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IRRIGATION AUSTRALIA

JOURNAL

FOR IRRIGATION PROFESSIONALS

Smart Irrigation feature

Contractors' Corner Smart irrigation a winner on the track

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ON THE FRONT COVER:
Smart irrigation supports decision making by analysing inputs from sources such as soil moisture monitoring equipment, weather stations and plant-based sensors. In this photo, Peter Keynes from Total Eden Renmark advises a client on irrigation scheduling using soil moisture and other data to inform decision making. Photo: Sentek.

WELCOME

CHAIRMAN'S MESSAGE

As I write this message, I am conscious of the many people around Australia suffering from drought, fires or floods, and their severe consequences on businesses and families. This includes Irrigation Australia members, who are among those immediately affected by these conditions. Although as individuals we may feel inadequate and unable to assist in meaningful ways, I encourage all to work together in our local communities and to support each other during these events and on the long road to recovery.

On behalf of the Irrigation Australia board I thank those members who participated in our annual general meeting. This year, we had the highest number of members attend the meeting for some time, underlining the interest that members have in their association.

After the formalities of reporting on ongoing association activities, an important matter announced at the AGM was the election of directors. Every year several members of the board are required to vacate their positions, and subject to their length of service, may renominate. Director Bruce Scarterfield decided not to renominate on this occasion, and we thank him for his dedicated service to the industry.

The four existing directors who decided to renominate (Peter Brueck, Momir Vranes, Simon Treptow and myself) were all successfully returned for another term. Congratulations to Peter, Momir and Simon on your re-election.

We also are pleased to welcome Peter Weaver, General Manager - Water Group for Nutrien as the fifth director elected this year. This is Peter's first term on the board and I am confident that his involvement will add significantly to the diversity of experience around the board table and deliver additional value to the broader Irrigation Australia membership.

I thank all the other candidates who nominated this year – it is immensely pleasing to see the level of interest in participating in and supporting the efforts of your industry association.

During the AGM, the high level of industry support for Irrigation Australia was noted by the board. This support includes that of the manufacturers who sponsor the Centre of Irrigation Excellence and Irrigation Australia's training activities; of the advertisers in Australia's premier irrigation publications, the Journal and WA's Overflow; and of all members who participate in numerous ways and provide valuable feedback.

At the board meeting immediately after the AGM I was reappointed as chairman, and I sincerely thank my fellow directors for their continued support and confidence.

Strategic planning

One of the key strengths of the Irrigation Australia board is the diversity of industry knowledge and experience held by the directors.

In December each year we meet to focus this knowledge and experience on refining the strategic direction for Irrigation Australia. What guides us in these meetings is that we retain the goal of delivering value and service to Irrigation Australia members; that we continue to be the prime source of irrigation related knowledge for industry stakeholders; and that we are providing professional development for the industry, supporting economic sustainability in Australia.

The outcome of this process is intended to provide the management team with strategic guidance for their activities for the coming year. If next year is anything like this, the team will be extremely busy.

This year Irrigation Australia's CEO Bryan Ward and the team have worked hard on a diverse range of areas, including metering, regional activities, our industry training package and national competency standards, VET-funded training, involvement with ICID, the forthcoming 2020 conference, rainwater harvesting, and Waterwise. But this is what is visible to members. Much goes on in the background, addressing issues and working on behalf of the irrigation industry, which may not see the light of day for some time, if ever.

Of course, all this activity needs to be sustainably resourced with people, financial resources and structured delivery plans.

It is critically important that the strategic direction the Irrigation Australia board provides for the management team is aligned with the desires of Irrigation Australia membership. To do that we need your input on what you view as important to your section of our industry.

The response to the member survey completed each year is an important element of receiving that input. The changing responses over the years to specific questions in the survey provide a useful measure of industry satisfaction with our activities.

Your directors urgently seek your input and comments on ANY matters of importance to you in relation to our industry. This will help Irrigation Australia to best represent your interests and needs. The more input members have into the organisation, the greater will be the resulting benefits for members and for our industry.

Contact details for directors are listed on the Irrigation Australia website and on page 28 of this issue of the Journal. Please take this opportunity have your say on the future direction of your industry association.

Andrew Ogden
Chairman

Check out Irrigation Australia's website and social media feeds.

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FROM THE CEO

As if the worst drought in recorded history wasn't enough, we now find our country ravaged by extreme bushfires and, in some obscure irony, we have had reports of floods in Tasmania where famers in the north-west of the state are having trouble keeping water off their land.

By necessity, we are a tough lot in Australia, but it is no great surprise that many of our important primary producers have had enough and are leaving or are considering leaving the land. The federal government cannot make it rain but we must give them credit for the range of initiatives being implemented to support farming communities. It was therefore pleasing to note the announcement of a once-off provision of 100 GL of water in the southern connected Murray-Darling Basin at $100/ML. This is the result of South Australia agreeing to turn on its desal plant and substitute this water for River Murray water that will instead be diverted upstream to grow fodder. While not every agricultural sector will benefit from this measure, it does show what can be done when different tiers of government think outside the square and work together for the benefit of the community.

In industry news, the long-overdue trade qualification of Irrigation Technician has been well received by industry, and Geoff Harvey and his team have been inundated with enquiries. They are currently working with industry groups to hold the first course in the new Certificate III in Irrigation Technology in the new year.

Metering policy activity with state governments continues to dominate our workload. In this context, we are pleased to confirm a funding agreement with the MDBA for a Governance Officer - Metering, and we are equally pleased that Irrigation Australia member Peter Smith, who is also a trainer and a certified meter installer, has accepted this role for the initial twelve months of the agreement. Peter is based in Tamworth and looks forward to working with our CMIs as we finalise arrangements such as the code of conduct and the implementation of state regulations. Peter can be contacted at metergovernance@irrigation.org.au or on his mobile, 0455 973 780. You can read the interview with Peter on page 26.

Managing and measuring water remains top of mind for all state jurisdictions, and Irrigation Australia has been approached by the NSW Department of Planning, Industry and Environment to develop a training and certification program for the installation and validation of water storage measurement devices. Our involvement underlines the credibility of Irrigation Australia with government and acknowledges the work that we have put into our professional development and certification programs over the years.

The Hon. Melinda Pavey, MP & NSW Minister for Water, Property and Housing, has recently announced the NSW Floodplain Harvesting Policy, which sets out the process for bringing floodplain harvesting into the water licensing framework. This is now being rolled out across the northern basin valleys. It involves creating new work approvals, licences, rules and ways of measuring floodplain harvesting.

Irrigation Australia will be working with the department to develop the training and certification framework and we hope to have courses available in the new year. We are seeking expressions of interest from our members, particularly those qualified as meter installers and validators, to take on this additional training and qualification. If you have an interest, please drop us an email at info@irrigation.org.au.

Finally, we remind members and industry stakeholders that planning is well advanced for the next major event on the Irrigation Australia calendar which combines the Irrigation Australia Conference and Exhibition with the ICID 24th International Congress and 71st Executive Council meeting. This will be a significant opportunity for international and Australian delegates to share firsthand the technology and expertise available in our important industry.

Early Bird registrations and exhibition sales are now open and further information can be found on the event website at www.icid2020.com.au.

Bryan Ward
CEO

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Smart irrigation – what is it?

In this editorial feature, we look at the application of digital technology to irrigation (also called smart irrigation) through case studies and technical articles. To begin, we define some terms to clarify what "digital" encompasses.

A 2017 research report funded by Australia's R&D corporations and the Australian Government called *Accelerating Precision Agriculture to Decision Agriculture: Enabling digital agriculture in Australia*, defines digital agriculture as typically involving "both the collection and analysis of data to improve both on-farm and off-farm decision making, leading to better business outcomes".

Smart irrigation is part of what some called the fourth wave of digital innovation. It is where the hardware used for delivering and applying water is assisted by algorithms that take a variety of digital information derived from technology such as drones, sensors, weather stations and soil maps and use it to aid decision making and manage the system.

Technologies currently being used for smart irrigation include:

- aerial imagery, e.g. using LIDAR and drones
- flow meters
- scheduling technology
- low energy, precise application, including variable rate application
- mobile drip irrigation
- plant sensors
- soil mapping
- telemetry and weather stations.

The research report also clarifies some commonly used terms used when referring to digital agriculture.

Reference. *Accelerating Precision Agriculture to Decision Agriculture: Enabling digital agriculture in Australia* (2017). Available from https://www.crdc.com.au/precision-to-decision.

TERM	MEANING
AgTech	Commonly used in the investment community to describe digital technologies used in agriculture.
Big data	Any collection of datasets so large and complex that it becomes difficult to store, process and analyse using current technologies. Big data comes from many sources (e.g. text, image, audio, social media etc) at an alarming velocity, volume and variety, which adds to this challenge.
Decision agriculture	Conclusion or action resulting from the application of knowledge and/or information that may be derived from digital agriculture.
Digital agriculture	Typically involves both the collection and analysis of data to improve both on-farm and off-farm decision making, leading to better business outcomes.
Digital disruption	Digital and associated technologies that 'disrupt the status quo, alter the way people live and work, rearrange value pools, and lead to entirely new products and services', often in a relatively short period of time.
Information and communication technologies (ICT)	A broad term used to refer to technologies that involve the use of computers, computer networks, telephone networks and internet networks to manage data and information.
Internet of Things (IoT)	Devices such as sensors, machine and other digital instruments which are connected to each other and the internet so they can collect and exchange data with each other.
Open data	Data that is: • Freely available to download in a reusable form. Large or complex data may be accessible via a service or facility that enables access in-situ or the compilation of sub-sets. • Licensed with minimal restrictions to reuse. • Well described with provenance and reuse information provided. • Available in convenient, modifiable and open formats. • Managed by the provider on an ongoing basis.
Precision agriculture (PA)	Farming practices that involve precise spatial management using Global Positioning System (GPS) or machine vision technologies. Involves the observation, impact assessment and timely strategic response to fine-scale variation in causative components of an agricultural production processa. This can include variable rate seeding and fertiliser application, yield mapping, and animal location and analysis. * Precision Agriculture Laboratory, What is Precision Agriculture? Sydney University at https://sydney.edu.au/agriculture/pal/about/what_is_precision_agriculture.shtml

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Smart app for farm management

Over the last two decades, Fabian Gallo, a long-time member of Irrigation Australia, has had a successful consultancy providing irrigation automation and monitoring services. In the last three years, Fabian has focused on developing a farm management app called Farm in ONE.

While Fabian specialises in irrigation automation and monitoring, his vision for his company HTM Complete, which is based in Far North Queensland, is much broader. Although water is a crucial part of farming in high value crops for horticulture, his clients have been asking for a way of managing their irrigation within a complete farm system.

According to Fabian, this makes perfect sense. While the service sector might specialise in areas such as irrigation or fertilisers, farmers must manage an entire system, and the power of digital technology makes incorporating and integrating data from a variety of sources possible.

The challenge is to develop something that is user friendly, time efficient and useful for decision making.

Set this challenge by some of his clients, three years ago Fabian began to examine how digital advances such as Wi-Fi and mobile communications, remote monitoring and control, cloud storage and the Internet of Things could be married with input data such as from drone imagery, pest and disease scouts, farm infrastructure and scheduled on-farm tasks to produce an online, whole farm management system.

GROWERS GUIDE DEVELOPMENT

With the help of his "ambassador growers" and the development of a few grey hairs, Fabian and his team have put together Farm in ONE.

"A shorthand way of describing Farm in ONE is that it is a web-based, multi-tool app for daily farm operations. It allows for farm activities such as irrigation, spray application and crop monitoring to be scheduled according to input data from soil moisture equipment, weather stations, drone observation and manual crop inspections," explained Fabian.

A screenshot for the app, which can be used across multiple devices.

Fabian Gallo is applying his experience in agricultural consulting and irrigation automation to developing smart technology for whole farm management.

As well as this, the application includes a Task Manager that enables assignment of tasks, alerts, work orders, OH&S forms and reporting. This provides for efficient communication between management, staff and contractors.

Its interface allows multiple sites and interacts through satellite or drone GPS mapping, where a variety of information can be overlaid to record activities and allow for schedules to be developed. As well as creating spray and irrigation schedules in a shared timeline, over time it builds a powerful historical record of farm management.

Growers access information through five modules – irrigation automation, spray schedule, monitoring, mapping and general tasks.

"They can choose to subscribe to all of these areas or just those they believe are important for their management priorities," explained Fabian.

"Our ambassador growers have tested the platform and we have a number who now use it to help with their decision making," said Fabian.

One of Fabian's ambassador growers, Steven Schincariol from BLS Farming in Dimbulah in far north Queensland, is currently trialling Farm in ONE. Steven grows limes and mangos and is using the full application for irrigation automation, fertigation, spray scheduling and monitoring devices.

Steven says that while he has seen savings in electricity, wages, time, water and fertiliser, the biggest impact has been on his lifestyle and family time.

"Once the programme is set, I don't have to be on the farm to change shifts anymore, which means better quality of life because we can actually

go places on weekends now without having to be home to change valves. The app, which is easy to use, has improved our yields and most importantly saved us time and money, which means more time with the family," he said.

"Another benefit is the monitoring functions, which have improved yields with little to no runoff benefiting the environment and saving time and money by delivering the exact requirements to the crops," he said.

CHALLENGES

Of course, with a project such as this, there will be challenges along the way.

According to Fabian, the biggest challenges have been integration between the different features and making sure the data can be shared across multiple modules.

"Other challenges are enabling functions to work offline and creating a user interface that is easy to navigate and enjoyable to use," he explained.

Being able to use "smart" technology so that its potential is realised is something that also requires new skills. And this is not limited to the user. It includes all sectors, from the developers, who might understand digital technology but not the intricacies of farm management, to suppliers, who need to understand apps and programs so they can recommend ones that suit user's needs, right through to the users, whose needs are individual and based on their particular situation.

"Everyone is constantly striving to make improvements in efficiencies, time and expenses," said Fabian. "What makes it difficult is finding the right practical tool and having confidence that new technology that they are taking on board can be integrated with existing hardware and practices, while reducing the paper trail and effort in maintaining records."

LOOKING TO THE FUTURE

Fabian isn't standing still with his app, rather he is constantly on the lookout for new features to include that will enable farmers to use Farm in ONE in more areas such as tissue samples, harvesting and packhouse control.

One of the advantages of digital technology is that it can be updated, added to and improved. According to Fabian, the future for Farm in ONE is where it will be "constantly evolving to the needs of our customers".

Anne Currey, Irrigation Australia

Watching water from space

In the last financial year, the Australian Government committed more than $260 million to Geoscience Australia's capabilities to develop satellite technology.

One of the company's offerings that this funding is helping to support is a digital platform called Digital Earth Australia (DEA). This uses spatial data and images recorded by satellites orbiting the Earth to detect physical changes across Australia in unprecedented detail. DEA prepares these vast volumes of data and makes it available to governments and industry for easy use.

Spatial information provides an understanding of what is happening in our environment, where it is happening, and what the causes of change are to provide insights into the past, present and (likely) future. When prepared and analysed using high performance computing, this data provides a wealth of information to users for monitoring the environment and increasing productivity.

Of relevance to the water industry is a DEA information product called Water Observations from Space, which provides a national map of where water has been seen in Australia from 1987 to the present and can be used to better plan water management strategies. Other DEA products provide information about ground cover, crop health and coastal environments.

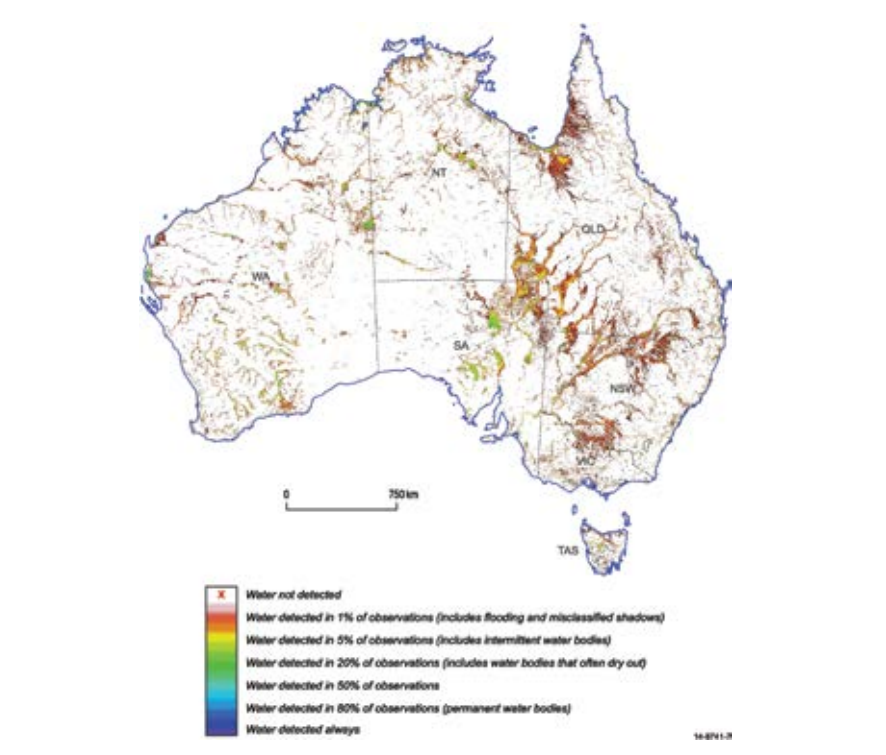
HOW DOES DEA WORK?

Using high performance computing power provided by National Computational Infrastructure and commercial cloud computing platforms, DEA organises and prepares satellite data into stacks of consistent, time-stamped observations that can be quickly manipulated and analysed to provide information about a range of environmental factors such as water availability, crop health and ground cover.

By preparing data in advance, DEA reduces the cost and time involved in working with the vast volumes of Earth observation data. This Analysis Ready Data is made freely available to users.

INFORMATION

For information go to website https://www.ga.gov.au/scientific-topics/community-safety/flood/wofs

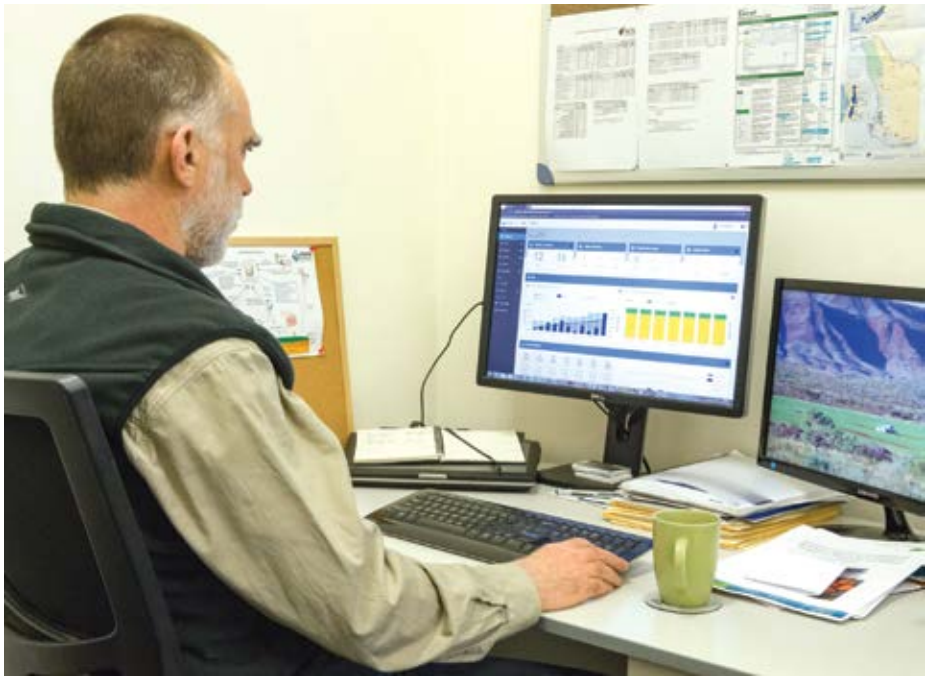


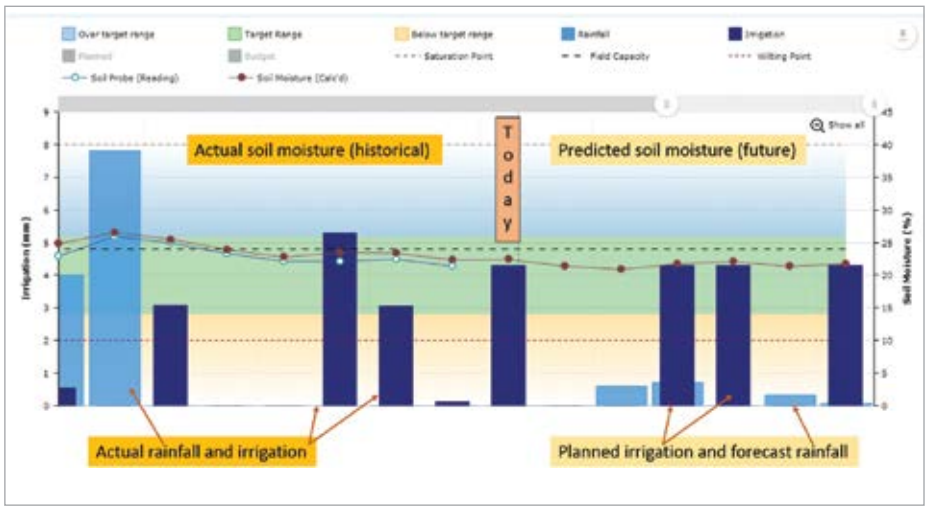
Water Observations from Space filtered summary product for Australia, derived from water observations from 1987 to 2014. Source: Remote Sensing of the Environment, "Water observations from space: Mapping surface water from 25 years of Landsat imagery across Australia", Vol. 174, March 2016, pp 341 -352, https://doi.org/10.1016/j.rse.2015.11.003

Public open space and smart water management technology

One of life's great frustrations is seeing the local park or footy oval's irrigation system on when it has just rained or is about to rain. We all think there must be a smarter way to manage our dwindling water supplies with this sentiment being exacerbated by drought conditions across Australia.

Never has the lack of rain been of greater interest to governments and to communities, whose expectations about how we use our natural resources are ever more demanding. Increasingly, we hear the term "social licence" being applied to farming practices, animal welfare and environmental programs. Individuals are demanding a higher level of accountability for a range of activities. A message from this is that better water management is of concern to everyone as we develop strategies to cope with dwindling supplies and an uncertain future.





With smart systems, it is crucial that the data being gathered is useful for decision making, is user friendly and is insightful and engaging.

OPPORTUNITY IN DATA

It is in this context that innovative technologies to harness the potential of smart irrigation and water management by gathering data from a myriad of sources are being developed. While these technologies based on gathering and interpreting data provide opportunities, it is crucial that software platforms are based on the fundamental premise that the data being collected is essential, insightful and engaging. Such information must be directed towards enhancing decision making and be well understood in its application.

The digital revolution is a wonderful thing, but it must derive tangible user benefits.

While there has been a quantum leap in the sophistication of hardware systems in the last decade, the step change in the future will come from smart software that can leverage the hardware's capability. The precision levels of irrigation hardware have advanced enormously with a range of devices targeted at improving performance, e.g. centrally controlled irrigation systems, on-farm weather stations and soil moisture probes. The ability to differentially irrigate separate fields or plots across multiple sites is also empowering the end user. Developments now allow each sprinkler head across an entire golf course to be managed independently.

With this level of opportunity comes the need for precision planning and surveillance so software management platforms deliver real returns to the user. This can apply at an individual manager level right through to a water supply manager.

OPEN-SPACE IRRIGATION CHALLENGES

Two critical challenges for Public Open Space (POS) irrigation managers are to:

- reduce overall water volumes being consumed
- develop strategies for the use of alternative water sources to supplement diminishing rainwater supplies.

The first challenge can be met by using data to better inform the irrigation manager on exactly how much and when the plant or crop needs water. Human nature is to put out extra water, but this can be highly inefficient and wasteful and is often suboptimal for the plant which can be affected by waterlogging and fertiliser leaching. In retrospective

reviews of irrigation programs, SWAN Systems have seen excessive water use of up to 30 per cent.

The second challenge is around the increasing use of treated water and bore water as an alternative or supplementary supply to potable water. While alternative water sources have the advantage of providing more irrigation options, they also bring with them issues to manage. These include tracking the nutrient loading to understand quality issues and calibrating irrigation to take account of the inherent levels of elements like nitrogen, phosphorous and certain heavy metals.

A strategic decision when using recycled water centres around what the water is being used to irrigate. As an example, it is expensive (and sometimes unnecessary) to strip out elements which can have value to the end user when the planned use is for crop irrigation. The trick is to know what the nutrient loading is and to be able to calibrate a fertiliser program around what already exists in the supply source. This requires an integrated system where the irrigation module interacts with the nutrient module which is obviously directly relevant to fertigation systems but is also important for granular fertiliser application.

A smart irrigation system takes data from a variety of sources such as soil moisture monitors and weather services and processes and analyses it to produce information that can be customised into reports and recommendations for the customer to improve irrigation management. With many systems, the information and outputs are reviewed and can be modified to ensure they suit the management and other needs of the customer.

A challenge when managing irrigation of public open space is to reduce overall volumes of water consumed.

THE FUTURE IS SMART

These key challenges lend themselves to technology that incorporates the collection and analysis of useful data to provide real-time responses and information about what is happening with irrigation and water management. The advances in the next few years will be in continuing to develop software systems to improve irrigation operation and water use efficiency, and in developing the skill of irrigation managers to fully take advantage of the opportunities offered by smart irrigation technology.

Rod Campbell, SWAN Systems, Perth

CASE STUDIES: USING SMART SYSTEMS TO IMPROVE WATER AND IRRIGATION MANAGEMENT

Three councils using smart systems developed by SWAN Systems to schedule water and manage nutrient application are Melbourne City Council (using mostly scheme water supplemented by stormwater harvesting) and Bayswater and Armadale councils in Western Australia (using mostly local bore water).

For Melbourne City Council, the main aim is to optimise irrigation water use efficiency to achieve a healthy and functional landscape regardless of the water source.

West Australian local councils are working on strategies to operate in a lower bore allocation environment in response to diminishing aquifer volumes. A program with the City of Armadale demonstrated water savings of about 15 per cent were achievable by taking a proactive management position incorporating detailed information including soil type, grass type, actual water volumes applied and site specific 7-day weather forecasts (with granular detail on ETo, temperature, humidity and rainfall). The increasing variability of weather patterns, where daily ETo readings can be 40 per cent different from one day to the next, means that making operational decisions based on historical climate averages is a very inefficient way of giving the plant exactly how much water it needs. Importantly, it doesn't guarantee it will get this water when it needs it.

SA Water, a SWAN System client which manages water and infrastructure development, has championed the use of treated water across many applications from farms to schools and homes. Underpinning this is the enormous investment it has undertaken over the last 10 years to realise the state's desire to be a leader in smart water management. This started with a clear focus on developing water infrastructure that was cutting edge and capable of delivering supply flexibility. Now the focus is on software capability to leverage this installed infrastructure.

In the Federal Government's very recent drought relief package, SA Water was able to do a deal on desal water to use for large scale fodder crop irrigation. The plan to supplement up to 40 billion litres of desal water for fresh water is possible given South Australia's previous investment planning.

It is this level of flexibility that will be required to ensure Australia more generally is able to do more with less and reduce its reliance on rainwater for broadscale irrigation.

Software-based smart irrigation

The advantage of smart irrigation systems is that they can gather data from various sources, analyse it and then apply it to help growers decide when and how much to irrigate as a way of improving water use efficiency and environmental outcomes.

Some systems use hardware in the field to collect data, while others use software only. With software-based systems, there is no need for physical contact with the soil or the plant and they avoid issues to do with installing and maintaining delicate devices in the field. And because of the way data such as ET and temperature are collected, it is possible to get a reading of the entire field rather than just from one or two points.

DATA SOURCES

While the collection and analysis of satellite and weather data are key inputs to smart irrigation systems, this is just the beginning of the story. The "smart" element is based on the algorithms that combine and analyse the data and provide deep insights that allow for more precise management.

As with a number of smart systems, the Manna system relies on satellite imagery analysis combined with meteorological data and agronomy models: Satellite images are received from three different satellite systems once every three to five days. This data is analysed to determine current crop conditions – vegetation vigour and water potential.

Weather data is based on a virtual weather station, a hyper-local weather service that provides historic, current and forecast conditions at the farm level. The agronomy models are adapted to each crop and geographic location. The system combines this information with the soil and irrigation system parameters and provides dynamic irrigation recommendations on a weekly or daily basis.

VISUAL PRESENTATION

An important part of most smart systems is how irrigation managers learn what is happening in the paddock and in the soil. One way of assisting this learning, as well as providing schedules on when and how much to irrigate, is with visual data such as satellite images presented as coloured maps (NDVI images), that indicate vegetation density (crop canopy cover) and plant wetness levels. Irrigation managers can use these maps to help identify areas of the farm that are not performing as well as they could be.

Another way smart systems help irrigation managers learn about crops and allow for more effective management is that they define crucial indicators such as water use efficiency, i.e. crop yield per megalitre of water applied. There is a tendency in vegetable production to overwater crops as they are sensitive to under-irrigation and don't respond well to their growth being checked at any stage. Using smart systems like Manna helps reduce water use without under or over irrigating and maximising yield from each megalitre applied.

ACCESSIBLE ANYWHERE

Convenience is an important aspect of smart irrigation. No longer do managers have to collect data in the field and then sit in an office to analyse it. With most smart systems, software is accessible via a web page, is available as an app on smart phones, tablets and via a laptop. In the case of Manna, data is stored in the cloud, on servers located in California and other countries.

Smart irrigation systems analyse a range of data such as from satellites to provide feedback on what is happening in the field and in the crop and to develop irrigation schedules.

Irrigation managers can access the app whenever they want and wherever they are to check on crop status and irrigation recommendations.

Data from weather stations is extremely useful; if rain is expected the weather engine will predict how much and when it is due, and the irrigation manager can decide whether to wait to apply water until after the forecast or reduce the amount applied before the expected rain. With the Manna system, the rainfall amount received in mm at each farm must be manually entered and this will reduce the recommendation for each affected zone.

LEARNING TO BE SMARTER

Smart systems do require some work initially, e.g. to load the irrigation design for the farm and irrigation valves/areas/zones into the system and set up each crop to specific growth characteristics. And they are not limited to just one area or farm, rather multiple farms that are some distance away from each other can be set up. A huge saving in time is that data on all growing areas and crops are held in and can be accessed from the one place.

Smart systems regularly update data and provide notifications and warnings to the manager, e.g. the Manna system receives updates of satellite imagery every three to five days and crop growth is monitored using these images as well as the algorithms built into the software. The software also sends notifications of changes to the crop stage or if severe weather is expected. The system also considers soil type, weed cover, salinity and geographical influences.

Fundamental to smart systems is that they "learn" using the data that is being collected, thus providing managers with management assistance at their fingertips.

Dr Nick Walker, Manna Irrigation Intelligence

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Knowledge is power with soil moisture management in crops

With the current high prices of traded water in the MDB, it is more important than ever that growers optimise water use in both annual and perennial crops.

This is where soil moisture data is delivering powerful insights to farmers and consultants, supporting better-informed decision making.

"We simply must make every drop count to maximise crop performance and return on investment," said Peter Buss, agronomic R&D manager and co-founder of Sentek Technologies.

Even small improvements that help manage crop performance are important, and this is where smart irrigation technology is increasingly being used successfully.

Soil moisture probe in an onion crop, installed at seedling stage and removed before harvest. This allowed for precision irrigation scheduling by identifying crop water needs at critical stages.

"Technology utilisation is becoming a game changer as we look to understand how a crop is faring across the season. Using sensors to understand soil water content and identify the active root zone is crucial for managing risk and optimising crop performance," said Peter.

MORE THAN SIMPLY COST CONTROL

It is not only about monitoring inputs for cost control. Managing soils to improve plant health adds significant bottom-line value – offering yield gains and the ability to manage for quality parameters.

It is also about understanding the costs resulting from mismanaging irrigation as the decrease in yields can be between 10 and 50 per cent. In tree crops, for example, the success of the coming season will be determined by how well irrigation and water use factors are managed during critical crop growth stages such as flowering and fruit set.

"Data provided by soil monitoring systems are a farm risk management tool, helping the grower reduce variance and plant stress. The more the grower knows about how the crop is growing in real time, the more potential they have to act on factors they can control," explained Peter.

RETURN ON INVESTMENT STACKS UP

Almond growers in California, who produce more than 80 per cent of the world's almonds over more than 53,000 ha, are extremely aware of the benefits of using available water as efficiently as possible. Water availability, cost and efficiency are uppermost in the minds of all growers.

"Growing a crop of almonds requires, on average, about three feet of water applied across each acre per year. Each foot of water generally costs between $300 and $600 per acre per year, which is a conservative average of around $1,200 per acre. There are around $30 of energy costs to pump that foot of water across the acre, so around $90 per acre per year," said Gill Costa, business development manager for Sentek for Western USA.

Being efficient either saves input costs or it can help achieve increased yields of between 20 and 30 per cent for the same input costs.

According to Gill this can add up to an additional $650 to $970/ha per year for an average farm of 40 ha (100 acres).

"Larger farms can obviously scale this through to make significant savings and/or increased revenue. All from the same inputs," he said.

DATA QUALITY IS EVERYTHING

While weather parameters describe the atmospheric environment acting on the plant, the soil moisture probe helps in evaluating plant responses.

The soil moisture dynamics reflect a combination of plant reactions to the weather above ground and the availability of moisture below ground. By tracking moisture changes at multiple depths in the soil profile, it is possible to monitor root activity, know where and how much water is available at any depth and establish soil property parameters such as field capacity, onset of wilting and saturation.

The additional measurement of temperature and salinity in the soil gives a comprehensive guide for germination; salinity and fertiliser management

optimisation. Other key measurements recorded by Sentek's IRRIMAX software include:

- the effectiveness and depth of infiltration of rainfall and irrigation
- active depth of root zone at different times of the growing season
- amount of water uptake and evapotranspiration from different parts of the root zone.

Keeping in mind how critical this knowledge is for irrigation decisions, using quality instruments and software that help the user to interpret the data is important.

Important factors to consider are length of probes and the intervals at which they measure indicators such as soil moisture, temperature and salinity. The size of the probe is also important and should match the root length of the crop (most tree crop growers use a 120 cm probe).

Another important factor is whether installation results in soil disturbance. In general, the less soil is disturbed, the more accurate and reliable the readings will be.

According to Gill, Sentek minimises disturbance by installing the probe using a power drill with a custom designed auger. The probe's tapered shape allows for easy insertion into the soil with minimal disturbance and they can be buried at any depth so that working of the upper soil layers is not affected.

Growers and consultants can view their real-time soil moisture data using web-based software.

Quality instruments are critical for data integrity. This "no gaps" installation example shows how the probe should sit in undisturbed soil. Growers and consultants can view their real-time soil moisture data using web-based software.

USER FRIENDLY AND EFFECTIVE

The bottom line is that whatever the equipment used, it is crucial to provide a solution that works, is precise and easy to use and helps improve irrigation scheduling.

Acknowledgment. This article was provided by Sentek Technologies.

Cloud-based irrigation control – the sky's the limit

Cloud-based irrigation control continues to gain a foothold in the irrigation sector as needs evolve related to water consumption and landscape management.

Cloud-based irrigation offers comprehensive benefits for customers and is suitable for managing sites ranging from residential homes and commercial buildings to sports stadiums and agricultural land. Any site that needs defined irrigation management is a great candidate for cloud-based irrigation control, which provides microclimate weather adjustments that cut water use by an average of 50 per cent.

There are three main components to cloud-based irrigation management:

- the infrastructure, comprising the cloud and software
- the hardware, including controllers, valves, sensors, and flow meters
- the smart device that allows a user to connect to the system, such as a phone, tablet or computer.

In cloud-based systems, data is stored on a secure server with trusted third-party providers such as Amazon Web Services enabling a secure and safe environment for storage and operation. A key feature of cloud-based software is that it can be made available to everyone who needs it, regardless of the device they use to access it. Many systems that claim to be cloud-based do not actually store data on the cloud and rely on a single phone for data storage and communication.

Homeowners see immediate water and cost savings because automatic irrigation adjustments based on local weather conditions fine-tune irrigation according to site needs. Some systems use history and forecast data to ensure irrigation matches weather conditions. Cloud-based technology also allows councils and government agencies to manage multiple sites from a central location. Staff members can connect using smartphones and tablets, so remote irrigation system access is available to all who need it. Smart control systems log all staff actions and make adding and removing users simple and fast, which provides an additional layer of protection.

BASIC FUNCTIONS – WHAT TO LOOK FOR

When it comes to selecting a cloud-based irrigation solution, basic functions include:

- works on multiple devices, including smartphone, tablet, and computer
- IOS and Android operating system compatibility
- ability to manage multiple sites at once
- highly reliable local weather data
- site-mapping tools
- ability to add zone location details, including photos for each zone
- comprehensive staff and user logging
- reliable hardware
- strong and established company.

Some cloud-based irrigation solutions permit microclimate monitoring down to 400 x 400 m, which significantly streamlines local data for irrigation management and generates massive water savings. However, when considering microclimate monitoring, purchasers should be careful — not all brands of controller offer this level of detail.

Using the cloud to store data and software that takes inputs from a variety of sources such as weather stations and soil moisture sensors has allowed for improved irrigation management and water use efficiency.

USERS SEE BENEFITS OF CLOUD-BASED SOLUTIONS

Case study 1. The Sunshine Coast Council recently implemented an upgrade to cloud-based central control. They researched and tested several brands before choosing a user-friendly solution that met their technical requirements. The council ranked the ability for reporting, remote access, and flow and electrical monitoring as the most important factors in its decision.

Case study 2. Irrigation control has always been difficult at the University of New South Wales because locations are spread throughout the community. The many parks, gardens, and outdoor environments that make up the system need proper irrigation to survive hot Sydney summers. Before implementing a cloud-based central control solution, administrators had little ability to modify irrigation programs and even less understanding of system performance. Since the upgrade, they can quickly change and update controller programs to ensure maximum water savings.

Case study 3. Overseeing vineyards in the Coonawarra region of South Australia is a complex task. Managing dozens of irrigation controllers spread out over thousands of acres requires high levels of skill. One irrigation mistake could result in the loss in significant revenue. With the adoption of cloud-based irrigation control, this task has been greatly simplified. Being able to control the exact amount of water applied at any time via remote management is vital to ensure high-quality grapes and world-class wine.

SMART IRRIGATION EXPANDS POSSIBILITIES FOR MANAGEMENT

According to Anthony Long, Hydrawise Product Manager at Hunter Industries, cloud-based control offers a range of new and exciting possibilities for irrigation management and landscape protection.

"Machine learning, artificial intelligence, emerging sensor technology, and the ability to link these tools together through the cloud is really exciting," Anthony said. "More importantly, the cloud helps us do our real job — which is to manage water use and create savings wherever we can."

Acknowledgment. Article provided by Hunter Industries.

GUIDE TO CLEAN ENERGY SOLUTIONS FOR AUSTRALIAN FARMERS RELEASED

In September this year, the Clean Energy Finance Corporation (CEFC) and the National Farmers Federation (NFF) announced a collaboration with the twin goals of increasing on-farm efficiency and cutting greenhouse gas emissions.

Under the collaboration, an Australian first, they have released a practical guide, *Transforming Australian Agriculture with Clean Energy*, which outlines 51 opportunities where farmers can reduce their energy bills by improving energy efficiency and switching to renewables.

The NFF and CEFC have collaborated to develop a guide that describes opportunities to reduce energy costs and improve energy efficiency.

The guide, which draws on the work of the University of Southern Queensland's Centre for Agricultural Engineering, shows how farmers can reduce their energy consumption and lower emissions, using realistic cost estimates.

Investment commitments described in the guide start at under $10,000, making them cost effective at a time of farm stress and drought.

According to the NFF and CEFC, clean energy leads to greater efficiencies and productivity, and an overall lower emissions profile for the agribusiness sector, and irrigation is one target area.

The organisations point out that farmers are no strangers to investing in energy projects, with more than 1,100 agriculture projects drawing on $260 million in CEFC finance to invest in solar photovoltaics (PV), lower emissions farm equipment, energy efficient machinery upgrades and biomass energy-from-waste.

Seven-step guide

The guide sets out seven steps for farmers to embrace clean energy (see box). Presented in an easy-to-read dashboard format, the 51 technology solutions include:

- simple improvements to irrigation, heating, cooling and vehicle fuel efficiency, typically requiring an investment of $5,000 or less
- new strategies to generate and store energy such as small-scale wind, solar PV and hydroelectric systems, typically requiring an investment of up to $25,000
- emerging technologies such as microgrids, biomass generation, precision application and digital sensors, robots and drones which have the potential to revolutionise farming practice.

Information

For information and to download the guide go to CEFC website https://www.cefc.com.au.

The NFF and CEFC have collaborated to develop a guide that describes opportunities to reduce energy costs and improve energy efficiency.

Seven steps to a clean energy future

1. **Conduct an energy audit.** This is an important first step to understand current energy use and to prioritise energy-related investment decisions.
2. **Generate your own energy.** The farm sector is ideally suited to producing renewable energy and alternative fuels. This includes solar PV, small-scale wind and bioenergy, as well as on-site storage.
3. **Upgrade vehicles and machinery.** Tractors, ancillary equipment and vehicles can be easily made more energy-efficient, often with relatively little capital expense. This is particularly the case for cropping systems, where upgrades can cut fuel consumption and increase operational efficiency.
4. **Improve irrigation and pumping.** Energy-efficient irrigation and water management practices have the potential to improve water use through technologies such as variable-speed drives and solar-powered pumping.
5. **Consider buildings, and heating and cooling.** On-farm building assets, processing technologies, and heating and cooling equipment can be energy-intensive, driving up farm costs.
6. **Benefit from precision agriculture.** New technologies that calculate the optimal quantity, timing and location of farming inputs such as water and fertiliser can greatly reduce energy use.
7. **Consider emerging technologies.** Digital solutions such as sensors, robots and autonomous vehicles are already helping farmers generate energy savings.

AG VIC TRIALS
DIGITAL TECHNOLOGY AND APPS

Agriculture Victoria recently announced a $12 million trial to support the uptake of the IoT (Internet of Things) on farms and test the benefits of IoT technologies across irrigated and dryland production. This is part of its Digital Agriculture Strategy, launched in late 2018.

The trial will run for two years and will eventually involve up to 600 farms. Expressions of interest to choose the first 100 farms closed in August 2019. One of the aims will be to address barriers to uptake, including:

- Lack of connectivity – the trial is delivering IoT network connectivity to four trial regions in the state.
- Digital literacy – industry technology coordinators with expertise in farm management and digital technology will support farmers participating in the On-farm IoT Trial, including selecting IoT solutions to test that are suitable for their on-farm needs.
- Capital to invest in on-farm IoT technologies – Agriculture Victoria will contribute to the cost of buying IoT apps and devices for farmers taking part in the trial.

Suppliers of apps and devices were invited last year to submit proposals for their technology to be considered for the trial. The department is now putting together a catalogue of apps and devices that have been deemed suitable for the On-Farm IoT Trial. The catalogue will include details such as functionality, cost and network compatibility for each of the IoT technologies listed. Farmers will be able to select apps and devices from the catalogue to test on-farm under the trial.

Areas relevant to irrigated agriculture are listed in the tables.

Information. For information about the trial, go to website http://agriculture.vic.gov.au/agriculture/digital-agriculture/on-farm-internet-of-things-trial

INFORMED AGRONOMY AND ENVIRONMENT DATA
Information systems to support decision making. Compile data into key reports, analysis, alerting and/or decision support. May bring in additional data through free or allied services.
Weather monitoring. Monitor weather conditions including air temperature, relative humidity, barometric pressure, wind speed, wind direction, rainfall and solar radiation or photosynthetically active radiation.
Soil moisture monitoring. Monitor soil moisture and other soil factors for crop/pasture management. May include soil temperature and macronutrient sensing at a range of depths.
Microclimate monitoring. Sensors for specific applications such as leaf wetness, frost, rain gauge, wind speed, wind direction and light sensing.
Plant growth monitoring. Measure plant and fruit growth status. Includes stem and fruit diameter using dendrometers. May allow for comparative assessment of block and variety progression and inform harvest timing.
Plant stress tracking. Track plant water use and moisture stress for informed management of productivity and fruit quality.
Plant disease risk monitoring. Measure crop environment temperature, humidity and leaf wetness to monitor fungal disease risk.

FARM MANAGEMENT
Asset tracking. Track location, movement and status of equipment.
Battery condition monitoring. Track remote equipment battery status, power consumption and battery health.
Staff safety monitoring. Monitor welfare of staff (fall detection, location, panic button), including staff working remotely or in one-up situations.
Fuel tank level monitoring. Monitor diesel fuel supply volume and actively manage resupply based on current and historical fuel requirement.

MANAGING WATER
Water flow measuring. Meters to measure water flow through reticulation systems. Pipeline sensing from 20 to 100 mm, plus channel flow-rate metering.
Tank level monitoring. Remotely monitor water tank levels for stock, irrigation, spraying or domestic supply.
Water quality monitoring. Monitor water salinity, electrical conductivity and/or pH.
Pump monitoring and managing. Remotely manage pumping through scheduling or level or pressure switching.
Dam level monitoring. Remotely monitor dam levels for stock, irrigation, spraying or domestic supply.
Water delivery monitoring. Remotely detect wetting front in soil – especially via flood irrigation.
Water pressure monitoring. Pressure sensor to remotely confirm pump status in water transfer/delivery.
Valve controlling. Remotely control reticulation valves for efficient automation of orchard irrigation/fertigation

SMART SYSTEM MAKES WISE WATER USE DECISIONS

Three sources of inputs are generally used in scheduling irrigation systems – climate information, soil water status and plant-based data. Most current technologies rely on one of these methods as a way of scheduling irrigation.

CSIRO has been working on smart technology, called WaterWise, that uses all these inputs to allow growers to see in real time the water stress of their crop and to predict a crop's future water needs.

Harnessing the digital revolution for irrigation decisions

Recent improvements in wireless sensor technology and advanced data analytics mean that plant- and soil-based sensors can be used to continually monitor crops and soils providing information like never before.

The WaterWise app provides irrigation decision making based on both monitored and forecast crop water stress status. It incorporates advanced data analytics, spatial sensing systems, weather forecasts, and novel physiology research in crop biochemistry.

Currently the technology is being trialled with tomato, cotton and sugarcane growers.

One of the trials is examining the response of tomatoes that usually survive on 12 mm of water a day, including in the middle of summer. Researchers are using sensors, weather forecasts and smart analytics to see if they can reduce this amount of water to 10, 8 or even 6 mm of water a day – and still produce the perfect tomato.

Using WaterWise, growers can see in real time the water stress of their crop and can predict their crops' future water needs so they can schedule irrigations to keep the plant in its optimum range.

Information. Article from CSIRO website https://www.csiro.au/en/Research/AF/Areas/Digital-agriculture/Inputs/WaterWise, accessed 11 November 2019.

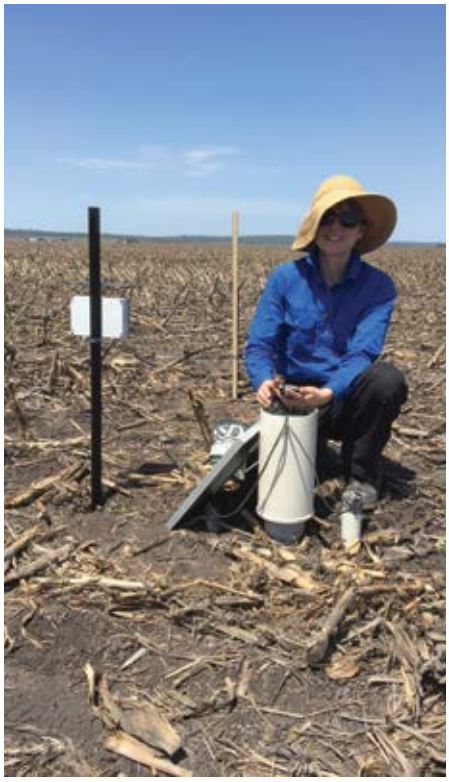
CSIRO is trialling its WaterWise system to allow growers to see in real time the water stress of their crop and to predict a crop's future water needs.

SENSING TOOLS AND MODEL-BASED CONTROL FOR AUTONOMOUS SURFACE AND ADAPTIVE VARIABLE-RATE IRRIGATION

Water availability and labour are often the most limiting factors in broadacre cropping productivity. Automated variable-rate irrigation is one tool that can help identify where water needs to be applied and save labour at the same time.

In this article, Alison McCarthy and Joseph Foley from USQ describe a Centre for Agricultural Engineering project to develop automated, site-specific surface and pressurised irrigation systems. The project was funded by the Australian Government Department of Agriculture as part of its Rural R&D for Profit program with CRDC, SRA and Dairy Australia.

The pressurised irrigation systems integrate data analytics software and hardware, including low-cost sensors, optimisation control software and actuation systems, to automatically analyse field data and start and stop site-specific irrigation events for surface and overhead irrigated cotton, surface irrigated sugarcane and overhead irrigated dairy pasture.



Alison McCarthy installing in-field sensors for soil and crop monitoring

Top: Variable-rate centre pivot irrigator used on the cotton trial in Jondaryan in Queensland.

Above: Sample variable-rate irrigation prescription map.

Automation contributes to WUE

Automated irrigation systems can identify water requirements across a field, and only apply it when and where it is needed to increase water use efficiencies and crop productivity. Existing commercial systems rarely consider water availability or track the multiple weather, soil and plant constraints that influence irrigation requirements, and nor do they usually target yield-based seasonal performance objectives. As a result, they struggle to adapt to different weather conditions, limited water situations or individual crop needs for yield optimisation. In addition, there has been poor adoption rates of variable-rate irrigation systems because of a lack of decision support in determining volume and timing of irrigation.

To overcome these issues, USQ has developed automated, site-specific irrigation control software (called 'VARIwise') that can adapt to multiple crops, irrigation systems, soil types, and weather profiles by considering the soil-plant-atmosphere dynamics in in the irrigation decision. The system automatically:

- analyses weather, soil and plant growth imagery measurements
- links sensor and imagery data with a crop model
- determines spatial irrigation requirements using optimisation and control that produce the maximum end-of-season yield or water productivity.

Where this system has been implemented on a commercial cotton farm in Jondaryan in Queensland and a dairy farm in northern Tasmania growing pasture, there have been significant yield improvements, coupled with water savings. As an example, using in-season crop sensing in cotton irrigation decisions has led to

6 per cent extra yield and 14 per cent more efficient water use than existing standard soil sensing approaches.

Planning irrigation management

In-season yield prediction can also help plan irrigation management based on predicted yield potential in each field. CottonInfo extension officers are evaluating VARIwise for yield prediction from UAV imagery data. In the 2017-18 and 2018-19 seasons, VARIwise was evaluated for cotton yield prediction at one site near Goondiwindi and 16 sites near Griffith. Management zones in the field monitored with the UAV were identified from vegetation index surveys, yield maps or satellite images. Phantom 4 UAV imagery was collected monthly at each site between January and picking to calibrate the crop model. The sites had varying levels of fruit removal, hail damage and heat stress.

In the 2017-18 Griffith trial, the percentage yield prediction errors were 10.2 per cent in January, 6.0 per cent in February, 2.5 per cent in March, and 0.5 per cent at picking, and in the 2018-19 Griffith trial, the errors were 18.8 per cent in January, 4.9 per cent in February, 9.5 per cent in March, and 10.1 per cent at picking. In the 2018-19 Goondiwindi trial, the yield prediction percentage errors were 8.7 per cent in February, 5.9 per cent in March, 7.1 per cent in April and 2.6 per cent in May. The prediction errors at Griffith were higher in the 2018-19 season than the 2017-18 season because the sites experienced hail and heat stress which is not currently represented within the VARIwise crop model.

Tools for management

VARIwise is one tool in a suite of novel, inexpensive technologies that USQ has developed to modernise traditional broadacre furrow, lateral move and centre pivot irrigation systems. These measure crop and irrigation parameters, and transfer data to provide growers with irrigation control from smartphones and tablets. Other specific USQ-developed tools are:

- Model 'SISCO' that simulates the infiltration of water along furrows based on measured advance rates and inflow rates. This tool has been commercially delivered through IrrimateTM and cotton consultants.
- Single point wireless furrow irrigation advance rate sensor with SMS alerts and automated resetting.
- Low-cost wireless rain gauge.
- Wireless channel height sensor.
- Advance rate sensing from UAV images.
- In-season yield prediction from UAV image.

Information

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MURRAY-DARLING BASIN WATER COMPLIANCE ENFORCEMENT INTENSIFYING WITH CLIMATE AND MARKET CHANGES

As 2019 draws to a close, the irrigation industry will have completed another tumultuous and challenging year. Notable areas of change include market and production restructuring, e.g. from seasonal to perennial crops, as well as increasing environmental pressures and tightening of regulatory enforcement.

As irrigation communities head into what seems certain to be a difficult summer, Jeremy Fisher reviews some of the key factors that will drive water compliance enforcement as an increasing cost factor into the next decade.

Climate. This year has seen empirical confirmation of climate change in the form of intensified weather-related events across Australia - including acute rainfall, fire, flood, and temperature events - and in chronic, widespread drought conditions, with impacts on soil health and productivity and deteriorating water availability and quality.

Paradoxically, climate change is implicated in slowing some enforcement measures meant to address the drying impact of climate change, such as the introduction and policing of standardised metering.

Rainfall and inflows. Despite intense rain earlier in 2019 in northern Australia that resulted in high levels of loss and damage, further south, rainfall in the Murray-Darling river system has been relatively low. As a result, inflows driving water availability have been insufficient to alleviate stress on sectors of the irrigated agriculture industry and on the river regions in each of the Basin states.

Basin Plan discord. Against this background, 2019 has seen marked intensification of challenges and tensions in the management of the water resources of the Basin.

Since the *4 Corners* revelations of compliance failures in licensing and metering in 2017, there have been more reviews, inquiries and regulatory strengthening, but just as remarkable has been the ferocity of expression and discord in public forums surrounding irrigation and rural water supplies.

Even as the commitment of public resources to increase compliance with water laws has started to show results at the local level, the big picture for Basin water resource management is worsening and the hard-won intergovernmental consensus between and states, and the Commonwealth of the 2000s is now more fragile, and for that reason, more tenuous than previous.

Stakeholders, especially irrigators and irrigation communities, are experiencing adverse impacts and pressure from a variety of sources. These include market shifts as new perennial crops are capitalised and irrigation water take is increased in some areas

and environmental factors, such as climate change and drought, as well as political influences and concerns.

The water resource legal framework for eastern Australia, comprising the federal Water Act and water legislation in Queensland, New South Wales, Victoria and South Australia, has refined and extended its reach in response to climatic pressure and the uncovering of serious non-compliance in some areas.

Enforcement. Water law enforcement is increasing, and the administrative capacity of agencies to mount investigations, compile cases and enforce water take, use and supply works compliance has been strengthened significantly. With this increased departmental, and public, attention on enforcement, more penalties are being issued.

In New South Wales, the Natural Resources Access Regulator (NRAR), has embarked on a coordinated program to encourage compliance and increase public confidence in water regulation. Its operating method is to encourage public reporting of non-compliance to identify properties for investigation.

Once commenced, an NRAR investigation can obtain wide-ranging evidence via compulsory notices to provide information. Information given by landholders and water users in compliance with such notices can be the basis for finding multiple offences, leading potentially to preparing of a case for consideration by the public prosecutor, on top of penalty notices being issued for lesser offences.

Compliance priority – metering. New South Wales intended to put in place a "no meter, no pump" policy by the end of 2023. As part of this, steps towards installing new and replacement meters, tagging of inactive works and faulty meter remediation requirements commenced on 1 April 2019.

The program of rolling out metering is being adjusted through community consultation and feedback from the water users who are being required to invest in compliance upgrades, new works and equipment. In response to this feedback and considering the extreme drought conditions across New South Wales, the state has delayed the staged roll-out dates for introduction and enforcement of metering.

Other community feedback information influencing WaterNSW and NRAR in implementing the strengthened regime include:

- a lack of water to test metering equipment because of the drought
- absence of technical specifications for telemetry compliance
- financial hardship in taking required compliance steps including meter testing
- concern about conversion of government meters to private responsibility
- limited range and high cost of pattern-approved meters
- shortage of duly qualified persons to assist with testing, installation and commissioning.

While these issues are being resolved by government, NRAR will continue its program of compliance enforcement for existing and newly introduced requirements. Further, because new rules have been deferred in some cases, NRAR will not allow grace periods for compliance when they do start, e.g. if the agency considers water users are non-compliant by the due date because they have been waiting for cheaper pattern-approved meters to become available.

Despite the adaptive approach to compliance with metering rules, unresolved important areas of potentially high-cost compliance risk for irrigators remain, including: the number of take-points there are under a water access license, how many times the same use must be approved for a given piece of land, how far basic rights and stock and domestic water take rights extend, e.g. in terms of household use considered for size of dwelling and garden, and whether such rights are required to be formally licensed.

In addition to the market cost of water, irrigators' risk and cost of production increase where compliance uncertainty persists. In a climate of uncertainty, one thing certain is that when enforcement action commences, legal costs follow.

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Jeremy Fisher, Kingfisher Law, Sydney

Getting pumps off to a good start: installation and commissioning

Pumps are like people: giving them a good start in life can contribute substantially to their long-term health and productivity. Taking extra care with pump installation and commissioning procedures can pay off handsomely in ensuring long and trouble-free service lives. Proper installation and commissioning will also help ensure that the manufacturer's warranty will be honoured. In this article, KSB describe the steps to getting pumps off to a good start.

Getting a pump off to a good start after it leaves the manufacturer will contribute to a long life of efficient operation.

While some installers will opt to install new pumps on their own, many recognise the value of contracting the manufacturer's service experts to do this work. The manufacturer brings a depth of specialised experience that on-staff maintenance have not had the opportunity to develop.

Starting off on the right foot: site preparation

Getting your pumps installed properly begins before the equipment arrives on site. Mounting foundations should be checked to ensure that they have flat, level surfaces and securely anchored tie-down bolts. Properly positioned piping nozzles will reduce stresses on the pump's casing and help reduce leakage from flange joints. For submersible pumps mounted on rails or wires, the alignment of these components should be carefully checked. Pipes should be flushed to ensure that there is no construction waste or foreign objects waiting to be drawn into the new pump or valve.

Checking the order

When pumps are delivered, carefully review the shipping documents and pump nameplate to ensure that machinery – as received – matches specifications in the order. Where pumps and motors are shipped separately, it's also a good idea to check that the direction of rotation of the motor matches that of the pump.

For some pumps, it is important to periodically rotate the shaft manually if the machines are stored onsite or in a warehouse for an extended period. This helps avoid future problems with seals and bearings. The manufacturer's guidelines will explain the requirements.

Collecting documentation

Before the tools are brought out to start installing the new pumps on site, it's helpful to ensure that installation manuals and other relevant documents are available and that those responsible for the work have reviewed the information and understand what is required to do the job properly. The manufacturer's service staff are especially helpful here as they have access to up-to-date installation and service documents for both the pumps, motors and special components such as VFDs (variable frequency drives).

At this stage – and at each of the other stages in the installation and commissioning process – the best practice is to work with comprehensive checklists that list and explain each step in the process. The person in charge of each task should sign off that the step has been completed. Photographs of key components including equipment nameplates can be very valuable additions to the installation/commissioning records.

Installing the pumps and motors

Once the mounting foundations and piping system have been properly prepared, it's time to uncrate the new pumps and move them into position. Clearly, the correct lift points must be used. The pumps and motors (or assembled pumpsets) will be carefully located on their mounting foundations, levelled and bolted in place to the correct torque levels. If there is any sign that the casings or pumpset frames are being distorted when the tie-down bolts are tightened, delay installation until any problems with the foundations or piping system have been corrected.

The pumps and motors of pre-assembled pumpsets are normally aligned at the factory. However, shaft alignment should also be checked as part of the pre-commissioning process. Specialised equipment such as laser alignment tools can speed this process and improve accuracy, especially when used by experienced service specialists.

The electrical supply and control systems must also be thoroughly checked before they are attached to the motors. Many pumps include sensors that will detect abnormal conditions such as excessive vibration or the presence of moisture inside motor casings. These must all be connected to the appropriate readouts or control systems.

Oil levels must be checked. If the pump has been left standing for an extended period, it may be necessary to renew grease and oil in the seals and bearings.

Preparing to run

Before any attempt is made to start the pump, all mechanical and electrical connections must be carefully checked, and all drain and filler plugs properly tightened. Vents must be checked to ensure that they are clear. The area around the pump should be cleared so that nothing will interfere with operations. This is especially important for submersible pumps where stray pieces of equipment could be drawn into the pumps' intake, causing significant damage.

Manufacturers will normally provide detailed instructions for priming and starting new pumps. Not only must these be followed, but careful records of each step should be kept – including photographs and videos.

Once a pump is running, it is important to check operating conditions (speed, vibration levels, temperatures, pressures, power etc.) and note any abnormalities. Once again, recording all the relevant data is an important part of the commissioning process.

Acknowledgment. This article is from KSB website, https://www.ksb.com/ksb-en/Press_and_News/magazine/installation-and-commissioning/1750368/ accessed 12 November2019.

Big savings from pump upgrade and remote monitoring

The investment of a global company in its vineyards, wineries and production facilities in Australia and New Zealand included a vineyard in the South Australian wine region of Langhorne Creek. Here, the vineyard was using an old fixed-speed pumping system to supply water from a lake, to a holding dam for irrigation of vines over its 65 ha.

The system was difficult to access, close to the lake's edge, and required a 40-minute drive by staff to reach it. Given that staff were regularly having to drive to the system to start and stop the pump, the resource and fuel costs were becoming an issue. It was also very inefficient when it came to energy use, resulting in high running costs.

Another serious failing of the system, brought about by its remoteness, was that when a power failure or fault caused the system to stop running, staff would sometimes remain unaware for several days, by which time water in the holding dam could be critically low.

Solution incorporate remote management

In July 2018, the vineyard consulted Brendan O'Neil at Daish Irrigation in Strathalbyn. The brief was to install an energy efficient solution with remote monitoring abilities to help save valuable time and avoid critical incidents.

The team at Daish Irrigation came up with a solution based on a pump upgrade and the capacity for remote management.

To ensure reliable and cost-efficient water supply, the existing installation was upgraded to a Grundfos NBG single-stage end-suction pump with CUE external frequency drive and CU352 MPC Control Panel. This was partnered with a Grundfos Remote Management (GRM) unit, for complete control of the pumping system.

The external frequency drive on the NBG pump means that the pump can ramp up or down according to the system demands, making for a much more efficient system than a fixed-speed system.

With the GRM unit, the pump, sensors, meter and controllers are connected to a datalogger, which provides real-time data via the internet. When sensor thresholds are crossed, or a pump or controller reports an alarm, an SMS notification is sent immediately to the responsible person.

Efficiency improves

The new system represents a significant improvement in efficiency and has been a time saver for staff. They can now monitor and manage the pump remotely, reducing the need for onsite inspections and enabling them to act quickly in the event of an alarm or warning.

According to Brendan, the remote management system almost paid for itself in the first three months, simply by removing the lost time staff were spending driving to the pump day and night to stop or start it.

In addition, the technology has enabled the vineyard to accurately monitor pump performance and efficiencies, helping staff to provide more accurate reporting, and added flexibility for scheduling and redundancy.

The new system is also providing the vineyard with improved flow and efficiency gains with the ability to reduce the speed of the pump to fill the dam.

The pump has two duties, supplying water to a dam for the vineyard, and to recharge a bore. Originally, the fixed-speed pump would dam fill at 61 L/sec at 4.5 bar using 67 amps, but after installing the new pump and VFD it achieved 81 L/sec at 3 bar using 48 amps.

"Basically, we are filling the dam far quicker and using less energy. The original pump would regularly overload and trip out above 67 amps, but the new four-pole motor controlled with the variable speed drive is running cooler and not overloading," said Brendan.

When it comes to bore recharge, the system can now run at a lower pressure and flow to keep pace with the bore capability.

"In the old system the fixed-speed pump was using full load amps during this period, with a valve to restrict flow. The new system can be adjusted via the remote management, and we are only using 45 amps, with a flow of 33 litres per second. The system is now reliable, more efficient and easier to use," said Brendan.

The bottom line

The bottom line as a result of the upgrade has greatly improved. Overall, in its first few months of operation the vineyard experienced an average 24 per cent increase in efficiency (29 per cent better efficiency from the pump).

Acknowledgment. Thanks to Grundfos for permission to publish this article, which is an edited version of a case study from the Grundfos website, https://au.grundfos.com/cases/find-case/Efficient-and-time-saving-pump-solution-for-one-of-the-worlds-largest-wine-companies.html

Staff can monitor the pump remotely and respond if there is an alarm or warning.

SMART IRRIGATION
A WINNER ON THE TRACK

Ben Chapman and his team at Project Pumps & Irrigation (PPI) in Brisbane have designed and installed seven racetrack irrigation systems around Australia and have more in the pipeline. With this experience, they have developed an approach that takes account of the special challenges of working on racetracks as well as the usual ones associated with completing a system that is fit for purpose, applies water efficiently and meets client expectations.

In early November, Jim Roberts, track manager at Doomben racecourse in Brisbane, turned the tap for the first time on the new irrigation system, designed and installed by Ben and his team. We spoke with Ben about the challenges of a project like this.

The job

The managers at Doomben specified a fully automated system. They wanted to completely replace the old system, from pumps to sprinklers, which had done the job for 25 years, but was showing its age and certainly wasn't up to the efficiencies of newer systems that are centrally controlled.

The design needed to be able to water three different tracks – the "track proper", a grassed racetrack which is where races were held; a second, shorter, grassed track on the inside of the track proper that was used mainly for training; and a sand training track. The total area of turf to be watered was 12.5 ha.

The irrigation water source is stored stormwater. This water is captured from runoff from the surrounding neighbourhood. It initially runs into an 18 ML storage dam on neighbouring Eagle Farm racecourse and the overflow from this then runs into an 8 ML storage on Doomben. This is the only irrigation water source, so limited water supply was a factor that had to be considered in the system design.

The track proper, which is has a curved contour across the width, is built on loam, which is local to the area, with slit drains to aid drainage.

The challenges

Ben explained that one of the tricky aspects of the design was the width of the area to be watered, especially around the racing chutes which were 40 m across.

"Obviously, we couldn't place sprinklers anywhere on the track, so we had to specify a sprinkler with a long throw," he said.

He settled on Toro Perrot pop-up sprinklers, which can throw up to 54 m.

Along with the normal challenges with any turf irrigation design, Ben had to consider the safety of both jockeys and horses, which was "paramount". As well as the issue of not having sprinklers and lines anywhere that would represent a safety hazard, Ben explained that all equipment had to be installed so that it wasn't obvious to horses, who could be frightened by it.

The biggest challenges of the job were during installation. The first was that while the PPI team was installing the system, they had to keep the old one live to maintain a watering schedule. Another was that the racecourse is a busy one, not only during race meetings. Horses are being trained and doing trackwork every day, so the team had to schedule their work not to interrupt these activities.

Aerial photo of Eagle Farm and Doomben racecourses. The irrigation water source is from runoff, which is collected from the surrounding neighbourhood in the storage on Eagle Farm, which then runs into the Doomben storage.

Doomben Track Manager Jim Roberts (left) and Queensland Racing General Manager Development and Construction Steven Grimes demonstrate the size of the sprinklers chosen for their throw.

The equipment

The system incorporated Toro Infinity 35 and infinity 55 sprinklers, and Toro 690 sprinklers on some areas where the track width exceeded 30 m. Toro Perrot VP3 sprinklers were installed at the chute mouths. All sprinklers are valve in head for individual control.

Four Sentek soil moisture probes, each with six sensors, were installed to a depth of 600 mm. While they are not connected to the irrigation control system, soil moisture data is stored in the cloud and the track manager can access this information when deciding when to irrigate and for how long. Dataloggers have been placed in valve boxes so that there are no posts or infrastructure above ground, again a safety consideration.

A challenge, particularly around the racing chutes, was to be able to water across the 40 m width of the course, limiting which sprinklers could be specified.

The central control is via a Rain Bird SiteControl, installed using a two-wire decoder system. Ben emphasised how important having the weather station was, not only for calculating ET, hence saving water, but also for controlling areas of sprinklers affected by wind.

"As racetracks are open spaces, wind plays havoc when it comes to irrigation uniformity, let alone keeping the water on the tracks where it is meant to be," he explained. "In many cases, there is also very expensive real estate close to racetracks, and this is certainly the case at Doomben. To keep spray from being blown into these areas, we need to be able to suspend sprinklers in specific areas around the track when the wind reaches a pre-set velocity."

The skills

Something that most people in the industry appear to agree on is the fact that smart irrigation, which uses inputs from various digital sources such as soil moisture equipment and weather stations, requires a higher skill level, both of managers and those doing the designing and installing.

Ben said that he has found racetrack managers are "top shelf" when it comes to managing track turf.

"They are highly skilled operators, but they still need training in using the equipment and management, especially things such as how to achieve application uniformity and how much water needs to be applied," Ben said.

And this acquisition of technical skills, including in digital technology, is equally important as far as Ben's staff are concerned. He makes sure their skills are up to date through professional development activities such as training courses.

"We are proud of the work we do and provide professional backup and support to our clients," said Ben.

"Ensuring we all have a high level of skills gives us an edge and ensures that our clients are confident in our support and technical expertise."

Anne Currey, Irrigation Australia

Staff from Doomben racecourse receiving training in use of the smart irrigation system.

Meter governance a priority

In October, Irrigation Australia and the Murray Darling Basin Authority (MDBA) announced that Peter Smith from Sapphire Irrigation Consulting will be taking up a new part-time position with Irrigation Australia as non-urban water meter governance officer, initially for 12 months. This new role is funded by MDBA.

According to Irrigation Australia CEO Bryan Ward, this is a timely appointment.

"Recent regulatory changes in the non-urban water meter sector mean that Queensland, South Australia, and New South Wales now require that installation and auditing of meters be completed by certified personnel.

"Irrigation Australia, which provides training and certification of installers and auditors, has been aware that these changes also have brought with them a need to provide governance support to agencies and the industry," he explained.

Peter's main tasks will be to:

- network with regulators and develop processes to ensure states and territories are compliant with metering requirements
- develop and implement Certified Meter Installer and Validator (CMI) Code of Conduct and Complaints Procedure policy documents
- assess the competencies of certified professionals by reviewing validation certificates, and conducting desktop audits and field visits
- refer appropriate compliance action to the Irrigation Australia Certification Board if certified professionals are not undertaking their responsibilities as required under the code of conduct
- undertake audits and investigate complaints as required.

"Peter is highly qualified for the position, having previously worked as an irrigation officer for the NSW Department of Primary Industries and having been an Irrigation Australia board director," said Bryan. "As well, he has meter installer and irrigation agronomist certifications and is TAE40116 qualified."

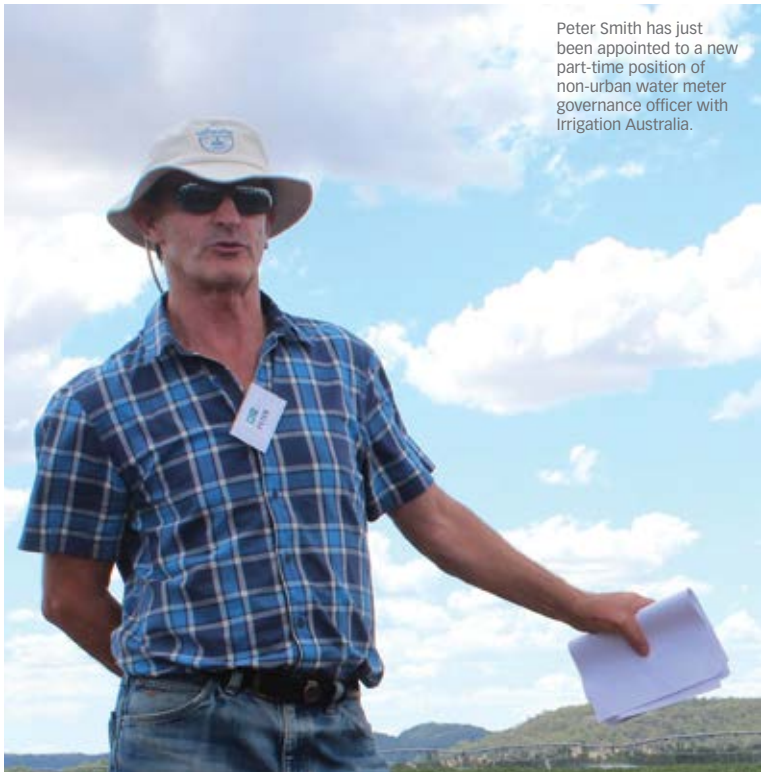
Irrigation Australia asked Peter for his take on the new role and his priorities as he settles into the job.

IA. How have you been settling into the new role and what activities have taken your attention in the first month or so?

Peter. I can't say that I have settled into the role yet, as both the detail of the position and more so the specific metering requirements in each state are still somewhat fluid – and I guess this has taken my attention. Trying to understand the state of play is necessary before working out what I should be doing.

IA. The position focuses on governance and complying with procedures. How significant do you believe non-compliance has been so far in the non-urban metering sector?

Peter. Non-compliance with best metering practice is widespread in the non-urban metering sector. This is not necessarily due to deliberate intent to mislead – in times past, accurate metering in many areas has not been needed and both water authorities and irrigators have therefore been relaxed about it. But the requirements of the National Water Initiative require a better effort, and the severe drought across most of the country and recent transgression of a few individuals have highlighted this need. There is a lot of work to be done to achieve an acceptable level of compliance.



Peter Smith has just been appointed to a new part-time position of non-urban water meter governance officer with Irrigation Australia.

IA. How important are a code of conduct and a complaints procedure in ensuring the integrity of the program and retaining the confidence of the community?

Peter. I think both are very important. Irrigation Australia has accredited several hundred CMIs now and is training many more. This means there will be a lot of them in the marketplace. Because accurate reliable metering is so important, we need to ensure these practitioners are delivering service to the highest standards and in line with the intent of the legislation.

Most professionals involved in our industry, whether irrigators, meter installers, farm managers or others, do a very good job. Unfortunately, a few bad examples highlighted in the media unfairly colours the whole industry. The best way to overcome this is to ensure we have high standards that are rigorously maintained.

IA. What are you most looking forward to and what will be the biggest challenges?

Peter. I am looking forward to meeting the key agency and irrigator players in all states and seeking to understand their issues. I am also looking forward to understanding the range of issues that will arise and helping to bring about practical workable outcomes to them in a collaborative way.

Inherent in this are also the biggest challenges – all governments have their own agendas and don't always want to work for the benefit of other jurisdictions, and in the midst of an extreme drought, it is a hard sell to irrigators.

To contact Peter for matters related to this role, call 0455 973 780 or email metergovernance@irrigation.org.au

Pattern approved meters

Below is the latest list of pattern approved meters, published by the Murray-Darling Basin authority in November 2019.

Pattern approved closed-conduit meters

These meters have been tested by an accredited laboratory and meet the Australian Pattern Approval requirements (NMI M 10) for closed-conduit meters. These meters can be installed within the operating range specified by the meter manufacturer and certified by the National Measurement Institute.

Certificate of approval number	Meter model/meter technology	Approved sizes (DN = nominal internal pipe diameter in millimetres)	Approved maximum continuous (Q3) flowrates m^3/h
14/3/21	Krohne Waterflux 3070 Electromagnetic	DN25 – DN600	10 – 6,300
14/3/24	Siemens MAG8000 Electromagnetic	DN50 – DN1200	63 – 12,500
14/3/29	Arad Octave DN50 Ultrasonic	DN50 – DN200	40 – 400
14/3/30	ABB AquaMaster3 FEV2 Electromagnetic	DN40 – DN200	40 – 1,000
14/3/32	Aquamonix / Pentair I500 Electromagnetic	DN50 – DN600	36 – 7,032
14/3/34	Sensus WP-Dynamic Inferential turbine	DN40 – DN400	25 – 2,000
14/3/36	Euromag MUT 2200 EL Electromagnetic	DN40 – DN1000	25 – 3,600
14/3/42	Rubicon Sonaray Pipe Meter Ultrasonic	DN600	42 – 1,313
14/3/46	ABB AquaMaster4 Electromagnetic	DN40 – DN300	25 – 1,600

Provisionally approved closed-conduit meters

A meter in this category has been tested by an accredited laboratory but does NOT YET fully meet the Australian Pattern Approval requirements (NMI M 10) for closed-conduit meters. These meters can be installed within the operating range specified by the meter manufacturer and the National Measurement Institute will issue additional conditions on the provisional approval certificate.

Caution. Meters in this category may not be accepted as pattern approved meters for the purposes of state and territory metering requirements. When the National Measurement Institute issues an unconditional certificate of compliance, the meters can be accepted.

Certificate of approval number	Meter model/meter technology	Provisionally approved sizes (DN = internal pipe diameter in millimetres)	Maximum continuous (Q3) flowrates m^3/h
14/3/32	Aquamonix / Pentair I500 Electromagnetic	Provisional approval = DN700 – DN1035	36 – 7,032

Pattern approved open-channel meters

No open-channel meters currently have pattern approval. Rubicon's SlipMeter, which uses Sonaray technology, is currently undergoing pattern approval testing, with open-channel flow measurement certification expected in the coming months.

Note. This list was current at 1 November 2019 and was taken from MDBA publication, *Pattern Approved non-urban Water Meters: Including the indicative pattern approved metering requirements for the Murray-Darling Basin states, Revised: November 2019*. Accessed 12 November 2019 at https://www.mdba.gov.au/sites/default/files/pubs/pattern-approved-non-urban-water-meters-revised-november-2019.pdf.

You can also download the publication from the Irrigation Australia website, https://www.irrigationaustralia.com.au/certification/metering-policy-regulations-resources-by-state-territory

Meter Validation and Installation course

If you are interested in becoming a certified meter validator and installer through Irrigation Australia's national certification program, then your first step is to complete our training course.

The course is designed to provide students with information needed about Australian standards and procedures for them to safely and successfully install water meters in rural environments. It prepares students to complete site preparation and commissioning along with field assessments for meter installations.

Our three-day courses will provide participants with three units of competency towards certification for meter validation and installation after assessment tasks are completed. The three units are:

- NWPIRR014 Install meters for rural water supplies
- NWPIRR022 Maintain meters for rural water supplies
- AHCWHS301 Contribute to work health and safety processes.

After the successful completion of the specific course-based assessments, as well as an exam and a meter installation, participants will be issued with a statement of attainment for the three units covered.

The additional three units are completed through an evidence equivalence process where participants answer a series of questions about company policies and procedures and metering knowledge.

Information. For information about the course, course requirements and course dates in 2020, check the Irrigation Australia website, https://www.irrigationaustralia.com.au/training/training.

NEW DIRECTOR FOR BOARD

As a result of the recent Irrigation Australia election, Peter Weaver, General Manager - Water Group, Nutrien Ag Solutions, has joined as new director. Peter Brueck, Momir Vranes, Simon Treptow and Andrew Ogden were re-elected, and Andrew will continue in his role as chair of the board.

Andrew thanked Bruce Scarterfield, retiring board director, and association members who had nominated for the election, commenting that their interest was a sign of the health and strength of Irrigation Australia.

Peter said that as a board director, his major focus would be on the rural sector, which reflects the business priorities of Nutrien Ag Solutions. He nominated the key challenge for Irrigation Australia next year as ensuring that it continues to be relevant now and into the future.

Peter Weaver from Nutrien Ag Solutions joins the Irrigation Australia board as a new director.

PIA AND IRRIGATION AUSTRALIA STRENGTHEN PARTNERSHIP

In 2017 Irrigation Australia and the Pump Industry Association (PIA) signed an MOU to work more closely and to collaborate to help strengthen the synergies between each association. Just recently this relationship was strengthened further when both Irrigation Australia and PIA became associate members of each other's organisation.

Irrigation Australia has also been working with PIA on tailoring a competency-based training courses to help retain and attract new people into this industry, where currently very little is offered in this area other than subject-only training.

Like Irrigation Australia, the pump industry needs to attract more younger people to consider the opportunities offered by a profession in the pumping industry, however, in the absence of a formal career structure, it is hard to attract new people when we are competing with other industries that offer qualifications.

Commenting on the closer relationship, John Inkster, Chair of the PIA, said that it was looking forward to working with Irrigation Australia, leveraging on their experience in the provision of training courses as a path to certification.

About the PIA

Pump Industry Australia Inc. is an association established to support and promote businesses operating in the Australian pump industry. As the peak industry body its aim is to help promote its members and their products and services and to provide opportunities to develop their personnel through the provision of technical publications, training courses, seminars and networking meetings.

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REGIONAL ROUNDUP

What's going on in the regions and with membership by Tracy Martin, Irrigation Australia's National Membership and Regions Manager.

South East Queensland

A full house of 40 people attended an informal breakfast, site visit, discussion and presentation in September at Doomben Racetrack hosted by the regional committee and sponsored by Davey Water Products and Rain Bird Australia. During the breakfast, participants were introduced to the region's sub-committee members and provided with information about irrigation training and professional development and plans for the regional committee. They then completed a site visit at the racetrack, which had an old irrigation system in much need of upgrading.

Involved in the upgrade is Ben Chapman of Project Pumps & Irrigation, who described the design and installation of the new irrigation system (see article on page 24). Ian Lacey from Davey Water Products provided an overview of the in-situ Monsoon IQ Pumping system, Tim Robertson from Rain Bird Australia took participants through features of the SiteControl Computer System and there was a demonstration of part of the new irrigation system showcasing Toro PERROT VP3 model sprinklers.

Welcome on board to Chris O'Shea from Total Eden and Peter Morath from Total Water Services, who volunteered to join the sub-committee after the event.

Western Australia

After a short recovery from organising its highly successful Waterwise Irrigation Expo 2019 in August, the Western Australia committee held a breakfast and presentation at Hammersley Golf Course in Karrinyup. The event had a rollup of 68 people who heard Kevin Zoccoli from the City of Stirling talk about the reasons for replacing the old system and Gareth Jones from Toro, who demonstrated the Link system and Infinity sprayers..

A well-attended breakfast and demonstration of sprinklers was organised for Irrigation Australia and industry members at the Hammersley Golf Club.

Melbourne-Urban

The Melbourne Urban Committee will meet on the third Tuesday of every month from February 2019.

In good news, four businesses (28 individuals) in Melbourne have registered for the Waterwise Irrigation Design Shop and are working through the entry process.

South Australia

After some groundwork by ex-Irrigation Australia board director Ian Penno, members in South Australia have agreed to rev up the committee, starting with the formation of five sub-committees: rural, urban landscape, training, events and local government/SA Water. Nearly 20 members have stepped up to the plate so far, and they are inviting people from Adelaide and beyond to become involved.

The first activity organised by the rejuvenated regional committee was held at the end of October at Weigall Oval Reserve in Adelaide. Attendees were treated to breakfast and then a site visit and presentations by Rick Johnstone from City of West Torrens, Alan Michelson from Glenelg Irrigation and Geoff Zerna from Rain Bird about the Stage 1 irrigation installation at the oval.

Forty-eight people attended a breakfast and site visit at Weigell Oval Reserve, organised by the regional committee.

Sydney

In June, 14 Irrigation Australia members put up their hands to reactivate the Sydney committee and be an initial point of contact for Sydney Water on irrigation issues. Two sub-committees have been formed - Water Restrictions Review and Waterwise – and members have been busy communicating with Sydney Water about garden watering guidelines.

The committee has developed a Sprinkler Watering Run Time flyer which Irrigation Australia has had printed and sent to the local retail sector to help educate the community about correct run times for different irrigation systems in their home gardens. The flyer also encourages gardeners to measure the efficiency of their systems using catch cans.

IRRIGATION AUSTRALIA TO HOST SOUTHERN HEMISPHERE'S BIGGEST-EVER IRRIGATION AND DRAINAGE EVENT

The biggest-ever irrigation event in the Southern Hemisphere is quickly taking shape with exhibition spaces being reserved, expert speakers from around the world and Australia submitting papers, conference programs online and participants taking advantage of early bird registrations.

Irrigation Australia and its partner, the International Commission on Irrigation and Drainage (ICID), are inviting irrigation and drainage industry representatives from around the world to the 24th ICID International Congress and 71st IEC Meeting at the International Convention Centre, and the Irrigation Australia Conference and Exhibition being held in Sydney from 22 to 28 September 2020.

According to Irrigation CEO Bryan Ward, the weeklong Sydney event will play host to more than 1500 delegates from more than 60 countries.

"With such a range of people from around the world we are looking forward to hearing the many perspectives on our conference theme of *Innovation and research in agricultural water management to achieve sustainable development goals.*

"Combine this with an exhibition that will be an enormous showcase of the latest in irrigation technology from around the world, and the event is certainly one that is a must attend for anyone involved in irrigation and water management," said Bryan.

Two conference programs

The event includes two programs – the ICID congress and the Irrigation Australia conference.

The ICID congress will be held from 22 to 28 September 2020, and proposals for abstracts for the program are now open (go to website https://www.icid2020.com.au/icid-home/).

Topics for the Australian conference, also being held from 22 to 24 September, will be announced early in the new year and a panel has been selected to review submitted abstracts. The call for papers for the Irrigation Australia conference will be open early in 2020, but anyone planning to give a paper can register their interest now at website https://www.icid2020.com.au/iace-home.

The two integrated conferences will provide a unique and valuable opportunity for academics, students, researchers and practitioners to share their latest research findings, case studies and knowledge with their peers and help to foster connections between irrigation and drainage specialists from around the world.

New sessions

There will be several new sessions as part of the conference programs.

ICID have invited Irrigation Australia to host a special session on the conference program on the topic of "Developing the Future Tools for Managing Uncertainty in Irrigation Water Supply". For more information go to the event website, https://www.icid2020.com.au.

The Australian ICID committee is also working on new initiatives in the congress program, including a dedicated Women in Irrigation session as well as opportunities for students to participate at the congress through presentations and a dedicated student awards to assist with funding their participation at the event. Support is presently being sought from Australian education providers to help fund this initiative. We would love to hear from any potential supporters for this extremely important activity, so please contact Irrigation Australia if you are interested in finding out more.

The Outback Spectacular dinner to be held on Wednesday 23 September at the ICC Sydney will be another highlight and includes entertainment from outback bush band Swamp Dawkins.

Huge exhibition

The weeklong event will be complemented by the biennial Irrigation Australia Exhibition, being held from 22 to 24 September. Organisers are expecting the exhibition to be the largest ever held in the Southern Hemisphere, with more than 2000 visitors expected in addition to conference attendees.

Exhibition space bookings are open now and we are encouraging past and new supporters to take advantage of this expanded opportunity to reach a wider international audience in 2020. For information and to book go to website https:// www.icid2020.com.au.

This is Australia's opportunity to showcase unique irrigation and drainage initiatives and technologies to the world and provide our international colleagues a true experience of Australian hospitality.

Mark your diary

With so much on offer, be sure to mark your diary in September to participate as an exhibitor, sponsor, presenter or delegate at what promises to be the largest irrigation event ever held in Australia.

24th ICID INTERNATIONAL CONGRESS
71st IEC MEETING
22-28 SEPTEMBER 2020

IRRIGATION AUSTRALIA
INTERNATIONAL CONFERENCE & EXHIBITION
22 -24 SEP 2020

IRRIGATION AUSTRALIA

INTERNATIONAL CONFERENCE & EXHIBITION | 22 -24 SEP 2020

SYDNEY, AUSTRALIA 2020

24th ICID INTERNATIONAL CONGRESS 71st IEC MEETING

22-28 SEPTEMBER 2020

Meet people from*

Expected Participation*

1500+ Conference Delegates

2000+ Exhibition Visitors

SYDNEY 2020

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*All figures are based on Irrigation Australia Conference & Exhibition in 2018 as well as previous participation of the ICID Congress and IEC Meeting.

IRRIGATION AUSTRALIA NEWS

NEW MEMBERS

Welcome to our new members who have joined since September.

Andrew Ryan, SolarDrip Design Pty Ltd, Consultant | Designer

Lauren Kidd, Brisbane City Council, Government - Federal | State | Local

Peter Sobotta, Adelaide Cemeteries Authority, Government - Federal | State | Local

Parham Ahmadpour, Individual | Student | Retired

Paul Byrnes, Individual | Student | Retired

Adam Croy, Fresh Fields, Individual | Student | Retired

Kevin Cullinan, Individual | Student | Retired

Duncan Davidson, Davidson Bros, Individual | Student | Retired

Chad Dransfield, Midwest Turf Supplies, Individual | Student | Retired

Russell Eade, Westcoast Reticulation Services, Individual | Student | Retired

John Forrest, Forrest & Forrest Horticultural Consultancy Service, Individual | Student | Retired

Felipe, Ghirghinis Nunes, Individual | Student | Retired

Martin Joosen, Individual | Student | Retired

Matthew Lane, Scotch College, Individual | Student | Retired

Richard Lonie, Individual | Student | Retired

Neil Marriott, Individual | Student | Retired

Matthew Milner, Individual | Student | Retired

Gary Pedrola, Individual | Student | Retired

Louis Van Rooyen, The Retic Company, Individual | Student | Retired

Andy Wieland, Irimaster, Individual | Student | Retired

Tom Watkin, Flexim Australia Pty Ltd, Manufacturer | Supplier | Distributor

Evan, Zikos, Austworld , Manufacturer | Supplier | Distributor

Jeffrey Bowerman, J&G Bowerman, Primary Producer | End User

Adam Coleman, Auscott Limited, Primary Producer | End User

Hamish MItchell, Speciality Trees Pty Ltd, Primary Producer | End User

Deb Brinkmann, Moree Pumps Irrigation & Plumbing Pty Ltd, Retailer | Installer | Contractor

Ian Coutts-Smith, ICS Mobile Welding, Retailer | Installer | Contractor

Sandra, Jacobson, JIM'S MOWING - POORAKA, Retailer | Installer | Contractor

Geoff, Lucas, The Lucas Group, Retailer | Installer | Contractor

Zac Pfeiffer, Birdwood Pumps and Irrigation, Retailer | Installer | Contractor

Gregory Thompson, Chiverton Estate Pty Ltd T/As Thompsons Irrifab, Retailer | Installer | Contractor

John, Dimasi, Lower Murray Water, Water Authorities

IRRIGATION SPECIALISTS AT YOUR FINGERTIPS

If you are looking for an irrigation specialist, then the Irrigation Australia website is your one-stop-shop. Just type in a postcode and irrigation professionals listed in the area will be shown, along with their contact details.

SAWM INVESTIGATES THE RELATIONSHIP AUSTRALIANS HAVE WITH WATER AND HOW IT HELPS IRRIGATORS

Like air, water is taken for granted and not consciously used or valued. Based on our experience over the last 15 years working with the community and industry in water efficiency, SAWM hypothesised that by making water 'visible', Australians would relate to it, value it and want to use it efficiently.

To establish whether our hypothesis was supported, SAWM conducted research in May 2019. This research highlighted that most Australians are generally on autopilot when it comes to household water use.

All water use was discussed as part of the research, including outdoor i.e. irrigation, pools and rainwater. We were able to determine what water efficient devices they use, their attitudes towards saving water and their awareness of how much water is used for everyday tasks.

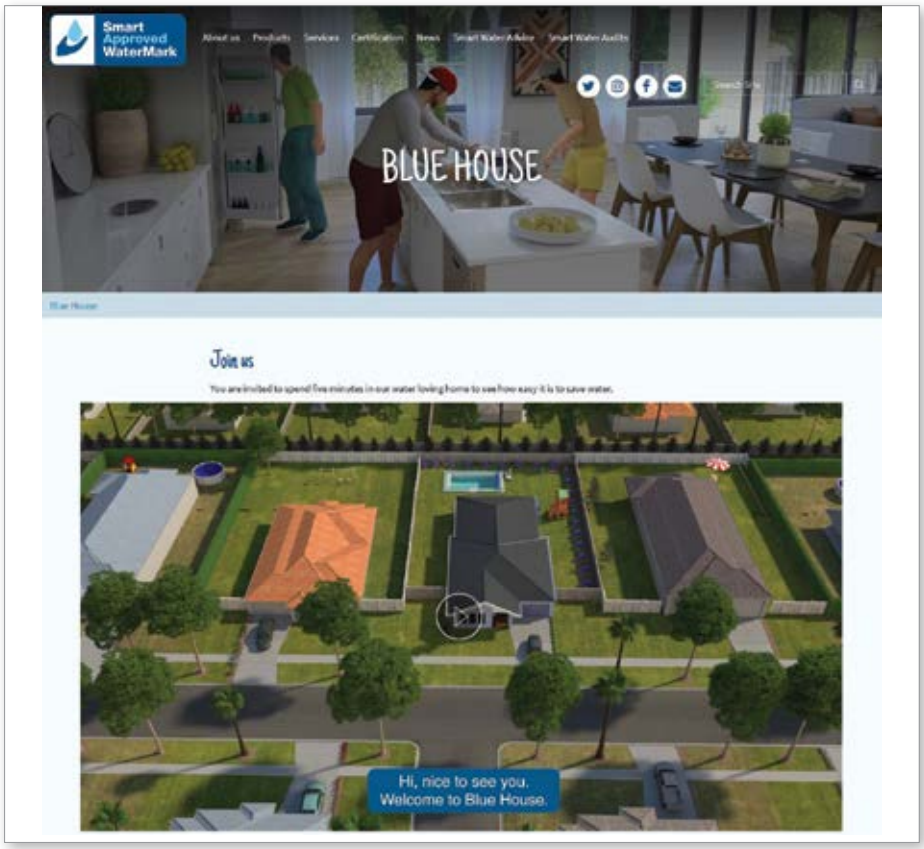
They were shocked when they realised how much they were using with 62 per cent of 18- to 34-year-old respondents saying that, as a result of the little education SAWM imparted, they now wanted to do something to save water.

The research included an experiment that deprived interviewees of tap water for one night from 5pm until the following morning. When forced to experience their own personal water shortage, their eyes were opened as to how much tap water they use and waste every day.

In fact, those who completed the exercise became very aware of their 'water auto-pilot' and were shocked by how subconsciously they reached for the tap. Fifty-five per cent of Australians even agreed that they are addicted to turning on the tap, and those those with high water literacy were higher, at 62 per cent.

The results demonstrated that it would take a personal water shortage for younger generations to see and appreciate 'tap/household' water and to understand the connection between their use every day of this water, many times, and the 'water in the environment' they value so highly.

The research concluded that the key to building a relationship between everyday Australians and water lies in improving people's understanding of the household water cycle, using an experience that will inspire conscious use. As a result, they are more likely to value water and consequently, relate to it. (Complete findings are available in Australia's relationship with water, November 2019.)



The Blue House is a web-based tool that consumers can use to identify where they can make water savings inside and outside the home.

What this means for SAWM approved irrigators and consultants

This published research complements the tools available to SAWM licensees of approved water efficient products. These include the website listing and placement in The Blue House (https://www.smartwatermark.org/blue-house/) as well as the opportunity to be part of the Western Australia Waterwise Products Program and to be promoted in our newsletters regularly sent to 25,000 consumers and 1500 industry stakeholders.

SAWM is currently sharing its detailed findings with councils and water utilities across the country. Water businesses and local governments are responding positively as they start to launch water efficiency campaigns to their residents.

This is great news for our SAWM licensees since the discussions are generating awareness for SAWM products. Our services are also taking advantage of some great opportunities since SAWM now offers the Smart Water Solutions Program that delivers non-residential water audits and smart metering recommendations.

With drought in full swing in many parts of the country, SAWM is a great partner for irrigation equipment and service providers since they have a nationwide network of contacts in the industry responsible for determining inclusions in water restriction regimes and the development of rebate schemes.

Information

For information about certification or other water efficiency opportunities contact Chris by email at chris.philpot@smartwatermark.info.

Chris Philpot, CEO

IRRIGATION AUSTRALIA TO DELIVER NEW CERTIFICATE III IN IRRIGATION TECHNOLOGY EARLY NEXT YEAR

Following the exciting news about the new irrigation technician trade that we announced in the last edition of *Irrigation Australia Journal*, the new Certificate III in Irrigation Technology qualification is now on the www.training.gov.au website and available to be delivered.

Irrigation Australia is now making all the necessary changes to comply with the new qualification and plans to have this qualification on our RTO scope soon so we can start to deliver it early next year.

We will deliver both the new Certificate III in Irrigation Technology qualification as well as top-up training courses for those who already have the old Certificate III in Irrigation and want to become an irrigation technician tradesperson.

All registered training organisations that deliver the old Certificate III in Irrigation qualification have 12 months to convert to the new qualification.

Information

If you are interested in becoming trade qualified as an irrigation technician, contact Geoff Harvey, email: geoff.harvey@irrigation.org.au or phone 07 3517 4000 for more information and to register your interest.

CERT III GIVES LANDSCAPE ARCHITECT A LEG UP

Luke Zaradic is a landscape architect with Coolth Inc., based in Melbourne. The company provides design, construction and maintenance services for large and small urban landscape projects.

Recently Luke made the journey from Melbourne to Mildura to attend an Irrigation Australia Certificate III in Irrigation course. We spoke with him about the course and how it will help him with his role as a landscape architect.

IA. Can you tell us about your background and your role in the company?

Luke. I'm a 2nd year landscape architect and I coordinate the end-to-end process of design and construction. This means that I am involved from client meetings and conceptual stage, design developments and drawing, through to building and maintenance.

I come from a mechanically minded background, and I grew up pulling apart various engines and learning how they work. Pair that with my love for design, and I found an ideal job in landscape architecture and with Coolth Inc.

IA. How important is having irrigation technical skills and knowledge in your job?

Luke. It is a vital skill but mostly it's an asset that puts you above the rest. To have pre-existing knowledge of plant water needs allows you to have a leg up in design. Being able to not only design an irrigation system but to have it integrated with your design, rather than just have it disjointed and an add-on, allows for a result that not only functions better but is also executed with much more ease.

IA. One of the project areas Coolth Inc is involved in is designing and installing green walls. Can you briefly describe the steps in designing a green wall, particularly how you decide on an irrigation system?

Luke. The main considerations for irrigation are the design and function of the green wall. For instance, a large commercial build would want no spills and to have a very full and lush wall. This means that we would use a contained green-wall system that fills troughs of water for plants to wick moisture out of.

It would be different for a more residential green wall, e.g. where a small herb wall was required. In this situation, clients usually just want something small and to feel a connection with the watering process, almost as if they are hand watering it themselves. Often, we would use a more visual dripper system so the effect of the irrigation system on the plants is easy to see.

IA. What are the key things you consider when designing and installing irrigation in a green wall and how different is it to irrigating gardens in the ground?

Luke. The key things are:

- orientation, particularly in relation to the sun (of course if it's well shaded than you have less chance of evaporation)
- plant selection (epiphyte plants for example, which stick to walls in clumps, require an individual sprayer to each plant)
- location, e.g. if it is a commercial or public site, we need to make sure that no water drips down the face of the building creating any pools or puddles for slip hazards.

IA. Why did you decide to complete the Cert III in Irrigation?

Luke. Both my employer and I thought it would be a great asset to add to my toolbelt. We wanted to be able to incorporate irrigation and water management from the initial design. This way we keep it all in-house and we don't have to outsource to other contractors. This minimises any loss in translation and gives you a finer grasp on reducing any defects down the track.

IA. What was the best thing about the course?

Luke. The best thing was definitely the course teachers. They were open, friendly and allowed, and even promoted, camaraderie between both staff and students. This made it much more enjoyable to learn and didn't make the course feel like a chore.

IA. What could be improved?

Luke. The biggest improvement for me would have to be to change the location. Living in Melbourne at the time of the course, there weren't many options for me to study. Also, while the course ticked all the boxes for residential and agricultural, if a few more sections were focused on the commercial side of things that would have been great. I realise all the skills are transferable from setting to setting and that everyone else attending was from agriculture or residential, but a few examples of how it would apply to me would have made me a bit more confident from the get-go.

IA. If someone was considering whether to do a Certificate III, what would your advice be?

Luke. If you are keen to learn a new and growing trade, and you are happy to work both inside for design and outside for construction, then this is most definitely for you. The skills are transferable from small jobs to large and there is no shortage of work with all the new construction work happening around.

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NEW RAINWATER HARVESTING TRAINING MODULE

Irrigation Australia's rainwater harvesting sub-committee recently released a Rainwater Harvesting Training Module on its training portal. The module is designed to highlight industry best practice and scientific research on all aspects of rainwater harvesting.

It describes the operation of the system from the roof, through the tank and delivery to the household; and is presented so it can be used and understood by a broad audience, including engineers, irrigators, builders, plumbers and end users.

For information about the module and how to access it, contact Geoff Harvey, email geoff.harvey@irrigation.org.au

BROWN BROS ON BOARD AS NEW COIE SPONSOR

In November Irrigation Australia welcomed Brown Bros Engineers Australia as a sponsor of the Centre of Irrigation Excellence. Brown Bros joins eleven leading industry suppliers in this important partnership that facilitates and coordinates irrigation knowledge and training development.

David Seaman, General Manager of Brown Brothers Engineers Australia, said that the company was proud to sponsor and partner with Irrigation Australia through the COIE.

"The Centre of Irrigation Excellence is an advanced platform for industry recognised accredited training and partnering for the next generation of irrigation professionals.

"As water management becomes more vital to our economy and communities, with a reliance on technology and knowledge, the COIE is an excellent institution to ensure Australia's water security into the future through practical workshops and industry lead education," he said.

Brown Brothers Engineers Australia, which has supplied pumps in Australia and New Zealand for more than 110 years, distributes some of the world's leading pump brands, including Lowara, Hydrovar, Goulds Water Technology and Flygt.

It has three major facilities in Sydney, Melbourne and Brisbane which all offer warehouse distribution, in-house engineering and assembly, workshops for custom-design-manufacturing of pump sets and pumping systems.

For information about the company and its products and services go to website https://www.brownbros.com.au.

TRAINING DIARY 2020

Irrigation Australia has been busy developing its training diary for 2020. Courses planned so far are listed below.

If you are looking to upgrade or update your skills and you would like to find out more about one of the courses listed or other training provided by Irrigation Australia, go to the training pages on our website www.irrigationaustralia.com.au, or contact Kahla McKinless the Irrigation Australia training and compliance officer, e: kahla.mckinless@irrigation.org.au, p: 07 3517 4000. She can also help you if you have general questions about training and requirements.

TRAINING DIARY 2020

DATE	COURSE	LOCATION
29 January	Meter Validation & Installation - 3-day course	Wagga Wagga, NSW
31 January	Meter Validation & Installation - install only	Wagga Wagga, NSW
4 February	Meter Validation & Installation – 3-day course	Orange, NSW
6 February	Meter Validation & Installation - install only	Orange, NSW
4 February	Certificate III in Irrigation Course - Block 1 of 2 (VIC)	Melbourne, Victoria
11 February	Certificate IV in Irrigation Course - Block 1 of 2 (WA)	Perth, WA
18 February	Irrigation Pumps & Systems	Renmark, SA
25 February	Meter Validation & Installation – 3-day course	Mackay, Queensland
27 February	Meter Validation & Installation - install only	Mackay, Queensland
25 February	Certificate III in Irrigation Course - Block 2 of 2 (SA) -	Adelaide, SA
3 March	Certificate III in Irrigation Course - Block 1 of 2 (WA)	Perth, WA
3 March	Meter Validation & Installation – 3-day course	Melbourne, Victoria
10 March	Meter Validation & Installation – 3-day course	Griffith, NSW
24 March	Meter Validation & Installation – 3-day course	Goondiwindi, Queensland
31 March	Certificate III in Irrigation Course - Block 1 of 2 (NSW)	Tocal College, Paterson, NSW
31 March	Irrigation Pumps & Systems	Perth, WA
28 April	Certificate III in Irrigation Course - Block 2 of 2 (Vic)	Melbourne, Victoria
5 May	Certificate III in Irrigation Course - Block 2 of 2 (WA)	Perth, WA
12 May	Urban Irrigation Design	Perth, WA
14 May	Basics in Wiring & Electrical Troubleshooting	Perth, WA
19 May	Certificate IV in Irrigation Course - Block 2 of 2 (WA)	Perth, WA
9 June	Certificate III in Irrigation Course - Block 2 of 2 (NSW)	Tocal College, Paterson, NSW
16 June	Concepts of Drip Irrigation	Perth, WA
22 July	Irrigation Efficiency	Perth, WA
4 August	Introduction to Irrigation – Urban	Perth, WA
18 August	Introduction to Irrigation – Agriculture	Perth, WA

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www.coie.com.au

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Isuzu is the leading manufacturer and innovator of outstanding industrial diesel engines producing more than 1 million engines annually.

KSB

The KSB Group is a global company and a leading producer of pumps, valves and related products.

NELSON AUSTRALIA
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NETAFIM™

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TORO.

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VALLEY
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A worldwide leader in precision irrigation. The Valley brand of Centre pivots provide solutions for meeting the growing demand for food.

Vinidex
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The leader in manufacturing and supplying quality PVC, polyethylene (PE), polypropylene (PP), ductile (DICL) and industrial pipe systems.

ICID 24TH INTERNATIONAL CONGRESS AND THE IRRIGATION AUSTRALIA CONFERENCE & EXHIBITION SYDNEY 2020

The combined ICID & Irrigation Australia event has well and truly been the focus of the IACID Australian committee's focus. The second announcement was made during the ICID 3rd World Forum in Bali in early September and is available to download on the conference website at https://www.icid2020.com.au

The event website is live, the programs for both the Irrigation Australia Conference and the international conference are being developed and a call for papers is now live on the international site and will be available on the Australian conference site in early 2020. Why not get in early and take advantage of the early bird discount and register for the conference now through the website.

Conference committees have been established for the following areas:

- Program Management and Abstract Panel (Australian Conference)
- Program Management and Abstract Panel (ICID Conference)
- Technical Tours
- Young Professionals Program
- Partner Tours
- Media Communications and Marketing
- Student Awards/Scholarships
- Social Program
- Finance Committee

Exhibition space is selling well, and many major industry manufacturers and suppliers have already committed to the exhibition, which promises to be the biggest and best showcase yet of irrigation technology and services ever seen in Australia. For enquiries on exhibition space contact our event manager, Encanta at info@encanta.com.au

For information about Irrigation Australia 2020 Conference and Exhibition and the ICID Congress, go to https://www.icid2020.com.au

24th ICID INTERNATIONAL CONGRESS 71st IEC MEETING
22-28 SEPTEMBER 2020
SYDNEY, AUSTRALIA 2020

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INTERNATIONAL CONFERENCE & EXHIBITION | 22 -24 SEP 2020

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MORE WORLD HERITAGE IRRIGATION STRUCTURES RECOGNISED BY ICID

ICID World Heritage Irrigation Structures register is a way of identifying and recognising significant irrigation structures that are more than a century old and helping to understand the evolution of irrigation systems among civilizations across the World. Began in 2012, the idea is to conserve these heritage structures for posterity similar to the way World Heritage sites are recognised by UNESCO. More than 90 sites have been recognised, with 19 having been added in 2019. They are as follows:

China

Hetao irrigation system and Qianjinbei irrigation system

Iran

Abbas Abad complex, Kurit Dam, Fazl Ali Khan Qanat and Shushtar historical hydraulic system

Italy

Berra irrigation plant, Migliaro water diversion gate and Panperduto Dam

Japan

Jukkoku-bori, Minuma-Dai and Kikuchi irrigation systems and Kurayasu and Hyakken rivers irrigation and drainage system

Malaysia

Terusan Wan Mat Saman canal

Sri Lanka

Minneriya Reservoir

United States of America

Alamo irrigation system and Theodore Roosevelt Dam

Panorama of the Shushtar Historical Hydraulic system. Photo Razie Amirian [CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0)]

Information

For information about the register and structures registered, go to website https://www.icid.org/icid_his1.php

IMPORTANT DATES

DATE	PLACE	DETAILS
16 – 19 March 2020	Marrakech, Morocco	**5th African Regional Conference on Irrigation and Drainage (ARCID).** Theme is sustainable Management of irrigation for improved resilience of agriculture in Africa. W: http://5arcid.ma/
22 – 28 September 2020	Sydney, Australia	**24th ICID International Congress and 71st IEC Meeting.** For more info E; info@irrigation.org.au, W: http://www.icid2020.com.au

MANAGED AQUIFER RECHARGE IN AUSTRALIA ON STAGE IN KUALA LUMPUR

In October, Karlene Maywald, ICE WaRM Chair and Chair of ICID Task Force on Trans-boundary Water Sharing, described Australia's experience in marrying economic principles with water management to delegates at the Malaysia International Water Convention. The convention, held in Kuala Lumpur, was attended by more than 500 people from 34 countries.

Australia is a global leader in managed aquifer recharge (MAR) from stormwater, treated wastewater and surface water diversion. Adelaide is the epicentre of water sensitive design using MAR technology which supplies more than 40 per cent of municipal wastewater in parks and irrigated agriculture. Its healthy groundwater systems support the city's vibrant urban ecology.

The theme of the convention was *Advancing Innovations, Embracing Transformation and Securing the Future.* Presenters highlighted the need for water utilities to be future-ready by breaking down resistance to technological innovation and embracing new ways of working.

Karlene Maywald described how Australia uses managed aquifer recharge in urban situations to extend water supplies.

Momir Vranes, Irrigation Australia Board Director and ICID Australia National Committee Chair

STATE ROUNDUP

ACCC INQUIRY INTO WATER TRADING IN THE MDB

In October the Australian Competition and Consumer Commission (ACCC) released an issues paper for its inquiry into water trading in the Murray-Darling Basin, and in November held public hearings in Victoria, South Australia, New South Wales and Queensland.

The inquiry is looking at how irrigators, investors, water brokers, water exchanges, water registries and others use market information, and whether water markets are sufficiently transparent.

The ACCC will examine allegations voiced by irrigator groups and others in the community that non-farming speculators are putting pressure on water prices.

The inquiry is also examining:

- how the practices and behaviours of different market participants and interested parties impact markets
- how market regulation, regulatory agencies and policy differences between states and trading zones have affected markets
- how competition has changed over time.

An interim report is expected by the end of May 2020.

To download the issues paper, go to ACCC website, https://www.accc.gov.au/focus-areas/inquiries-ongoing/murray-darling-basin-water-markets-inquiry/issues-paper.

GOVTS AGREE TO REALLOCATE MURRAY WATER

In November the South Australia and Commonwealth governments agreed that the state would fire up its desal plant and reallocate the River Murray water saved as a result to farmers upstream.

Under the $100 million agreement, which is part of the federal drought stimulus package, the 100 GL water previously destined for Adelaide from the River Murray can be used to grow fodder upstream. The deal will provide 6,000 farmers with access to 25 ML each, offered to irrigators at $100/ML and delivered by the end of April.

It costs between $600 and $900/ML to produce water out of the desal plant, depending on energy costs.

After the first 40 GL of desal water is delivered, a review will assess the arrangement's effectiveness as well as any impacts on water availability in the basin, and South Australia's water security and costs.

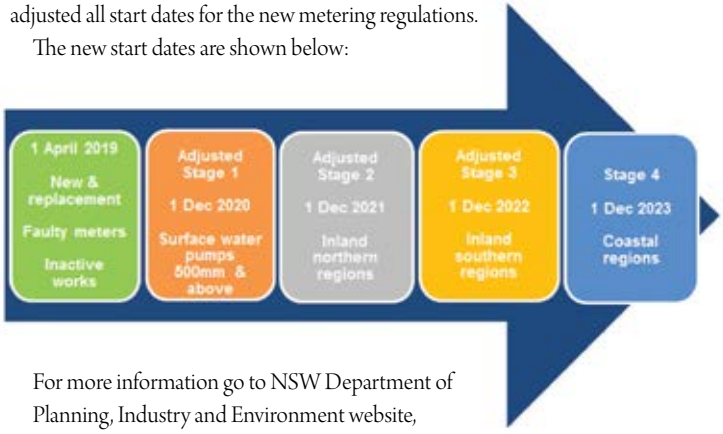
Not everyone is on board yet with the Australian Fodder Industry Association questioning the rationale of the decision. The association queried the impact of the extra water and the details such as when the water will become available, how the water will be allocated, what crops will be grown and the impact on demand and prices.

Source. Watercareer news, www.watercareer.com.au

NSW DELAYS METERING UPGRADE DEADLINES

As a result of the extended dry conditions and the pressure of having to pay the costs of upgrading meters, the NSW Water Renewal Taskforce (WRTF) has adjusted all start dates for the new metering regulations.

The new start dates are shown below:



For more information go to NSW Department of Planning, Industry and Environment website, https://www.industry.nsw.gov.au/water-reform/metering-framework/overview-of-the-non-urban-water-metering-frameworkWater.

FICTIONS (AND FACTS) ABOUT WORK EXPENSE DEDUCTIONS

There can be varied sources for some of the myths about tax deductions —pub-talk, BBQ-banter, shopfloor stories, what-your-taxi-driver-just-heard and many others. In this article, Thomas Noble and Russell, accountants in Lismore, sort out fact from fiction.

This year's tax time saw media reports about various outlandish tax claims, for example the ATO being faced with claims for dental expenses, gambling losses, Lego sets, sunscreen (and an umbrella), for cigarette breaks, and even the cost of a wedding reception (all rejected, by the way).

How certain myths are started about what can or can't be claimed on tax is anyone's guess, but it is these snippets of misinformation about allowable tax deductions that can lead unaware taxpayers to make incorrect claims — and get the taxman's attention. Here are some of the most common.

Fiction. Everyone can automatically claim $150 for clothing and laundry, 5,000 km under the cents-per-kilometre method for car expenses, or $300 for work-related expenses, even if they didn't spend the money.

Fact. There is no such thing as an "automatic" or "standard deduction". Substantiation exceptions provide relief from the need to keep receipts in certain circumstances. While you don't need receipts for claims under $300 for work-related expenses, $150 for laundry expenses (note: this is for laundry expenses only and does not include clothing expenses) or if you are claiming 5,000 km or less for car expenses under the cents-per-kilometre method, you still must have spent the money, it must be related to earning your income, and you must be able to explain how you calculated your claim.

Fiction. I don't need a receipt; I can just use my bank or credit card statement.

Fact. To claim a tax deduction, you need to be able to show that you spent the money, what you spent it on, who the supplier was, and when you paid. Bank or credit card statements alone don't have this information. The only time you don't need these details is if substantiation exceptions apply.

Fiction. I can claim makeup that contains sunscreen if I work outside.

Fact. We all like to look good, but cosmetics are usually a private expense and the addition of sun protection does not make it deductible. It may, however, be deductible if the primary purpose of the product is protection from sun damage (that is, it has a high SPF rating), and that the cosmetic component is incidental, and you need to work outdoors in the sun.

Fiction. I can claim my gym membership because I need to be fit for work.

Fact. While you might like to keep fit, there are only a very small number of people who can claim gym memberships, such as special operations personnel in the Australian Defence Force. To be eligible, your job would have to depend on you maintaining a very high level of fitness, for which you are regularly tested.

Fiction. I can claim my pay television subscription because I need to keep up to date for work.

Fact. A subscription to pay television is not ordinarily deductible. Keeping up to date on news, current affairs and other general matters usually will not have a sufficiently close connection with your employment activities to provide a basis for deducting these subscriptions. They are essentially private expenses.

Fiction. I can claim all my travel expenses if I add a conference or a few days' work to my holiday.

Fact. If you decide to add a conference or some work to your holiday, or a holiday to your work trip, you must apportion the travel expenses between the private and work-related components, and only claim the work-related component.

If you include a holiday in a work trip, you can only claim expenses for the work-related components of the time you are away.

Fiction. I can claim home to work travel because I need to get to work to earn my income.

Fact. For most of us, home to work travel is a private expense.

Fiction. I've got a capped phone and internet plan, so I can claim both business and private phone calls and internet use.

Fact. Unless you only use your phone and internet for work, you must apportion the cost between work-related and private use and only claim the work-related portion of your expenses.

Important. The information contained in this article is not advice. Readers should not act solely on the material in this article as they are general comments only and do not constitute or convey advice. We recommend that our formal advice be sought before acting on anything contained in this article.

Acknowledgment. Thanks to Thomas, Noble and Russell for permission to reprint this article.

AROUND INDUSTRY

NUTRIEN ACQUIRES RURALCO

Canada-based company Nutrien Ltd announced in September that it had completed its purchase of Ruralco Holdings Limited (Ruralco). Nutrien also owns Landmark so the addition of Ruralco to its portfolio strengthens its already significant position in the agriculture market in Australia.

Nutrien is the world's largest provider of crop inputs and services, producing and distributing 27 million tonnes of potash, nitrogen and phosphate products worldwide. The company stated that the combination of Ruralco's business with Nutrien's Landmark operations is expected to provide "significant benefits for all stakeholders and enhance the delivery of products and services to Australian farmers".

Nutrien has steadily grown its retail business and earnings in Australia, with annual EBITDA expected to be more than A$330 million in 2020, of which approximately A$100 million is expected to come from the Ruralco acquisition, after accounting for expected synergies.

Information. https://www.nutrien.com/investors/news-releases

WORKS UNDERWAY TO CONNECT IRRIGATION AREA TO MODERNISED IRRIGATION SYSTEM

Twenty-seven dairy and mixed farming landowners in the Rochester Irrigation Area south-west of Echuca will soon be connected to a modernised irrigation system, transforming the way they irrigate.

With works underway to install 3.3 km of pipeline, decommission 430 m of ageing channel and install 35 new, state-of-the-art meters as part of the $2 billion Connections Project, landowners will have access to the automated system. The works began in October and are due for completion in December 2019.

For dairy farmers, this means shorter ordering times and better flow rates delivering water when and where it is needed with many reporting life changing benefits. The automated system allows farmers to place water orders just 24-hours in advance and turn the water on with the touch of a button.

To date, the Connections Project has decommissioned more than 1,450 km of old channel, generated 344 GL of verified annual water savings, remediated over 300 km of channel to stop leakages, seepage and generate water savings, installed more than 8,500 meters to modernise and automate the delivery system and fully modernised more than 6,800 landowners.

The project is more than 90 per cent complete and is on target to achieve its key objective of 429 GL of water savings each year (long-term average). When the project is complete, it is estimated irrigation water use efficiency will increase from 70 to 85 per cent.

The $2 billion Connections Project is Australia's largest irrigation modernisation project and is funded by the Australian and Victorian governments.

Source. Connections Project www.connectionsproject.com.au

Wards Bros Earthmoving Manager, Michael Palmer, on-site along the Northern Highway where a bore was used to drill under the road to make way for a pipeline to be installed. The works that are currently underway at this site will include the installation of 3.3 km of pipeline, decommissioning of 430 m of leaking and ageing channel and installing 35 state-of-the-art meters, connect 27 surrounding landowners to the modernised irrigation system.

FRANKLIN ELECTRIC

HOW TO MAXIMISE THE LIFECYCLE COST OF YOUR PUMP

While upfront cost is often a major consideration when buying a pump, a report issued by the Victorian Government says that the initial cost accounts for less than 10 per cent of the lifecycle cost. In fact, energy and maintenance after purchase make up the bulk of these costs at between 50 and 95 per cent. The message is that it is important to consider long-term costs when selecting a pump. Here, we look at what factors can influence and maximise the lifecycle cost of your pump.

Selecting a pump: quality over cost

One important choice when selecting a pump that will influence its lifecycle costs is the quality of the equipment. A quality, reliable, well-built pump will likely have a lower lifecycle cost than a cheaper, lightweight pump. Going for a cheaper option may result in a lesser quality product, resulting in a higher chance of premature failure or unexpected servicing and replacement costs.

Getting the right size pump

Selecting a correctly sized pump is imperative to reduce lifecycle costs. While it might be tempting to get a smaller pump to reduce costs or a larger pump to account for possible higher pumping requirements, these will ultimately result in higher costs.

An undersized pump will result in reduced water efficiency, while an oversized pump will have a higher installation cost, as well as higher energy usage and wear rate.

Maximising energy efficiency

For applications where variable speed and flow rates may be needed, investing in a pump with a variable frequency drive (VFD) will help reduce lifecycle costs.

While a VFD will increase the initial cost of the pump, if the pump is not running to its BEP, it will experience increased wear and require more frequent maintenance and parts' replacement, and have high energy consumption.

Quality and reliability at the heart of Franklin Electric

Malcom Eyre, Managing Director at Franklin Electric, said the company understands its customers need for products that are durable and long lasting to ensure optimal lifecycle costs.

"Nothing less than having the highest quality products and service are acceptable for our customers, because anything else is too costly. That is why we are committed to the manufacture of high-quality, reliable products, designed to stand the test of time," he said.

Information. For information go to website https://franklin-electric.com.au/

KUBOTA

A PROUD HISTORY OF AUSSIE INGENUITY

There have been Colvilles in Barham for nearly a century, but probably the most famous one is 84-year-old Hume Colville, who designed and patented the world's first self-priming irrigation pump in the early 1960s.

No-one had ever done anything like it before – in fact, a lot of people had told him a self-priming pump with no foot valve couldn't be done. But Hume proved them wrong, and in the early 1980s, more than 100 companies in Australia were building Hume's pumps under license.

Today, his original design is still being used, however, the business has redesigned the prototype and re-engineered it to suit more modern applications, particularly with the move in agriculture towards being more water efficient.

Brenden Colville said that with less water available to farms and fewer allocations, farmers have made a move to premium pumping systems, with many of them also using pipelines rather than channel systems to eliminate seepage and evaporation losses.

"So, our pump has had to change and develop to match. While the self-priming function is still a primary component, we've increased the efficiency and range of our custom-built pumps dramatically," said Brenden.

Kubota and the Colville pump – a steadfast partnership

Brendan's father Merv first used Kubota engines during the in the early 2000s drought.

They were lean times, and farmers didn't have a lot of spare cash to throw at pumps and new engines, so Merv started sourcing secondhand Kubota motors because of their reputation for durability and quality.

"Even if they've run 6,000 hours, the oil still comes out clean," Merv said. "They're just an outstanding quality, well-built engine."

When they decided to go to the Elmore Field Day a couple of years ago to generate more brand recognition and promote the Colville name, Brenden and Merv decided to buy new Kubotas for the display.

"We prefer to use them because they're extremely smooth running, quiet and excellent on fuel, and we like the excellent dealer support," said Brenden.

In fact, Brenden's become good mates with Anthony Miliado, Swan Hill's Kubota dealer, who makes sure anything they ask for happens.

"When it comes to servicing, the farmer can give us a call, or he can call his local Kubota dealer and have the parts sent out to him, or they'll be out there with a service tech the very next day. He never has to touch a thing – everything's ready to go," said Brenden.

Handcrafted 'set-and-forget' functionality

Colville liaise closely with each farmer to ensure they build a pump that will achieve the optimum efficiency for their unique application. After they have established the farmer's needs, Merv and Brenden cut everything by hand then roll it, shape it, drill it and assemble it.

The aim is that when the pump is in place, it's a turnkey operation so the farmer can just walk up and start it – or if he's too busy, he can send someone else down to do it. There's no need for a foot valve. There's no need for vacuum priming. Just put the pipe in the water and set up the discharge.

Like Kubota, the critical aspect of the Colville pump is low maintenance reliability. Brenden guarantees that a Colville pump will pump no matter what.

"Whether it's sticks, mud, trash, or any hard roughage, it chops it up and just keeps pumping – and the Kubota engine will be running right along with it," he said.

And that means the farmer has one less thing to worry about, which is worth its weight in gold when they're busy running a property.

Information. Go to http://www.kubota.com.au/

NEW PRODUCTS

TORO

WATER VIA YOUR SMARTPHONE WITH TORO'S LATEST IRRIGATION INNOVATION

Toro has just launched the newest addition to its controller line-up, the Tempus DC battery-operated controller, which is programmable from your smartphone thanks to Bluetooth technology.

By using the Tempus DC app on your smartphone or tablet, the new battery controller is ideal for managing irrigation in areas without mains power, meaning you have full watering control from your device.

Managing irrigation without electricity and relying on tap timers can be difficult and unreliable; with Toro's Tempus DC battery controller, you can take the guesswork out of watering. It's easy to use, install and program with multiple stations and flexible irrigation programming to suit your needs.

Battery operated with no need for electricity, you will also be able to install your new Tempus DC with step-by-step tutorial videos that help you program the controller. The app is easy and simple to use with flexibility for your watering preferences including 1, 2, 4 or 6 stations, four independent programs and three start times.

The advanced features of Tempus DC offer more versatility than tap timers which operate on a single station. It comes with a 2-year warranty. Your irrigation equipment will always be safe as Tempus DC is vandal-resistant in a valve box, while tap timers are vulnerable as they are screwed in the tap.

If you wish to have an LCD, Toro offers both options should you prefer to program on the display. The Tempus DC can be with or without the LCD screen as you have the option to program your controller using the app or manually.

Powered by Bluetooth and battery operation to rely less on connections and more on convenience, Toro is putting the best product on the market for your watering requirements. With reliable performance and thinking outside the box, the Tempus DC Battery Controller brings you full control of your irrigation at the touch of a button.

Information. For information go to website https://www.torotempuscontrollers.com.au.

TORO

TORO AQUA-TRAXX FLOWCONTROL DRIP TAPE TO CHANGE THE FACE OF IRRIGATION

Taking control of an irrigation system's flow rate has been expensive and time consuming for growers, until now. Trusted to bring you the best in drip tape solutions, Toro is proud to announce their newest product, Aqua-Traxx® FlowControl™ Drip Tape.

Designed to give you the best of both worlds with optimal features of a pressure-compensating tape and non-pressure compensating tape, FlowControl offers more uniform irrigation for any terrain and the flexibility to control the overall system flow rate.

For years, growers have dealt with irrigation technology that is unable to consistently water uneven, sloped and hilly terrain – trying to achieve a healthy crop at low and high elevations can prove challenging.

While standard drip tapes offer growers the ability to apply water and fertiliser efficiently, uniformity is sacrificed over longer runs and uneven ground. But with FlowControl's unmatched durability, clog resistance, and precision placement of valuable water and fertiliser, longer runs are now made easier with better uniformity in steeply sloping fields resulting to higher quality yields for growers.

The innovation behind FlowControl allows growers with difficult terrain and changing elevations to get the most out of their yields, without the additional cost. Before, growers that wanted consistency and quality over their challenging terrain had to resort to expensive heavy wall pressure-compensating drip lines with closer emitter spacing. But with a wide range of available thicknesses compared to pressure-compensating drip lines, FlowControl provides a cost-effective solution for those farming on challenging terrain. The ability to run FlowControl over long distances also reduces set up costs.

"Maximising crop yield and quality has a lot to do with irrigation application uniformity. Using Aqua-Traxx FlowControl gives the grower a valuable tool to help improve the irrigation uniformity," said Robert Aitken, Toro Australia's National Technical Services Manager.

Aqua-Traxx FlowControl is available in wide range of wall thicknesses, offering one price point for any emitter spacing between 15 and 60 cm – providing growers with their desirable wetting pattern, without the extra costs.

You can count on Toro Aqua-Traxx PBX & Aqua-Traxx FlowControl Premium Drip Tape for every application to help you take control of your irrigation. A new level of uniformity and efficiency for any grower's farm, offering complete control of the flow, no matter the terrain.

Information. Go to https://www.toro.com.au

NEW PRODUCTS

CSIRO

SENSEI MASTERS IN-SITU GROUNDWATER MONITORING

A new groundwater sensor system developed by CSIRO is designed to make environmental monitoring faster, more reliable and less labour intensive for resource managers. SENSEI is an advanced in-situ sensor system that gives water managers real-time data to monitor and manage groundwater impacts efficiently and quickly.

Replacing labour-intensive manual monitoring techniques, SENSEI is a multi-sensor system that can simultaneously collecting data on pH, reduction potential, temperature and conductivity.

"SENSEI is an automated system which delivers reliable groundwater data in real-time saving companies time and money on labour from traditional manual monitoring approaches," CSIRO Research Leader, Dr Kathie McGregor said.

The solid-state multi-sensor array features CSIRO's patented pH sensor and reference electrode innovation based on advanced sensor chemistry and materials. The robust sensor unit can be embedded into groundwater wells and aquifers and deliver continuous data for months without the need for manual calibration or maintenance.

Third-party sensors can also be integrated into the systems attached to the solid-state multi-sensor array. With real-time analytical capability, SENSEI can provide early alerts so companies can mitigate environmental issues arising in groundwater management.

CSIRO is now looking for partners to bring the technology to market.

For information go to website https://www.csiro.au/en/Do-business/Commercialisation/Marketplace/Sensei

SENSEI is an autonomous off-grid system that delivers continuous data streams from remote locations. Powered by a solar panel, the data is transmitted via an internet connection direct from the source and into the digital cloud, giving user the ability to access and analyse the information on-site or from farther afield.

BOOKSHELF

CLIMATE GUIDES RELEASED

The Regional Weather and Climate Guides project is part of the Australian Government's Drought Assistance Package, announced by Minister for Drought David Littleproud in August 2018. The project aims to improve the resilience of farming businesses by providing localised facts about the likelihood, severity and duration of key weather variables in regions across the country.

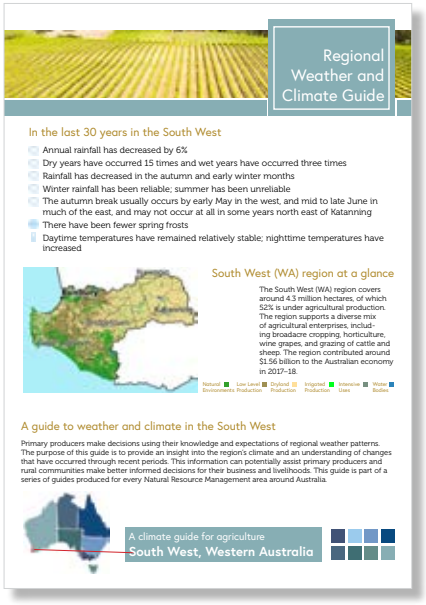
The four-page guides summarise weather and climate information corresponding to each of Australia's natural resource management regions. Included is summary information on:

- last 30 years – rainfall and temperature
- annual rainfall (since records began)
- changes in rainfall reliability and timing by season since 1989
- frosts
- temperatures.

The project is a collaboration between the Bureau of Meteorology, the CSIRO and FarmLink Research. The guides have been developed in collaboration with representatives from each NRM region to ensure the information is tailored to the needs of local farmers and agribusinesses.

Information

To download the guides, go to Bureau of Meteorology website http://www.bom.gov.au/climate/climate-guides/



A sample of information from a Regional Weather and Climate Guide (South West Western Australia)

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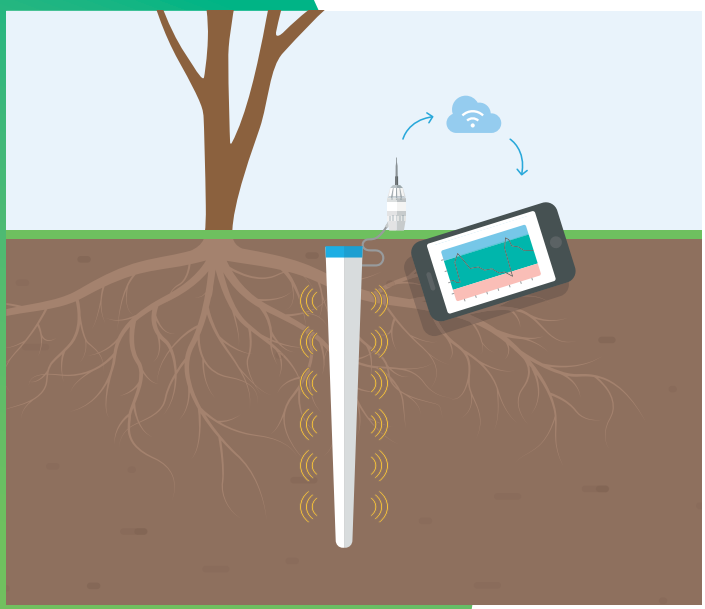

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