

MEASURE manage and save

Why meters are gaining momentum

It's a trusted truism that what you don't measure is much harder to manage – that's proving very much the case for water metering as DataCol's **Bruce Franks** explains.

How many of us would think of driving a vehicle on the open road without the aid of a speedometer? Would we weigh up the risk of exceeding the speed limit versus a hefty speeding fine, or would we prefer to know how fast we are travelling and keep our money in the bank account?

It's the same with water usage rules and metering.

While water appears to be 'free' and plentiful for some consent holders, others may be forced to go without. Recently introduced regulations aim to bring fairness into the use of water by stipulating measurement and monitoring of a valuable resource. As the age old saying says – "you cannot manage what you don't measure".

The clear benefits are around having accurate soil and climatic data in real time and therefore being able to apply the right amount of water to the right environment at the right time – removing the guesswork.

It's like having the speedometer visible in the vehicle. By knowing the quantity of water used and when, a consent holder can plan their water usage with greater accuracy than prior to having measurement. This means if a season is predicted to be dry, a consent holder can compare weather data and water usages from previous seasons to formulate a plan that enables smarter irrigation and water to be available throughout the irrigation period.

Another benefit is around the management of Farm Dairy Effluent (FDE). In having accurate data measurements for applied water and soil temperature and moisture, then the application of FDE can be optimised to mitigate the risks of effluent leaching into the waterways.

Why the growth in metering?

A sizable increase in irrigation activity over the past few decades inevitably led to over-allocation in some areas – and it proved next to impossible for regulatory authorities to make any meaningful assumptions as to how much water was actually being used.

Then, when new applications were made for water, it became impossible to know whether they should or shouldn't

allow the new water rights.

This was addressed when the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 came into effect on 10 November 2010.

Prior to regulation, it was believed that around one third of all water takes were monitored. This meant that while some consent holders were taking water within their limits, others may have been exceeding their allocation and potentially reducing the availability for other stakeholders to take water. Others may not have been using any at all.

The regulations stipulated a staged approach to metering and monitoring over a period of six years for water consent holders. Takes with 20 litres/second or more required monitoring by November 2012, 10-20 litres/second by November 2014 and 5-10 litres/second by November 2016.

What are the advantages?

At the beginning of the process, there was resistance from some farmers around implementing water meters and monitoring. However, over time, the benefits have become obvious with many consent holders now embracing the practice.

Compliance is one benefit – but consent holders have discovered others.

For instance, the ability to view the volume of water being consumed against their consent is a considerable benefit. Regular monitoring, (which can range from 15 minutes to two to three hours) enables intelligent decisions to be made around water extraction – within the consent conditions.

Failing to keep within these can potentially result in Regional Council officers undertaking investigations and, in the worst case, loss of consent.

In some seasons, underground aquifers are fully charged over the winter season – but during the 2015 winter period, aquifers in the Canterbury region, for instance, didn't top up. This left some farmers facing an irrigation season with restrictions in place from day one.

Regional Authorities have an important role in water management and allocation. With accurate data, Councils can



DataCol has a number of solar units operating in harsh summer and frigid winter conditions 24/7.



This piece of equipment assists to calculate the evapotranspiration values required to predict when water should be applied to paddocks.

make more informed decisions around water allocation when water is scarce – and fairer decisions in terms of allocation increase. By knowing exactly what is used, and where, Councils can work with consent holders to ensure water is used equally and fairly.

Using good intelligence

With the ‘base’ water measurement technology implemented, the next question is often around timing: ‘when do I start irrigating?’ While this involves a number of factors, the decision is largely affected by time of season, soil temperature and moisture levels. Consent holders have worked out that if their water is being monitored, then additional information about soil moisture and temperature, rainfall, evapotranspiration, effluent pond monitoring, and energy efficiency makes good sense. By having the basic infrastructure in place, the step up to additional information is relatively minor.

This additional sensor information gives consent holders the ability to quantify what is happening on their farm and can help them make accurate decisions around when to start irrigating and how much to apply.

Another benefit is the ability to capture accurate data records for future farming seasons. Quantifiable data and environmental knowledge from previous years helps farmers make more informed decisions as to future water usage. This allows valuable water to be used in a way that enables good pasture growth and provides for any sudden dry weather conditions.

In addition, if the property is sold, a farmer can prove to a prospective buyer the volume of water required to make the farm viable. Anecdotal evidence has suggested that some farms have failed to achieve a higher price merely due to either insufficient water records or none at all.

As well as having visibility around water usage, in some regions, Councils are bringing in Farm Environmental Plans (FEPs). These require a number of inputs to demonstrate the effect a farm is having on the environment – nitrate leaching being a prime example. In having a number of sensors monitoring key variables, farmers can prove to any investigating

body that they have followed the rules and can demonstrate good business practices that meet FEP requirements.

What do the systems measure and how?

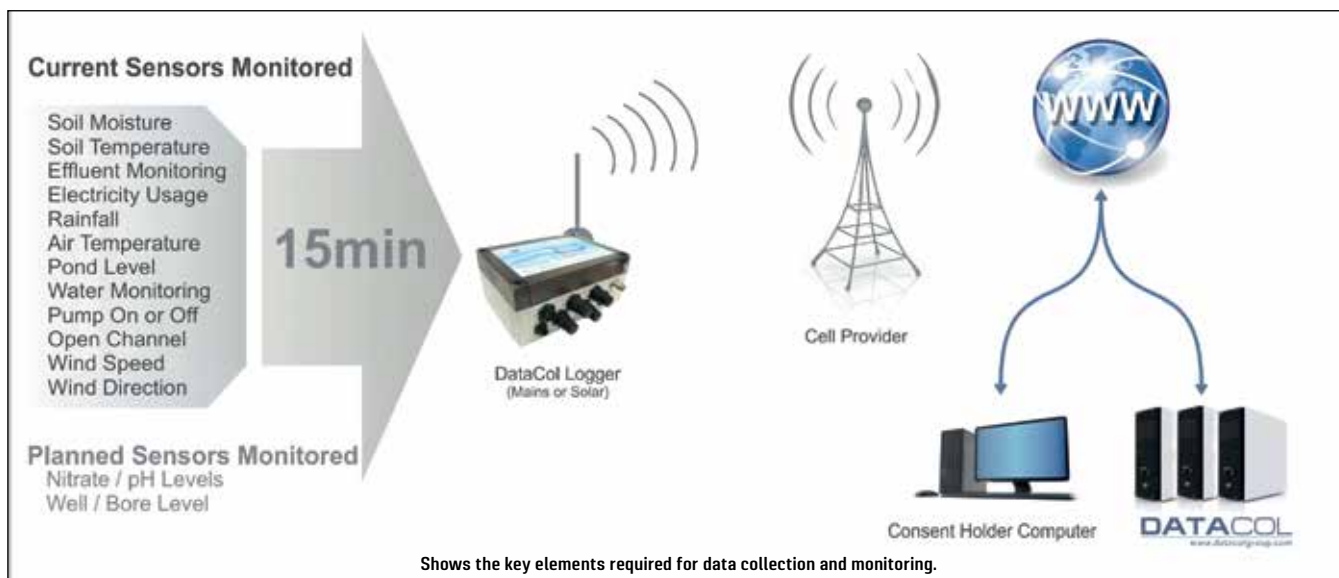
There are generally three key parts for the measurement and reporting of water takes.

1. A water meter that is installed at or near the point of water take (usually specified in a water consent). This can take the form of an inline water meter, or an insertion meter, or a clamp-on ultrasonic meter. The meter is configured to provide usage information to a data-logger and can be set to provide a range of data counts. For most water consents, water meters are generally set to one pulse equal to one cubic

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metre of water. In some cases where greater granularity is required, the count can be set as low as one pulse equal to one cubic litre.

2. A data logger which collects pulse/signal data from the meter and transmits collected data via a radio mesh or cellular network to a specialist data collection and management company. Usually the data logger will have a number of ports for digital, analogue and pulse data.
3. The collected data is managed and monitored by a specialist company. The data will more than likely be published to a password-protected website where consent holders should be able to view all their collected data in one place. In addition, the service should monitor water usage against consent conditions and in cases where there is a



breach, quickly notify the consent holder so they can take remedial action.

The diagram on the previous page shows the key components.

What are the advantages to farmers?

Knowing when to start and how much to irrigate is a good example of the benefits derived from monitoring water use and soil conditions. This can often save a large amount of water and delay when the irrigation starts and bring forward when it finishes each season. Adding electricity measurement from the pump motor and overlaying this information with water usage can quickly determine if the pump is operating efficiently. High volume irrigators spend tens of thousands of dollars each month on power so any savings go straight to the bottom line.

Measurement not only keeps a consent holder on the right side of the law but also provides empirical data when negotiating with regulatory authorities for increased water allocation as it can be proven that the water is being applied in the most optimal manner.

In our experience, most farmers strive to do the right thing. But in some cases without knowing what the ‘right’ thing is, it is hard to meet regulatory obligations. In having a monitored system for water and other farm inputs, farmers can start making decisions that can reduce input costs and reduce the harmful effects on the environment.

The future

Water metering is the first step in managing farm inputs towards a sustainable and profitable future for farming. The next steps are to integrate and monitor data from multiple sensors – including unmanned aerial vehicles (drones). Measurement of moisture at a micro level can lead to lower input costs and potentially reduce the introduction of harmful elements to the environment.

Another step is large scale water storage which is growing rapidly in momentum. This will lead to water ordering and trading which are seen as the next areas for growth. These tools will enable schemes and consent holders to trade water between themselves. Farmers who require more water for a short period will be able to access this from others who can spare or share their allocation at that particular time. This offers the ability to rethink the way we have traditionally thought about water rights and encourages a value to be placed upon water. The result is greater collaboration, fairer use of water – more for all while consuming less.

We also see many irrigation companies embracing a side use of metering technology – the ability to tie smart drives/variable speed drives for irrigation pumping to the flow rates measured by the meters. This allows greater control of the pumping output to both ensure the consent parameters are not exceeded but also for optimal irrigation and energy efficiency. [**WNZ**](#)