The Water Resource Management Framework in New Zealand: A Case Study of Moving towards a Less Adversarial Approach

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ABSTRACT: New Zealand appears to be a water rich country; however there are considerable water allocation issues. Mostly these revolve around balancing environmental concerns with economic development. The largest economic sector is agriculture which currently utilizes around 80% of the allocated water and has considerable potential to increase in size. The resource management framework that New Zealand has developed over the past twenty years revolves around local decision-making and sustainable management principles. As the demands for water have grown there has been growing concern that this framework is inadequate to deal with the issues of declining water quantity and quality through agricultural intensification. In Canterbury, the region with the highest water allocation and demand, a new approach is being trialed. The Canterbury Water Management Strategy (CWMS) recognizes the need for: ecological restoration for past damage; infrastructure development for increased irrigation; and the need to link infrastructure with more efficient use of water by both existing and new water users. These three elements are recognized as having equal value. The CWMS builds on the local decision-making concept but is deliberately aimed at consensus building in order to remove expensive and adversarial resource management hearings. It is practical enough to recognize that economic development is needed but that it need not proceed in conflict with the environment, but rather can be a means towards environmental improvement.

1 INTRODUCTION

At first glance New Zealand appears to be a land with plenty of water available to a relatively small population (4.3 million in 2009). New Zealand is ranked 12th out of 193 countries on a per capita basis for the size of its renewable freshwater resource (MFE, 2007). Average annual rainfall varies from around 6000 mm per annum in the mountains of the South Islands to a low of 346 mm per annum in the rain shadow from these mountains. The geographic and seasonal variability in rainfall and evapotranspiration means that there is considerable variability in terms of water resource availability. In addition to this natural variability in climate is an increasing demand for water, particularly for irrigation to increased agricultural production. All of these pressures make water resource management a significant national issue.

Water usage in New Zealand is dominated by agriculture (Fig. 1) with around 75% being either for irrigation or livestock watering. More recent figures put this at 80% (MFE, 2007). This is a reflection of the New Zealand economy which is dominated by agricultural primary production (dairy products, sheep and beef) with other major economic sectors being horticulture (including wine production), forestry, tourism, services and a relatively small manufacturing industry. Fig. 1 shows that South Korea has a similar water use profile, although a higher domestic use of water as a result of a population over 10 times greater than New Zealand's. The major irrigation areas are in the east of both islands, which coincide with the driest regions of the country. Irrigation water predominantly used for growing grass (generally sprayed rather than flooding) but there are also large areas of viticulture (grapes for wine production) and horticulture (kiwifruit, apples and other pipfruit).

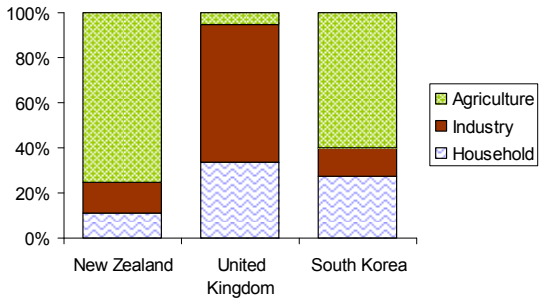

Fig. 1. Use of abstracted water in New Zealand, United Kingdom & South Korea (OECD figures, 2002).

This paper provides describes the water management framework for New Zealand and provides a case study of how a new approach has been developed for one of the regions with greatest water stress. The new approach is based around defusing the legal, adversarial approaches currently employed.

2 PRESSURES ON WATER ALLOCATION

Fig. 1 shows that the major water use in New Zealand is from agriculture and irrigation in particular. Agricultural intensification has led to a rise in the amount of irrigation (Fig. 2), with a near doubling in 20 years and predictions that it could double again in the next 20 years. This has led to water allocation becoming a major resource management issue for the country.

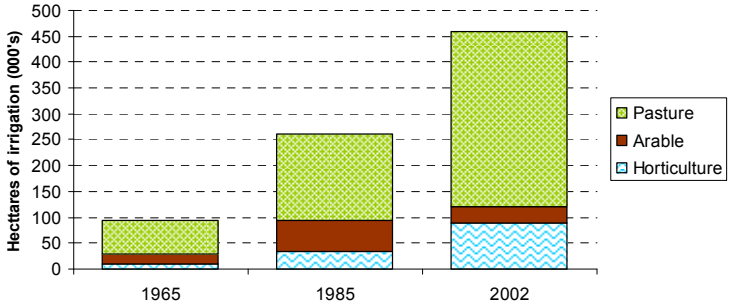

Fig. 2. Hectares under irrigation for different land uses in New Zealand (source: PCE, 2004)

3 WATER RESOURCE MANAGEMENT IN NEW ZEALAND

The pre-eminent piece of legislation concerning water resource management in New Zealand is the Resource Management Act (RMA) of 1991. The purpose of the RMA is "to promote the sustainable management of natural and physical resources" where sustainable management encompasses notions of providing for social, economic and cultural well-being across generations and avoiding, remedying or mitigating any adverse effects of development on the environment (Richmond et al., 2004). One of the underlying principles of the RMA is a devolution of decision-

making to local government so that decision-making is left to those who are directly affected by the results of those decisions (Fenemor and Robb, 2001). Today there are 12 regional councils operating as NZ's environmental management agencies managing land, water, rivers, air, and coasts. Seventy district and city councils provide community services such as water supply, sewerage and manage land subdivision and local land use. Four councils are unitary authorities having the functions of both regional and district councils. Regional and unitary authority boundaries are shown in Fig. 3.

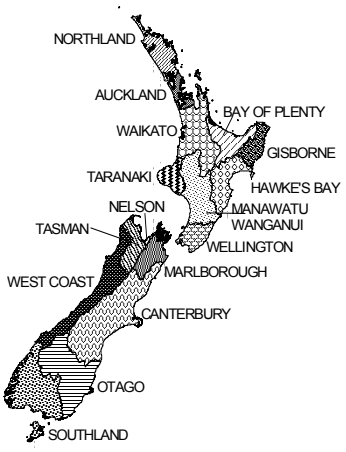

Fig. 3. Regional and unitary councils within New Zealand. These regional authorities provide the water resource management functions in New Zealand.

There is a planning framework for resource management in New Zealand that starts from central government and works down to individuals seeking to utilize a resource, e.g. using water to irrigate a farm. This hierarchy is shown in table 1; as you move further down the hierarchy each layer has to be consistent with the policies in the steps above it. An individual water user seeking to abstract water from a river needs to apply to a regional council for a "resource consent" to abstract the water. The resource consent is effectively a water right that allows the usage of water for a period of up to 35 years, however it is not attached to property title. Whether this consent is granted or not depends on whether it is allowable under the various planning tools above it and also on whether the abstraction is likely to cause an adverse effect on the environment or not.

Table 1. Planning framework for resource management in New Zealand

Planning document	**Responsible organization**
National Policy Statement	Central Government (Ministry for the Environment)
National Environmental Standards	Central Government (Ministry for the Environment)
Regional Policy Statements	Regional Councils
Regional Plans and District Plans	Regional and District Councils
Resource consent	Individual applicants

The planning documents shown in table 1 which are developed at the regional level are all appealable to the Environment Court and then to the High Court. These two courts are part of the independent judiciary system designed to provide check and balances. If we take the example of a

Regional Council developing a regional plan we can see how the appeal process can work. An individual who is opposed to one part of the plan (e.g. opposed to the setting of a particular allocation limit) first of all puts in a submission to the Regional Council and has the right to be heard with their views on the allocation limit. This can involve a separate scientific expert, hired by the submitter, giving an opinion on whether the allocation limit is reasonable. If the submission is rejected the submitter can appeal the decision to the Environment Court where a judge (frequently advised by a panel of technical experts) makes a decision on whether the correct decision has been made. If the submitter is not satisfied with the Environment Court decision then he/she can appeal to the High Court, although only on a point of law, not solely because of dissatisfaction. Recent changes to the Resource Management Act have made it more difficult to appeal to the Environment Court in order to cut down on frivolous appeals and speed up the resource management process..

While in theory table 1 provides a logical structure for resource management, in practice it has become fraught with difficulty and frequently involves legal proceedings that make it expensive and unpleasant for all concerned. Some of the reasons for this framework not working well are outlined below with particular reference to freshwater management.

3.1 Delays in implementing plans and policy statements

Although the Resource Management Act came into force in 1991 not all steps in planning framework of table 1 have been implemented. While regional policy statements are mandatory, other regional plans are not. Some councils have developed a full plan covering all resource management functions, others have developed specific plans for issues e.g. air, water etc. (Richmond et al., 2004). For water planning purposes, most councils have adopted an approach to allocation that first establishes the values and uses of each water resource, sets limits – such as allocation limits, or minimum flows or groundwater levels - to the amount of water that can be extracted to avoid significant adverse effects to those values and uses, and allocates the remaining water among applicants for water permits on a 'first in, first served' basis (Lincoln Environmental, 2000). The setting of those environmental flows and allocation limits can be an extremely contentious and cause long delays in establishing the relevant plans. As an example, the region of Canterbury where there are very large demands for water, the regional plan was started to be developed in 1996, notified in 2002-4 and is still going through decision making based on the 62,000 submissions on the plan. This long delay in getting the regional plan in place has caused severe problems in water management (most notably the need to manage each resource consent application individually rather than cumulatively) and has recently led to central government intervention in the Canterbury Regional Council functioning.

In a similar manner to the regional plan for Canterbury, the National Policy Statement for freshwater has encountered long delays in becoming fully operational. As of April 2010 a draft policy has been proposed and a Board of Inquiry has heard public submissions and made recommendations to the Minister for the Environment but it is unlikely anything will be done to implement the national policy statement for at least another 6 months or more. The proposed National Policy Statement is necessarily at a very high level but sets out important policies such as "to phase out over-allocation of water" and ensuring that all councils "set freshwater quality standards for all bodies of fresh water". Without this national direction important issues can be ignored by local decision-makers without a national overview.

3.2 Adversarial nature of resource management hearings

Where there is plentiful water a resource consent hearing can be relatively straightforward with the applicant merely having to prove that the abstraction of water will have a minor effect on the environment or that the effect can be mitigated for. However there are many parts of New Zealand

where surface or groundwater is considered fully allocated or there is a very poor understanding of how much resource is available. This leads to many contentious hearings which frequently focus on the adequacy of scientific knowledge for the particular case. Once this has elevated to the Environment Court or beyond it is an extremely adversarial (and/or confrontational) situation with one line up of experts versus another in a "winner takes all" type of environment. In most areas of biophysical science there is a degree of subjective interpretation of results and it is common for experts to disagree. In a "normal" science environment this is part of a rigorous scientific debate; in a resource management context these disputes are contentious and often involve a large amount of financial risk for the applicant. It can also be argued that the questions being asked in the court are not science questions, they are more political, e.g. should this water be allocated?

3.3 Expense of resource management proceedings

As well as an adversarial environment, resource consent hearings are expensive with the cost normally being borne by the applicant. In a current example a group of farming interests and local councils in Canterbury are applying for consent to abstract water from two major rivers and irrigate 84,0000 ha of farmland (the Central Plains Water scheme). The application was lodged in November 2005 and has cost $2M so far (New Zealand dollars, approximately 1.5 billion Korean Won). This cost is solely for running the resource consent hearing, it does not include any engineering design or construction costs. The reason for such an expensive hearing is that it is extremely contentious, particularly with respect to building a new reservoir (since abandoned in the plan) and the impacts of the agricultural intensification on water quality downstream. Once the resource consent hearing is over it is likely that an appeal will be lodged with the Environment Court which may double the costs.

Many developers claim the high cost of obtaining a resource consent has deterred applicants from further development, although as fig. 2 shows there has still been a rapid expansion of irrigated land.

4 THE CANTERBURY WATER MANAGEMENT STRATEGY

Canterbury is a region of 42,200 km^2 on the east coast of the South Island of New Zealand (fig. 4). The Canterbury Regional Council (also referred to as Environment Canterbury) governs this region which is the largest in New Zealand. Canterbury has 70% of the country's irrigated land and 65% of the nation's storage capacity for hydroelectricity. In 2008 the irrigated area within Canterbury was 500,000 ha which it is estimated contributes $800 million (New Zealand dollars, approximately 640 billion Korean Won) to national gross domestic product.

The Canterbury Plains is a flatland area of 8,000 km^2 within Canterbury which has much of the irrigated area in the region. The annual rainfall varies across the plains but at Christchurch Airport averages 614 mm per annum with an average annual potential evapotranspiration of 896 mm; producing an annual soil moisture deficit of 282mm. This soil moisture deficit is more pronounced during the growing season (October to April) where it stretches to 421 mm. This is the amount of irrigation water required to maintain full plant growth during the summer months. This amount is for grass and will vary for different crops, lower for grapes and some arable crops and higher for some vegetables, e.g. potatoes.

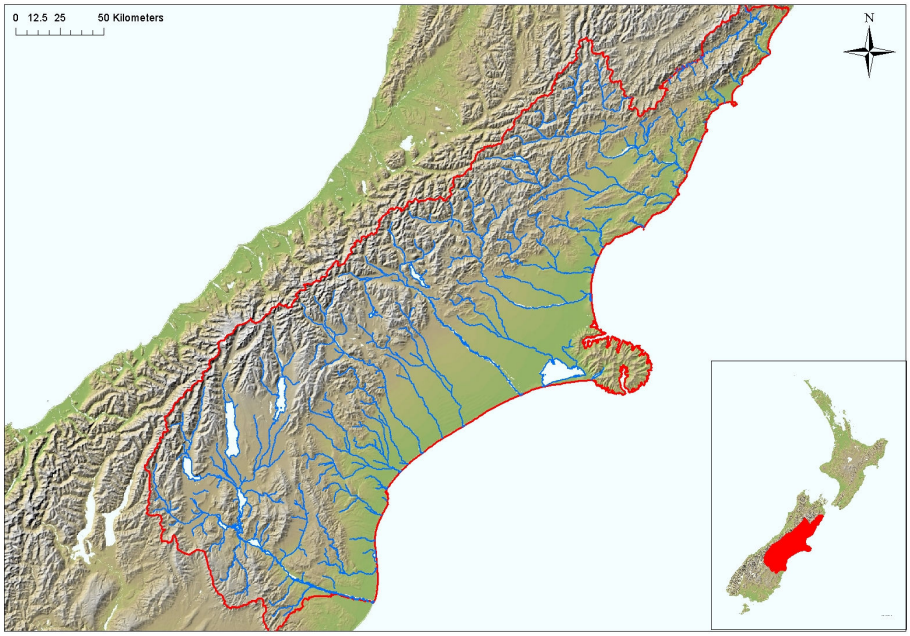

Fig. 4. The Canterbury region of New Zealand showing the major rivers and lakes.

The plant water requirement over the currently irrigated 500,000 ha has placed considerable stress on the quantity and quality of natural water systems (both rivers and groundwater) in Canterbury. In addition to this a further 215,000 ha of land has been identified as possible to irrigate given adequate water availability. It has been recognized that the region has enough water to meet the increased irrigation demand but it would have to be achieved through more efficient use of existing water allocations and storage of water from the large alpine rivers shown in fig. 4. At the same time there has been considerable general public concern over the degradation of Canterbury's rivers, particularly in lowland areas that are largely receiving bodies from agricultural runoff. This degradation is shown by monitoring of the invertebrate populations within lowland streams of Canterbury (fig. 5). In ten years of monitoring there has been a substantial increase in the number of sites in poor or very poor condition. A similar degradation can be seen in monitoring of nitrate concentrations in shallow groundwater (a major source of drinking water for the rural population).

The combination of increased demand for water, concerns over decreasing water quality, and the costly, adversarial nature of water allocation decision-making has led to the development of a new paradigm in the way water is allocated and managed: the Canterbury Water Management Strategy (CWMS). This is a strategy that draws upon a wide group of stakeholders and the general community to develop water management principles to lessen the need for costly and adversarial processes.

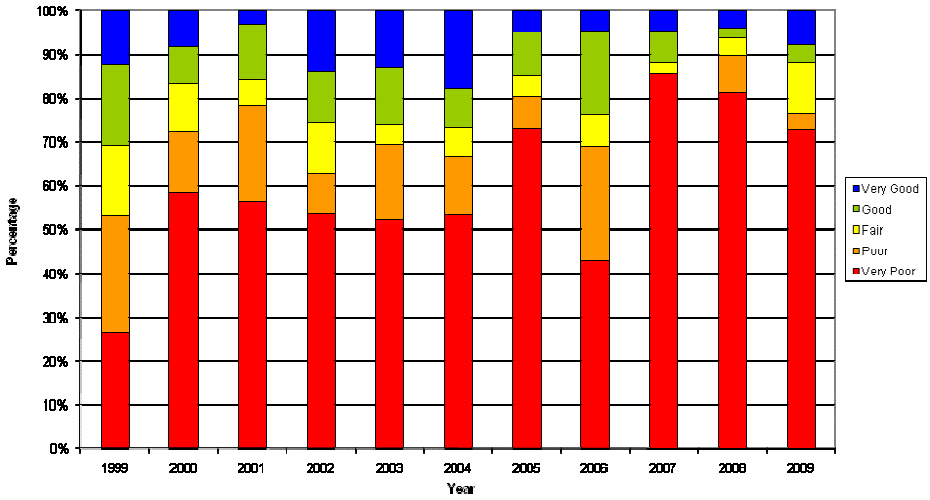

Fig. 5. Biotic health of lowland streams in Canterbury from 1999-2009.

The fundamental vision of the CWMS is: "to enable present and future generations to gain greatest social, economic, recreational and cultural benefits from our water resources within an environmental sustainable framework". Although this reads as a general statement that could fit any resource management issue the key changes that have been identified by the CWMS are:

- A shift from effects-based management of individual consents to integrated management based on water management zones.
- Management of the cumulative effects of water abstraction and land use intensification.
- Water allocation decisions that address sustainable environmental limits and climate variability.
- Actions to protect and restore freshwater biodiversity, amenity values and natural character.

The first part of the CWMS has been to set up a series of water management zones to allow more local decision-making and to establish a series of targets over the next 30 years. The targets fall within nine categories: drinking water; irrigated; land area; energy security and efficiency; ecosystem health/biodiversity; water use efficiency; kaitiakitanga (a Māori term referring to indigenous stewardship of resources); contribution to regional and national economies; natural character of braided rivers; and recreation and amenity opportunities. The targets are deliberately a mixture of environmental, economic development and cultural values and have defined values for 2015, 2010 and 2040. One of the key points about the CWMS is that it recognizes the need for: ecological restoration for past damage; infrastructure development for increased irrigation; and the need to link infrastructure with more efficient use of water by both existing and new water users. These three elements are recognized as having equal value.

Examination of the CWMS targets shows that the first targets are around restoration of ecological health and functioning and water use efficiency. It is only when these have been achieved that targets around commissioning infrastructure can be considered. This is an important principle that moves the emphasis on irrigation development proposals (such as the Central Plains Water scheme described in section 3.3) away from environmental mitigation of their effects and onto environmental improvement.

It is the mixture of economic and environmental concerns that has enabled the strategy to move to a point where it is being accepted by a wide range of stakeholders and community and is now (April 2010) starting to be transformed from strategy to reality. In order to achieve this there has had to be some legislative change, in particular giving the visions and principles of the strategy and the water management zone committee legal status.

Another feature of the CWMS is the establishment of funds to achieve the targets. Therefore there is money being made available carry out environmental restoration projects immediately and the expectation that there will also be money available for design of effective irrigation schemes in the future. At present almost all of the money for irrigation infrastructure design has been raised privately. This has created problems where schemes have suffered from limited design, due to limited funding available. There are three examples in Canterbury where privately funded schemes have suffered setbacks that may have been preventable with larger budgets available for engineering design and construction. The first example is the Opuha Dam, an earth dam which collapsed during construction sending a large amount of sediment into the downstream river system and causing considerable environmental damage. The second is the Kakahu irrigation scheme which feeds from the Opuha Dam scheme but has been plagued with difficulties in providing enough water to users due to large seepage losses in the open canals carrying water from the river to irrigators. The third example is the Benmore Irrigation Scheme where the canal carrying water to the irrigators collapsed in area traversing an active fault line. In all of these cases there was a substantial amount of capital raised from private investors to develop the scheme but in reality they were under-funded. If these cases were to be developed under the CWMS the availability of extra funding to ensure excellent design and construction was carried out may have ensured better schemes overall that could also have delivered extra environmental benefits. This requires a long-term view and utilizes money to be paid off over several generations, most likely loaned from central or regional government sources.

There is nothing particularly new or radical about the Canterbury Water Management Strategy but it is the piecing together of environmental, economic and cultural concerns within a single strategy document that has allowed it to receive wide praise and endorsement. This is particularly significant in a region where access to water (whether for amenity or economic interest) is such a contentious issue.

5 CONCLUSION

New Zealand has had nearly twenty years since the introduction of the Resource Management Act (RMA) to develop a strong resource management framework. The devolution of decision-making that is part of the RMA was in itself a reaction to many years of centralized planning of water and infrastructure. There has been much criticism in recent years of the RMA approach, mainly due the expensive compliance costs for development projects but also due to inadequate dealing with cumulative impacts of multiple consents. It is often suggested that at the time of developing the RMA New Zealand was “water rich” and therefore cumulative effect and contentious science were not issues that were considered. The principle that local communities decide the allocation of their own resources is considered an important part of New Zealand democracy but it has not always worked well. The Canterbury Water Management Strategy (CWMS) is built out of this devolved decision-making principle. It offers a way forward that involves consensus building but is practical enough to recognize that economic development is needed but that it need not proceed in conflict with the environment, but rather can be a means towards environmental improvement. The CWMS is at an early stage of implementation so cannot be judged as a success or not. In reality the alternatives to a CWMS approach are: to take an autocratic approach to water infrastructure development or to continue with the current expensive and adversarial approach.

6 REFERENCES

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