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Inside

The New Zealand Institute of Agricultural & Horticultural Science Inc

AgHort *talking*

A More Inclusive Approach

John Lancashire
President

Well what did we learn about science and the primary sector during last year's election? Unless you visited the parties' websites which surfaced very late in the campaign – not much. Admittedly there was some reasonably constructive comment at our political panel at Lincoln in June, reported in the last issue of *AgScience*, but actual coverage in the run-up to the election was virtually nil. Of course that's not new – there are few votes to be gained on science policy. Perhaps of more concern was the complete absence of discussion on the primary sector, which as Rick Christie, Chair of the AgResearch Board, has pointed out could best be represented by standing for a one minute silence. However, some comfort can be drawn from the fact that a recent editorial in the *National Business Review* picked up on Rick Christie's comments and stated that "the high performance in the farming sector is driven by research and innovation."

We are all familiar with the statistics on the economy with agribusiness comprising 65% of merchandise exports. But less commonly recognised is the fact that since 1985 the agricultural sector has grown twice as fast as the rest of the economy. The productivity of the sector has also increased at around 4% a year compared with the rest of the economy at around 1.5% a year over the past 20 years, which is near the bottom of the OECD. Further the contribution of agriculture to GDP has actually grown from 14% to 17% in that period, which hardly suggests a sunset industry. Given the general consensus among politicians from the Prime Minister down, and most economists, that low productivity is a major reason for the poor performance of the New Zealand economy, you might expect that there would be great interest in why agriculture does it so much better. But apparently not, and even more surprising, according to a recent Royal Society of New Zealand publication *The Road Ahead,* our dependence on the primary industries is a "problem." Our economy could do with a few more problems like that!

Obviously our sector has a lot more work to do to keep the key importance of the primary industries in front of the politicians and policy-makers. Your Institute is convinced that there is a need for a more inclusive approach by different parts of the sector, so that the message is not diluted by too many apparently uncoordinated players. It was with this in mind that I recently addressed the National Council meeting of Federated Farmers in Wellington on "The importance of primary sector research to the New Zealand economy." After the meeting the two organisations decided to meet regularly to reach common ground on issues around science, farming and the agricultural sector. Another encouraging initiative is "Dairy 21", a joint approach to government by industry and research to increase research funding in the pastoral sector.

There was also good news in the new campaign recently launched by AgResearch to attract more students into science careers, although some gloss was taken off that by the announcement in the same week of 70 redundancies in the Industrial Research CRI. The deficiencies in career prospects in science have been well aired in this journal (Issue 23) and many other fora. What is often not recognised is that the problem of an ageing scientific work force is international and not just confined to New Zealand. One third of the scientists in the USDA are due to retire in the next seven years, while the average age of scientists in NASA is 50. The EU has identified a shortfall of hundreds of thousands of scientists in the next few decades. All this means that New Zealand must lift its pathetic output of science graduates, because it will no longer be able fill its requirements from overseas. This problem is also reflected in the rapid ageing of Institute membership, an issue which your Council intends to address this year.

Finally, where is the Minister's "Picking up the Pace" vision for science and technology in New Zealand up to? Even given the inevitable delays in an election year progress seems slow, but hopefully this does not mean that the title of the initiative will come back to haunt the Minister and his officials in the next few months. There are some reassuring "new" words on the MoRST website such as 'less prominence given to competitive allocation process as the dominant funding mechanism' and 'greater trust is placed in research organisations to make decisions on the research that is done'. But Institute members who recently attended presentations from FRST on the next bidding round were told that FRST did not know how the Minister's initiative would influence the outcome! To get your views on "Picking up the Pace" and other issues the Institute will be trialing an online discussion board between March and June 2006. If successful (and that depends on the membership taking part) it could become a permanent feature of our activities. Details in the next issue of *AgScience.*

So here's to a much better year for science and the primary sector in 2006.

– John Lancashire

Wading Into Water

Politicians, trying to persuade us about their worthy work for the environment, emphasise their concerns about it.

Scientists increasingly are becoming involved in research related to its quality and quantity.

Time Magazine identified it as the oil issue of this century.

The issue is water.

During the election campaign, Prime Minister Helen Clark said Labour was committed to putting sustainable development at the heart of government planning and policy-making. Among her pledges, "we will … introduce national instruments to address fair and equitable allocation of water."

The Waitaki Catchment Water Allocation Plan serves as a model. It was officially handed to Environment Minister Marian Hobbs by the chair of the Waitaki Catchment Water Allocation Board, Judge David Sheppard, early in October. The plan, developed by the board, provides the framework for allocating water in the Waitaki catchment and is intended to help guide decision-making on resource consent applications to use water from the catchment.

A week later, AgResearch chairman Rick Christie made several references to water issues in a speech to the Grasslands Conference. Among his observations, the resources for dairying in New Zealand are limited – "as you know only too well, we have severely limited land and water in this country." It was the same for meat and wool production, although not so critical. "We know there is lots of work to be done to improve and conserve our land and water, and to do better in nutrient and waste discharges," Mr Christie said.

On 8 November, making one of his first speeches as Minister of Agriculture, Jim Anderton told Federated Farmers' national council the Labour-Progressive coalition government was making productivity growth a top priority for this term of parliament. The driver of productivity improvements in the primary sector has long been science, he acknowledged.

"The Government wants to ensure that research, science and technology is transformed into real, high value products for progressing New Zealand's economy," Mr Anderton said. There was likely to be government support for broadly-based pastoral forage research, for dairy and meat, with a focus on economic growth, "and for environmental sustainability, especially focusing on nitrogen, water, and sustainable soils."

The New Zealand Institute of Agricultural & Horticultural Science held a forum on water and water issues in Christchurch in mid-year. It was the initiative of the Canterbury Section of the institute and was chaired by Terry Heiler, who said the difficulties facing policy-makes and water managers in this country have been experienced much earlier in many other countries. In Sydney, for example, the authorities are talking about de-salinisation as the most appropriate way to augment a dwindling water supply for a rapidly growing city. In the developing world, the problem is worse.

Speakers at the forum were Morgan Williams, the Parliamentary Commissioner for the Environment; Bryan Jenkins, chief executive of Environment Canterbury; Lachlan McKenzie, from Federated Farmers; and John Donkers, a director of Central Plains Water Ltd. CPWL is proposing the development of a large irrigation scheme for the Central Canterbury Plains: water storage is a key component.

Four of the articles in this issue were provided by those speakers or are edited accounts of their contributions to the forum. Dr Brett Mullan, from NIWA, sets the scene by examining the critical effect climate change will have this century on the use and availability of water.

Only in the West

Water resources under climate change

Dr Brett Mullan, NIWA

Water is vital to the New Zealand economy. The agriculture and forestry sector contributes about 20% to GDP, and much of this production is dependent either on natural abundant rainfall or on water abstraction for irrigation. Approximately 70% of the country's electricity is generated from hydro-storage. As far as New Zealand is concerned, the most critical effect of climate change this century will be on the use and availability of water.

Industrialisation has caused the concentration of greenhouse gases in the atmosphere to rise markedly over the past 200 years. The concentration of carbon dioxide has increased by over 30%, and that of methane has more than doubled. This has led to increased trapping of infrared radiation within the climate system and an inevitable rise in temperature. The trends are widespread and extend deep into the oceans. Non-instrumental observations, such as the timing of seasonal freezing and thawing, support the picture. As time goes on, the observed warming matches ever better with calculations from global climate models. In the 2001 Assessment from the Intergovernmental Panel on Climate Change (IPCC), it was asserted that "most of the warming observed over the past 50 years can be attributed to human activities".

Climate projections developed by the IPCC based on scenario analysis include:

- an increase in globally averaged surface temperature by between 1.4°C and 5.8°C over the period 1990 to 2100. This rate of warming is probably without precedent during at least the last 10,000 years
- either increases or decreases in annual rainfall (depending on location) of typically 5–20% during the 21st century
- continued widespread retreat of glaciers throughout the 21st century
- a rise in global mean sea level of 0.09 to 0.88 m between 1990 and 2100
- a range of beneficial and adverse effects on both environmental and socio-economic systems.

Global climate models are in general agreement that the total globally-averaged rainfall will increase by about 2% for every 1°C rise in temperature. However, this increased rainfall (and likewise increased evapotranspiration) will not be distributed evenly.

Admittedly, there's a bit of poetic licence in the title of this article, but it paints the picture well enough. Recent projections for New Zealand suggest an increase in westerlies and accompanying rainfall in the west of the South Island, but a rainfall decrease in the east of both islands and the north of the North Island. While climate models differ in the exact amount of change predicted, they are in strong agreement about the direction of the change, especially for a decrease in rainfall in the northeast of the country.

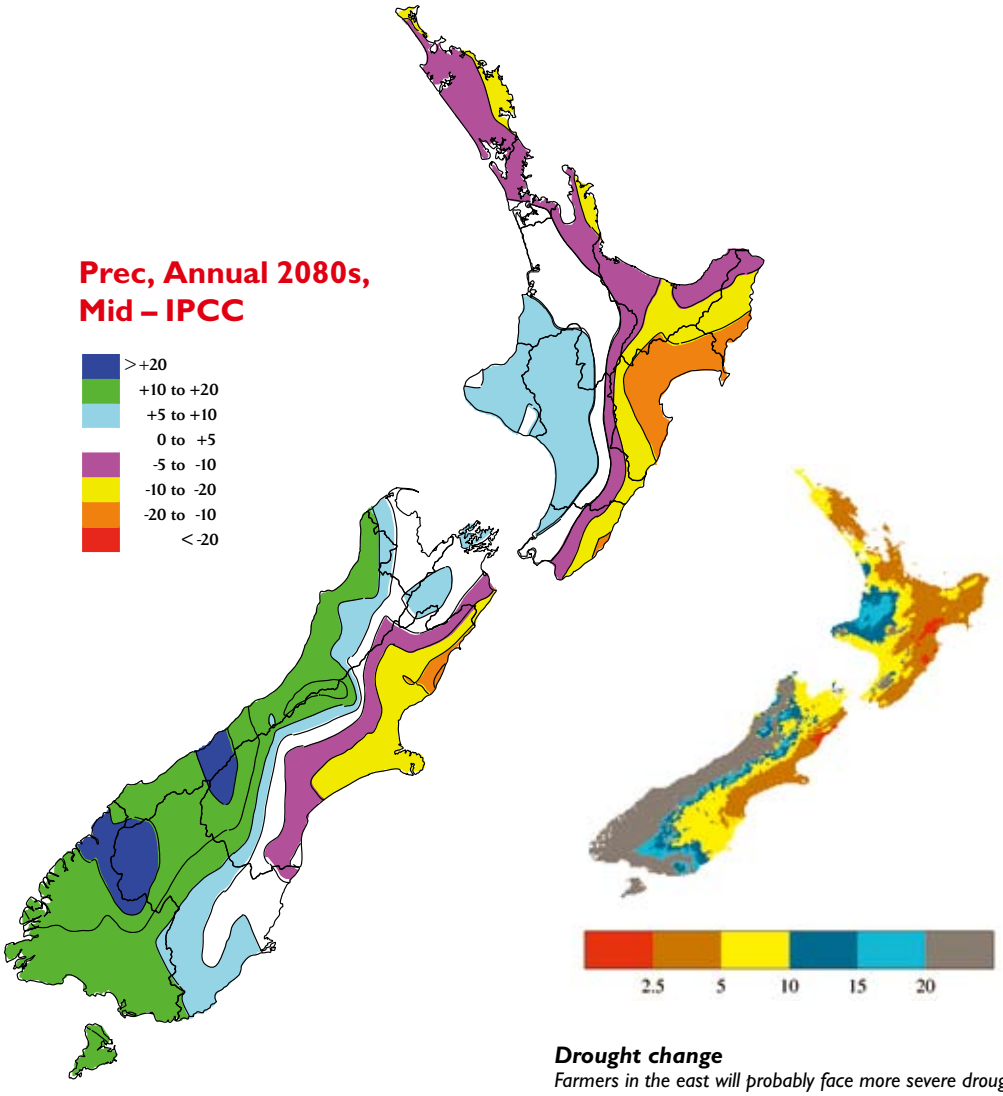
NIWA has assessed how future droughts might be affected by the projected rainfall changes and accompanying increases in wind and temperature. Severe droughts are likely to become two to four times more frequent than at present by the end of the 21st century. This will obviously put greater pressure on access to irrigation. Fortunately, increased rainfall in the west makes it likely that the major rivers, which are sourced from catchments high in the Southern Alps, will also have more water available for extraction. However, a nation-wide assessment of river flow changes under global warming has yet to be carried out.

Ironically, global warming is also expected to bring more heavy rainfall because higher temperatures enable the atmosphere to carry more moisture. Whether a given region actually gets more extreme rainfall depends on local circulation and weather patterns. Paradoxically, it is possible to have an increase in high-intensity rainfall in the same region as more frequent drought and decreasing long-term average precipitation. Observational evidence for increases in extreme rainfall in New Zealand is still ambiguous. The widespread flooding of the lower North Island in February 2004 was certainly an extreme event, but the NIWA Climate Database holds similar examples from the past.

The year 1923, for instance, still holds the record for widespread intense downpours (measured as the number of weather stations recording one-in-100 year amounts of rainfall over a 24-hour period).

Future reductions of greenhouse gas emissions will not prevent substantial climate change and sea-level rise. It will be necessary to adopt a broad range of adaptation measures to adjust to the impacts. At this stage the most urgent measures involve infrastructure with a long lifetime, such as stormwater drainage systems, planning for irrigation schemes, development plans for low-lying land already subject to flood risk, and housing and infrastructure along already eroding coastlines.

During the 21st century New Zealand's climate will continue to vary naturally from year to year and decade to decade, but increasing levels of greenhouse gases in the atmosphere will drive the global climate to a warmer state than at any time in human history. These changes are expected to significantly affect local water resources. Active research is under way on other water-related issues, particularly changes in water quality and in water availability for hydro power. Being aware of the likely changes, and planning pro-actively for them, is the most cost-effective strategy for communities in the long run.



Rainfall change

How will climate change affect rainfall? In general, we expect more rain in the west and south, and less rain in the east and north.

This map shows the percentage change in rainfall around New Zealand by the 2080s compared to 1990 'normal' levels. The figures represent an average over a number of climate models assuming mid-range projected increases in carbon dioxide concentrations.

Drought change

Farmers in the east will probably face more severe droughts as this century goes on.

This map shows predicted average recurrence interval (years) in the 2080s under a 'medium-high' climate change scenario, for the driest annual conditions that currently occur on average once every 20 years. The current 1-in-20 year drought in Timaru (brown region), for example, is predicted to occur on average once every 2.5–5 years.

The measure used for drought is 'potential evapotranspiration deficit', which is the amount of water (in mm) that would need to be added to a crop over a year to prevent loss of production through water shortage.

Many rivers to cross

Dr Morgan Williams,
Parliamentary Commissioner for the Environment

Fresh water: sustainability challenges for farming and society

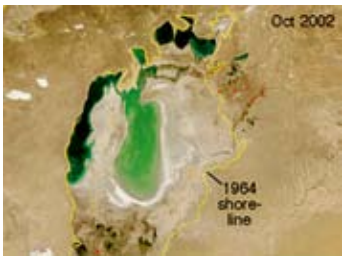
Based on a talk to The New Zealand Institute of Agricultural and Horticultural Science Convention at the Water Issues Forum, Lincoln University, 23 June 2005

At the heart of the sustainability challenges around water lies this question – how do we maintain the health of ecological systems while allocating surplus water for human use? To take a concrete and dramatic example, it means how do we avoid the situation that now exists in Russia's Aral Sea, which has been effectively killed because the rivers that flow into and sustain it have been diverted to irrigate water-intensive cotton and rice crops. The Aral Sea is now 60% smaller by volume than it was 30 years ago and its salt concentration has doubled.

By looking at the international and national context of fresh water demand, and at water management trends in a thirsty world, we should be able to draw out some implications for New Zealand.

In October 2000, UN Secretary General Kofi Annan said:

"To arrest the unsustainable exploitation of water resources, we require water management strategies at national levels and local levels. They should include pricing structures that promote both equity and efficiency. We need a 'blue revolution' in agriculture that focuses on increasing productivity per unit of water – 'more crop per drop' – together with far better water-shed and floodplain management… But none of this will happen without public awareness and mobilisation campaigns, to bring home to people the extent and causes of current and impending water crises."



Mr Annan makes two key points:

- water is being used unsustainably, particularly in agriculture – that's where efficiencies must occur if we are to turn the situation around
- the public needs to be more aware that fresh water is a very limited resource, far more so than energy.

Because it so often rains in parts of New Zealand and because water surrounds us, it is easy to fall into the trap of thinking that the resource is unlimited. It is not. And although fresh water is essential for all life we continue to devalue it by dumping all sorts of rubbish into it.

Farming for foods and fibres uses the most water of any human activity, but water is also critical for drinking, cleaning, and sanitation in urban living.

Much of our thinking about water remains muddled. We pay one of the highest prices in the world for bottled water but resist flow-based charging to deliver water to our homes.

Water should be right at the heart of a nation's strategic thinking and planning. However, water allocation systems are generally poor; water is undervalued, economically and ecologically; society has a low understanding of water's importance; and the political and institutional management of it is weak. We have a Minister of Racing, but no Minister of Water. One of the most critical life forces on the planet is nowhere near the centre of our radar screens.

So how much water are we talking about, and where is it? Table 1 shows where the world's water is to be found.

Table 1:

The World's Water

	Volume (million km3)	% total	% fresh
All water	1386	100	-
Saline	1351	97.5	-
Fresh	35	2.5	100
- ice	24.4		69.7
- ground	10.5		30
- surface	0.1		0.3

Just 2.5% of the world's water is fresh – the rest is seawater and undrinkable. And most of this 2.5% is frozen, locked up in Antarctica, the Arctic, and glaciers. So humanity, and the Earth's terrestrial ecosystems, rely on 0.75% of the total.

This is still a vast quantity, but it is not always available where and when people want it. Twenty percent of the world's population has no access to safe drinking water, and 50% have no adequate water sanitation. Humanity's use of water is soaring and in 20 years' time, two out of every three people in the world will face either water shortages or having to use polluted water.

Water use in the past century has grown astronomically, and led to what we might call a 'fresh water deficit'. This is growing world-wide, and the rapidly growing water deficit in China is

likely to have an impact on agriculture and food prices that will be felt globally.

China possesses 21% of the world's population but only 7% of its fresh water. Seventy percent of its grain is grown on irrigated land (compared to 15% in the USA), so any failure in its irrigation systems would have a devastating effect on the country's ability to feed its people. Irrigation failures have been known to topple dynasties in the past!

China is now industrialising so rapidly that it appears to have abandoned its policy of grain self-sufficiency. In the six years to 2000, it went from soybean self-sufficiency to being the world's largest buyer – it now purchases 40% of the world's soybean production. China will at some point soon hit the wall on water, with massive projects required to shift water to where it is needed.

Closer to home, Brisbane, Sydney, Melbourne, Adelaide and Perth all have water restrictions. So what is our water situation?

Our streams and rivers have myriad uses – places to fish and to swim, to put our wastes in, and to take water from for irrigation or electricity generation. Clean water from the tap we tend to think of as our birthright, a public good we expect to be provided for free despite the cost of capture, treatment, transport and treatment again as waste water. Yet we spend exorbitant sums on bottled water. A *Listener* cover story a few years ago was headed 'Water water everywhere', and sub-titled 'health fad', 'fashion accessory' and 'big business'.

New Zealand has abundant precipitation; we are profligate users at 82,000 litres per day for all purposes; irrigation accounts for 70%-80% of our annual consumption; and the value of the resource can be calculated in the billions of dollars.

Households use 210 million cubic metres of water annually (with daily per person use averaging 180-300 litres), industry 260 million m^3, and livestock 350 million m^3. But the dominant trend is our growing use of water for irrigation – it now soaks up 1,100 million m^3 every year.

My office examined this issue in more detail in *Growing for Good*, our October 2004 report on the impact of intensive farming on our environment. The area of irrigated land in New Zealand has been increasing at a rate of about 55% each decade since 1965, with the pressures that brings now most apparent in the Canterbury region.

Most of us still see water as an abundant resource, a 'commons' for the taking, but once we take water for irrigation it becomes private property. In that sense it can be compared to resources such as fish, oil, and gas that exist freely in nature until secured through quotas, property rights, or some other allocative means.

Once we start thinking about water, we start thinking about systems and how we can do things differently. Stormwater, for instance: is it an asset or a liability? In south Queensland, legislation now requires that homes have water tanks to capture stormwater for gardens, toilets, and general household use. This is a way of managing off-peak demand – capturing rainfall not only takes the pressure off urban infrastructures to deliver fresh water, it also lessens the volume of water the infrastructure must dispose of during peak downpour periods.

Environment Waikato surveys show how important water quality issues are to us. Water pollution ranked the top environmental concern of Waikato residents in 1998, 2000, and 2003, with the level of concern increasing in every survey. And as the wrangling over the Waitaki River has shown, we are also nervous about water allocation.

In managing water demand, there are four core issues:

- allocation across competing purposes – after we have left sufficient in rivers, lakes, and aquifers to maintain their ecological health
- consents and tradeable rights
- charges for use
- education and awareness.

Our challenge is to start a process of dialogue on allocation, and we can take some interesting international precedents as a guide.

The first is from Canada's Fraser River Basin, a huge catchment in British Columbia where loggers, farmers, miners, recreational hunters and fishers, and others had been in bitter opposition. Through formation of the not-for-profit Fraser Basin Council in 1997, a way forward was found to manage the competing interests. It showed that sustaining fresh waters is a deeply social and political process where the 'science' of dialogue is critical to progress. It also showed that water is more than just a commodity and that market mechanisms alone will not advance sustainable use.

In Europe, the 2000 Water Framework Directive provides a long-term planning focus on land use, non-point source pollution, and climate change. The framework hinges on shifting water management away from what we use it for, to sustaining its ecological health so that people have good quality water available in the first instance.

Among the water pricing and allocation trends in OECD countries, metering of domestic users is becoming increasingly common. Tariff structures have fixed and volume based components. The real cost of water is rising and becoming more transparent – a trend with clear political ramifications.

Our farmers use more water than anybody and farm production figures underline just how critical the water resource is. Although hard data from New Zealand agriculture is lacking, Australian figures show that it takes 7,458 litres of water to produce $1 worth of rice in the husk; 1,470 litres to produce $1 worth of dairy cattle and whole milk; 379 litres to produce a $1 of fruit and vegetables; and 245 litres to produce $1 of wheat and grains.

Farmer efficiency also has a big impact on water use. While the top 10% of farmers in Victoria, Australia, use 500 litres of water to produce one litre of milk, the bottom 10% use 1,000 litres.

Such analysis of the 'water footprint' needs to extend to many everyday products – in the US, the extraordinarily heavy use of water in cotton production is shown in the 4,100 litres it takes to produce a cotton t-shirt, compared to 2,400 litres for a hamburger, 140 litres for a cup of coffee, and 10 litres for a sheet of A4 paper.

In thinking about sustainable water in New Zealand, we need to begin with a vision that will flow through to the institutions, research, education, and legislation that deal with water. Plans and policies would emerge from that level, particularly to deal with how we value and price water. Finally, we would need to examine our technological options.

An action list around water would include:

- central government addressing our fragmented approach to water management, with a clear national strategic framework and focus – perhaps through National Policy Statements under the RMA, or a Minister for Water. The government's Water Programme of Action is a positive initiative
- increasing business and community understanding of options for industrial, agricultural, and urban water systems, and expanding research in this field
- establishing water valuing, pricing, and charging options that maximise sustainable allocation, efficiency, and use, and that are socially just
- ensuring that current water 'rights' through permits don't impede sustainability gains
- local governments improving their strategic planning and management of water
- developing sustainability indicators for fresh water that are relevant to communities, and
- managing water at a catchment and ecosystem level.

Many big water challenges face us. These in turn provide opportunities for leadership, as seen in the Lake Taupo Protection Project which aims to maintain the lake's water quality. Such examples are rare, however.

The science community has extensive knowledge of water but translating that into policy and political action can be a slow process. Concerted leadership from 'collectives' of concerned scientists, working in partnership with community and political leaders, could be very timely. A model might be Australia's Wentworth Group of Concerned Scientists, a loose affiliation of 11 of the country's most influential environmental scientists and economists.

Many synergies exist between how we think about water and how we think about energy. But ultimately, because water is so central to growing things and to New Zealand's economic well-being, it threatens to be more constraining than energy.

In a social and political climate of declining trust in government agencies and corporations, supplying potable water can be looked on as an exercise in risk management. Certainly, managing water is a deeply social process where it is essential to understand people's values and beliefs. Water is not a simple commodity, and valuing, pricing, equity and ownership issues take its management beyond simple market models. When Maurice Strong addressed the US Senate Environment Treaty Implementation Review in July 2002, he said:

"Most of the changes we must make are in our economic life. The system of taxes, subsidies, regulations and policies through which governments motivate the behaviour of individuals and corporations continues to incent unsustainable behaviours".

References:
Ageing Pipes and Murky Waters: Urban water system issues for the 21st century. PCE, June 2000.
Growing for Good: Intensive farming, sustainability and New Zealand's environment. PCE, October 2004. See www.pce.govt.nz.

A More Stable Funding Environment

Sector Engagement paper – December 2005

Just before Christmas we received a package of material from MoRST on their new priority goal of bringing more stability to the Research, Science & Technology funding environment. Although there is some background material on their website the key documents are not. However, MoRST have sent us an electronic version to forward to interested members and if you would like a copy please email Jenny Taylor secretariat@agscience.org.nz

There are 13 key questions that are posed in the sector engagement paper but these cannot be answered without reference to document. You will also note that the deadline is extremely tight ie Monday 13th February to MoRST.

The council therefore needs your feedback by Wednesday 8th February if we are to put forward a coherent view of the Institute's opinion. Apologies for this but it is outside our control - and as we have been told is driven by budgetary deadlines. Please send you response to Jenny Taylor so she can collate and forward to the NZIAHS Council.

We understand that there may be meetings for interested parties in Auckland, Wellington and Christchurch and Council have stated that they would want to be involved.

Your Council has decided that we need feedback from you on this very important issue.

What follows is an except from the document with the 13 questions.

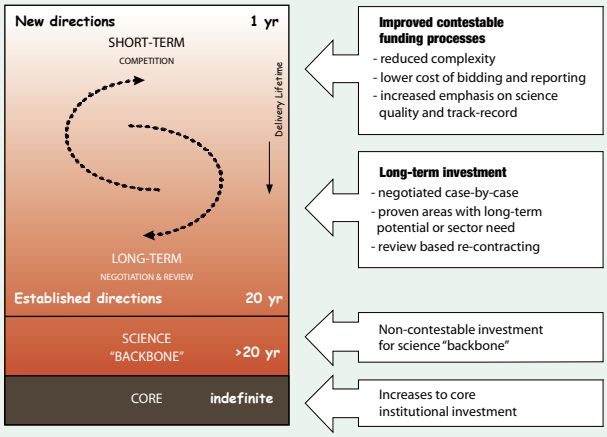
Introduction

The purpose of this document is to promote discussion and gather feedback on a proposed package of change designed to create a more stable funding environment.

The paper describes a package with four components:

- Improvements to contestable processes;
- The use of review and negotiation to support areas of long-term investment;
- Non-contestable investment to support essential infrastructure, databases and collections; and
- Increases to core institutional investment.

The diagram illustrates the proposed funding model .



Questions

1. Are there other mechanisms we can add to the package in order to better balance the funding of new ideas and stability for ongoing successful programmes?
2. Is this right set of criteria? What would you add or remove? How would you weight the criteria?
3. Is the description of 'technical review' too wide, or too narrow? What do you think review should encompass?
4. Who should lead the review process?
5. How will negotiation help in forming collaborative arrangements?
6. How should FIAs select those research programmes, or areas, which should be reviewed for transition to long-term investment? Should the FIAs make the initial choice or could a self-selection mechanism be used?
7. Can you identify any unintended consequences or risks of using review and negotiation in making investment decisions?
8. What process or criteria could we put in place to ensure disinvestment decisions are made in a timely and appropriate manner?
9. What mechanisms would you suggest to encourage the right level of end-user engagement at the right point in a programme's development?
10. How would you suggest that investments in "backbone" science be selected and reviewed?
11. What principles could be used to determine which organisations (other than CRIs) might qualify for core institutional investment from Vote RS&T?
12. Would you prefer to see the transition to a new funding approach being incremental as funds are released, or an immediate shift of eligible contracts to this new package?
13. What risks, threats, or opportunities can you see arising with the implementation of this proposed package?

Canterbury Takes a Multi-stakeholder Approach

Bryan Jenkins

The intensified use of water has made a major contribution to Canterbury's prosperity and the availability of water for recreation is of immeasurable value for residents and tourists.

More than half the volume of water allocated in New Zealand for consumptive use is allocated in the Canterbury region: 250 of the 429 cumecs, or 58%. Similarly, 350,000 of the 500,000 hectares of irrigation land in this country – 70% of it – are in Canterbury. The next largest irrigated province is Otago, with 66,000 hectares of irrigated land.

The consented area for irrigation in Canterbury since 1985 is 250,000 hectares, compared with just 100,000 hectares in the rest of New Zealand. In other words, the consented area for irrigation in Canterbury has been 2.5 time greater than in the rest of New Zealand over the past two decades. The next biggest region is Otago with 25,000 hectares of consented area. This means the amount of irrigation development in Canterbury is 10 times greater than the next largest region. The other regions tail off in quite small numbers.

Another significant issue for Canterbury is that it has the capacity to double New Zealand's irrigated land.

Canterbury's economy is growing at about 5% a year on a population increase of about 1%. That means we have a 4% productivity increase in the Canterbury region. Auckland is growing economically at about 3% a year on a population growth rate of 3% a year – a zero productivity increase. In short, Canterbury's performance is significant not only for the region, but also for the country.

The number of water-related consents considered by the regional council is increasing dramatically – around 30% to 40% more applications for consents last year compared to the previous year. But the region is reaching the sustainability limit for river and ground water withdrawals for irrigation. Water no longer is as freely available as before . We are starting to see wider use and increasing restrictions, affecting the reliability of supply.

But water has become part of the production process and reliability of supply is just as important as the quantity of water used. Important resource management issues must be addressed.

An issue that should be discussed by scientists is the need for better scientific information, as we increasingly must manage our resources closer to the sustainability limits.

Environment Canterbury is developing our Natural Resources Regional Plan to apply rules consistently across the region and address sustainability issues long-term for Canterbury. The plan sets out the policies and rules considered appropriate for the sustainable management of land and water resources.

Regional councils must use much more than regulatory tools and the threat of legal action to ensure landowners stick to consent conditions, however. While there is an increasing effort in monitoring and enforcement, the council also is shaping best practice – the practices we should be encouraging as well as those we should be discouraging – with a mix of awards, funding for wetlands restoration (we have an environment enhancement fund to which people can apply) and through our resource care staff working with local communities.

The maintenance of in-stream values is a significant issue. As we hit sustainability limits, much more pressure is coming on the flow regimes needed to preserve the environmental value of the streams. We also are starting to see some degradation of the down-stream water quality and the spring-fed streams.

The most significant nitrate issue is with meat processing effluent discharge in Ashburton, which has led to consent reviews for conditions and monitoring changes A key component of the council's Nitrate Management Plan is the undertaking of water quality surveys. Conditions in consents on discharges and land use impact are becoming much more specific in relation to nitrate management. There is also a major compliance programme

To deal with water management more generally, Environment Canterbury is trying to get recognition of sustainability limits. It has started a strategic water study in partnership with district councils, although the Resource Management Act doesn't encourage strategic work – essentially, the RMA is an effects-based piece of legislation. Moreover, there is a need for a national water strategy, an issue not being addressed at the national level, as well as strategies at the regional level.

Getting a statutory mechanism in place under the RMA can take time, too – at least five years. That's why Environment Canterbury is looking at multi-stakeholder forums to try to resolve water issues and help educate people so they better understand the nature of the problem the community must deal with.

The strategic assessment of Canterbury's catchments and the development of multi-stakeholder issue resolution groups are scientific processes as well as social and political ones. If you try to get people to agree on what is the appropriate strategy for water management, you will get at least as many opinions as stakeholders who come to the table. Waitaki catchment stakeholders have been experiencing this in relation to the Waitaki River.

But as we review environmental flows, we are improving our knowledge of what is needed. We are now starting to apply this knowledge to all the river systems in Canterbury.

Various partnerships are being developed to enhance water management in Canterbury – with the community (through schemes like Living Streams), with industry (through schemes like the Clean Streams Accord, a nation-wide accord) and through community trusts.

Under the Living Streams programme, the council undertakes surveys and produces catchment reports. This is followed by work to involve the community, review the reports, consider the options and develop an action plan. The third phase involves implementation of the improvements, getting the funding, monitoring and a reassessment if we are not getting the expected results.

Harts Creek is an example of what can happen. It had very high levels of suspended sediment. Since a group was formed under the Living Streams programme and changes were implemented, there has been a significant improvement in water quality.

A water enhancement group in South Canterbury is one of the multi-stakeholder groups with which the council has developed a relationship. The Opuha Dam has been one focus of its attention in terms of water quality. In the Lower Waitaki a community group has been set up to look at operational aspects, as well as water allocation aspects, in relation to the Lower Waitaki.

Further water use will need storage. A strategy is being developed by local governments and Environment Canterbury, looking at a range of storage possibilities within a sustainability framework. Catchment management is being developed, too, through partnerships with community trusts, such as the Avon Heathcote Estuary Ihutai Trust (the Christchurch City Council is also a signatory) and the Waihora Ellesmere Trust.

There is also a programme of strategic assessment of catchments where there are particular areas under stress or subject to resource conflict. The aim is to establish sustainability frameworks for consent decisions. Assessments are under way in the Hurunui, Waipara, Motunau and Kaikoura catchments. The results from these multi-stakeholder programmes, will be incorporated in consent conditions.

The council is trying to get new concepts introduced for water management. One example is the Natural Step, a concept of sustainability being applied to irrigated agriculture in Canterbury. The Natural Step is an international non-profit organisation that has been working since 1988 to accelerate global sustainability. Using the internationally endorsed and tested Natural Step framework, which is based on sound science, systems thinking and practical business decision-making, companies, non-profit organisations, individuals and communities can be helped in the transition to an ecologically, socially and economically sustainable future.

Sustainability limits are being set, too, and just a few small areas in the south and the north of the region do not now have an environmental flow specification in place for river systems.

Sustainability limits are being set for run-of-river irrigation through defining "A Blocks", which specify the volume of water that can be withdrawn from a river to meet a specified level of reliability without having a material effect on in-stream values. Reliability criteria for the Ashburton River were set under this scheme.

Sustainability limits on groundwater extraction are set through the use of "red zones". We have estimated the ground water use associated with the existing consents and the re-charge based on the best available information. Consents are declined unless the effects are minor or better information justifies their granting.

A lot of work is going on, but more work remains to be done.

Besides the development of partnerships with industry and the community, there is still going to be a need for statutory mechanisms such as Natural Resources Regional Plan and the consenting process. We are trying to get more strategic assessments, not just at the regional level, but also at the catchment level, to provide non-statutory guidance to consents and plans.

And because we are reaching our sustainability limits, we need more accurate measurement to more wisely manage our resources. Water is certainly the critical resource in terms of the environment and the economy of Canterbury. How we use it is going to become much more significant and if water is our scarce resource, then the productivity we get from its use is going to be critical both in terms of environmental sustainability and in getting the maximum economic value from it.

This can only come about not only with measurements of quantity but also with a range of other measurements. For better sustainability management, the amount of measurement that will be required is going to be significantly greater than is now undertaken within Canterbury.

Water metering is one of the key first steps in dealing with the issue. We need to be finding ways of better recognising the economic value of water, which usually comes through some pricing or charging mechanism.

One role to be played by central government is passing appropriate legislation. The Resource Management Act is probably ahead of the legislation in most other jurisdictions in the world. Very few countries have brought together all of their resource management requirements under one piece of legislation and usually they have separated their water and environmental legislation. But the RMA was framed at a time when water in particular was not reaching its sustainability limits.

One area to be reviewed is whether the first-come-first-served mechanism, which works well for unlimited resource, is the appropriate mechanism for a limited resource.

But central government probably missed an opportunity in terms of the Waitaki and addressing the issue of water allocation. Environmental management was the stated goal of the draft plan. But the minimum flow proposed in the draft did not reflect the nature of the environmental systems that created the lower Waitaki. It would have given a constant medium flow rather than what is needed for braided river systems, which is a variable flow. The scientists who have actually worked on the Waitaki, will tell you they can find no basis for the environmental flow regime specified by the Waitaki Allocation Board.

But getting a board of five well-intentioned and wise people to make those decisions is not necessarily the most appropriate mechanism. My council prefers a multi-stakeholder approach that brings the various interests together around the table. We have had some incredible success with the South Canterbury Water Enhancement Group in bringing together some quite diverse interests from the Opuha Dam owners, farmers and fishermen to address the issues. When people share information and get an understanding of what is possible, we get steps towards outcome that aren't achieved under the board approach.

Bryan Jenkins became chief executive of Environment Canterbury two years ago after serving as chief executive of the Department of Environmental Protection in Western Australia. He is an environmental planner by training.

Cockie's call for dialogue with scientists

Many of the environmental problems generated by farming result from the increasing intensity of farming and increased applications of fertiliser. Among the consequences, farmers can run more animals on the same amount of land.

But are these developments being matched by appropriate scientific research? Dairy InSight, for example, spent only around $1.5 million on environmental research last year out of a total budget of about $30-$40 million. Around half of the money goes to the Animal Health Board for opossum control and is not available for research. Even so, it's fair to argue that if farmers want more environmental tools and more environmental research, then there's a case for them having to pay for it through agencies like Dairy InSight, if only because there's a fair chance nobody else will pick up the tab.

Bay of Plenty farm leader **Lachlan McKenzie** takes the point. He says farmers have put the blow torch to Dairy InSight several times to say it has spent too much in some areas and not enough in others. But he also says Dairy InSight funding goes to whoever has applied for it. He makes the case for farmers and scientists to get together, identify problems and work out strategies so the best applications are made to Dairy InSight. Farmers then can draw the attention of Dairy InSight directors to the good applications in their in-trays and press them for funding.

Lachlan acknowledges his personal priorities are the same as those of most farmers: the economic ones come first. If he doesn't make a profit over a period of time, his bank manager will close him down. He also says he has good economic tools, to manage his farm, but he has no good tools (at least, not in his opinion) for making environmental judgements. Developing the right tools, he reckons, would reduce the need for regulation.

"I think if we have 30,000 farmers all making decisions with enhanced tools to help them, some are going to get it wrong but some of are going to get it right," he says. "The ones who get it right are going to be used as leaders and the other people will follow."

Lachlan is a dairy, sheep and beef farmer and is interested in forestry in Rotorua. He is deputy chair of Dairy Farmers New Zealand, the dairy section of Federated Farmers. He has been involved with regional councils in and around the Rotorua area on the issue of land use and its impact on water quality and in shaping policies to clean up the lakes in the region.

Here's what he told the forum in Christchurch in June last year, discussing water issues from a farmer's perspective…

Issues related to water and the management of its use are not peculiar to farmers. Urban people expect water to be taken for granted. They turn on a tap and expect the water to come out clean and of useable standards. On the farm, however, we use it for our domestic use, for stock drinking, for irrigation in Canterbury and some other areas, and for recreational use. Some of us use water for power generation on our farms. We store it, we use it for fire fighting, and we have flood control schemes.

I live at the top of a catchment area and have several retention dams. Therefore I can reduce the speed of flow off my farm during flood periods. We store it and we manage it.

The availability of water basically is on a first-serve basis. That's how most water is allocated. Canterbury obviously is starting to experience problems from this arrangement. Other regions, too, are going to have to develop new mechanisms for allocating water resources as they becomes scarce.

From a farmer's perspective, eight principles should be developed on the issue of water allocation:–

1. Water allocations must be based on sound science and on sound systems. Knowing how much water is available, how much is in aquifers and so on is critical. That's where the science fraternity certainly becomes important.
2. The allocation system has to be simple and cost-effective. With too much bureaucracy, the procedures to be followed and the cost of administration can far out-weigh the benefits from a good system.
3. We a need a good secure tenure. Obviously a farmer wants to invest and to attract investment. As Canterbury's experience shows, water is important in lifting productivity, but to get productivity gains from the use of water there must be security of tenure.
4. No particular water allocation policy may be appropriate in all circumstances. I come from an area blessed with two metres of rainfall a year and while I have many other issues with water, irrigation is not one of them. Twelve kilometres down the road, however, kiwifruit growers around Te Puke extract water from the ground for frost protection and so on, and can impinge on the water use of their neighbours. It is a very short distance from my house, with an over-abundance of water, to neighbours with an under-allocation.
5. Community aspirations and strategies must be a top priority.
6. Water allocation has to provide for water harvesting in the future and the efficient use of water is best determined by a permit system.
7. We have got a whole lot of things to do before we start legislating and regulating. Economic systems and economic markets do allow for changes to be made, giving us the ability to allow water use to be shifted from less efficient to more efficient systems.
8. The voluntary transfer and exchange of water permits must be accommodated in any water allocation regime so that a water use permit can be transferred to another land use when the permit-holder moves into a land use that doesn't need as much water. Dairy farmers in Australia complain about water

being sold off dairy farms to urban people. We have to be able to provide for the trading of water.

Water quality raises a raft of other issues.

Farmers have been very good at changing or minimising our point pollution. In my area we have shifted from pond disposal of cow-shed effluent to land irrigation. We have fenced off water-ways into Lake Rotorua and we are improving our riparian management. We have realised, for example, that blackberry and gorse is not very good at filtering out nutrients. That is where scientific information plays a role, but it must be transferred from the scientists to the people who will apply it in managing and operating their farms.

Bridges and culverts for stock water and alternative water supplies cost money. One farmer in my district is spending $500,000 upgrading his water system and fencing off the last 20% of natural water on his farm.

Non-point discharge, on the other hand, is an issue with which farmers are struggling. Farmers have modernised. They are using nutrient budgets, they have got Fertmark and Spreadmark, they are using GPS technology in a lot of machinery. They have riparian dams to stop erosion. And now they are being called on to comply with the demands of regional councils with various rules.

The regulating of water quality again must be based on sound science. We can't have generalisation. We have to get away from sensationalising matters and we must find ways of presenting the facts with a sense of proportion.

There are problems to be resolved. Farmers recognise this. But we must identify who is contributing to a problem and what the sources are. We have to identify clearly, too, the significance of a problem and put it in an appropriate context. Again, this is where the science fraternity has a role to play.

The solutions, too, must be based on sound science. But they must be practical and affordable. And they must help facilitate the trade-offs between individuals and communities concerning water quality.

In Rotorua, for example, the cap on nitrogen and phosphorous exports from farms has an economic impact to the community of about $30 million a year. The rule impinges only on about 50 commercial farmers and probably several hundred lifestyle blocks. But it is having a huge economic impact on some individuals: some farmers are taking a $1 million hit in their back pockets. We have to balance this but don't have the tools.

When the people of Rotorua and the wider region were asked if they wanted clean water in the lakes, everyone said yes. But when asked how much they were prepared to pay for good water in the lakes, enthusiasms changed. The people who own $1-1.5 million batches around Lake Rotoiti and the other lakes – many of them professional people from Auckland – said they were prepared to pay $200 a year to protect their investments. People in Rotorua were prepared to pay about $7 each per year. The average was a willingness to pay $11.75 a head to protect the water in our lakes.

There's something not quite in balance there. Moreover, the survey results show there are risks in taking a too-regulatory approach to water quality. Rather, we should be working with land owners to get c hanges in attitudes and behaviour.

One concept that sounds good in theory is the transferability of permits for nutrients. But we don't have the tools to enable it to be applied. A complex regulatory regime for what might be a minor problem should be avoided, because it will simply add a whole lot of bureaucracy and costs to the system.

Nevertheless, difficult questions are raised. How do we allocate nutrients to farming entities in the first place? Do we base applications on current usage? Do we say that because a dairy farm is exporting 40 units of nitrogen per hectare per year at the moment, it should be allowed to continue this? But the farm next door may be in multiple ownership, a Maori block of land without the financial wherewithal to have got things up and running, exporting only a few units of nitrogen because is running only a few sheep and beef cattle.

Do we say that we cap nitrogen exports at the current level, stopping the owners of multiply owned Maori blocks from bringing their land up to the level of economic performance of the dairy farm? Do we try and work out an average, then apply the average to everybody, as was suggested in Taupo? The forestry people then have a huge surplus of nitrogen credited to them while the dairy farmer is put out of business. How do we then compensate the dairy farmers for taking their livelihood away from them? Do the dairy farmers then have to pay something to the forestry companies to get their nitrogen back?

These matters are hugely complex and we need to accept trade-offs between economic, social and environmental goals. But I don't believe we have the tools to work out management systems or regulatory formula based, let's say, on numbers of cows and the nitrogen and phosphate generated by a farm, taking into account the social, economic and environmental effects. It's not a question of whether environmental values should be rated low or high; it's a question of weighing the value of an economic activity against the value of having good, clean lakes or streams or sufficient water.

The challenge for scientists is helping to develop those tools and management practices.

Farming has to be competitive internationally to be sustainable. If farmers are not competitive in world markets when they sell their meat, fibre, milk products and trees, then they won't have the resources to minimise the environmental effects of their production. Therefore there must be greater farmer involvement in setting the agenda for scientists. I have heard the arguments about science and its stream of funders. But the end users of the science – such as farmers – should be allowed to have a major input into questioning where that science is going.

We are doing this in Rotorua. We have got AgResearch doing some major work for us on the nitrogen and phosphate losses off our farms. We have asked them to do a critique of the current science and put it in layman's terms, so farmers and other ordinary people can understand it, read it and say "yes, but hang on – there is a hole here to be examined."

The typical farmer wants to do 15 different things all at once and the scientists say sorry but they can actually measure only two variables at the same time. Through dialogue we have come up with a plan and had three experiments under way in recent months. The scientists involved have appreciated the layman's input and we have appreciated the dialogue that is getting those results. But there needs to be more workshops with farmers and the science fraternity to facilitate a greater dialogue and work out our differences and the way to go forward.

More Than Just An Irrigation Scheme

John Donkers

Let's put irrigation into perspective: the 500,000 hectares irrigated throughout New Zealand comprises 3.9% of around 12 million hectares of farmland.

Irrigated land generated $920 million of a total $8.1 billion in farm gate GDP in 2002-03. This means irrigated land contributed 11% of total farm gate GDP. Irrigation therefore punches well above its weight and is particularly important in Canterbury and Otago, where 75% of the country's irrigated land is located.

There has been huge development in the past 10 years, when the area of irrigated land has doubled, and there is the potential to increase the irrigated area by a further 500,000 hectares to a total of 1 million hectares.

However, river water and groundwater are scarce resources. Even with storage there is a limit to how much water is potentially available for the community, particularly for irrigation. If we are going to realise the potential of irrigating 1 million hectares, we must take a significantly different approach to the way we perceive and manage our water resources.

In recent years there have been significant changes to the way irrigation is perceived and managed, not only in Canterbury, but throughout the country. Whereas irrigation 10 to 15 years ago was regarded as insurance, something you resorted to when conditions were really dry, it is now a key element in modern farming systems. I am the part-owner of an irrigated dairy farming business. The business is based on irrigating first and milking cows second. This change makes supply reliability increasingly important.

Setting up a system, even from groundwater, is costly, however: it would leave you no change from an outlay of $3,000 a hectare. Then you have pumping costs. In our case, pumping from a depth of about 100 metres, we are spending around $400-$500 a hectare a year. This cost is a significant driver for getting it right.

Waimakariri River DAVID WALL

But the easy water has gone, and remaining supplies from rivers or groundwater are highly unreliable. We need storage to improve reliability.

To facilitate economic storage, a community approach will be needed. Paradoxically, there is community resistance to irrigation, linked to the intensification of agriculture and the perception it has huge impacts on the quality of water, particularly ground water.

The Central Plains water project is a community initiative, aiming to take water from the Rakaia and Waimakariri rivers. A key feature is the storage in the Waianiwaniwa Valley, located in the Malvern Hills, holding around 200 million cubic metres of water. The base scheme will cover an area of about 60,000 hectares.

CPWL opted for a volumetric basis for the allocation of water, linked to the shareholding in the scheme, so that one share was equivalent to one unit of water, which amounted to 1,000 cubic metres a year. That would be delivered at a maximum flow rate of 0.6 litres a second. The reservoir capacity of 280 million cubic metres would require a maximum reservoir dam height of 550 metres.

We expect to see trading in water and shares between irrigators.

The project started in 2000 with an initiative by the Christchurch City Council and Selwyn District Council, which set up the Central Plains Water Enhancement Steering Committee. The committee was charged with preparing a feasibility study into whether it was economically, socially and environmentally viable to develop not just an irrigation scheme, but a water enhancement scheme for the Central Plains, that would benefit the whole Canterbury community.

A consultative working group was established, through which we tried to pull in anybody with an interest in water in the Central Plains. They were put together in a room, six, seven, eight times in one year, to try to synthesise the key issues associated with such a large project.

Key issues from the working group included groundwater quality, river flows, drainage at the lower end of the Plains, farmer affordability, host community issues, land access. Identifying these issue was an important step. There wasn't universal agreement on them but the main points remain key aspects of and key risks to Central Plains' plans.

The Enhancement Steering Committee's feasibility study concluded in 2002 and was followed by the joint council setting up the Central Plains Water Trust to move on to the next stage of the plan and gain resource consents.

As part of that process, Central Plains Water Limited was established in 2003. Last year the company raised $4.7 million through a prospectus offer of shares, which was 40% over-subscribed. Last year the company and the trust began the resource consenting phase of the project.

A key feature of the structure will be that the resource consents will be held for the community by Central Plains Water Trust but Central Plains Water Limited will be granted exclusive rights to use the consents. So it is not just a question of a group of farmers thinking the irrigation project will be good for their businesses; the overall focus of the scheme remains linked to the well being and benefit of the whole Canterbury community.

When this scheme proceeds, it will be the biggest water enhancement scheme built since the Rangitata Diversion Race (RDR) was built in mid-Canterbury during the depression years. It will cover some 60,000-70,000 hectares. That degree of scale adds significant complexity and risk to the achievement of outcomes.

It is more than just an irrigation scheme. There is a focus on long-term sustainability and the scheme offers environmental, social and economic benefits for the Central Plains community.

Among the issues from an environmental perspective is the reduced pressure on the groundwater resource and the lowland spring-fed streams. The scheme has the potential to be very energy-efficient, compared with the way we irrigate now from deep ground water.

From a social perspective, we believe the scheme will lead to stronger and more vibrant rural communities. This will bring more jobs, which will tend to be more skilled jobs, more technical than perhaps was available in those communities before irrigation. There is also the potential for significant development of recreational facilities.

Our work indicates we can expect an increase in annual net output at the farm gate of approximately $2,000 a hectare and an annual increase in regional output of around $450 million. There would be 500 new jobs created on farm and annual "added value" to the Canterbury region of $175 million will be created.

Total capital cost of the scheme, including the land purchase and construction, capitalised interest, start-up costs and resource consenting, inflation adjusted is forecast to be $367 million. This equates to $976 per unit of water and on a per hectare basis, averaged at 6.25 units of water per hectare - $6,100 a hectare.

Operating charges are very dependent on the financing structure of the scheme, which is still very much up in the air. They are estimated at $60 a unit of water (1,000 cubic metres/year) or $377 a hectare.

Major hurdles to overcome before the scheme can be built include the cost and time of the resource consenting process and land acquisition. The scheme involves a reservoir built on farms that have been in the same families for five or six generations. These people are not going to readily acquiesce and careful negotiations are needed.

If this proposal has such huge community benefit, why - you might ask - has it taken five years to only get to the point we are at today? It has to do with money. Seed funding to get projects like this off the ground is scarce. Added to this is the significant risk associated with the resource consenting process - without a consent we have nothing. This makes backing the project very much a leap of faith.

Even though we have spent some $3 million to date and we have committed shareholder funding of $4 million, as a community we do not have guaranteed access to any water. The available water supply could be captured by others.

Because we are a community initiative, it might seem, we should have some right to the water. Not so. Under the "first in - first served" principal of the Resource Management Act process, a person or organisation could still undermine a community initiative by capturing the remaining available river water resource.

Stakeholder consultation at all levels has been vital. Our scheme has strong grass roots support shown by the success of the prospectus, but there is still the need for a greater urban understanding of the irrigation positives. As an irrigator, I believe we need to do more to sell the positive aspects of irrigation. We haven't done that.

We need the wider community to see value in irrigation. This is one of the key objectives for Irrigation New Zealand, the organisation re-formed in 2001 to represent the interests of irrigators and the wider irrigation industry. It currently has an objective to increase membership and financial resourcing to enable the appointment of a chief executive to represent the irrigation industry and to initiate work to improve standards and training in the sector

Changes to the resource consenting process would help provide our community with much more certainty of access to the water. If plenty of resource were available, this wouldn't be an issue, but we are at the end of the available water supply and the first-in-first-served approach of the RMA is inappropriate. Moreover, our project is a very long term proposition. It is not about a farmer taking a 10 or 20 year view, but about a community aiming to develop something that might last 100 to 200 years or more.

Science can provide the answers for the community. I don't mean scientists coming up with ways of spending their time and money. What we need is community-initiated science.

Under the current adversarial approach to resource allocation, science is often initiated by groups at opposing ends of the process, often with a pre-determined agenda. This situation leads to inefficient use of our limited scientific resources and a focus on debating, and in some cases discrediting the scientific results. If as a community we could agree on the where the information gaps were, and target the science accordingly, with an acceptance by all stakeholders on the results, I believe development could progress more effectively.

We also need central and local government to make a greater commitment to resource quantification and understanding.

Central government has a key role to play, in helping with more innovative and flexible scheme funding options, which take into account the importance of the irrigation infrastructure to our economy. We hear a lot of about traffic in Auckland and what a huge economic benefit New Zealand would gain from having a more efficient Auckland transport infrastructure. Irrigation development has the potential to create similar benefits for New Zealand.

Suppose New Zealand could potentially develop another 500,000 hectares of irrigated agriculture, obviously ensuring the impacts aren't significant, this would generate additional GDP of $1 billion at the farm gate alone not for one year but every year for hundreds of years.

The funding structure would need to take into account the long-term nature of irrigation investment and reflect the financial burden placed on first-generation irrigators. Those people with dry land now who buy into this scheme under our current funding structures effectively end up having to build the scheme, do their own farm development and pay for much of it in their generation.

This seems unfair when they will do all the work and take on significant risk but the significant benefits will be gained by the wider community and by subsequent generations.

John Donkers is a director of Central Plains Water Ltd. The company has done a lot of work over the past five years and information on this is available on the website www.cpw.org.nz or can be ordered from the organisation.

PHOTO: NAPIER WAR MEMORIAL CONFERENCE CENTRE www.venues.co.nz

In October 2004 the Parliamentary Commissioner for the Environment Dr J Morgan-Williams published "Growing for Good" which examined the environmental sustainability of more intensive farming in New Zealand.

The report detailed the many pressures on farming systems that are leading to significant declines in water quality in lowland streams and lakes. Although it was generally agreed that some legitimate issues had been raised the reaction of the farming community was generally fairly negative – farm leaders contended the belief being that the environmental problems were being overstated and those that existed were being addressed by schemes such as the Clean Streams Accord. While the report detailed current farming advances and efforts to mitigate environmental impacts, it concluded that a fundamental redesign of farming systems was needed.

Your Council feels that there are some very complex issues involved here, not least why the science funding system has failed so lamentably to maintain capabilities like soil science, which are now desperately needed to find acceptable solutions to the problems raised by "Growing for Good". Therefore Council is proposing that "Convention 2006" should address some of these issues, by inviting all shades of opinion in the primary sector to present their views and look to the future, when hopefully New Zealand will again be "Good for Growing".

The date for the Convention is September 5-7 in Napier, so make sure this is recorded in your diaries.

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