# SUSTAINABILITY APPRAISAL OF WATER MANAGEMENT STRATEGIES FOR CANTERBURY

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## ABSTRACT

Water management in the Canterbury region of New Zealand is reaching sustainability limits in terms of water availability and cumulative effects of its use. The Canterbury Water Management Strategy was developed as a collaborative governance approach to formulate a new way of managing water in the region. A key component of strategy development was the sustainability appraisal of strategic alternatives (the first such application in New Zealand).

The paper describes the appraisal process set in a sustainability framework based on four well beings (economic, environmental, social and cultural) and New Zealand resource management legislation. A paradigm shift has been required to water management based on a strategic approach to the management of the resource (rather than effects-based management of projects); on collaborative governance approaches to decision-making with multi-stakeholder and community engagement (in contrast to the adversarial approach of applicant-driven development within environmental constraints); and on proactive achievement of sustainability outcomes (rather than reactive consideration of adverse effects).

## INTRODUCTION

### Water Management Issues in Canterbury

With 58% of New Zealand's water for consumptive use allocated in Canterbury, water allocation is a significant issue for the region. With 540,000 ha of land consented for irrigation, Canterbury has 70% of New Zealand's irrigated land and has land suitable to double that area. Water also creates and sustains Canterbury's world-famous braided rivers, high country and coastal lakes, as well as lowland streams and wetlands. However with current methods of abstraction (run-of-river offtakes and groundwater bores) reaching sustainability limits for many parts of the region, water allocation has also become contentious. In addition cumulative effects of use are contributing to the declining ecological health of lowland streams and water quality in groundwater.

A strategic approach has been taken to address water management issues in the Canterbury region, leading to the development of the Canterbury Water Management Strategy (Canterbury Water 2009). Stage 1 was a study of water availability issues in Canterbury. This demonstrated that under low flow conditions current peak demand cannot be met by run-of-river and groundwater abstractions. On an annual basis water is available to meet future demand but would require storage. Stage 2 was an investigation of potential storage sites for their hydrological feasibility in

terms of their supply reliability and effects on flow regimes. Stage 3 was a multi-stakeholder evaluation of the most prospective storage options. This evaluation identified the storage sites that were worthy of further investigation in terms of their sustainability. The evaluation highlighted the need to address water quality risk from land use intensification. It also identified the potential for integrated solutions which improved efficiency of existing use, minimised storage and enabled restoration of lowland streams through higher flows. Stage 4 involved stakeholder and community engagement on the development of water management strategies as well as strategic investigation of likely outcomes and a sustainability appraisal of strategic options (Jenkins, 2009).

Legislative Framework in New Zealand

The key legislation for natural resource management in New Zealand is the Resource Management Act in 1991. The purpose of the Act is to promote sustainable management. The legislation is "effects-based" and concentrates on the environmental effects of activities rather than the activities themselves. The focus is on environmental effects and leaves the pursuit of economic and social goals to other mechanisms.

There is no natural resources agency in central government in New Zealand. The Ministry for the Environment has responsibilities for National Environmental Standards and National Policy Statements. The first National Policy Statement was announced in May 2011 to take effect in July.

Regional councils are required to prepare Regional Policy Statements identifying environmental issues and responses of significance for its region. Regional councils also have the authority to prepare Natural Resources Regional Plans which can include water management. Territorial authorities, the next tier of local government are required to prepare District Plans which cover land use and subdivision. Regional councils have the authority to issue resource consents for the taking and use of water, and for discharges to water. Territorial authorities have the authority to issue consents for land use.

There is an Environment Court. The Court has extensive powers not only to consider appeals on resource consent decisions but also on regional policy statements and plans. The Court has the ability to review the technical merit of decisions. This has made resource management in New Zealand a highly legalistic process. It has also led to an adversarial style of decision making.

The introduction of amendments to the Local Government Act (LGA) in 2002 enabled a different approach to sustainable development. The LGA emphasised the achievement of community outcomes through partnerships of government, communities and industry. It was up to a local authority to determine with its communities what contributions the local authority would make to community outcomes and the rates that would be paid for services provided. Under the LGA, this enabled the regional council to become a facilitator of sustainability and not just a regulator for environmental protection.

DEVELOPMENT OF THE CANTERBURY WATER MANAGEMENT STRATEGY

The sustainability appraisal was part of the fourth stage of the development of an integrated water management strategy for the Canterbury region. The main elements of this stage were:

a. Stakeholder and community engagement on option development and fundamental principles for a strategy
b. Definition of strategic options by the Steering Group to the Mayoral Forum
c. Community consultation on option preferences
d. Strategic investigations of likely outcomes
e. Sustainability appraisal of options at the regional level leading to sub-regional water management approaches
f. Strategic approach to water management, environmental restoration, infrastructure requirements and governance arrangements.

One of the keys to success of the CWMS has been the role of the Steering Group. The 16-person group contains a diversity of backgrounds including local and central government, industry, irrigation, fishing, kayaking, community, conservation and Ngai Tahu[1]. They were engaged on a voluntary basis. The willingness of the Steering Group to work constructively to accommodate multiple perspectives has facilitated widespread support for the CWMS. Another key component has been the technical input from the Officials group with specialists from local and central government. They provided much of the background material for the Steering Group's deliberations.

Using the "Strategic Choice" approach (Friend and Hickling, 2005), the Steering Group for the CWMS developed four strategic options for the future of water management in Canterbury. These options are:

- Option A: Business As Usual – this option represents the current processes under the Resource Management Act based on applicant-driven proposals subject to effects-based assessment and resolution of conflict by adversarial hearings and court processes.
- Option B: Advance environmental protection and then proceed with infrastructure development – this option would address degraded waterways through formalising environmental limits, initiating restoration and improving water efficiency before further infrastructure development and land use intensification.
- Option C: Reconfigure consents and infrastructure to improve efficiency and reliability and enhance environmental quality – this option would take the opportunity to reconsider existing consents and operation of infrastructure in order to increase efficiency of currently allocated water while proceeding with complementary infrastructure and reducing environmental pressures.
- Option D: Advance infrastructure development with environmental repair and restoration – this option would create an infrastructure platform involving storage while incorporating environmental mitigation.

Unlike Option A, the other Options (B, C and D) would involve a significant degree of integration and evolution of governance arrangements. The differences between the other Options are largely around the priority given to primary focus of change. The options can be characterised as Environment-led (Option B), Efficiency-led (Option C) and Storage-led (Option D).

[1] Ngai Tahu is the Maori tribe within whose traditional land the CWMS is being developed.

The four options were subject to a Sustainability Appraisal by the Steering Group and an Officials Group (technical Advisors) using the Framework developed by Sadler and Ward (2008) to reflect New Zealand institutional arrangements. The Framework is founded on four pillars of sustainability (social, economic, environmental and cultural) which correspond to the four well beings of the Local Government Act.

Key elements of the framework include:

- Consideration of intergenerational equity which is very relevant to the consideration of long term resource strategies like the Canterbury Water Management Strategy;
- Consideration of intragenerational equity which is very relevant to situations with divergent views about the use of a resource at its availability limits, such as water in Canterbury
- A focus on capital assets for each of the pillars of sustainability, i.e. natural capital, economic capital, social capital and cultural capital.
- The definition of sustainability bottom lines across all sustainability criteria (i.e. a quadruple bottom line) which is very relevant to assessing a resource at its sustainability limits
- The definition of objectives-led top lines across all sustainability criteria (i.e. quadruple top lines) which fitted very well with considering the multiple values sought by the community with respect to water in Canterbury.

The appraisal was conducted as a two day workshop (Russell and Ward, 2010). The intensive two-day SA workshop followed five weeks of work by the SA specialists with the Officials Group on technical content and rehearsal of various small group elements of the workshop. It was attended by over 30 CWMS Steering Group members and officials who were allocated to four small groups, each of which incorporating a range of technical, regional and subject knowledge. They undertook a facilitated process with the following steps:

1. Select the level of sustainability to evaluate strategic options: from the options of 'weak' (maintaining capital without regard to composition), 'moderate' (attention given to the mix of capital stocks with natural capital substitutable only up to certain critical limits) and 'strong' (maintaining natural capital at current levels), most participants thought that a moderate level of sustainability was appropriate.
2. Define the capital assets: participants reviewed a preliminary list of the capital assets and prioritised the assets involved in the water management in Canterbury as the basis for the development of evaluation criteria. The individuals were asked to choose the six most important assets under each pillar. The most highly ranked are set out in Table 1.
3. Consider space-time dimensions: participants considered the implications of the strategic options across a range of spatial and temporal scales to ensure intergenerational issues were identified and matters to be considered at the sub-regional level were noted.
4. Review evaluation criteria: the draft evaluation criteria of the official group were reviewed and revised. Process criteria related to equity, feasibility and resilience were added to the criteria based on capital assets. The criteria adopted are shown in Table 2.

5. Define quadruple top and bottom lines: Five point scales were developed for the lowest acceptable value for each of the evaluation criteria (Quadruple Bottom Line) and the preferred objective position (Quadruple Top Line). The inclusion of "business as usual" as the base case option meant that an assessment of sustainability was undertaken for the existing approach to water management.
6. Score the options against the evaluation criteria: the participants used the evaluation criteria to score the scale of the impact – from strong negative impact (−2) to strong positive impact (+2) – for each criterion in each option and compare the results with the QTL and QBL to draw a sustainability profile. A summary of the sustainability appraisal scores is contained in Figure 1.
7. Consider sub-regional options: application of the strategic options at the subregional scale was considered.

TABLE 1: PRIORITY CAPITAL ASSETS FOR WATER MANAGEMENT IN CANTERBURY

| NATURAL CAPITAL | ECONOMIC CAPITAL |
|---|---|
| Surface water flow variability and quality<br>Groundwater relatively free from contaminants<br>Biodiversity: native bird habitat<br>Wetlands, coastal lagoons, and springs<br>Braided rivers as an international resource<br>Ecosystem resilience | Schools, community facilities, marae and housing<br>Farm irrigation and stock water<br>Roads, bridges and transportation industry<br>Capacity to support population<br>Access to clean drinking water<br>Hydro-electricity generation and plant and lines |
| SOCIAL CAPITAL | CULTURAL CAPITAL |
| Trust in institutions and processes<br>Scientific knowledge<br>Sense of community<br>Collaborative governance and participation<br>Confidence around futures<br>Social cohesion | Sense of experience<br>Whakapapa – pride in place<br>Mahinga kai (food gathering)<br>Regional identity<br>Town-country connection<br>Recreation |

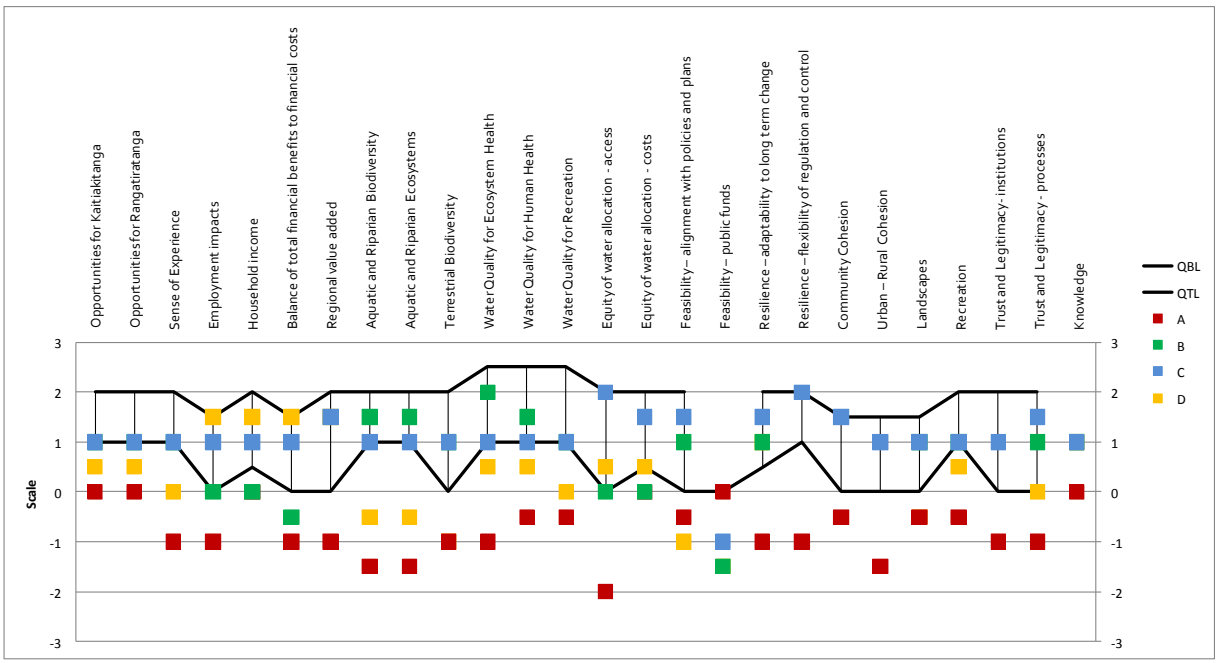
TABLE 2: LIST OF EVALUATION CRITERIA

| | | | | | |
|---|---|---|---|---|---|
| Cultural | 1 | Opportunities for kaitiakitanga | Processes | 14 | Equity of water allocation – access |
| | 2 | Opportunities for rangatiratanga* | | 15 | Equity of water allocation – costs |
| | 3 | Sense of experience* | | 16 | Feasibility – alignment with policies and plans |
| Economic | 4 | Employment impacts | | 17 | Feasibility – public funds |
| | 5 | Household income | | 18 | Resilience – adaptability to long-term change |
| | 6 | Balance of total financial benefits to financial costs | | 19 | Resilience – flexibility of regulation and control |
| | 7 | Regional value added | Social | 20 | Community cohesion |
| Environ-mental | 8 | Aquatic and riparian biodiversity | | 21 | Urban–rural cohesion |
| | 9 | Aquatic and riparian ecosystems | | 22 | Landscapes |
| | 10 | Terrestrial biodiversity | | 23 | Recreation |
| | 11 | Water quality for ecosystem health | | 24 | Trust & legitimacy – institutions* |
| | 12 | Water quality for human health | | 25 | Trust & legitimacy – processes* |
| | 13 | Water quality for recreation | | 26 | Knowledge* |

**TABLE 3** EXAMPLE OF EVALUATION CRITERIA AND SCALE DESCRIPTORS

| **Criterion** | **Brief description** | **Scale descriptors for impacts (vis-à-vis current state)** | | | | |
|---|---|---|---|---|---|---|
| | | **Strong negative impact** | **Moderate negative impact** | **Neutral impact** | **Moderate positive impact** | **Strong positive impact** |
| | | **–2** | **–1** | **0** | **+1** | **+2** |
| **Aquatic and riparian biodiversity** | Aquatic and riparian indigenous biodiversity, including key species | Rapid or extensive reduction of biodiversity including loss of key species | Reduction of biodiversity in some areas and/or loss of key species | Biodiversity and key species maintained at current levels | Recovery of biodiversity in key areas and for key species | Extensive and sustained recovery of biodiversity and survival of all key species ensured |

**Figure 1: Diagram showing combined options**




Some of the key findings of this appraisal were as follows:

- The bottom line is higher than Option A – Business as Usual, i.e. the current situation is not sustainable
- Option B (environment-led) scores well on environmental criteria but is below the bottom line on economic criteria
- Option D (storage-led) scores well on economic criteria but is below the bottom line on environmental criteria
- Option C (efficiency-led) scores above the bottom line on nearly all criteria.

When considered at the sub-regional level, the workshop participants considered that combinations of Options B, C and D were most likely to achieve sustainability at the sub-regional level.

## DISCUSSION

One of the key outcomes of the sustainability appraisal was that it was only possible to achieve sustainable management by incorporating changes to existing uses of water as well as considering future uses and new projects. Traditional EIA and much of SEA have focussed on new projects. Existing use typically forms the baseline for EIA and SEA. Sustainability appraisal was focussed on the management of the resource rather than the management of projects.

Another characteristic of the sustainability appraisal process that is different from much of current practice for decision making where there are multiple objectives is the acceptability criterion. This is to meet all sustainability bottom lines rather than undertake trade-offs before achieving different objectives. The approach was the development of a strategy to achieve community outcomes rather than mitigating the adverse effects of projects.

The collaborative multi-stakeholder approach to tasks like sustainability appraisal has changed the nature of the debate around water management. The facilitated workshop format enabled all views to be heard but in a constructive way. This contrasts with the more traditional hearings processes that are characterised by adversarial proceedings.

## REFERENCES

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