



New Zealand Agricultural and Resource Economics Society (Inc.)

Priorities for, and preferred approaches to, management of New Zealand fresh waters

Kenneth FD Hughey

PO Box 84, Lincoln University, Lincoln 7647, Christchurch. New Zealand
e-mail: ken.hughey@lincoln.ac.nz

Geoffrey N Kerr

PO Box 84, Lincoln University, Lincoln 7647, Christchurch. New Zealand

Ross Cullen

PO Box 84, Lincoln University, Lincoln 7647, Christchurch. New Zealand

Fujun Shen

PO Box 84, Lincoln University, Lincoln 7647, Christchurch. New Zealand

**Paper presented at the 2010 NZARES Conference
Tahuna Conference Centre – Nelson, New Zealand. August 26-27, 2010.**

Copyright by author(s). Readers may make copies of this document for non-commercial purposes only, provided that this copyright notice appears on all such copies.

Priorities for, and preferred approaches to, management of New Zealand fresh waters

**Kenneth FD Hughey,
Geoffrey N Kerr,
Ross Cullen,
Fujun Shen**

**PO Box 84, Lincoln University, Lincoln 7647, Christchurch
Email: ken.hughey@lincoln.ac.nz**

Summary

Since 2000 six standardised biennial public surveys of the state of the New Zealand environment have been undertaken. A fresh water case study was included in the 2010 postal survey and in an electronic survey. Desirable futures for New Zealand's fresh water resources, sources of damage to freshwater, preferred management approaches, and views about charges for commercial uses of water are reported. Respondents desire high quality water, are not prepared to trade that off for damaging economic gains, and support charges for commercial uses of water. We report public preferences for tools to manage water use.

Key words: public perceptions, fresh water, New Zealand, economic instruments, management

Introduction

The sustainable management of New Zealand's seemingly abundant freshwater resources has been a growing issue for resource managers and politicians over the last decade. During this time we have undertaken a biennial survey of people's perceptions of the state of the New Zealand environment. The survey is built around the Pressure-State-Response (PSR) model of environmental reporting – including a standard set of questions around the state of freshwater, pressures on the state of freshwater, and management responses to changing states and pressures. In addition, we have periodically run complementary, more in-depth, case studies around particular fresh water issues. The time-series PSR data cover a 10-year time frame, but case study data are typically one-off.

Mindful of the multiple initiatives associated with fresh water and its management, impending reporting from the national Land and Water Forum, and controversy surrounding water management in Canterbury, we explored a range of water and futures related policy issues in the 2010 case study. This case study builds on earlier conclusions from our work and, in particular, we refer to Cullen et al. (2006) and Hughey et al. (2007):

- Nationally, New Zealanders' rate the state of rivers, lakes and groundwater highly, but still lowest of all the resources monitored. This finding is consistent with comparative international rankings (e.g., Esty et al. 2008);
- There is a much higher level of concern, even negativity, about the state of local lowland streams. This concern is matched by a range of biophysical science reports (e.g., Scarsbrook, 2006);

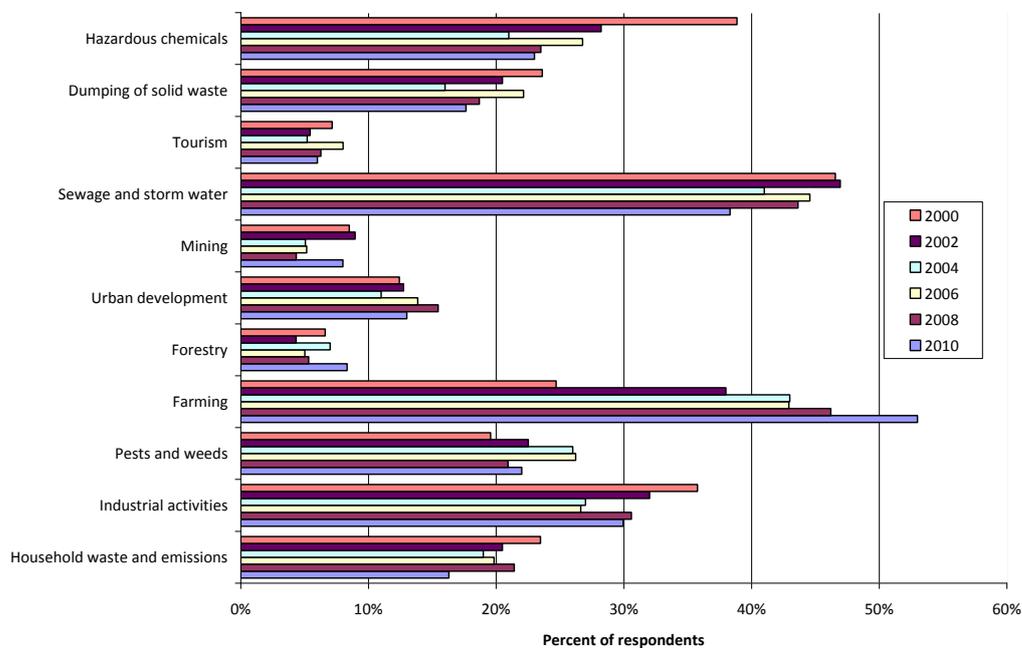
- There is particular concern about the management of New Zealand farm effluent and runoff, and there has been an ongoing and significant increase in concern about farming being a major cause of damage to fresh water.

Preliminary analyses of our 2010 postal and e-surveys reinforce the above findings (Hughey et al. 2010, and see Figure 1), so no further explanation is given here. In this paper we concentrate on:

- the most important values and desired futures for freshwater
- perceived effectiveness of different management approaches and their political acceptability
- acceptability of paying for commercial use of water.

In order of presentation we first describe the methods used, report the main findings, and then discuss the implications of these findings for policy making in New Zealand.

Figure 1. Perceived main causes of damage to fresh waters. Categories less than 5% are omitted



Methods

The PSR model of environmental reporting (OECD 1996) forms the framework around which the biennial environmental perceptions survey research is developed and reported (Hughey et al. 2008). Postal surveys administered to 2000 people aged 18 and over, drawn randomly from the electoral roll, have until 2008 been the source of all data. Effective response rates have varied between 40% (2008) and 48% (2000). In 2010 we used both a postal survey and an electronic survey (undertaken under contract by ShapeNZ). As well as recording PSR and case study data we also record key demographics. A full comparative analysis of the two data sets has yet to be undertaken, but compared to the NZ population it appears the ShapeNZ respondents heavily over-represent the higher educational categories. This paper presents freshwater related descriptive data and, where appropriate, cross tabulations, and paired t-tests principally from the e-survey.

Findings

Most important values of fresh water

Respondents were asked to indicate the importance of values associated with rivers and streams, with lakes, and with aquifers/underground water. Responses were recorded on a 5-point Likert scale ranging between ‘Totally irrelevant – not a consideration’ (a score of 1) to ‘Critical – the most important thing to consider’ (a score of 5). Results, ranked from most to least important for the three water ‘types’, are shown in Table 1.

Table 1. Comparative importance of different values of fresh water in New Zealand

	Rivers and Streams:	Lakes:	Aquifers/underground water:
Nature (e.g., native bird and fish habitat)	4.3	4.3	3.6
Community household and other use (e.g., garden irrigation or drinking water)	3.8	3.5	3.8
Scenic/visual (e.g., beauty)	3.8	3.8	NA
Recreation (e.g., fishing, boating, swimming)	3.6	3.5	NA
Commercial use (e.g., farm irrigation, hydro power)	3.3	3.1	3.1
Customary Maori (e.g., role as kaitiaki)	2.5	2.5	2.4

For all three types of water body, nature, scenic, recreational and community values outrank commercial interests which, in turn, outrank Customary Maori values ($P < 0.001$ in all cases; paired t-test).

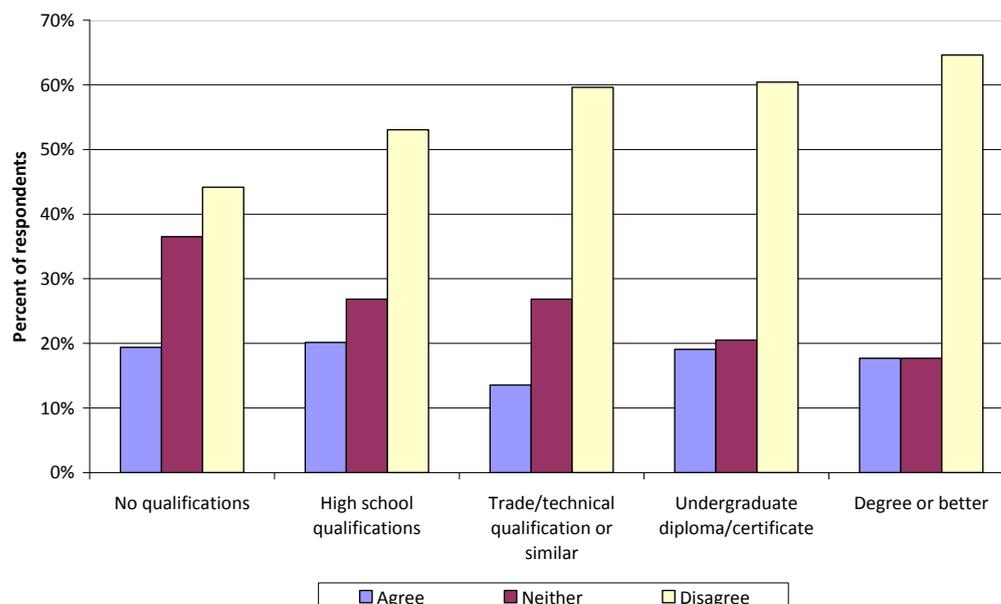
Desired futures for fresh waters

Respondents were given nine statements regarding the future for fresh waters in New Zealand to which they could respond on a 6-point Likert scale, anchored by ‘strongly disagree’ (1) and ‘agree strongly’ (5), alongside a ‘don’t know’ option. Table 2 displays mean Likert responses ordered from most to least favoured. Respondents clearly support futures with largely unpolluted waters that are swimmable – they will not accept the loss of native species and clearly do not believe the main emphasis of freshwater management should be economic. Equally, respondents disagree strongly with the proposition that ‘we should accept some reduction in environmental values of some freshwater resources in order to enhance economic benefits from their use’. We further analysed responses to this question by evaluating the level of education versus the level of agreement to this statement (see Figure 2). The Chi square test showed a highly significant difference ($P < 0.001$), i.e., as education levels rise there is increasing disagreement with the statement.

Table 2. Ranking of most to least preferred futures for fresh water in NZ (Note variation in the wording of some questions)

Future value statement	Mean Likert score
Almost all streams, rivers and lakes should be safe to swim in	4.47
There should be no further significant pollution discharges into water	4.45
Almost all underground water should be safe to drink without treatment	4.26
The most important fishing rivers should be protected	3.98
The most important rivers for hydro electric generation and/or irrigation potential should be fully used for these purposes	3.22
The relationship between Maori and fresh water should be considered a lot more	2.52
We should accept some reduction in environmental values of some freshwater resources in order to enhance economic benefits from their use	2.37
Loss of some native species from some water bodies is acceptable	2.16
In all decisions about freshwater management the main emphasis should be economic	2.01

Figure 2. Relationship between education level and level of agreement with the statement ‘We should accept some reduction in environmental values of some freshwater resources in order to enhance economic benefits from their use’.



Support for different management approaches

We assessed support for different combinations of three approaches for managing fresh water, namely:

1. Regulations, Rules and Standards which could be developed and implemented around:
 - environmental flows, e.g., providing enough water for fish and birds to live,
 - protection of drinking water, and
 - water contact recreation standards.
2. Economic instruments which could include:

- tradable water use permits, or
 - pollution fees, or
 - subsidies for reducing pollution, or
 - charges for commercial water users.
3. Voluntary and/or advocacy approaches which could involve:
- groups of water users taking responsibility for actions such as voluntary reductions in water use in times of low flow, or sharing available water between commercial and recreation users in such times),
 - water conservation education,
 - individual or collective riverbank planting, and
 - voluntary codes of practice for commercial users.

These approaches were evaluated according to their contribution to: ‘achieving environmental protection’, ‘achieving economic growth’, and ‘achieving benefits to society’. Respondents were asked to evaluate these contributions on a 1-5 Likert scale with 1 being very ineffective and 5 being extremely effective. Table 3 indicates a strong expectation that combining all three approaches are expected to achieve these goals; least expected to be effective was ‘Voluntary Action and Advocacy’ which was the only option to achieve a negative effectiveness ranking. While there is no significant difference between rankings of regulations and economic instruments alone for achieving economic growth, in all other comparisons economic instruments alone is perceived to be more effective than regulations, which, in turn, are perceived to be more effective than voluntary measures ($P < 0.001$, paired t-tests). There is a strongly held view that approaches incorporating regulation and economic instruments are likely to be very effective in managing fresh water.

Table 3. Comparative evaluation of respondent rankings (Likert scores: 1= very ineffective to 5= very effective) of effectiveness of different approaches to managing fresh water

	Effectiveness in achieving environmental protection	Effectiveness in achieving economic growth	Effectiveness in achieving benefits to society
All three approaches combined	4.2	4.0	4.1
A combination of Regulations and Economic instruments	3.8	3.6	3.7
A combination of Regulations and Voluntary action & advocacy	3.6	3.4	3.6
A combination of Economic instruments and Voluntary action & advocacy	3.4	3.4	3.4
Regulations alone	3.5	3.2	3.4
Economic instruments alone	3.2	3.2	3.1
Voluntary action & advocacy alone	2.8	2.7	2.8

Political acceptability of different management approaches

Respondents were asked to evaluate political acceptability of the three approaches for managing fresh water. As indicated in Table 4, stand alone approaches were evaluated to have low political acceptance; the highest level of perceived political acceptance being for a combination of all three approaches. All combinations of two of the three

approaches were perceived as being of similar political acceptability, but less acceptable than the three approaches combined.

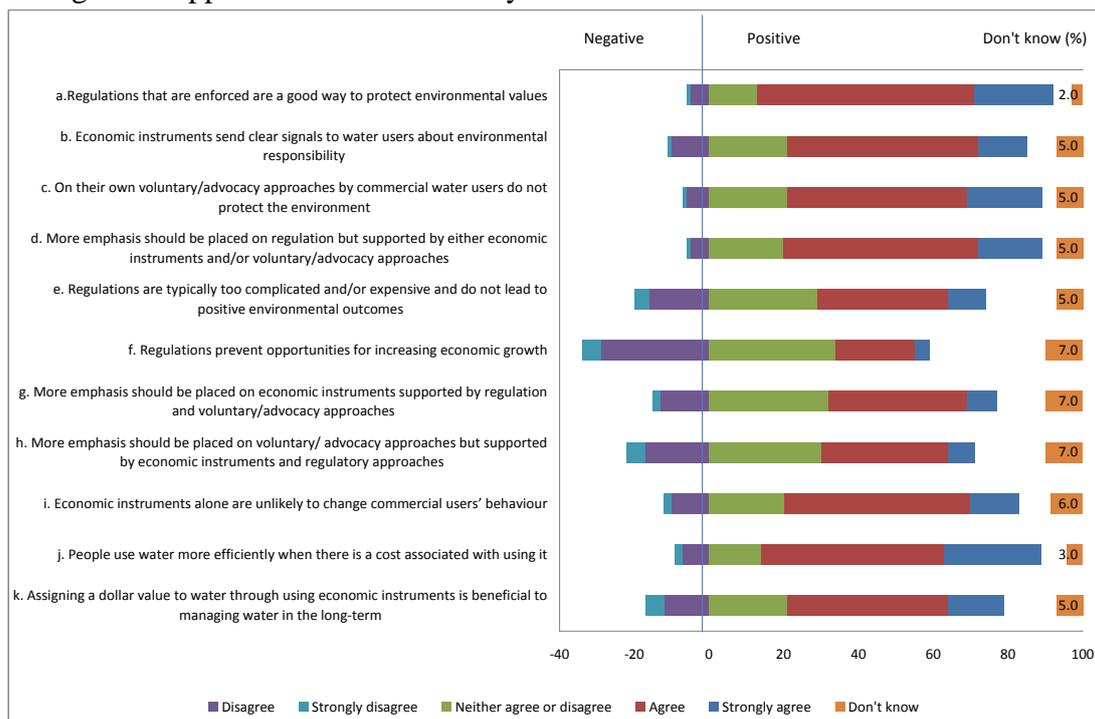
Table 4. Comparative evaluation of respondent rankings (Likert scores: 1= very ineffective to 5= very effective) of the political acceptability of different approaches to managing fresh water

Alternative management approaches	Mean Likert score
A combination of all three approaches	4.13
A combination of Regulation and Voluntary action & advocacy	3.61
A combination of Regulation and Economic instruments	3.56
A combination of Economic instruments and Voluntary action & advocacy	3.52
Regulation by itself	3.00
Voluntary action & advocacy by themselves	2.81
Economic instruments by themselves	2.75

Eleven directional statements, which contained ideas about the sorts of outcomes that may or not be achievable with different approaches or combinations of approaches, were given to respondents to evaluate on a scale of 1-5 (with 1= ‘strongly disagree’ and 5= ‘strongly agree’) supported by a ‘don’t know’ option. The relative distribution of responses to these statements is shown in Figure 3. Strongest support occurred for statements a, c, d, and j. These responses indicate a belief that voluntary mechanisms don’t work, regulations and pricing do, and combinations work well.

Statements b, and k reinforce the perceived importance of the role that economic instruments can play in managing water, but the high level of agreement with statement i underlines the perceived importance of coupling economic measures with other approaches.

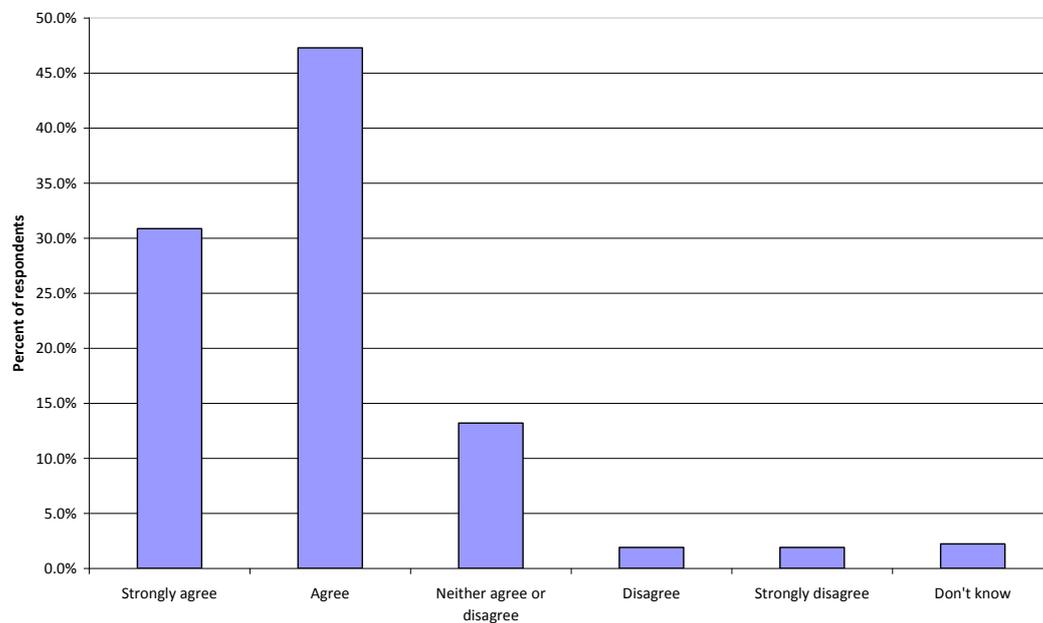
Figure 3. Respondents’ agreement or disagreement to 11 statements regarding management approaches and their likely outcomes.



Support for paying for commercial use of freshwater

Respondent views were tested on metering of business water use (Figure 4), businesses paying the administrative costs of providing fresh water they use (Figure 5), and businesses paying for the quantity of water they use (Figure 6). Overall, there was a high level of agreement with all three measures (over 50% of respondents gave 'agree' or 'strongly agree' responses to all three statements), with mean Likert scores¹ of 4.03, 3.76 and 3.58 respectively. A Chi square test of the relationship between occupation and level of support for commercial users paying for every unit of water they use showed no significant differences (N= 227 farm owners or managers, and 1529 in other occupations, P=0.29).

Figure 4. Respondent agreement with the statement that “all businesses should be metered to monitor how much fresh water they use and when they use it”.



¹ Ranging from 1=strongly disagree, to 5=strongly agree

Figure 5. Respondent views on whether businesses should pay the administrative costs of providing the fresh water they use

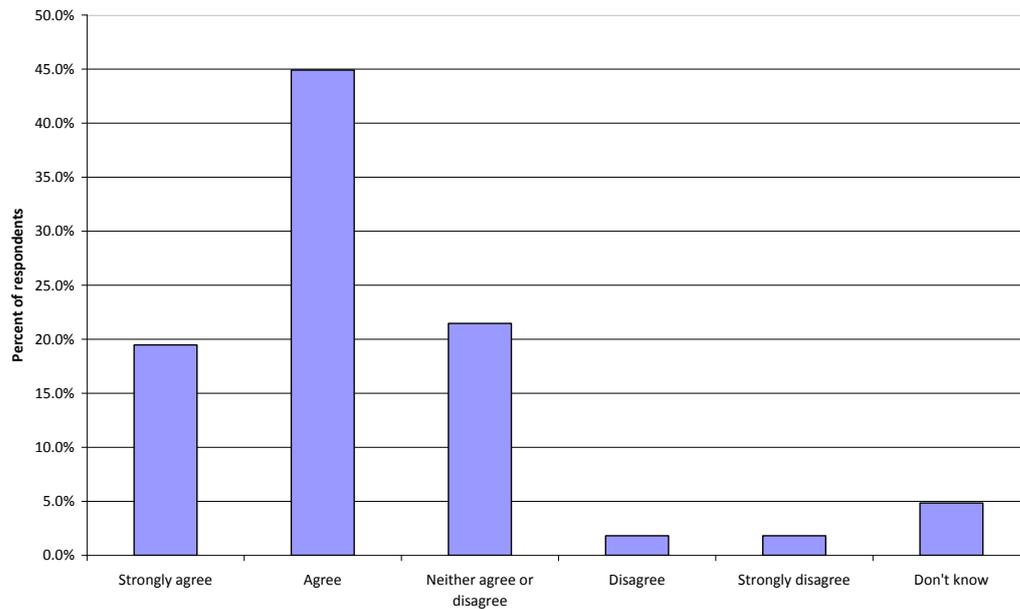
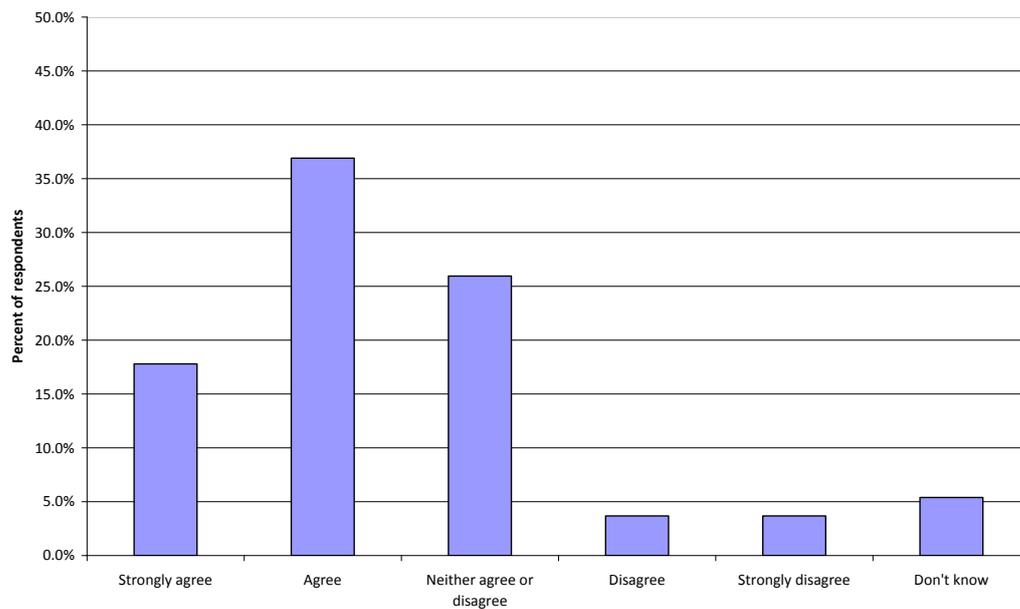


Figure 6. Respondent views on whether businesses, in addition to paying the administrative costs, should pay for every unit of water they take.



Discussion and conclusions

Overall, survey findings give a clear indication of New Zealanders' desired futures for fresh water and also an insight into how they see management proceeding. First, it is clear that New Zealanders have a very high desire for a future of largely non-polluted fresh waters, fit for swimming and with abundant aquatic life. They want the most important rivers protected and they do not want to trade off environmental protection for economic growth.

Respondents also have clear views on how fresh water should be managed – they consider voluntary approaches to be least effective and policy combinations that include regulation and market based measures to be the most effective. This finding flies somewhat in the face of many recent initiatives that rely almost solely on voluntary agreements (e.g., the just signed Manawatu River Accord²).

Finally, it is clear that respondents support commercial user pays regimes – limited analysis against some key demographics showed no significant difference between farmers and other occupational classes. They all want commercial water use to be monitored, they all want administrative costs charged to commercial users, and in addition they are all strongly supportive of commercial users being charged for the water they use.

The research findings should provide government with a mandate to demonstrate stronger leadership with regard to fresh water and its management, especially in terms of policy initiatives that would help drive efficiency and innovation in water use, and which also would help internalise the environmental externalities associated with current water use patterns. In this context, it is clear that imposing both a user pays regime to recover the administrative costs, and a fee for the commercial use of water would have strong and broad levels of community agreement. Both initiatives would also drive other improvements and would likely help New Zealand to achieve the long term goals that survey respondents clearly aspire to for fresh water.

Acknowledgements

We thank the Ministry for the Environment for its ongoing financial support to this project.

References

- Cullen, R., Hughey, K.F.D., Kerr, G.N. (2006). New Zealand fresh water management and agricultural impacts. *The Australian Journal of Agricultural and Resource Economics*. 50: 327-346.
- Esty, D.C., Levy, M.A., Kim, C.H., de Sherbinin, A., Srebotnjak, T. and Mara, V. (2008). 2008 Environmental Performance Index. New Haven: Yale Center for Environmental Law and Policy.
http://sedac.ciesin.columbia.edu/es/epi/data/2008EPI_Data.xls - accessed 3 October, 2008.
- Hughey, K.F.D., Kerr, G.N., Cullen, R. (2007). Public perceptions of New Zealand freshwater and its management – reconciling the science and management implications. *Australasian Journal of Environmental Management*, 14(2): 82-92.
- Hughey, K.F.D., Kerr, G.N., Cullen, R. (2008). Public perceptions of New Zealand's Environment: 2008. *EOS Ecology*: Christchurch.

² <http://www.radionz.co.nz/news/stories/2010/08/09/ab28a64cdb24> - accessed 10 August 2010

Hughey, K.F.D., Cullen, R., Kerr, G.N. (2010). A decade of perceptions of the New Zealand environment: A focus on water and its management. Unpublished conference paper. Joint Annual Conference of the New Zealand Association of Economists and Law and Economics Association of New Zealand, University of Auckland Business School, Auckland, 30 June-2 July 2010.

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

Scarsbrook, M. (2006). State and Trends in National River Water Quality Network. Report number 778, Ministry for the Environment, Wellington.