Water regulations working well

Regulation need not be an impediment. In the case of water use, it can be a friend.

Government regulations for measuring and reporting water use by water take consent holders came into effect in 2010. It aimed to establish consistency around the size and scale of water takes being measured and reported.

It has made for a more comprehensive understanding of overall water use, from both a catchment as well as individual perspective, says Stephen Thawley, Greater Wellington Regional Council, Project Leader, Environmental Regulation.

"Measuring and reporting effectively, helps farmers make smarter decisions around irrigation timing," Stephen says.

"For us (Greater Wellington Regional Council), it enables quick and easy compliance checks at water-short times that ensures the balancing needs of rivers and stream users is met."

There are two components to the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 – water metering, and reporting.

Greater Wellington Regional Council (GWRC) has had water metering programmes in place since the early 2000s. Prior to the new legislation, a number of existing water takes already had meters. For these consent holders there was a staged approach, starting with the larger water takes, greater than 20 litres per second, required to comply by November 2012. Water takes of between 10–20 litres had to comply by November 2014, and between 5–10 litres, by November last year.

Associated with meter reading was a requirement to have meters independently verified to make sure they are accurately measuring volumes of consented water being used. In some cases, this meant farmers had to get a new meter because the existing one was not fit-for-purpose, or they had to change their 'head works'.

Consent holders are required to engage an accredited provider to verify their meter. There are around half a dozen firms in the region that do a range of verification, installation and data management. The majority of them have supported IrrigationNZ's 'Blue Tick' programme that ensures installers and providers are meeting appropriate standards.

The regulation is set up to record daily readings, unless the council approves weekly. Weekly readings are allowed for some ground water users. Exemptions are not usually allowed for anyone with a direct intake from a river or stream or a bore that is connected to a river or stream.

"For us, it enables quick and easy compliance checks at water-short times that ensures the balancing needs of rivers and stream users is met."

The requirement for daily readings has resulted in many consent holders installing data loggers and telemetry systems. Nearly half of all water-use records provided to GWRC are telemetered or logged records.

Since 2012 there has been a big increase in water-take consent holders installing water meters with telemetry systems. For many users, this can be a cost-effective way of providing good quality water-use information to GWRC.

The regulation has also helped drive better water efficiency and understanding of using water in its most optimal way, Stephen says.

"When applying some of the other technologies available, such as soil moisture probes, farmers can make more science based decisions on when to irrigate, for example, rather than looking over the fence to the neighbouring farmer."

In total, GWRC collects information from nearly 600 water-take consent holders. The information is stored in their Water-Use Data Management System and used for a variety of purposes, including catchment modelling (understanding the effect of changes across the wider water collection area) and consent compliance.

A water meter installation meeting industry best practice near Carterton, Wairarapa.

The wonders of witloof

Pieter Solleveld isn't the first farmer to grow the pale leafy vegetable witloof in New Zealand, but the man who sold him the business, on the outskirts of Masterton, was.

The Dutch immigrant bought it off his former boss – Marius Van der Put – four years ago. Just as Marius did for 30 years, Pieter is still learning on the job.

What makes witloof such a fascinating crop, Pieter says, is that it has two stages of production. The first takes place outside, growing the seed through to a mature plant; the second is done inside – hydroponically – and entirely in the dark.

Witloof is also delicious, he says. The mildly bitter and nutty taste is highly prized in France, Belgium and other parts of Europe. Called endive by the French and Belgian, and sometimes referred to as chicory by the British, witloof is unlike any other vegetable and its unique flavour is gaining popularity in restaurants throughout New Zealand.

Prior to coming to New Zealand on a working holiday in 2009, Pieter had never seen witloof grown, let alone tried to grow it himself. Little did he know that his working holiday would result in him buying a business on the other side of the world that grows it.

Witloof grower, Pieter Solleveld, getting spears ready for market.

When harvested, the leafy green tops are cut off and the roots stored at -1˚C till they are needed for the next stage.

Now called Solleveld Produce, the business continues to be the only commercial grower of witloof in New Zealand. Such is the temperamental nature of the mysterious plant, Pieter works with an advisor from Holland to keep abreast with processing techniques and also maintain quality.

Solleveld Produce's headquarters west of Masterton is on a five hectare block which includes the processing, storage facilities and hydroponic setup. All of the growing is done in Greytown where the soil is lighter and reliable water is available. Pieter owns an irrigated 17 hectares on the outskirts of Greytown and also leases another block to ensure he has enough available land to maintain a five-year rotation cycle, essential for removing the risk of disease.

When growing witloof, it is not a case of how much water is needed, but when it is required. There is a critical window, when water – lots of it and in a steady controlled application – is the difference between success or failure.

All of the seed is imported from Holland and France at a cost of around $4000 per hectare. With five hectares to plant, it is a considerable investment. Seeds are planted only 10mm deep in very finely worked soil. Too dry and the seeds won't germinate.

It's also essential the seeds all germinate at the same time and grow at the same rate.

"The seeds are just too expensive to get it wrong, so irrigation is vital. Without it (water) germination could be perhaps just 30 per cent, and you just can't afford that."

Planting is done in mid-November to avoid frosts, sometimes as late as mid December. After about 22 weeks, the roots are dug up for the next stage in the production cycle. The leafy green tops are too bitter to be eaten, and are cut off and dug back in as compost.

The witloof roots are transported up to Masterton where they are graded and put into big bins. They are then shut away in storage at -1˚C till they are needed for the next stage. Roots can be stored for up to 12 months.

The roots are cleaned, planted upright in trays and moved to dark rooms where they are fed a hydroponic mix of nitrates, with calcium, potassium and other trace elements. In the dark, over the next 19–22 days, the roots sprout fat, pale yellow spears of tightly packed leaves. These are next cut, packed and put into cold storage ready for market.

Witloof is available year round. A lot is exported to French Polynesia and New Caledonia as well as cruise ships, restaurants and supermarkets in Auckland, Tauranga, Wellington and Christchurch.

Providing it is kept chilled and out of the light, the witloof spears have a shelf life of two to three weeks. In New Zealand witloof is mainly eaten raw mixed with other salad greens.

Climate change challenges and opportunities

Water storage, in combination with other measures, on the scale proposed by the Water Wairarapa project will be essential if the region is to cope with the stark implications of global warming on the climate.

Wairarapa comes out at the extreme end of changes that the National Institute of Water and Atmospheric Research (NIWA) projects will happen over the next 70 years.

The number of 'hot days' – classified as above 25°C – will nearly quadruple from 24 to 94 by 2090. Annual rainfall on Wairarapa's valley floor is expected to fall 10–15 percent by 2090, with a significant risk of increased drought.

The predictions are published in the 180-page *Wellington Region climate change projections and impact report*, commissioned by Greater Wellington Regional Council (GWRC).

The report is based on a business as usual scenario, i.e. a future in which the world makes little or no progress on greenhouse gas emission reductions.

An increase in drought would have significant ramifications for primary industries – particularly in Wairarapa – and flow on effects for water supply.

But while more droughts may limit pasture production and crop growth, warmer temperatures may allow for different crops to be grown with the possibility of multiple rotations. Countering against this is the likely stress on water reliability, expected to come under increasing pressure.

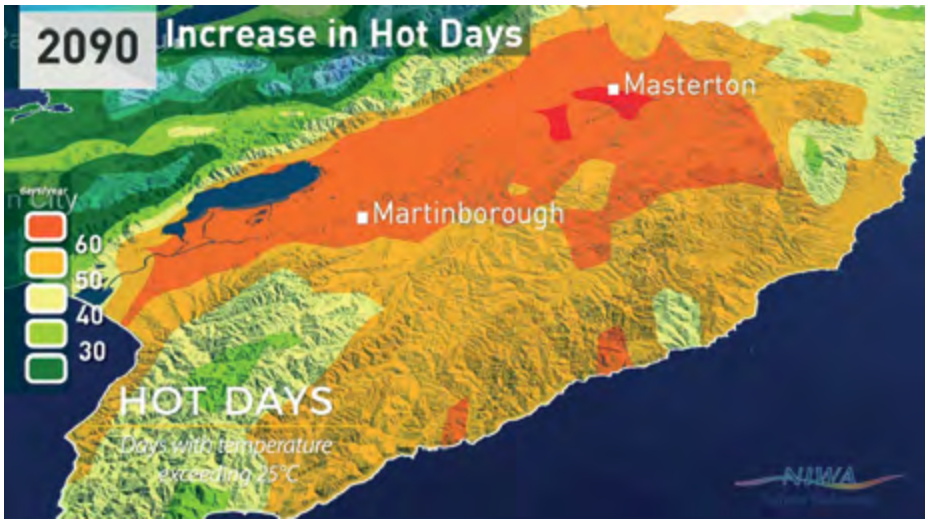
In the next 20 years, on average, Wairarapa is anticipated to have a climate more like Hawke's Bay and Poverty Bay, reflected in what is called growing degree days. By 2090, Wairarapa's growing degree days will be similar to that of present day Northland.

Water Wairarapa Project Director, Michael Bassett-Foss, says the report highlights the importance of the proposed region-wide water storage and distribution scheme.

"Establishing a more reliable water source will help address some of the effects of climate change and build regional resilience as well as take advantage of the potential opportunities climate change offers," he says.

The Water Wairarapa scheme, currently at feasibility stage, would consist of one or more storage reservoirs and a distribution network. Two proposed reservoir sites, near Masterton, are currently being considered.

Mr Bassett-Foss says the Water Wairarapa scheme is all about creating certainty around water availability, new land use opportunities, and promoting environmentally sustainable land uses and practices. In addition, it will enable more sustainable management of the Ruamāhanga River by giving some river reaches the ability to boost low summer river and stream flows, supplement urban water supplies and create new recreational uses.



The number of 'hot days' – classified as above 25°C – will nearly quadruple from 24 to 94 in Wairarapa by 2090.

WAIRARAPA IS HEATING UP

CLIMATE CHANGE REPORT

Impacts:

- **Air temperatures** increase by 3°C (Masterton) c.f. +1°C Wellington
- **Hot days** increase from approx 30 today to approx 110 days/year
- **Frosts** reduce from approx 20 events per year today to 5 days
- Little change to mean rainfall (-10% to +10%)
- Soil moisture deficit (Wairarapa valley floor) increases from 75 to 100 days
- **Heavy rainfall** will increase by up to 30% (1°C = 8% more moisture)
- Mean river flows (across the region) down by 5% (2040) & 10% (2090)
- Decrease in low river flows (MALF) of 10–15% in most catchments by 2040 and 20–40% by 2090
- Flood flow events increase 10–20% more flushing flows per year
- **Sea level rise** between 0.5 and 1.6m above today

Implications:

- Warmer temperatures may allow different crops to be grown
- More droughts may limit pasture production and crop growth
- Sea level rise may impact coastal communities and infrastructure, including inundation of lowland groundwater sources
- The reliability of urban and rural water supplies may be under pressure if there is no additional storage.

Probing the soil to make smart decisions

From simple water metering to whole of farm monitoring, smart technologies make good sense.

Masterton-based Harvest Electronics is one of several companies providing state-of-the-art telemetry monitoring systems to farms in Wairarapa. In our last issue we talked with managing director, Peter Munn, about water metering and management. In this issue, we highlight the type of things that telemetry providers, like Harvest, can do beyond that, but using the same kit.

One of their biggest growth areas is soil moisture probes. Knowing the exact soil moisture conditions on their paddocks means that farmers are able to use less water to grow pasture. It also enables them to increase yields and the quality of the grass by improved management of soil moisture during critical plant growth stages.

The probes, or sensors, are put in the soil at 100mm depth and also 300mm. Peter explains that 100mm is the international standard depth for water irrigation to grow grass; the 300mm depth probe is a check that the farmer is not over watering.

Based on the soil type, the field capacity is calculated. The probes measure field capacity, wilting point and refill point, which is an artificial point halfway between the two.

"You get the most grass growth if you keep between refill point and field capacity."

Farmers can check the moisture level readings 24/7 on their computers or smart phones.

An accurate soil moisture level is also critical for fertiliser application. If the level is too high, fertiliser will be driven down below the roots and therefore is largely ineffective, he says.

Recognising that most farms have more than one soil type, they will have multiple probes.

If they have got two centre pivot irrigators, for example, "it just makes sense" to have a probe under every soil type for every pivot.

"When they are spending $1 million on a pivot why wouldn't they have a probe?"

Soil moisture probes measure soil temperature as well.

"Every farmer knows that grass hardly grows when the soil is below 10 degrees. Don't put your fertiliser on early in spring because if there is a massive down pour it is going to push your fertiliser down below the root zone before your grass can even take it up."

Wait till you see the soil temperature getting up near 10 degrees, then order your fertiliser, he says.

"It is good for our environment and it is good for the farmer's bottom line to put fertiliser on at the right time."

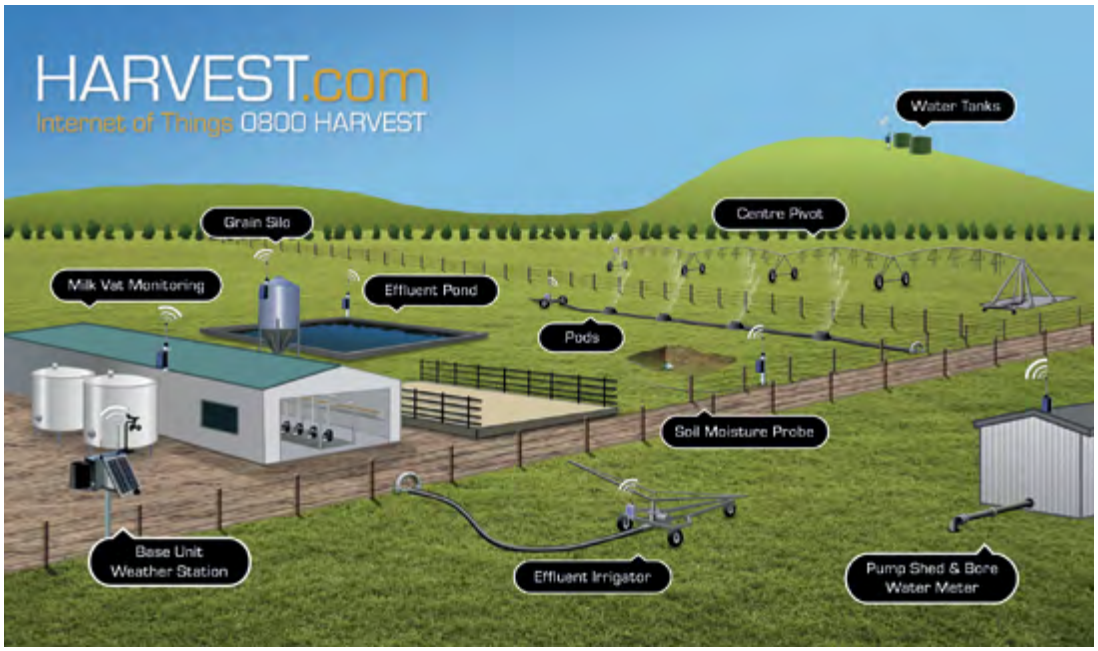
There is a very different philosophy for effluent irrigation as opposed to water irrigation, but either way the same technology can help farmers optimise their operation, Peter says.

Harvest also have a live app for farmers to monitor their stock water. A sudden spike in usage could indicate a burst pipe somewhere, conversely a drop off could mean that there is a blockage. The farmer is alerted, via a smartphone, and can quickly find the cause and remedy before the problem escalates.

"Every farmer knows that grass hardly grows when the soil is below 10 degrees. Don't put your fertiliser on early in spring because if there is a massive down pour it is going to push your fertiliser down below the root zone before your grass can even take it up."

Greater Wellington Regional Council (GWRC) Senior Environmental Scientist, Dr John Drewry, says soil moisture monitoring is an effective tool for managing targeted irrigation.

GWRC support farmers and telemetry providers to install their own soil moisture monitoring equipment. They are looking at developing a soil moisture monitoring network to help support farmers in making decisions at times of soil moisture deficit or surplus.



There are plenty of applications for telemetry equipment on the farm.