Data delivers irrigation efficiencies

By Gina McKenzie.

Providing farmers in the Waimakariri Irrigation Scheme with real-time data has prompted a shift in irrigation practices during a five-year pilot study by NIWA, funded by Ministry of Business, Innovation and Enterprise (MBIE) via AgResearch's Primary Innovation programme.

NIWA hydrologist Dr MS Srinivasan says the five farms involved in the pilot project have moved from an irrigation approach based on availability, towards one where each irrigation decision considers both current soil and or crop water demand along with the forecast water supply.

"Justified irrigation considers all the elements including climate, hydrology, economics and communication. When these elements are put into practice in a unified approach we have an innovative co-learning approach where we are developing a system that improves water use efficiency while reducing water and nutrient losses from root zone and saving money by using less water for irrigating."

Cust farmers, Bruce Baggott and Claire McKay, discuss the location of their soil moisture probe with NIWA scientists, Graham Elley and MS Srinivasan.

KEY LESSONS

Dr Srinivasan says three key lessons have been learned over the course of the study; manage irrigation and drainage simultaneously, know your rainfall and drainage gradient, and know your weather forecast for irrigation seasons.

"Training, education and confirmation of practices are vital for a successful uptake. Practice makes perfect," says Dr Srinivasan.

Soil moisture sensors were set at eight locations to keep track of how much water goes into the soil, how much drains away, and how much is needed in the coming days.

Significant variations in rainfall and soil drainage gradients across the farms in the study mean there is no single solution for the entire area.

DATA IS VITAL

Throughout the project farmers were provided with daily data including measured rainfall, soil moisture, soil temperature, drainage and estimated evaporation and two, six and 15-day rainfall and weather forecasts. This data was sent by via email in an easy to read graphical plot.

"We found that weather forecasting was a useful way to manage and reduce significant irrigation drainage throughout the irrigation season.

"Without reliable rain forecast information, farmers often irrigate right before significant rainfall, which results in a loss of nutrients and water from the root zone via drainage or leaching."

CO-LEARNING WORKS

A co-learning approach has been a vital ingredient throughout the project with a focus on sharing knowledge and ideas.

"Providing access to all the tools that are needed and having farmers share the knowledge and information among their peers has been invaluable.

"It's all about learning and growing together. We want to work together with farmers to improve irrigation efficiency."

Five years of additional funding from the MBIE will allow NIWA to increase the scale of the project while investigating the environmental and economic benefits of justified irrigation.

KEY POINTS FOR EFFICIENT IRRIGATION

- Manage irrigation and drainage simultaneously
- Know your rainfall and drainage gradient
- Know your weather forecast for irrigation seasons
- Consider current soil or crop water demand in conjunction with the forecast water supply when making irrigation decisions
- A co-learning approach where farmers, scientists and irrigation scheme providers share information provides excellent results
- More work is needed to translate hydrological data into environmental and economic reality

Teapot management serves new zone manager well

By Tania Butterfield.

It was the idea of working with people in an environment he didn't quite understand that attracted Chris Eccleston to apply for the Waitaki zone manager job with Environment Canterbury.

"I'm turning 50 in October and I just needed to reinvigorate myself a bit. So I was keen to put myself in an area where I have no idea what the hell's going on and put my skills to the test. It's a nice challenge."

The zone manager role is about forming relationships and working with Environment Canterbury staff and the community to implement on-the-ground actions based on the recommendations of the local water zone committees.

It's a role that builds on Chris' experience in quality control at the South Canterbury and Waikato District Health Boards, Fonterra and the National Blood Service in the United Kingdom.

Quality control is about working with affected people and the organisations to find solutions and improve their processes.

"If you improve 'an incident' then the ripples of that will improve elsewhere as well," Chris said.

The key to success in the position all hinged on having good conversations.

"I firmly believe in management by teapot, which is that concept that you sit down and have a cuppa and have a chat, and you work out things that way.

"I don't like emails, phone is okay, but actually sitting down you can get the point made very quickly and it builds a relationship as well."

Dealing with complaints and managing relationships on a daily basis wasn't necessarily the most positive experience for the quality control staff, but Chris was determined to ensure staff enjoyed coming to work, and were able to recognise success.

"In quality control, you tend to get greeted at the door with 'what the hell do you want?' because it tends to be something's gone wrong. I was just thinking surely there must be more to life than doing the bad stuff."

So he implemented a way his teams could celebrate success.

At first, it was with a bicycle horn.

Whenever someone in his team had something positive happen to them, they were instructed to grab the bicycle horn, toot it, and everyone would gather around to listen to the good thing that happened.

"It gave us an opportunity for a couple of minutes to be like great – something good has happened."

Then, Chris began to use the idea of elephants to hang the concept on.

"Everyone comes to work because they actually want to do the work they do. The elephant part of that is celebrating the little things that actually go right every day."

For some, it is an unusual concept to accept because they're just doing their job.

"It is just your job and you come to work to do your job, but you should still also have that elephant moment where you go wow that was really good because I did my job and somebody really liked it," Chris said.

At his first team meeting with Environment Canterbury, Chris gave each person a small elephant to help them remember the good things that happen each day.

"Don't be terribly Kiwi about it and just be like 'it just happened'. It's actually hard work, and if you get a good comment, be happy about it and tell other people about it. Celebrate the successes."

While he's only been in the position for six months, Chris has been inspired by the zone committee process and is excited to work with the zone team and committee.

"The zone committee structure to me seems really exciting and a really good idea.

"I really like the way the zone facilitators work. That is a really great addition to a committee that there's actually somebody there whose job it is to be like ok we've talked about that so what does it actually mean? How are we going to move this forward?"

It's a concept Chris could see being utilised in other organisations.

"Before I left the DHB they were looking at putting in a consumer committee and wondering how to do that, and I just looked at the zone committee and thought it's this!"

As part of the Canterbury Water Management Strategy, on-the-ground teams have been formed around the region to provide help and advice on land and water management and consents and compliance to local people.

If you would like to get in touch with Chris or another zone manager please contact the Environment Canterbury Customer Services Team (0800 324 636).

Denitrification wall could solve Silverstream's nitrate woes

By Gina McKenzie.

A pilot study for a denitrification wall at Silverstream Reserve near Kaiapoi could lower the stream's high nitrate levels.

The Institute of Environmental and Scientific Research (ESR) is keen to assess whether this method, which has successfully been used with sandy aquifer systems in the Waikato and in the USA, could have the same results for gravel aquifer systems like those in Silverstream and elsewhere in Canterbury.

The denitrification wall operates as a groundwater filter. A wall constructed of woodchip, mixed with gravel aggregate, strips nitrate from groundwater passing through the wall. Carbon within the wall provides a food source for bacteria to convert nitrate in groundwater to N_2 (80 percent of the air we breathe).

ESR principal scientist Murray Close says the pilot project would be a world-first as denitrification walls have not previously been tested in gravel aquifer systems.

"We're interested to see if the same method can work in these fast-flowing gravel aquifers. With nitrate levels being a concern in the groundwater-fed Silverstream, local residents and the Waimakariri Water Zone Committee want to know if a denitrification wall could be part of a viable solution to the problem."

Murray says ESR is currently running a salt tracing experiment alongside the Silverstream Reserve to measure the velocity of the groundwater.

"This will enable us to design the thickness of the denitrification wall. Once we have this data we will design a 60 metre pilot wall which will give us an opportunity to measure the effectiveness of the wall."

Once denitrification walls are installed they require little maintenance and can remain effective for up to 30 years. However, there are socio-political and cultural issues to consider, along with a risk of pollution swapping in the initial stages of operation when the woodchip is fresh.

"So far leaching tests in the lab have not shown any significant risks, however we can evaluate this further with the pilot project. The pilot wall will be located far enough away from any potable supplies and surface waterways to ensure that it doesn't have any adverse impact on them."

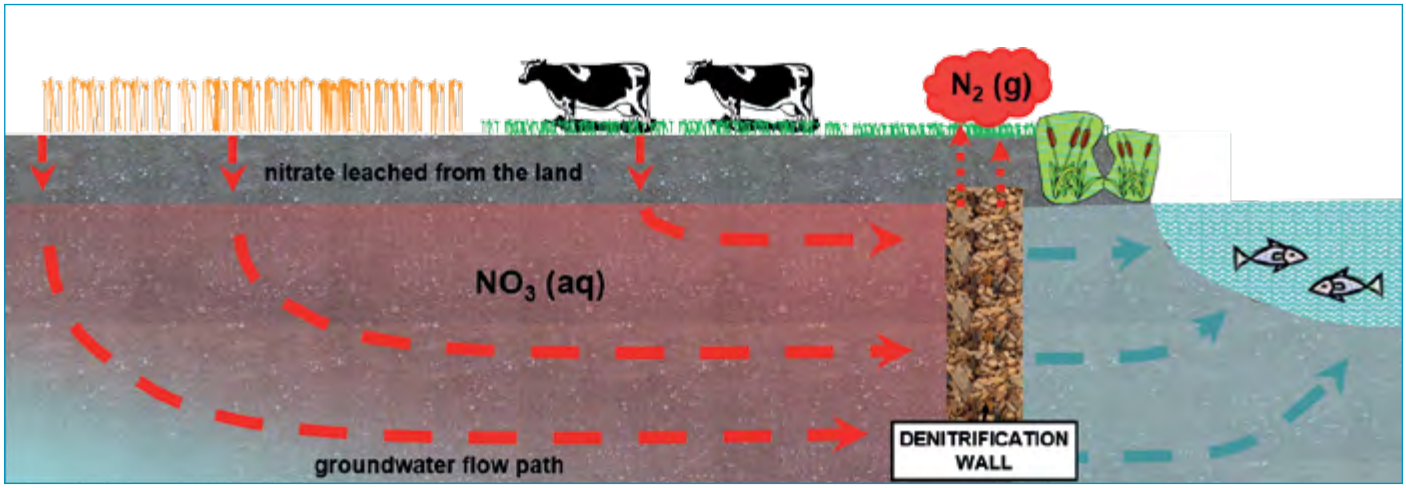
Although the intended result is improving water quality, altering the chemical state of water conflicts with the Canterbury Land and Water Regional Plan so ESR is currently in the process of applying for a resource consent from Environment Canterbury to carry out the pilot project.

> "We're looking forward to carrying out the pilot study. If the denitrification wall is able to remove nitrate from groundwater before it reaches Silverstream and improve its water quality it will be a brilliant result for the local community."

An important part of the resource consent application is a management plan which sets out all the monitoring that will take place during the project.

If consent is granted Murray hopes the project can begin this summer.

"We're looking forward to carrying out the pilot study. If the denitrification wall is able to remove nitrate from groundwater before it reaches Silverstream and improve its water quality it will be a brilliant result for the local community."



A concept diagram illustrating nitrate removal via a denitrification wall. Carbon substrate within the wall provides a food source for denitrifying microorganisms that respire nitrate. Any nitrate in groundwater passing through the wall is converted to harmless di-nitrogen gas (N_2).

Selwyn's water seminars draw hundreds

The issues of water quality and quantity, and the effects of land use intensification, are of high interest to Cantabrians, particularly in the context of dry rivers, lakes with algal blooms, and irrigation schemes advancing.

A series of water-related seminars hosted by the Selwyn Waihora Water Zone committee has been addressing these topics and drawing in people from as far away as Ashburton and right across the community spectrum.

With crowds – between 70 to 130 – turning out on cold winter's lunchtimes and evenings every fortnight since June, Selwyn Waihora Zone Committee chair Allen Lim says that it is great to see the high level of interest and engagement from the public in our region's water issues.

"The seminars have given our community a chance to find out what we have put in place, to understand why we have done things this way, and to ask the difficult questions. Perspectives of scientists, researchers, rūnanga and industry group representatives have all been covered, summarising the intricacies of Selwyn's water situation and outlining all of the work underway to address the challenges," says Allen.

"Feedback has been outstanding. The seminars have proven to be a successful avenue for people from across our community to get together and discuss the issues they are hearing about in the media. Whether they are urban folk or farmers, this information is really topical and relevant right now."

A booklet has been produced to summarise the information provided in the seminars. Free copies of '*Selwyn Te Waihora – Our Water Story*' are available at ecan.govt.nz/selwynbooklet. For videos of the seminars visit canterburywater.org.nz.

Good data key to managing the region's water

Good data is vital to managing the region's water effectively and ensuring we can balance environmental, cultural, social, and economic needs.

It also helps water users ensure they are getting the most out of their water and helps ensure consent limits are being met, saving time and money.

A set of data management guidelines has been developed to help water users and service providers to understand their requirements and ensure quality data is provided to Environment Canterbury.

The guidelines include information on the whole process of data management, from handling raw field data to processing, editing, supplying, and archiving it.

Here are some of the key things to remember when you are managing and supplying your data (the full set of guidelines is available at ecan.govt.nz/watermetering).

Key water management guidelines

- Work with your third party service provider to help maintain your system and manage your data to ensure it's working efficiently and within your consent limits
- Refer to your service level agreement with your service provider to see whether it needs to be updated to reflect the requirements of the data management guidelines
- Contact your service provider for systems maintenance or in the event of equipment or power failure – you need to keep a manual record of measurement readings if this occurs
- Check your data and /or measurement devices daily to ensure the data is accurate.