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"Water Management Challenges in Canterbury"

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Introduction

Water has been described as "*the defining crisis of the 21st century"* (Pearce, 2006). The Canterbury region is grappling with increased demand for water, a recognition that sustainability limits have been reached and in some cases exceeded, and public concern about the poor health of lowland streams and the effects of land use intensification on water quality.

The paper gives an overview of pressures on water resources in the region, outlines some elements of Environment Canterbury's response including; setting allocation limits, implementing more collaborative approaches for regulatory and non-statutory management, and seeking to recoup some of the costs of water management from users.

It is a personal perspective which does not represent the position of the Canterbury Regional Council or the views of Council colleagues. It does, however, draw on technical information from the regional council. It focuses on water quantity issues because others address water quality.

Canterbury's water bodies are important to the region and the nation. Some 54% of the water allocated nation wide for abstractive uses is in Canterbury, the region has 67% of New Zealand's irrigated land, and 65% of its hydro storage used to generate 24% of the country's power.

Inland lakes such as Tekapo and Pukaki are tourism icons while the region's largest lake, Te Waihora/Lake Ellesmere is a tribal taonga for Ngai Tahu.

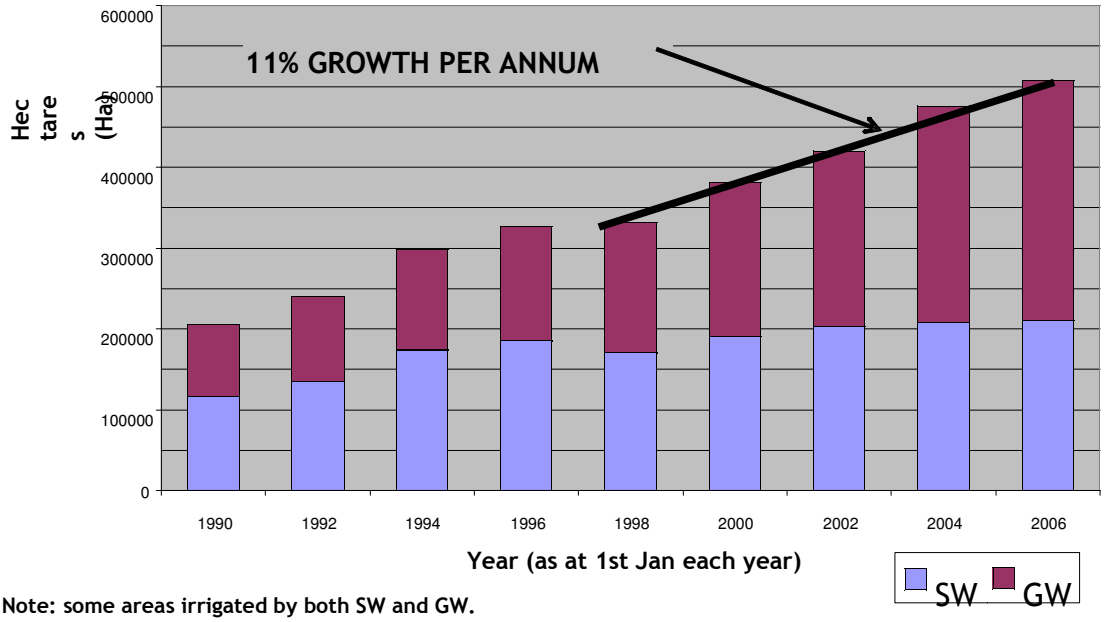
Braided rivers such as the Waimakariri, Rangitata and Waitaki provide a range of cultural and amenity values - fishing, kayaking and other water sports and scenic appreciation. As well, they provide outstanding breeding and feeding habitat for more than 80 species of wetland birds, many endemic to New Zealand, most with steadily declining populations, and several such as the wrybill and black-fronted tern which are threatened with extinction.

Groundwater provides Christchurch with untreated drinking water, and supplies many rural residents and some townships.

Increased water demand and land use change

There has been a significant increase in irrigation in the last 20 years, a demand which is expected to continue (Figure 1). Environment Canterbury's consent records show a 260% increase in the amount of irrigated land from 1985 to 2005, and an 11% annual increase in the extent of irrigated land between 1998 and 2006. This increase comes primarily from increased groundwater takes.

Some 90% of consumptive use of water in the region is for irrigated agriculture. The main irrigated land uses are dairy pasture 34%, other pasture 36%, arable 27% and horticulture and viticulture 3%. (Environment Canterbury, In press)



Note: some areas irrigated by both SW and GW.

Figure 1 Increase in consented irrigated area 1990-2006. Source: Environment Canterbury

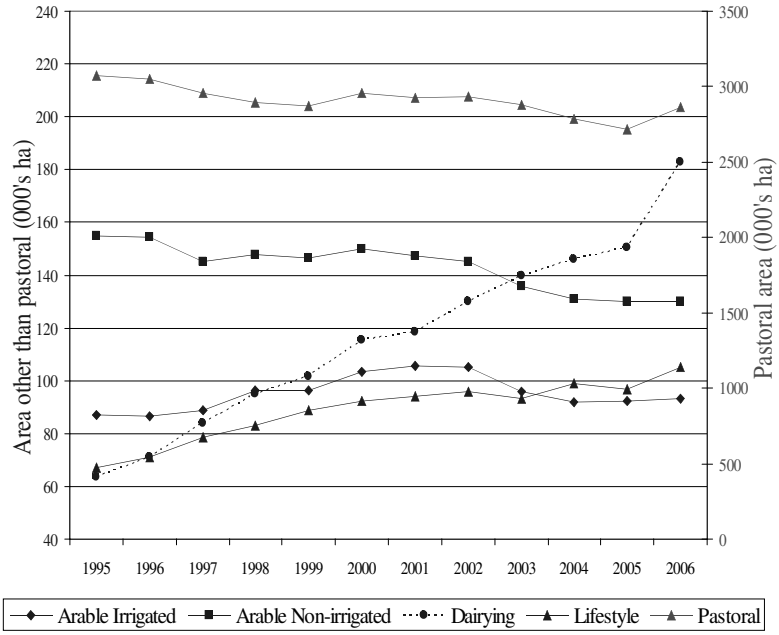


Figure 2 Changes in land use 1995-2006
(Dryland pastoral plotted on right axis) Source: Environment Canterbury (2008)

In the decade from 1996 to 2006 Canterbury has changed from a relatively minor dairying region to a significant one, with dairy cattle numbers increasing by more than 160 %. Fertiliser application has increased more than eightfold and by 2004 had reached the same tonnage as the Waikato region (historically the country's heaviest fertiliser user). (Environment Canterbury, In press)

Most shallow groundwater now has nitrate nitrogen concentrations greater than the natural background concentrations and there are areas where concentrations exceed the drinking water standard of 11.3 milligrams per litre.

Lowland streams have a high percentage of sites graded "poor" or "very poor" for biotic health with key issues including sedimentation and weed proliferation. (Environment Canterbury, In press)

There has been a significant lag in the planning and regulatory response to increasing water use and more intensive land use. During the 1990s and early part of this decade, few water take applications were declined, 35 year consent terms were the norm, minimum flows were established in an ad hoc way through the consent process, and there were no allocative caps on groundwater zones.

North Canterbury artist and writer Sam Mahon large metal "timebomb" artwork with a water poem inscribed around it, highlights some of the public concern about the inadequate agency response. One verse of the poem reads:

> "*Just stones and sand*
> *where the river once ran*
> *and the sound of the wind*
> *in a rusty tin can*
> *and a busted old car*
> *with its guts hanging out*
> *crankcase blood,*
> *mingling with the bones*
> *of the very last trout"*

The reasons lawyer and commissioner, Philip Milne gives for what he describes as *"the failure of some Councils to erect stop signs or at least "go slow" signs in their plans before sustainable limits are reached"* include:

- the time lag between the problem being identified and its cause established;
- inadequate information on which to base limits;
- uncertainty about the cause of particular effects;
- political reluctance to constrain resource use and economic development;
- time lag between a council deciding to act and the limits becoming operative; and
- proposed limits not being upheld in the Environment Court (Milne, 2008) or one could add, by commissioners.

In my opinion, all of these factors have operated in Canterbury. The proposed Natural Resources Regional Plan (NRRP), notified in 2004 and now part way through the hearing process seeks to set some sustainability limits. It was a belated but reasonably comprehensive response. It has gaps, particularly in relation to non-point source discharges because the science and modelling was not sufficiently developed in 2004 to support catchment limits for nitrogen and phosphorus. (A variation is being developed).

"Go slow" mechanisms in the proposed NRRP include prioritisation of catchments to review existing minimum flows and implement environmental flow regimes, non-complying rather than discretionary status for some takes, and detailed policies and assessment criteria to evaluate applications.

Setting sustainability limits – Surface waters
Canterbury has three main types of river system:

- major snow and glacial fed alpine rivers such as the Waimakariri, Rakaia and Rangitata which have peak flows in spring and early summer.
- foothills rivers such as Selwyn are rain fed and have peak flows in winter.
- spring fed, lowland streams that are sourced from groundwater and have small flows compared to alpine rivers.

All of the alpine rivers have at least one or more large scale abstraction for irrigation purposes. The biggest growth in surface water takes over the last 15 years has been from the large alpine fed catchments because of their larger, more reliable flows. Most of these rivers are nearly, if not already, fully allocated in terms of reliable run of river supplies. Run of river takes are also near their limits in foothills rivers and lowland streams.

Minimum flows exist on more than 200 river reaches. These have been established through operative plans, consent conditions, and water conservation orders. These are being progressively replaced with environmental flows through variations to the NRRP. These better recognise the need for flow variability, and to provide for natural character and other ecological, cultural and amenity requirements. The amount of water which can be reliably abstracted from the river (known as the "A block") while maintaining instream values is defined. Allocation blocks for successively less reliable water can be set as "B" and "C" blocks above this while also providing for retention instream.

The proposed National Environment Standard on Ecological Flows will provide a helpful interim framework for streams where environmental flows have not yet been established.

Setting sustainability limits – Groundwater
The significant increase in groundwater abstraction associated with land use intensification has contributed to a decline in groundwater levels and to reduced flows in spring fed, lowland streams with impacts on ecological health.

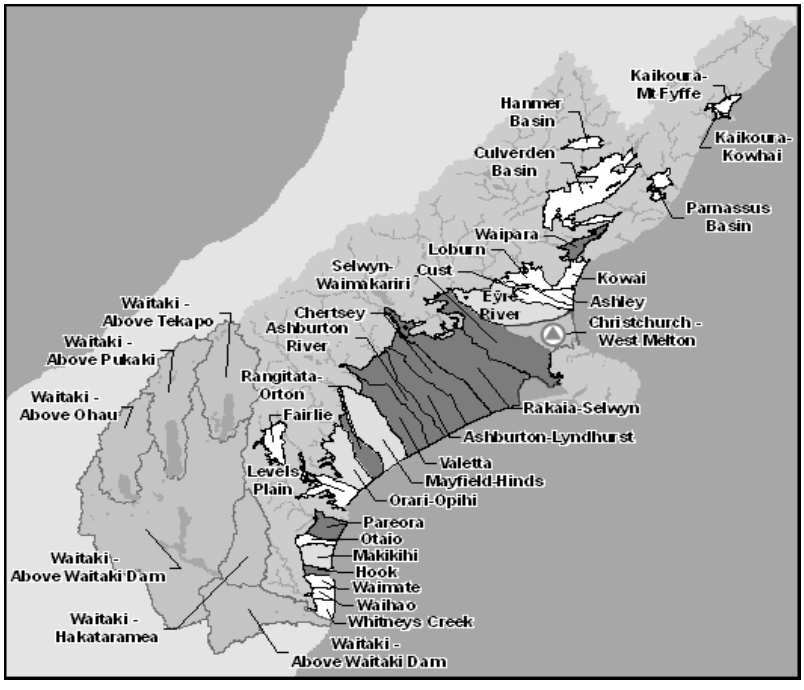


Figure 3 Groundwater allocation zones

In response, groundwater allocation limits and effective allocations have now been estimated for all 29 groundwater zones in the region. This involves:

- defining the groundwater zones (These represent areas of similar hydrogeology and recharge sources. They are based on the extent of permeable gravels on the Canterbury plains with the major river systems used as hydrogeological boundaries).
- estimating groundwater recharge using the best available information.
- estimating water use based on existing consents.

The "refined" method of estimating groundwater recharge involves calculating the land surface recharge using soil type, rainfall, and evapotranspiration. Allocation is limited to 50 % of the annual average land surface recharge for the time series of the data available.

Modelling of groundwater zones seeks to more accurately estimate the amount available for allocation but reliable models are likely to be some years away. In the interim, applicants seek to exploit the inherent scientific uncertainty caused by limited information through contesting many of the assumptions and basis for estimates.

When the estimated use exceeds the estimated recharge, the zone is considered to be fully allocated and defined as a "Red Zone". (Figure 3) Unless better information is available to indicate further availability of water, NRRP policies provide that takes should be declined unless cumulative effects are minor. New takes are non-complying activities.

Most of the major zones, such as Rakaia-Selwyn, are already "red" (fully allocated) or "yellow" (between 80% and 100% allocated). White zones are where effective allocation is less than 80 %. Consented allocations in many zones have now reached or are approaching those limits.

The allocation limits and policies seek to prevent a long term decline in groundwater levels, maintain a reliable supply for existing users, and ensure flows in hydraulically connected lowland streams are adequate to sustain a healthy functioning habitat.

Successfully applying these limits is no easy task. Groundwater zones comprise multi layered aquifers (up to 6 deep in places). Determining whether an application will cause more than minor effects requires an understanding of the relationship between takes at different depths and locations, and their potential effects on streams which can be tens of kilometres away.

There is disagreement over:

- The buffering effects of distance and depth
- The point at which effects become unacceptable (this can vary between years and locations);
- The reliability of evidence about the cause and impact of existing effects.
- Whether the effects of climate change are relevant.

The establishment of allocation limits has caused a significant increase in the number of consent applications received. With "first in- first served, applicants want to stake their place in the queue, creating a "water rush" situation. The Council already has a heavy consent load, processing around 2,500 consent applications annually, many of

these for water. In their haste to get a "place in the queue" the information provided by applicants can be inadequate, resulting in requests for further information and then legal debate about priority in relation to competing applications. Cases are being taken to the Court of Appeal and above.

The number of applications being notified has increased because their potential effects are more than minor in zones which are at, or near full allocation. Lengthy and expensive hearings and Environment Court challenges occur when Council officers' s42A reports recommend decline where consented volume exceeds the allocation limits. Scientific and technical staff are diverted away from plan and policy development to consent hearings. This high demand and the low availability of RMA professionals, hydrologists and other water professionals, can compromise consent processing times and policy development.

The costs in the current RMA processes for the regional councils, consent holders, applicants and other stakeholders are high. The outcomes are uncertain and depend on individual commissioner and Environment Court decisions.

With the difficulty in providing hard evidence about the extent to which individual applications contribute to adverse cumulative effects, and the limited application of a precautionary approach in decisions, more water is being allocated than would be desirable.

A recent example is the commissioners' decision in 2007 to grant the majority of the 69 applications to take and use water in the Rakaia-Selwyn groundwater Red Zone against the recommendations of Environment Canterbury officers. The commissioners acknowledged that "*further takes from deeper aquifers have some limited potential to increase the effects in some years"* but considered the increase would be minor. Given that existing cumulative effects are unacceptable, any increase in abstraction cannot be sustainable. Declining the consents would have implemented an "anticipate and avoid" strategy rather than the "suck and see" regime adopted. See http://www.ecan.govt.nz/Resource+Consents/Hearing+Decisions/

Other mechanism to set allocation limits
Given these difficulties, other mechanisms to set more defensible allocation limits include:

a) Prohibited activity status
The Court of Appeal's decision in *Coromandel Watchdog of Hauraki Inc. v Chief Executive of the Ministry of Economic Development* [2007] could encourage greater use of prohibited activities. The Court noted that prohibited status may be appropriate in a range of situations, including where council had insufficient information when it was developing the plan to determine how an activity should be provided for, where it sought to take a purposively staged approach and where it wanted to direct in a strategic way, the sustainable management of resources.

Such rules would still require adequate scientific justification, strong s32 benefit-cost analysis and policy support. (Section 32(4)(b) requires the evaluation to take into account the risk of acting or not acting if there is uncertainty or insufficient information about the issue addressed by policies or rules). New prohibited activity policies and rules would still have to survive the plan submission, hearing and appeal process to become operative. Given the economic value of water they would be strongly contested by user interests.

b) Using NES to identify "at risk" catchments"
National environmental standards (NES) using s43 of the RMA would be a more "agile" tool to address the high transaction costs and uncertain outcomes of the current highly litigious process of implementing sustainability limits. With an NES there is no formal submission or hearing process, and no right of appeal to the Environment Court.

Section 43(2) RMA enables standards to include "methods for classifying a natural or physical resource". Standards may "prohibit" an activity or allow consents to be granted "but only on the terms or conditions specified in the standard." National environmental standards could give regional councils the authority (subject to Ministerial endorsement) to designate "at risk catchments or groundwater resource" and implement associated control mechanisms, such as not processing new consent applications.

The "at risk" of over-allocation designation would remain until provisions in a regional plan to address the issue had become operative. This would allow regional councils a breathing space to develop more accurate modelling, eliminate some scientific uncertainty over the nature and scale of effects, seek some scientific consensus, and strengthen plan policies and rules.

Such an approach parallels the designation of airsheds under the National Environmental Standard for air quality. With regard to water, the ability to develop controls specific to the water body catchment or groundwater zone would be needed, rather than the one size fits all approach for airsheds.

c) Retrofitting existing consents
To help restore flows to spring fed streams affected by abstraction, Environment Canterbury is seeking to retrofit existing groundwater consents to address their contribution to over allocation. It is progressively reviewing 1500 consents in two Red Zones (Rakaia - Selwyn and Selwyn-Waimakariri) granted before sustainability limits were established.

The review is projected to cost $615,000 in 2008/09 alone. It aims to:

- establish annual allocation limits which better reflect groundwater recharge rates and should enable the impact of constraints on use to be shared equitably.
- require installation of meters and dataloggers.
- restrict takes which are hydraulically connected to surface water by linking them to minimum stream flow. If the environmental flow is reached, pumping stops until the stream recovers.

Consent reviews are a difficult exercise given the principle of non-derogation. A collaborative process is being used with the formation of "cluster groups" of consent holders in sub zones, well facilitated meetings between council and each "cluster group" about timelines, proposed consent conditions, the scientific basis for the annual allocation limits, and practical issues around metering requirements.

If the collaborative process fails, and the first group of reviews become bogged down in legal challenges, then amending the RMA to provide an accelerated process for consent reviews would be desirable.

Collaborative processes

There is also an increasing emphasis on a collaborative approach in statutory and non-statutory planning. Instead of parties interacting for the first time in front of an Environment Court mediator to try and resolve their various plan appeals, dialogue at the front end is now encouraged. When developing environmental flows the scale of the task depends on the size of the catchment. For a major river (Figure 4) it can involve:

- an initial public meeting where participants agree to the establishment of a Community Advisory Group which could meet 5-6 times over an 18 month period. It is a chance for staff to access local information and the public to request further investigations. It is not a consensus process and decision making remains with Council not the group.
- a Technical Panel to undertake field assessments and provide expertise to determine flow requirements for instream values.
- focused consultation meetings with key stakeholders and statutory consultees.
- opportunity for stakeholders to present to councillors before a variation to the regional plan is finalised and notified.

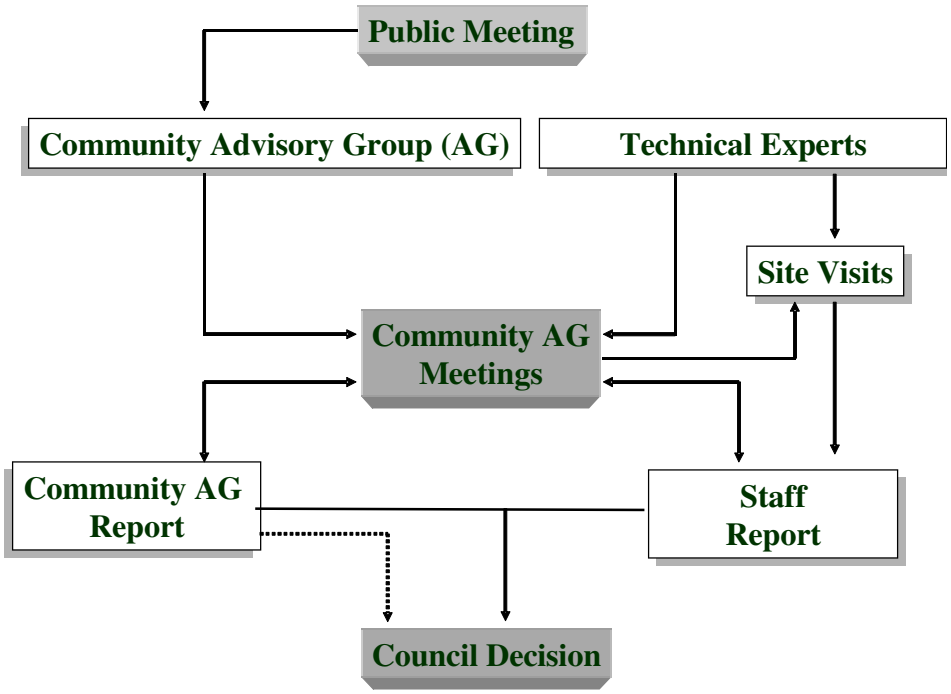


Figure 4 Environmental flows and community consultation

Non-statutory

The Council has increasingly sought to establish community partnerships to achieve environmental outcomes. A large Resource Care section comprising staff with facilitation and community networking skills work with landholders, and interested local people to improve land management practices, enhance riparian areas through fencing and planting, or use Integrated Catchment Management approaches to build a shared understanding of a river system.

In South Canterbury's Orari River and the lower Waitaki catchments for example, several years of work and regular meetings by people interested in each river has produced non-statutory river management strategies. Each strategy uses local knowledge as well as scientific surveys to build a fuller picture of the way the river

functions, outline practical actions on issues such as weed control, recreational access, and gravel extraction. It can help inform subsequent statutory planning. The process can also generate a greater understanding between those involved of their shared and differing perspectives.

Canterbury Strategic Water Study
One of the most ambitious collaborative exercises is a region wide strategy which seeks to determine if there is community agreement on the key priorities for water management for the next 20 years. It is being driven by territorial authorities and the regional council through the region's Mayoral Forum. To date, the Canterbury Strategic Water Study (CSWS) has been a regional investigation of water availability and has focused on options for water storage to meet future irrigation demand. (Whitehouse, 2008). The focus has broadened to address land use intensification and allow a wider analysis of water's uses and benefits.

Large scale storage and run of river schemes are controversial as indicated by the strong opposition to the Central Plains Water scheme and its proposed 40 cumec takes from each of the Waimakariri and Rakaia Rivers to irrigate 60,000 ha.

Evaluation of various storage reservoir options by a multi-stakeholder group in Stage 3 of the CSWS included: "*A desire for an integrated and reasonably equitable solution which minimised the major storages required, returned water to lowland streams, protected flow variability in major alpine rivers, and adequately accounted for environmental and social impacts" (Whitehouse, 2008)*

Stage 4 of the study involves a multi-stakeholder steering committee overseeing a programme of public engagement using the web based "Open Strategy" method to engage numerous stakeholder organisations, and public consultation. It should determine whether there is any community consensus around water storage, its scale and location, and whether or not the existence of 1 million ha. of irrigable land in Canterbury means that it should all be irrigated. (This would double the current extent of irrigated land).

Recovering the costs of water management
As pressure on water resources grows, more detailed and improved information on their state is required, increasing water management costs. In 2008/09 Environment Canterbury will spend $17.7 million on water management, (up from $11.9 m in 2005/06). General rates fund 70 % of this and water management is the second biggest budget item after public passenger transport.

While Council's technical investigations to help characterise the resource, understand processes, causes and effects, and its policy and planning work benefit the general community, users also benefit as the work helps ensure continuity of supply. Some of this work is only needed because of the heavy consumptive demand.

The Council uses administrative charges under s36 RMA to recover the cost of processing consents and monitoring conditions from users. There is, however, no obvious mechanism to recover other water management costs, such as investigations and policy and planning work. A resource rental would raise thorny "ownership" issues. It would also require encouragement and policy support from central government, and a template on appropriate charging regimes which regions could adopt.

The Local Government Rating Act 2002 (LGRA) appears to prevent regional councils from using an obvious tool and levying a targeted rate. Under the LGRA this could only

be applied to water actually supplied or provided. In issuing a water consent, the regional council is not supplying the water but simply granting a right to take and use it. Nor does Council provide the water directly to the land. The consent holder obtains it by exercising the consent.

Small amendments to section 19 and Schedules 2 and 3 of the LGRA, to extend the matters which can be used to define categories of rateable land and the factors which can be used to calculate liability for targeted rates, would enable more equitable funding of water management and reduce the current subsidy burden on general ratepayers.

Conclusion

In Canterbury more sustainable water management requires limits on allocation to be recognised as limits and decisions which promote an "anticipate and avoid" strategy rather than "suck it and see".

The previous liberal regulatory regime and the absence of a precautionary approach has generated significant costs, both financial and environmental. They include degraded water quality, and having to rebuild public trust in the council as an effective water manager, retrofit existing consents, and restore the ecological health of lowland streams.

A national environmental standard for "at risk catchments" could help address the problems associated with a "first-in-first served" approach to allocation when a resource is close to or at sustainability limits. It would allow the policy response to catch up with the speed and scale of irrigation-assisted land use change.

Collaborative processes are increasingly used. They can help ensure regulation is soundly based and may reduce litigation. Their effectiveness has yet to be fully evaluated.

Relatively minor amendments to rating legislation could help spread the costs of water management more fairly.

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