

Public perceptions of New Zealand's environment

Paper Presented at the New Zealand Agricultural and Resource Economics Society
Conference 25-27 August 2006

Ross Cullen, Commerce Division, Lincoln University

Ken Hughey, Environment, Society and Design Division, Lincoln University

Geoff Kerr, Environment, Society and Design Division, Lincoln University

Summary

Beginning in 2000 Lincoln University has completed biennial surveys of people's perceptions of the state of the New Zealand environment. The surveys use the Pressure-State-Response framework for state of the environment reporting to assess resources such as air quality, native plants and animals, native forest and bush, soils, beaches and coastal waters, marine fisheries, marine reserves, freshwaters, national parks, wetlands, urban environments, and the natural environment compared to other developed nations. They also examine participation in environmentally friendly activities, the most important environmental issues facing New Zealanders and a range of other issues. Individual case studies are also undertaken: in 2000 natural hazards; in 2002 the coastal marine environment, marine recreational fishing and preferences for expenditure on environmental matters; in 2004 freshwater and recreational angling; in 2006 transport and policies to internalise transport externalities. This paper reviews this research programme and its contribution to understanding state of the New Zealand environment and its management.

Keywords: Public perceptions, environment, survey, New Zealand

Introduction

The state of a country's environment can impact on the welfare of its citizens. Many New Zealand citizens are interested in the state of their environment, the sources of pressures on the environment, and the quality of environmental management. Many parts of the environment including air and waterways are open access resources and prone to abuse or overuse. Environmental issues can become important political issues if voters seek government action to modify pressures on the environment, or improvement in the state of the environment. Citizens often look to government (local, regional, or national) to respond to concerns over environmental issues.

Governments are assailed by voters to deliver many actions. Determining which actions are justified requires information on the nature of the issues, how important they are to citizens, and how costly it might be to deliver action. These types of information are in many cases not readily available to governments and effort and expenditure are needed to obtain them. Information on the state of the environment is patchy at best in many countries including in New Zealand, although there are some

recent international ratings of countries' environmental sustainability and their environmental performance (Esty *et al.*, 2005; 2006).

The New Zealand Department of Statistics is developing a set of environmental indicators (Department of Statistics, 2006). Some regions complete surveys of their ratepayers about the state of the regional environment, e.g., the annual Christchurch City Council survey of ratepayers (Opinions Market Research Ltd, 2006). More recently the Canterbury Region Community Plans Group has agreed to develop indicators for monitoring community outcomes, including environmental well-being (Canterbury Region Community Plans Group, 2005) and similar work has occurred for the Taranaki region (Enviro Solutions NZ, 2005). The 1993 International Social Survey Programme (ISSP) survey on 'New Zealanders' Attitudes to the Environment' (Gendall *et al.*, 1993) was used to examine the link between environmental attitudes and behaviour (Hini *et al.*, 1995) and was recently repeated (Massey University, 2001). However, the ISSP surveys focus on behaviour with limited information on public perceptions of the environment, its management and trends. Environment Waikato is establishing a long-term profile of environmental perceptions, but only for its region (Gravitas Research and Strategy Limited, 2004).

State of the Environment Reporting (SER) is the way many governments typically report on trends in (mostly) biophysical environmental parameters (UNEP, 2002). In New Zealand one national State of the Environment report has been completed (MFE, 1997), and, in an international context, the Organisation for Economic Cooperation and Development (OECD) (1996) has reported on the state of New Zealand's environment. Both reports use Pressure-State-Response (P-S-R) as the reporting framework. The P-S-R framework (OECD, 1996; 1999), or variations of it, is based on the notion of causality. It is used worldwide as a reporting tool to describe human activities that exert pressures on the environment, changing the quality and quantity (the state) of natural resources. Human management responses to the changes include any form of organised behaviour that seeks to reduce, prevent or ameliorate undesirable changes.

There are no long running surveys, either in New Zealand or internationally, that have used the P-S-R framework to focus on detailed public perceptions of the state of the environment. In response to this gap in SER, Hughey *et al.* (2001) commenced a long-term project to determine people's views about the state of New Zealand's environment. The project aims to examine and monitor perceptions over time using biennial surveys of a sample of the New Zealand population and four surveys have so far been completed. This paper outlines how the P-S-R framework is applied, the methods that are used, draws on selected data from the surveys, identifies some of the key findings and explores the validity and policy implications of this research programme.

The global sustainability study by Esty *et al.* (2005) builds on the P-S-R policy model. That study argues there are five core components that can be measured to gauge a country's sustainability performance: environmental systems; reducing environmental stresses; reducing human vulnerability; social and institutional capacity; global stewardship. The information obtained in the NZ environment perceptions studies is closest to the first and second of those core components.

A second study undertaken by Esty *et al.* (2006) aims to monitor the current environmental performance of countries by tracking 16 indicators. Esty *et al.* (2006) report each country's performance on these indicators against targets. Environmental performance is split into two major components: (i) Environmental Health and Ecosystem Vitality and, (ii) Natural Resource Management. The latter component is comprised of five subcomponents: air quality, water resources, biodiversity and habitat, productive natural resources, and sustainable energy. Results from the NZ environmental perceptions survey can be compared to the Esty *et al.* (2006) results for NZ and internationally.

Methods

Survey instrument

A postal questionnaire based on the P-S-R framework is used in each survey to gather information on New Zealanders' perceptions of the environment and environmental management. The postal survey format is used because the large number of questions asked of respondents is unsuitable for a telephone survey and in-person interviews are impractical because of budget limitations.

Pre-testing involves initial appraisal by MfE staff and by policy experts in the chosen case study areas of interest. Subsequently, up to 25 individuals selected from the target population complete the questionnaire and are interviewed to obtain interpretations of questions, tasks and responses. These pre-test responses prompt improvements to the questionnaire prior to its distribution. Considerable effort is applied to ensuring survey questions are readily understood, the survey booklet is attractive, and the task of completing the survey is not unduly onerous.

Two thousand questionnaires are mailed to households randomly drawn from the New Zealand electoral roll. The questionnaire and the letter of introduction are posted with a freepost return envelope. The questionnaires were posted during February in each of 2000, 2002, 2004, 2006. In addition, a follow-up postcard and then a second posting is made during March of each survey year to those who have not returned their questionnaire.

Sample representativeness

The effort applied to preparation of the survey appears to have contributed to the success of the surveys (Table 1). Effective response rates have been between 43 and 48 percent, once undeliverable questionnaires are removed from the sample. The responses all have a margin of error at the 95% confidence level of three per cent or less.

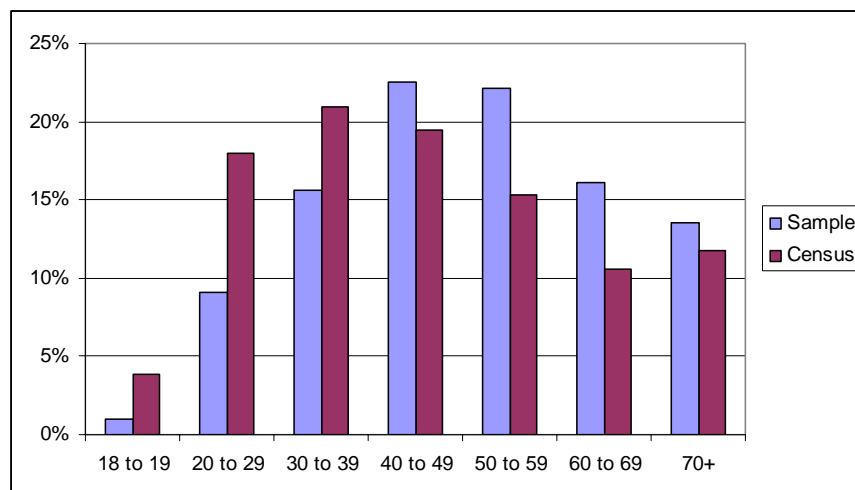
Table 1. Responses and response rates to environment perceptions surveys

Year	2000	2002	2004	2006
Number analysed	894	836	820	880
Effective response rate (%)	48	45	43	46

Each survey asks respondents to provide information on age, education, occupation, region they reside in, and the industry or sector they are employed in. The 2004 and 2006 surveys also asked respondents to state their ethnicity.

The survey respondents are not fully representative of the New Zealand adult population. 2004 survey respondents were overly representative of people aged over 40; with an income over NZ\$30 000; in employment; and with a tertiary qualification. The narrow margins of error indicate that respondents' perceptions are accurately described. The high response rate is encouraging because it reduces possibilities for self-selection. Furthermore, the reasonably close demographic match between survey respondents and the population at large is consistent with survey responses being representative of a reasonable cross-section of society. However, it is not possible to know for sure how well survey results represent the whole New Zealand population - respondents may have self-selected on the basis of some other attribute for which no information is available, such as environmental attitude. While this remains a potential limitation, the longitudinal nature of the study limits its impact. Because the sample is drawn in the same way each time the survey is undertaken, and because the response rates have been similar for each survey, the study has high power for measuring inter-temporal changes in environmental perceptions. Figure 1 compares the 2004 sample to the 2001 Census age distribution to illustrate the moderate differences between them.

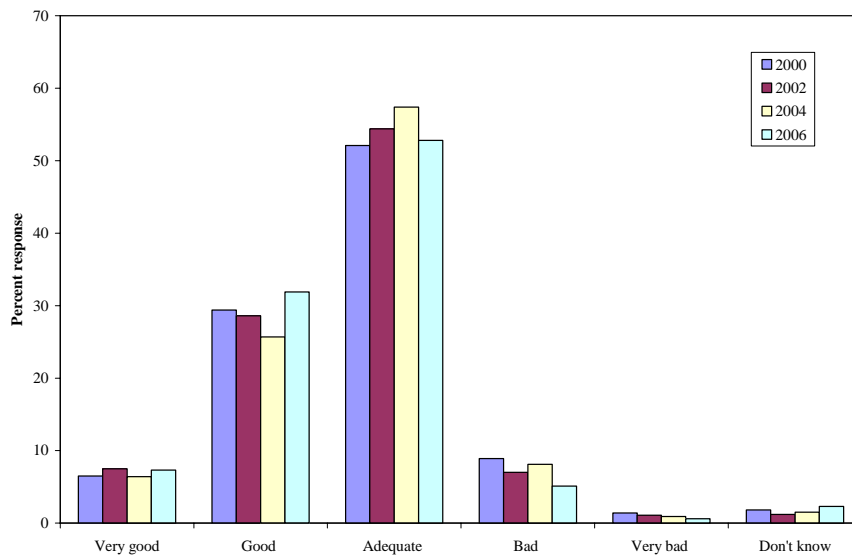
Figure 1. Age comparison of the 2004 survey respondents and the 2001 census of New Zealanders aged 15 or over (P<0.001)



Knowledge about the environment and sources of information

Respondents are asked how knowledgeable they consider themselves to be about environmental issues (Figure 2). Around 90 percent of respondents rate their knowledge of the environment as adequate to very good.

Figure 2. Respondents' knowledge of environmental issues



The 2006 survey asked respondents to rank their three main sources of information about the environment and how they rated a range of information sources for reliability. Thirty five and 30 percent of respondents respectively rated newspapers and television as their most important source of information about environmental issues (Figure 3).

Figure 3. Most important source of environmental information

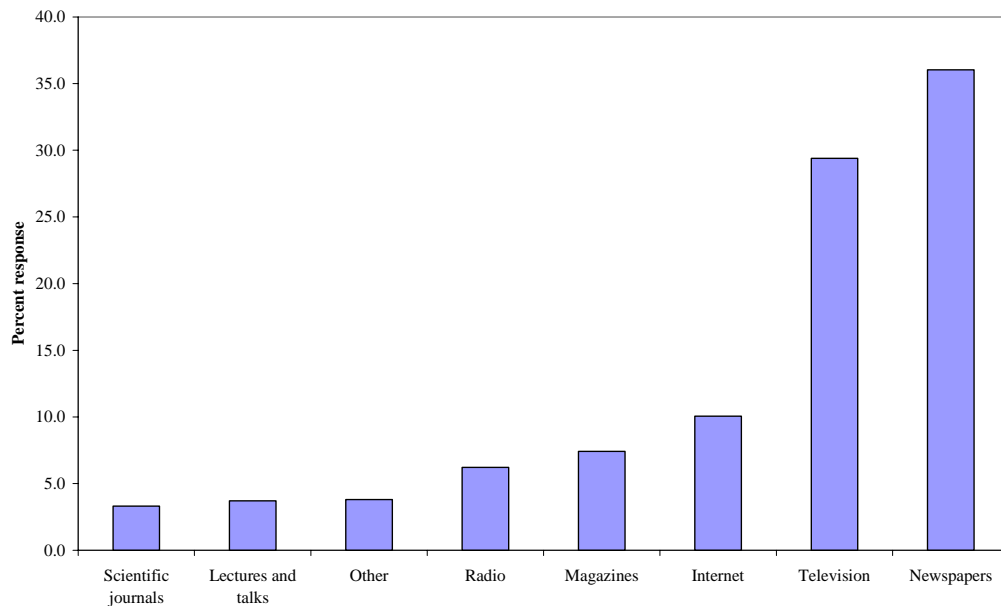
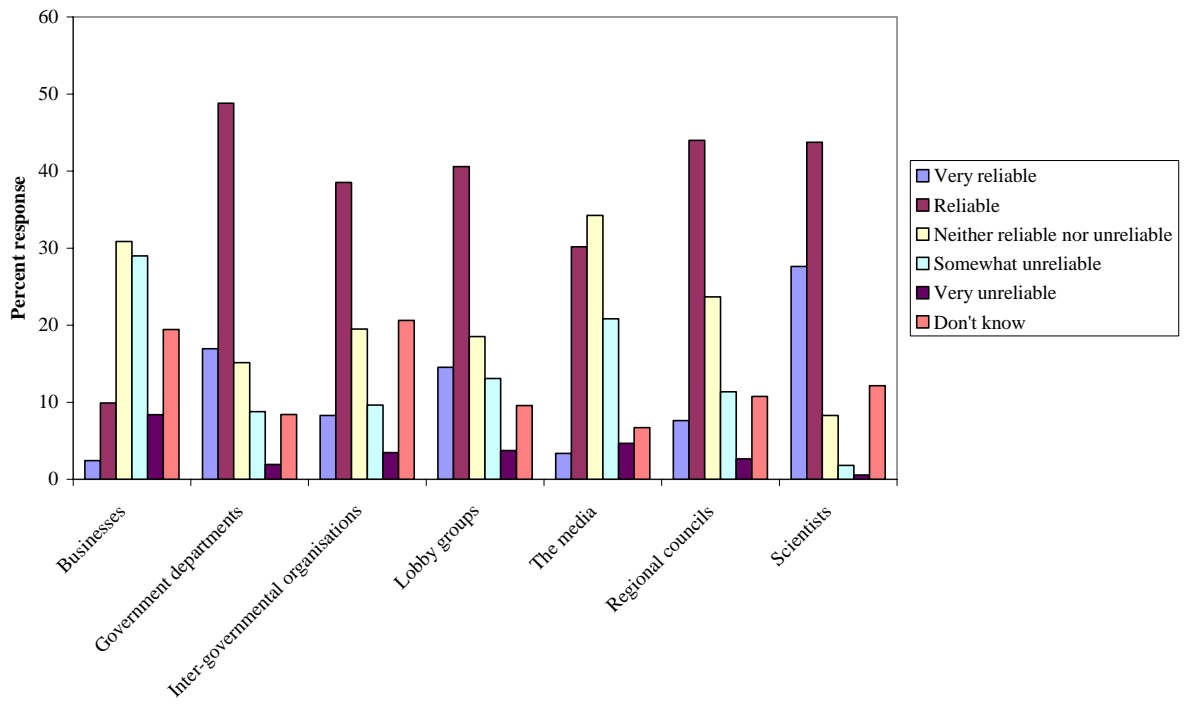


Figure 4 illustrates that newspapers and television are not rated highly as reliable sources of environmental information and businesses are rated even lower. Scientists, government departments and lobby groups are the sources most highly rated for reliability.

Figure 4. Reliability of sources of environmental information



Pressure, State and Response

Following the P-S-R framework, one set of questions in each survey measures perceived causes of damage to the environment. Three sets of questions assess perceptions of the state of the environment and three sets of questions assess perceptions about the response by management. For all of these measures a 'don't know' option is provided for respondents who may not feel sufficiently informed to respond. In this paper we provide selected results from each set of questions.

Pressures on the environment

Pressures (perceived causes of adverse environmental effects) are measured by presenting a table containing eleven resource areas (e.g., air, soils, marine fisheries) with fifteen potential causes of adverse effects. Respondents are instructed to select up to three main causes of adverse effects for each resource. This approach is designed to assist respondents by removing the necessity to select the single most important item from the fifteen presented. We provide information here on two resources, air and marine fisheries. Figures 5 and 6 illustrate the inter-survey consistency in respondents' assessment of the sources of damage to these two resources.

Figure 5. Main sources of damage to air

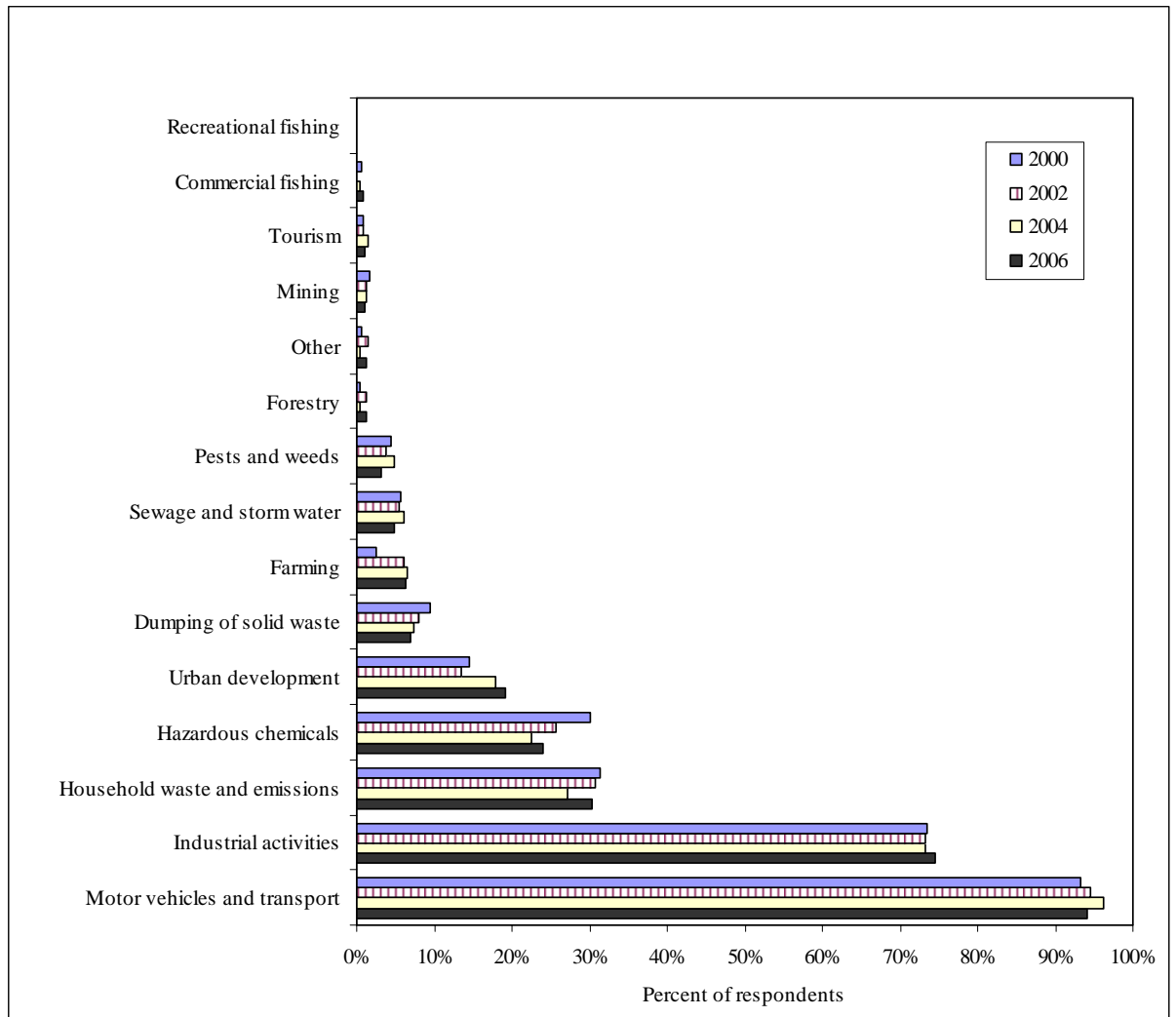
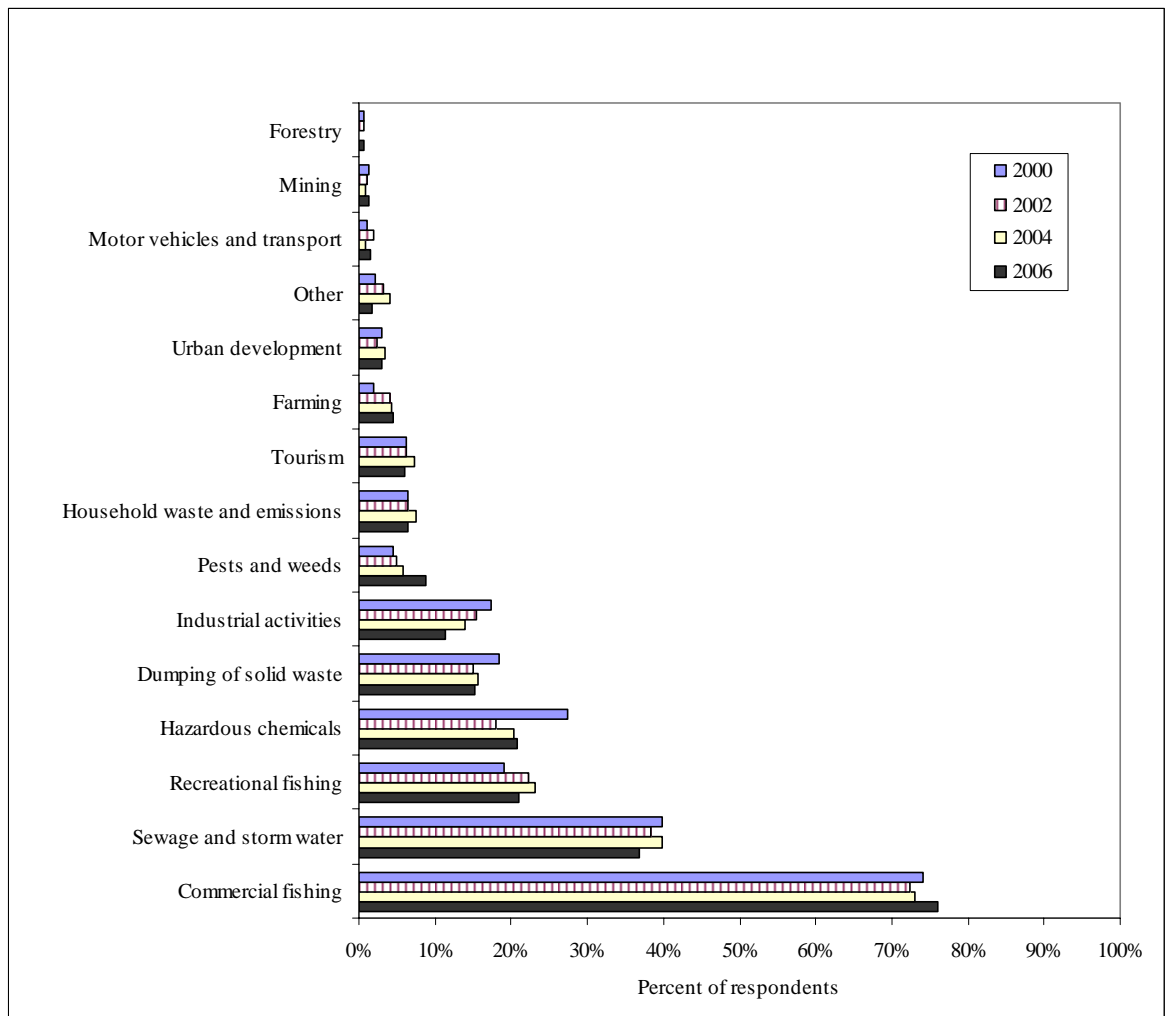


Figure 6. Main sources of damage to marine fisheries



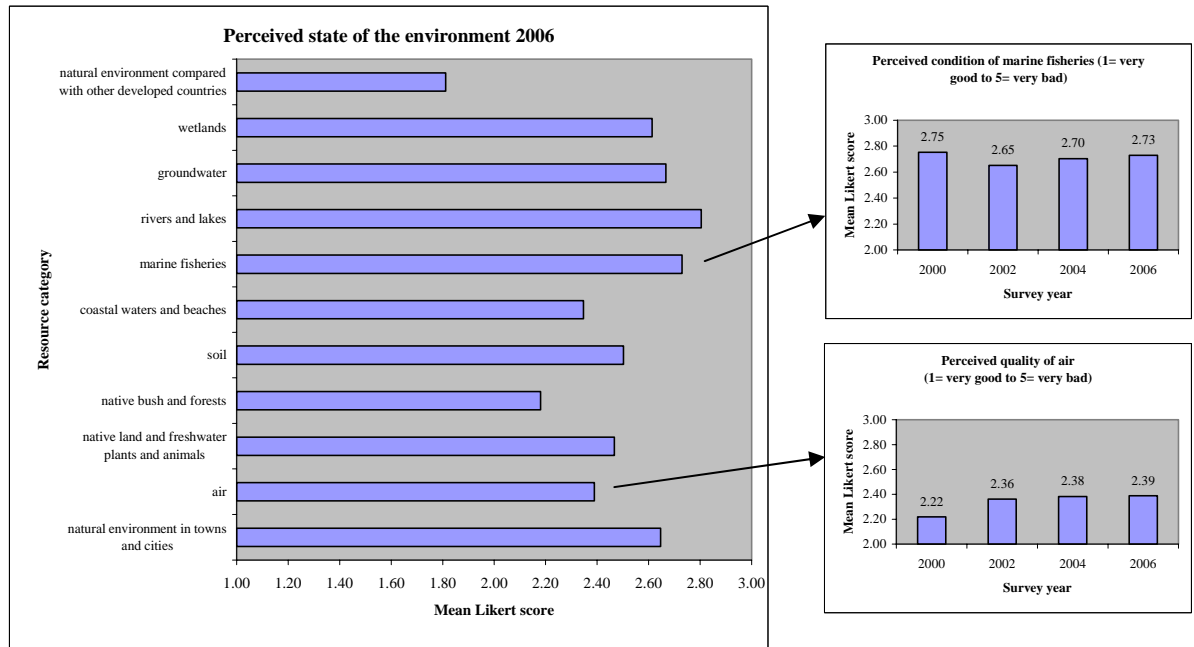
State of the environment

The perceived state of the environment has been measured in terms of quality, availability, and change over the previous five years. Respondents are invited to indicate the 'quality or condition' of eleven aspects of the environment on five-point scales anchored by *very good* and *very bad* (Figure 7). Because the surveys have now been completed on four occasions we compare assessments of the state of the environment across the surveys and no longer ask respondents to comment on 'change in state compared to five years ago'. We report in this paper on two of the resources, air and fisheries. Figure 7 indicates there is no trend in the perceived state of marine fisheries. However, perceived quality of air seems to have worsened from 2000 to 2002 ($P < 0.001$) and then been steady since.

These results can be compared to the Esty *et al.* (2006) results for air and marine fisheries. New Zealand has the ninth highest air quality score among 133 countries, based upon measurement of urban particulates and regional ozone levels. Esty *et al.* (2006) report on overfishing on a scale from 7 (overfishing) to 1 (no overfishing). New Zealand is rated 5, well behind Australia and Papua New Guinea who are both rated at 2. The state of air, relative to many other resources assessed in the perceptions survey is relatively high, consistent then with Esty *et al.* (2006) findings.

However, New Zealanders think that the state of marine fisheries is relatively good (albeit one of the lowest ratings of the 11 resources assessed), thus being at odds with Esty *et al.* (2006).

Figure 7. State of air and marine fisheries (2000-2006), compared for the state of all resources in 2006



Response - Adequacy of environmental management

A set of questions designed to measure perceived quality of environmental management is included in the surveys. Thirteen items are measured on a five-point scale anchored by *very well managed* and *extremely poorly managed*. 2004 results for air and marine fisheries are presented below.

Because respondents have been asked to state their region of residence, we can complete regional as well as national analysis of the responses where sample sizes are large enough. As illustrated in Figure 8, in 2004 Central region respondents rated the management of air quality in their region significantly more positively than did people from the Northern (Northland and Auckland) and Southern (South Island) regions ($P=0.03$).

Figure 8. Quality of air management, 2004 by region

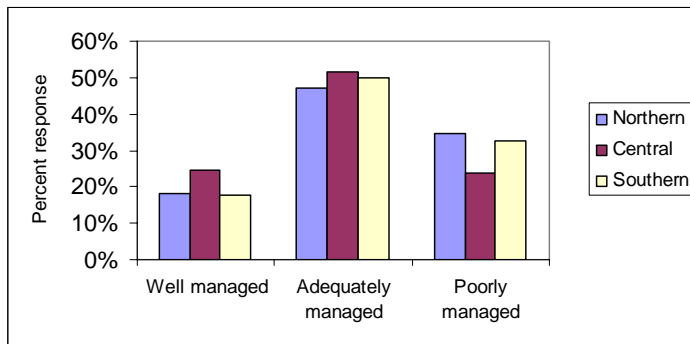
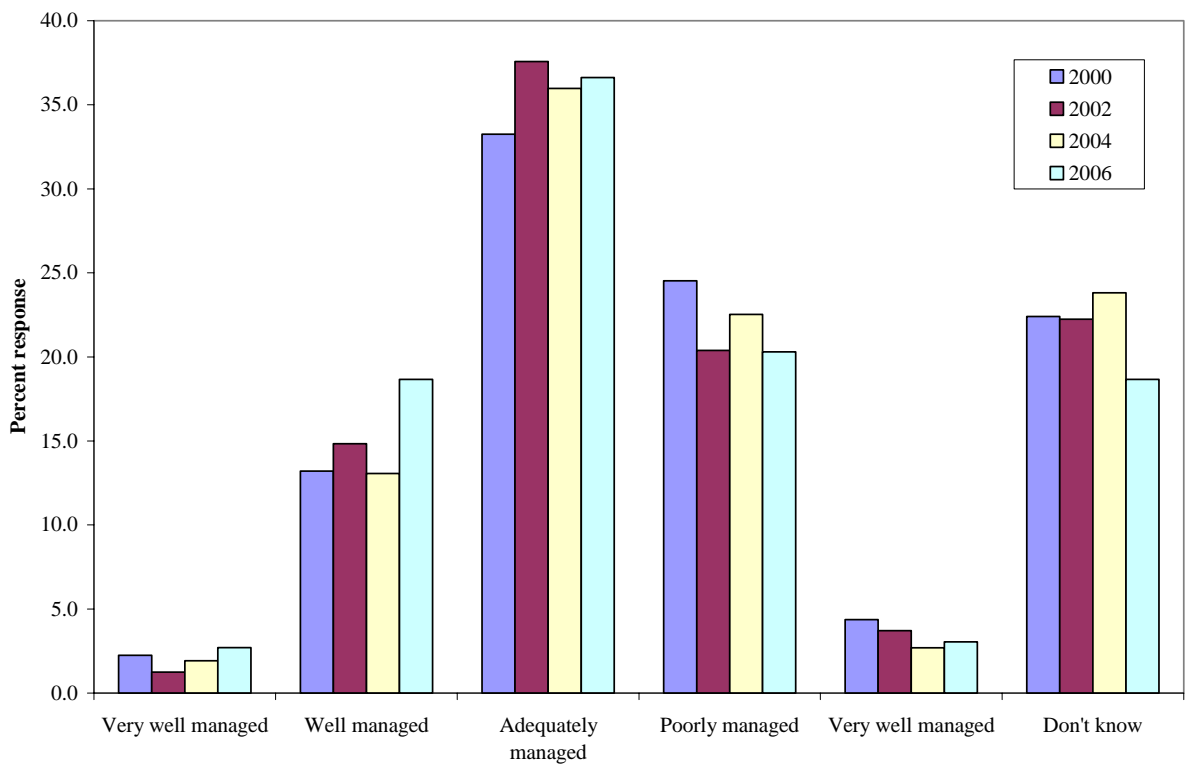


Figure 9 compares 2000, 2002, 2004 and 2006 assessments of the quality of marine fisheries management. One third of respondents judge that fisheries are adequately managed and about a quarter judge they are poorly managed. Note that Figure 7 indicates marine fisheries are rated the second lowest for quality or state among the eleven New Zealand resources studied.

Figure 9. Quality of marine fisheries management

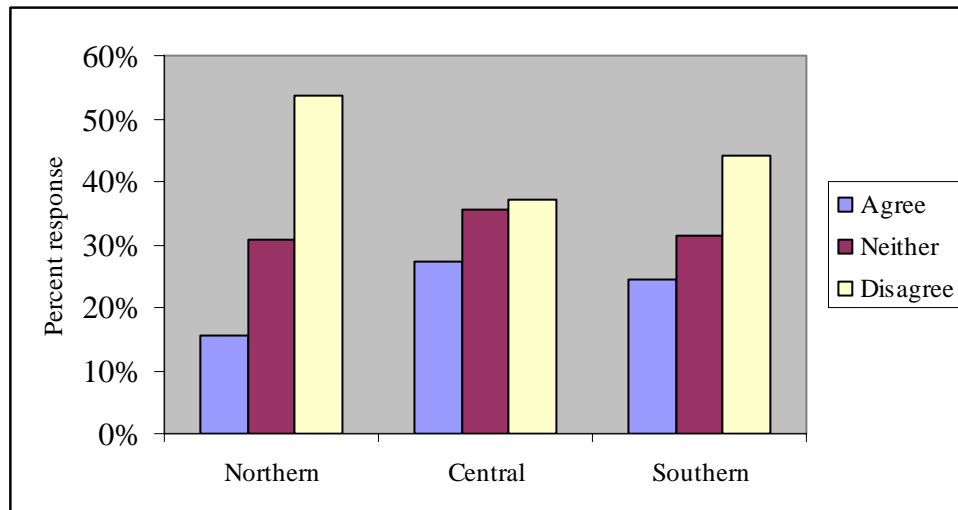


Focused questions

Each survey contains a set of questions focusing on a particular issue. The 2000 survey focused on natural hazards and individual and community preparedness for natural hazard events. The 2002 survey focused on the coastal environment and recreational fishing. The 2004 survey focused on freshwater management and recreational fishing. The 2006 survey focused on land transport and externalities associated with land transport.

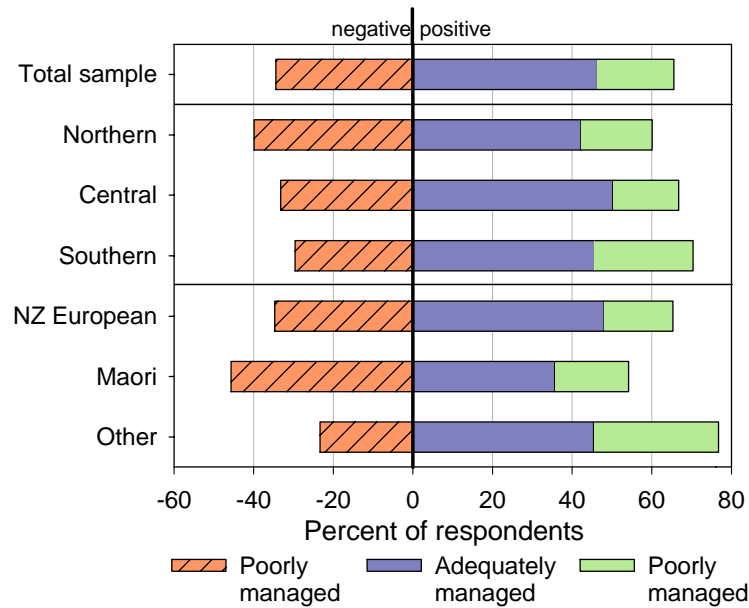
The survey design facilitates analysis of differences between sub samples. Figure 10 illustrates regional differences in response to the 2004 survey question “small lowland streams in my region are well managed.” While Northern respondents (Northland and Auckland) were significantly more likely to disagree with the statement, Central region responses were more evenly spread over the three possible response categories ($P=0.02$).

Figure 10. Small lowland streams in my region are well managed, 2004



A second illustration of the analysis of sub samples is provided by studying the influences of ethnicity and region. Figure 11 illustrates Maori had a more negative view of river and lake management compared to people of other ethnicities ($P=0.005$).

Figure 11. Management of rivers and lakes



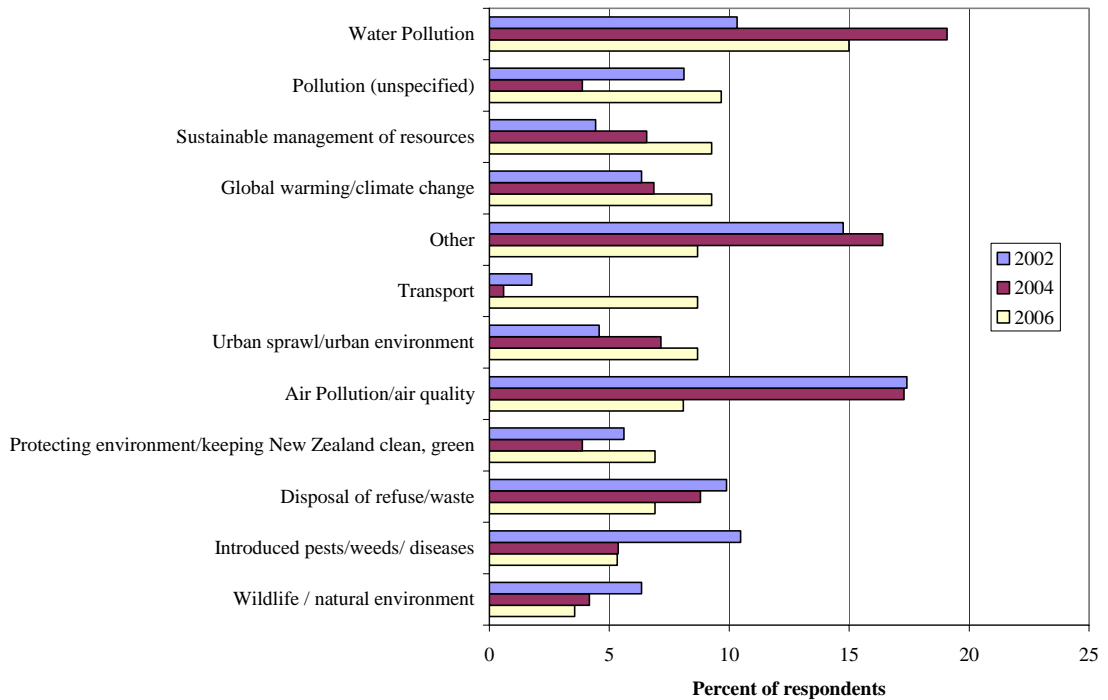
Main environmental issues

Three surveys (2002, 2004, 2006) have asked respondents to nominate the most important environmental issues for New Zealand and for the world. Figure 12 reports for New Zealand and illustrates that respondents consistently rate air pollution and water pollution as the major issues. Table 1 summarises the major inter-temporal changes that have occurred for New Zealand. In contrast, more than 30% of respondents rate ‘climate change and ozone layer’ as the most important global environmental issues (not shown here).

Table 1. Summary of main 2002-2006 changes in perceived major environmental issues

Increasing issue	Decreasing issue
Water pollution	Air pollution
Sustainable management of resources	Disposal of refuse/waste
Global Warming/ climate change	Introduced pests/ weeds/ diseases
Transport	Wildlife/ natural environment
Urban sprawl/ urban environment	

Figure 12. Most important environmental issue facing New Zealand



Comparisons with biophysical data

Responses to the surveys provide information about the state of the environment and related issues. These responses can be compared to biophysical data to check whether the two data sources provide similar views of the state of the environment. A series of publications (Hughey *et al.*, 2001, 2003, 2004a; Hughey *et al.*, 2004b; Cullen *et al.*, 2006) have examined this question. Public perceptions of the environment are often, but not in all instances, aligned with biophysical data. The public appear to have a good understanding of New Zealand water quality, pressures on water quality and the quality of water management (Cullen *et al.*, 2006; Hughey *et al.* in press).

There are some cases where the views of the New Zealand public are not well supported by biophysical data. A striking instance of that is survey respondents' rating of the state of New Zealand native plants and animals. The public rate this very positively, it is perceived as one of the highest quality components of the environment. Reality is quite different. New Zealand has amongst the highest number of threatened and endangered species of any country, with Esty *et al.* (2005) evaluating biodiversity as by far the lowest rated New Zealand environmental indicator.

Contributions of the research programme

Four relatively low budget surveys have been completed and all have achieved high response rates. Each survey contains a wealth of information about the state of the New Zealand environment, the pressures on the environment, and the quality of management of the environment. The small confidence intervals mean we can be reasonably confident that the results closely represent participant views. The

relatively small differences between the sample and the population mean those views provide a close approximation for the country as a whole. Further insights have been obtained by completing regional and other sub-group analyses. Trends in responses are being tracked across the four surveys and provide a means to quickly detect temporal change in pressure, state, and management quality. Judgements by respondents are generally well aligned with biophysical measures. Given the sluggish progress in developing a national series of environmental indicators (Department of Statistics 2006), the environmental perceptions data provide valuable insights into the state of the New Zealand environment and also provide a useful barometer of where policies for environmental enhancement are likely to gain political and popular support.

This paper has summarised the key motivations, the methodology and the types of findings that are emerging from the biennial survey of peoples' perceptions of the New Zealand environment. In reviewing the four surveys and their results the following key points have become clear:

- A consistently reliable method of reporting on perceptions of the state of the New Zealand environment, built around the OECD Pressure, State and Response model has been developed;
- The survey instrument is cost-effective to implement;
- Although the survey is not fully representative, the high response rate and low margins of error indicate a high level of reliability in the results reported;
- There is generally a good correlation between perceptions and biophysical scientific representations of the resources examined;
- The findings provide a barometer of public concerns related to the environment;
- A range of demographic variables, including ethnicity and regional analyses are proving very insightful;
- The ongoing surveys now represent the longest running set of fully integrated national level state of the environment reporting data in New Zealand, and the only data set of its type in the world;
- Trends in responses are being tracked across the four surveys and provide a means to quickly detect temporal change in perceived pressures, states, and management quality.
- The specific case studies provide an opportunity to examine contemporary issues from broad environmental policy and economic perspectives; and
- There is growing interest from the media, other researchers and from local and central government in the research and its findings.

Acknowledgements

We gratefully acknowledge the assistance provided by Ministry for the Environment and Lincoln University for this ongoing research programme.

References

Canterbury Region Community Plans Group.(2005). Indicators for monitoring community outcomes. Canterbury Region Community Plans Group, Christchurch

Cullen, R, Hughey, K.F.D., Kerr, G.N. (2006). New Zealand freshwater management and agricultural impacts. *Australian Journal of Agricultural and Resource Economics*. (in press)

Department of Statistics, (2006). Environmental Indicators. <http://www.stats.govt.nz/analytical-reports/linked-indicators/environmental-indicators.htm>. Retrieved 18.08.2006

Enviro Solutions NZ. (2005). Regional Community Outcome Indicators for Taranaki. Enviro Solutions NZ, Wellington.

Esty, D.C., Levy, M., Srebotnjak, T., de Sherbinin, A. (2005). 2005 Environmental Sustainability Index: Benchmarking national environmental stewardship. Yale Center for Environmental Law and Policy, New Haven

Esty, D.C., Levy, M., Srebotnjak, T., de Sherbinin, A., Kim, C.H., Anderson, B. (2006). Pilot 2006 Environmental Performance Index. Yale Center for Environmental Law and Policy, New Haven.

Heylen Research Centre. (1993). Conservation and recreation in New Zealand: a survey of public opinion. Wellington: Heylen Research Centre and Department of Conservation.

Hini, D., Gendall, P., Kearns, Z. (1995). The Link Between Environmental Attitudes and Behaviour. *Marketing Bulletin*, 6: 22-31.

Hughey, K.F.D.; Kerr, G.N.; Cullen, R., Cook, A.J. (2001). Perceptions of the state of New Zealand's environment: Findings from the first biennial survey undertaken in 2000. Lincoln University.

Hughey, K.F.D., Kerr, G.N., Cullen, R. (2003). Perceptions of the state of the environment: The 2002 survey of public attitudes, preferences and perceptions of the New Zealand environment. Education Solutions, Lincoln.

Hughey, K.F.D., Kerr, G.N., Cullen, R. (2004a). Public perceptions of New Zealand's Environment. EOS Ecology, Christchurch.

Hughey, K.F.D., Cullen, R., Kerr, G.N. Cook, A. (2004b). Use of the Pressure-State-Response model to explore peoples' perceptions of the State of the Environment in New Zealand. *Journal of Environmental Management*, 70(1): 85-93.

Gendall, P. J., Hosie, J., Russell, D. (1993). New Zealanders' Attitudes to the Environment. International Social Survey Programme, Department of Marketing. Palmerston North: Massey University.

Gravitas Research and Strategy Limited. (2004). Environmental Awareness, Attitudes and Actions, 2003 : A Survey of Residents of the Waikato Region. Environment Waikato TR 2004/01, Hamilton: Environment Waikato.

Kerr, G.N., Cullen, R., Hughey, K.F.D. (2003). Environmental Budget Allocation: Public Preferences. Discussion Paper # 98. Commerce Division, Lincoln University.

Kerr, G.N., Hughey, K.F.D., Cullen, R. (2003). Marine Recreational Fishing: Perceptions and contingent behaviour. Discussion Paper No.99. Commerce Division. Lincoln University. September 2003.

Kerr, G., Hughey, K.F.D., Cullen, R. (2004). What New Zealanders think about marine recreational fishing. New Zealand Fishing News, 27(1): 20.

Massey University. (2001). New Zealanders and the Environment. Palmerston North: Massey University: Department of Marketing.

Ministry for the Environment. (1997). The State of New Zealand's Environment. Wellington: MfE & GP Publications.

Opinions Market Research Ltd. (2006). Annual Survey of Residents May 2006 – Part I: Methodology and Questionnaire. Prepared for Christchurch City Council. Opinions Market Research Ltd, Christchurch.

Organisation for Economic Co-Operation and Development. (1996). Environmental Performance Reviews. New Zealand. Paris: OECD.

Organisation for Economic Co-Operation and Development (1999). Using the Pressure-State-Response Model to Develop Indicators of Sustainability: OECD Framework for Environmental Indicators. Retrieved 20 November 2002 from http://euroconfql.arcs.ac.at/Event1/Keynotes_panel/Keynote5-Fletcher.html.

Research Solutions. (1998). Environmental Awareness, Attitudes and Actions: A Survey of the People of the Waikato Region 1998. Environment Waikato Technical Report 1998/16. Hamilton: Environment Waikato.

United Nations Environment Programme. (2002). Global Resource Information Database. Retrieved 26 November 2002 from <http://www.grida.no/soe>