

## Dairying Impact on Ground Water

Dairy farming can have a negative impact on ground and surface water in three ways:

- The direct discharge of effluent from dairy sheds to streams or rivers
- Cows contaminating spring fed streams by walking through them
- Nitrates leaching to groundwater from the combined effects of fertiliser application and cow effluent on pasture.

Stream fencing and correct effluent treatment will eliminate the former two impacts. Careful monitoring and on-farm management will ensure nitrate leaching is controlled within sustainable levels.

Factors that can have an impact on nitrate leaching associated with dairy farms include depth and quality of soil, application rates of fertiliser and water, methods of irrigation, application of dairy shed effluent, species mix in pasture and whether pasture is renovated by ploughing or direct drilling.

Lincoln University's Centre for Soil and Environmental Quality has published a Nitrogen Leaching Estimation model, designed to enable farmers to manage application of water

and fertiliser so as to maximise production while keeping nitrate leaching to a sustainable level.

It has been suggested that, compared to groundwater irrigation from individual on-farm wells, a community surface water scheme has the potential to enforce 'best practice' environmental management tools such as this. Although voluntary adherence to these standards is considered preferable by most, to comply with resource consents a community scheme will likely be obliged to shut off irrigators not abiding by environmental guidelines.



Lincoln Dairy Farm - measuring nitrate leach through irrigated pasture



### Lincoln Dairy Farm

Established in 2001, the Lincoln University Dairy Farm was set up to undertake wide-ranging research into dairy farming in Canterbury. Research into the environmental impacts of dairying is an important part of its work.

Measuring rates of drainage through the different soils occurring in Canterbury, and the nitrate leaching associated with this, is one of the ongoing research projects at the farm. Initial indications after the first year of this research is that low rainfall over the first winter and the associated slow rates of drainage caused minimal leaching.

## Fertiliser and Irrigation Improve Soil Structure

Water drains quickly through shallow, light Lismore and Eyre soils that are typical of the un-irrigated Canterbury Plains, risking nitrates being leached with it into the groundwater system. With careful management of irrigation and fertiliser application over time however, the depth and organic content of these soils will steadily improve. As well as better quality soils providing better productivity, greater organic content creates a natural biological filter to prevent water draining so quickly and ensures better nitrogen take up.

Earthworms are a good indicator of the organic content and general health of soil. A recent study undertaken by Crop and Food Research at Winchmore Irrigation Station counted earthworms in different soils. While 250 was a typical number of worms in a dry unfertilised square metre of soil, irrigating the same soil would raise that count to around 500 worms per square metre and applying the correct amount of water and fertiliser could raise the worm count again to 800 per square metre.



## Ownership Options

A report completed late last year by MAF concludes that community owned irrigation schemes will provide stable and favourable returns to anyone prepared to make the initial investment such schemes require if they are to negotiate the resource consent process.

According to the report, which was part of the review of water allocation and regional development policy being undertaken by MAF, large scale water enhancement projects:

- require significant up-front capital;
- will operate over a number of generations, providing they are appropriately maintained;
- have a restricted direct-user market;
- generally supply a single service – water enhancement;
- are a catalyst for significant social and land use change;

require access to private land for associated infrastructure. The report outlines a number of different possible financial structures that might be appropriate for a community-owned scheme, weighing the respective merits and drawbacks of each. These include:

- Partnerships and unincorporated joint ventures;
- Co-operative companies;
- Limited companies and incorporated joint ventures;
- Trusts; and
- Unincorporated associations.

The report suggests that decisions on ownership structure should be made by the community served by each respective scheme.

The report can be viewed on the Ministry of Agriculture website: [www.maf.govt.nz](http://www.maf.govt.nz)

## Waimakariri Scheme Expands

Waimakariri Irrigation Ltd, which has provided water for irrigation to farmers between the Waimakariri and Ashley Rivers for the past three years, is expanding. At the start of the 2002/03 irrigation season coverage from the scheme grew from 14,000 to 18,000 hectares within a total command area of about 45,000 hectares.

Increasing its take from the Waimakariri River from seven to nine cubic metres per second, demand from farmers for the additional water was strong, with applications for all 4,000 shares received within six weeks of issue. The shares, sold at \$510 each, entitle the holder to 6,000 cubic metres of water over a 22 week irrigation season - sufficient to spray irrigate through that period. About 50 per cent of the new water was sold to 15 new irrigators, with the remainder going to existing shareholders who took the opportunity to expand irrigation of their properties.

Waimakariri irrigators are paying \$61 plus GST per hectare this season; up from \$59 in 2001/02. Unlike the proposed Central Plains scheme, the Waimakariri scheme has no storage component, relying entirely on run of river water, and is therefore subject to restrictions during the irrigation season if the flow of the river falls below set levels.

## Rangitata Decision

In October a special tribunal appointed by the Minister for the Environment recommended that a National Water Conservation Order be placed on the Rangitata River to protect the outstanding characteristics and features of that river.

The conditions of the draft conservation order are to maintain a minimum flow in the river of 20 cubic metres per second from 15 September to 14 May and of 15 cubic metres per second for the rest of the year. A one for one sharing regime is proposed for abstraction above these limits.

Central Plains Water made a submission to the special tribunal when it was convened in 2001 and has decided against appealing the decision to grant a conservation order. Some other submitters have lodged appeals however, meaning the final decision will be made by the Environment Court.

The draft Rangitata decision can be viewed on the Ministry for the Environment website: [www.mfe.govt.nz](http://www.mfe.govt.nz)

## Way forward for Canterbury Water

An extensive 18 month study into the availability and use of water in Canterbury was published recently by the Ministry of Agriculture and Forestry, Ministry for the Environment and Environment Canterbury.

Key findings of the study are:

- Co-ordinated management of all the region's surface and groundwater resources will ensure the needs of recreational, agricultural, industrial and civic water users can be met into the future.
- Water storage offers an effective way of achieving this.
- There is sufficient water in Canterbury to meet present and projected future demand – however, while there is an abundance of water in some catchments, there is, or will be, a shortfall in others.
- Conservative management of takes from groundwater will be necessary in the future, in particular to protect Canterbury's lowland spring-fed streams.
- In general, the large braided river systems such as the Rakaia and Waimakariri offer the greatest surface water resource. Water from these rivers can be successfully 'harvested' without compromising the character of these rivers or their flow variability.

The study covered 14 catchment areas from the Clarence to the Waitaki. Copies of the Canterbury Strategic Water Study are available from Environment Canterbury customer services 03 365 3828, or the Environment Canterbury website – [www.ecan.govt.nz](http://www.ecan.govt.nz).

## Water Enhancement Conference

Over 200 people attended a two day conference in Wellington in July jointly hosted by the Ministry of Agriculture and the Ministry for the Environment.

Entitled 'Water: The Lifeblood of New Zealand – The Allocation of Freshwater' the conference examined issues associated with the economic, environmental and practical aspects of developing a community water enhancement scheme.

Papers presented at the conference can be viewed on the Ministry of Agriculture website: [www.maf.govt.nz](http://www.maf.govt.nz)

*"Although the feasibility study indicates that a large scale community water enhancement scheme for the Central Plains is consentable, affordable and bankable, there are still a number of very complex issues on which a series of impregnable cases needs to be developed before the social, environmental and economic benefits that have been identified can be delivered."*

*Doug Marsh, Chairman, Central Plains Water*

## Ritso Society formed

An incorporated society was formed in April to represent the interests of individuals, property owners, primary producers and businesses that will benefit from the construction of the community water enhancement scheme under consideration by Central Plains Water.

Called the Ritso Society, the organisation is named after a Malvern District Engineer from the nineteenth century, Mr GF Ritso who in 1883 published an essay outlining a vision that an irrigation scheme using water from the region's principal rivers could transform agriculture in the district.

According to its constitution, the aims and objectives of the Ritso Society are to raise awareness of irrigation, of land use change associated with irrigation and of the economic benefits that can follow irrigation. It will also take a role as advocate on behalf of the rural communities of the Central Plains in ongoing discussions of these issues.

The Ritso Society is committed to raising \$250,000 to assist the work of Central Plains Water.

## Water Allocation

A study published in November 2001 by the Ministry of Agriculture concludes that maximum flexibility in allocation and trading of water rights will help ensure efficient water use for the various community water enhancement schemes under consideration throughout New Zealand – including Central Plains Water.

Among a number of conclusions made by the study is that to make allocation of water use in New Zealand more efficient, methods should be found to:

- Establish property rights to water
- Allocate water by the total capacity of the resource
- Create markets to enable trade in water rights
- Provide full information on the resource being allocated
- Assist in developing values for water for market and non-market uses.

This economic study was one of five commissioned by MAF in September 2001 with a view to providing policy direction to guide regional development plans and long-range water allocation. It can be read on the MAF website: [www.maf.govt.nz](http://www.maf.govt.nz)

## Trust will Progress Project

Councils have agreed to a trust being formed to take forward the findings of the feasibility study undertaken by the Central Plains Water Enhancement Steering Committee. Initial signatories to the trust will be the Christchurch City and Selwyn District Councils, with provision for additional signatories to be added as necessary.

Appointments to the trust will be made by the two Councils, according to an agreed set of competency-based criteria. One appointment will be made on the recommendation of Te Runanga O Ngai Tahu and two on the recommendation of the Parliamentary Commissioner for the Environment. Appointments are expected to be finalised early in 2003, with the trust formally taking over the work of the Steering Committee shortly after that.

A trust will enable consents to take and use water to be retained in public ownership, but will have flexibility to raise the funding required to complete preparation for a scheme independent of Council involvement and ratepayer risk. The first priority of the trust will be to secure required funding and carry out concept refinement work based on the Central Plains Water feasibility study.

Included in this phase of the project will be:

- An assessment of environmental effects so applications can be made for the resource consents necessary for scheme construction, take and use of water and land use.
- Information support to landowners and community interests in the scheme area to assist them to make decisions on whether or not they wish to irrigate.
- To determine the most appropriate ownership structure for a water enhancement scheme.
- To prepare a policy and strategy that will ensure the most effective means of acquiring the land necessary for a scheme.

This work is scheduled for completion in September 2003. Applications for consents are programmed to follow. Once consents are obtained, estimated by September 2005, the trust will make these available to a company, yet to be formed, which will obtain finance, design, construct and operate the scheme. Current best projections are for completion of the scheme in time for the 2008/09 irrigation season.

## Land Value Increases likely

Conversion of land use is an integral part of the success of irrigation. When community water enhancement schemes have been built in the past, many established farmers did not want to change their land use, choosing not to irrigate but instead selling to those who seek the opportunity to do so.

Based on experience in other areas, as many as 60 per cent of farmers may take this option if a scheme proceeds.

When access to water is guaranteed, a premium value will be added to the land. Generally a premium will be paid for the ability to irrigate, based on the cost – including cost of entry and annual water charges, the reliability of water in the scheme and the

potential productivity increase. Irrigation development can be expected to add value approximately equal to cost so the margin to be made is related to the ability to irrigate, not to the development as such.

Recent farm sales in the proposed Barhill Chertsey irrigation scheme area have seen premiums paid. This is before the Barhill Chertsey feasibility study has even been completed.

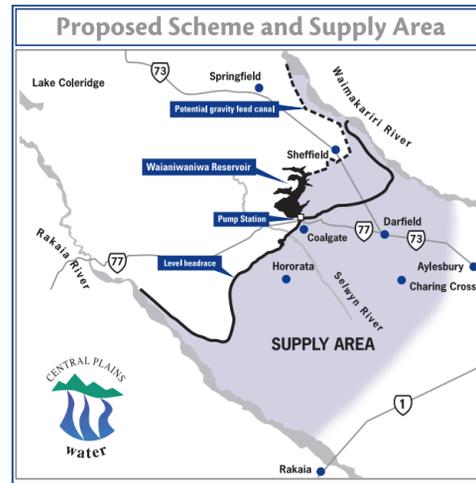
In the Central Plains a similar situation can be predicted if scheme proposals come to fruition. This will particularly be the case as and when resource consents are obtained and water is guaranteed.



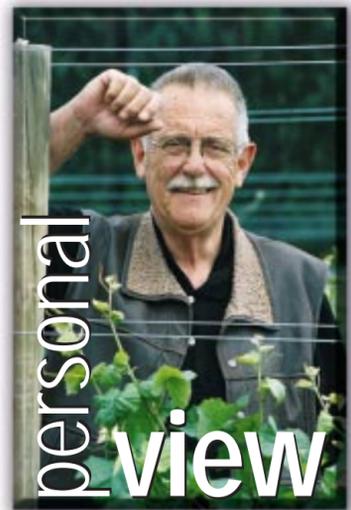
## Proposed Scheme Details

The feasibility study Central Plains Water completed in February outlined a base scheme proposal. Details of this scheme are as follows:

- Construction of a dam in the Malvern foothills to provide a storage reservoir capable of holding 290 million cubic metres.
- Intakes on the Rakaia and Waimakariri Rivers, just below the gorge on each river.
- A 56 km long level headrace canal at 235 metres above mean sea level between the Rakaia and Waimakariri Rivers.
- A supplementary pump and race providing water to the Windwhistle area.
- An open race reticulation network to supply water for irrigation to up to 84,000 ha of land.



- Run of river water would be supplied via the headrace system when water is available in the rivers, with the shortfall being made up from storage. During periods when supply exceeds demand, surplus water will be delivered to the Waianiwiwa Reservoir to replenish storage.



Richard Rowe is Professor (Emiritus) of Horticulture at Lincoln University and works as a consultant to the horticulture and wine industries.

“ For 20 years I trained some of the brightest young New Zealanders, teaching skills and technology to enable them to become useful citizens capable of leading our country to a prosperous future.

Unfortunately many leave our shores to use their skills to benefit more rewarding countries such as Australia, the United Kingdom and the United States.

The parents and grandparents of 500,000 New Zealanders living throughout the world tell with sadness how they now spend their annual vacations visiting grandchildren overseas.

We must take the problem into our own hands. Critical to our success is to grow the economy so that New Zealand is as financially attractive as our prosperous neighbours. Then our children and grandchildren will see a future in this country.

Farm products account for 45-50 per cent of Canterbury's export income, which accounts directly and indirectly for 60 to 70 per cent of Christchurch's economic activity. Our rural economy is the major driver of the economy and employment for both district and city.

If Selwyn and Christchurch are to obtain social, economic and environmental benefits by growing the economy, the productivity of the rural sector must grow in a sustainable manner. Present and future jobs, plus better levels of income, security and welfare will result from sensibly maximising utilisation of our extensive land and water resources.

## Water Enhancement, Agriculture, Canterbury and the NZ Economy

- Agriculture contributes \$20 billion worth of export returns per annum into the NZ economy – around 17 per cent of GDP. By comparison, the tourism industry earns around \$5 billion per annum.
- Between 300 and 400,000 hectares from Otago to the Wairarapa are under investigation by community groups throughout NZ for potential irrigation schemes. If all these were to proceed, they would contribute in the order of \$2 billion, at conservative estimates, which represents an increase of 1.7 per cent in GDP, most of which is in the form of export income.
- Export income from Canterbury's rural sector accounts directly and indirectly for between 60 and 70 per cent of Christchurch's economic activity – outstripping export income from the region's IT sector by a factor of 20 to one.
- In the last 15 years, NZ's agricultural productivity has increased by almost four per cent per annum – approximately four times the rate achieved by the total NZ economy.
- From 14 per cent in 1986, agriculture's share

of GDP has grown to 17 per cent today, while the total GDP has also grown by over 26 per cent – all this while, relative to their performance over a longer period, farmers have suffered exceptionally lean times.

- Canterbury farmers spend around \$750 million every year on goods and services provided by Christchurch businesses.
- Studies of water enhancement schemes already operating in NZ indicate a 14 per cent return on capital employed in irrigation development.
- Rural areas where irrigation has been developed experienced a net population gain of around 15 per cent, whereas undeveloped adjacent areas suffered a net loss of 0.6 per cent over the same period.
- In Australia irrigated agriculture earns SAU4.5 billion at the farm gate, with an economic multiplier of 3-4 across the wider community, of this SAU2.7 billion is export income with a high 'value-added' component at over 70 per cent of this figure from fully or partly processed production.

## Budget Outline

Funding projections for the development of the Central Plains Water project are as follows:

- \$1.25 million to complete the concept design investigations and assessment of environmental effects, which will bring the project to the point of applying for resource consents, anticipated to be completed by the end of 2003
- \$2.05 million to take the project through the resource consent process, obtain resource consents to take and use water and construct a scheme, provide information to farmers considering the opportunity to irrigate and establish a company to build and own the scheme infrastructure, anticipated to be completed by the end of 2005

At present income streams for this are as follows:

- \$530,000 is committed from the Selwyn District Council,

- \$250,000 is committed from the Ritso Society
- \$208,000 will be contributed by the Canterbury Economic Development Fund, subject to receipt of the contribution of the Ritso Society
- A further \$416,000 will be contributed by the Canterbury Economic Development Fund, subject to confirmation of alternative sources to fund the outstanding \$1.9 million required to complete the consenting process and establishment of a company.

This budget will be reviewed by the trust once it is established in early 2003. Approximately \$235 million is estimated for completion of final designs and construction of the dam, reservoir, races, intakes and other structures necessary for a scheme. It is anticipated that this part of the project will be taken on by the yet to be formed water company, which may be a user co-operative.

# Water update

DECEMBER 2002



The Central Plains Water Enhancement Steering Committee was set up by Christchurch City and Selwyn District Councils in March 2000 to investigate ways to improve the security and prosperity of the Central Canterbury region through water management schemes that enhance ecological and recreational values while providing opportunity for agricultural and horticultural diversity. Requests for further copies, previous issues and all other enquiries about the content of this newsletter should be directed to Central Plains Water Project Manager Eddie Thomas, tel (03) 377 8076. More information on [www.cpw.org.nz](http://www.cpw.org.nz)



## Waianiwiwa selected for storage

Plans under investigation by Central Plains Water have been altered to include the Waianiwiwa Valley as the preferred site for a storage reservoir.

Revised costings associated with unstable sediment under the proposed Wairiri dam site prompted further extensive geological and topographical studies at Waianiwiwa. The result of these, plus social and environmental considerations, saw the Waianiwiwa Valley emerge as the preferred site.

While both Wairiri and Waianiwiwa remain feasible, applications for resource consents for a scheme will proceed based on

storage in the Waianiwiwa Valley, which is approximately 11 km west of Darfield, adjacent to the township of Coalgate. An earth dam 2km long and 50m high across the mouth of the Waianiwiwa Valley will create a 290 million cubic metre reservoir with a surface area of approximately 1,300 ha.

Preference for Waianiwiwa over Wairiri is based on a number of factors:

- Less disruption to neighbouring communities – including no impact on State Highway 77,
- The capacity to increase the reservoir size to up to 450 million cubic metres by building a 10m higher dam subject to demand from irrigators outside the scheme area.
- Slightly lower capital and operating costs,
- Apparently better opportunities to use the reservoir for recreational purposes, though detailed assessment of this is still required.

Waianiwiwa Valley also offers the possibility of a gravity feed canal from an intake on the Waimakariri River upstream of the Kowai River. This would have a higher capital cost, but would reduce the annual power cost required to operate the scheme and may enable hydro-electric generation, while providing a convenient way to water the Sheffield-Springfield area.

