including the collection and presentation of data and statements within it. The ERM team was not involved in the design or compilation of the Report (except by way of this independent verification engagement). During 2006/07, ERM did not work with NIWA on other consulting engagements.

### Our Conclusion

**On the basis of its scope of work, and in consideration of the limitations of the verification engagement presented above, ERM concludes, in all material respects, that NIWA's Sustainability Report 2007 appropriately addresses the AA1000 Principles of Completeness and Materiality, for the 12-month period to 30 June 2007. In conjunction with this Independent Verification Report, ERM will provide a more detailed Management Report to NIWA.**

### Key Observations and Recommendations

Based on its scope of work, and without affecting its verification conclusion noted above, ERM highlights the following good practice:

- Inclusion of a range of initiatives aimed at extending science into the community.
- Coverage of a variety of research projects, displaying a strong sense of leadership in areas such as climate change.

ERM also provides the following key recommendations for improvement:

- Establishment of a central data management system for regular internal performance reporting and the annual collation of Report data, along with contributor guideline to facilitate smooth Report development and verification processes.
- Engagement of stakeholders in providing feedback on the Report to inform future Report development.

ERM congratulates NIWA on its commitment to sustainability reporting.



Environmental Resources Management NZ Limited (ERM)  
12 December 2007, Auckland, New Zealand

*ERM is an independent global provider of environmental, social and corporate responsibility consulting and verification services. Over the past four years we have worked with over half of the world's 500 largest companies, in addition to numerous governments, international organisations and NGOs.*

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