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IRRIGATION AUSTRALIA

Irrigation Australia
Regional Conference,
28 – 30 May

Succession planning
for the **family business**

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GOOD PRACTICE IRRIGATION MAKES A BIG DIFFERENCE

INNOVATION FEATURE

IRRIGATION IN WA

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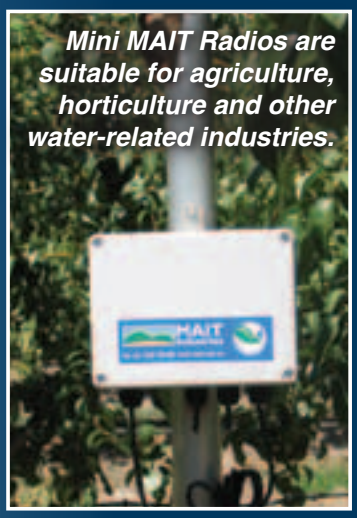

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Irrigation application uniformity and water use were greatly improved as a result of a system upgrade on this vegetable farm in WA. See article, page 6.

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WELCOME

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CHAIRMAN'S REPORT

2013 has started as a year of extremes, of droughts and flooding rains. A heatwave dominated the first half of January, making it the hottest month in over a century of records. High temperatures and record low rainfall turned much of southern Australia hard and dry, and water use surged. Then, in the second half of January, major floods from tropical cyclone Oswald wreaked havoc across Queensland and NSW, adding to the extremes.

After a long and winding path, the first Murray-Darling Basin Plan has now been signed into law. I cannot help but think of the quote attributed to the Prussian Chancellor Otto von Bismarck, " Laws are like sausages, it is better not to see them being made."

While the process arriving at the Plan may not have been that appealing, the Plan is in place and the Commonwealth, states and ACT now need to make it work for this land of extremes of droughts and flooding rains. The success of this will be judged by the Basin communities in the years ahead.

As many of you will be aware, the CEO Ian Atkinson is leaving IAL in February to take up a position as CEO of the Nature Foundation SA in Adelaide. I want to thank Ian for his contribution to IAL over the last two years and for steering the organisation through a challenging period. I wish Ian every success in his new role. The Board has engaged the recruitment agency McKenzie Consulting to undertake the search for the new CEO. This is well underway and should be drawing to a close by the time you read this.

In December, the Board and management started a review of IAL's strategies and all aspects of what IAL does. To gather data and obtain wider input into the strategic review, the chairs of regions, special interest groups and committees were invited to participate in a survey, as well as any members who wished to participate.

Feedback is important and it was encouraging to see the number of responses. I want to thank all those who completed the survey. The responses have been considered by the Board and they provide valuable insights that are being used to guide the development of IAL's 2013 strategic plan.

Through this, the Board has reaffirmed IAL's mission statement as *'Leading the development of a professional industry for healthy, sustainable urban and rural communities and their environments'.*

Regrettably, the departure of the CEO and the new CEO recruitment will extend the timelines for completion of the strategic review. It is still my intention to provide members with the opportunity to comment on the draft 2013 strategic plan.

I knew IAL members held a diversity of perspectives and interests but I did not fully realise until I looked through the survey results just how diverse the expectations of the different member segments were and how black and white the views held by some members were.

For instance, many rural members believe IAL is too urban focused and urban members believe there is too much of a rural focus. Some members see standards and certification as being all important while other members express no interest in them at all. Some members see value in the conferences only and not in the exhibitions while others take the very opposite view.

When I took on the role of chairman I was told of the difficulties of heading up a national member organisation and from the survey results I can see the truth in that, as there appears to be little chance of keeping all of the members happy all of the time.

Nevertheless, I think IAL can be a great organisation. It does some things really well now and needs to do other things better in the future. The challenge for the Board will be to get the balance right.

I look forward to seeing many of you in May at the Irrigation Australia 2013 Conference in Griffith. The conference theme is *Sharing irrigation knowledge for better outcomes,* and I am pleased to see that extra effort has been made to accommodate the special interest groups into the Griffith program.

IAN MOORHOUSE
IAL CHAIRMAN

CEO MESSAGE

Extra $1.7B in works for the Murray Darling Basin Plan

In the final stages of delivering a politically acceptable Basin Plan, in 2012 the Commonwealth Government announced it will provide an additional $1.77 billion over ten years from 2014.

It aims to relax key operating constraints and so allow up to 450 GL of extra environmental water to be obtained through projects, to ensure there is no social and economic downside for communities. If you think that sounds messy and complicated, you're right because the Government wants to:

- deliver up 450 GL of extra water to the Murray-Darling Basin to restore river health
- remove physical constraints that limit the use of environmental water
- support strong regional communities and ensure sustainable food production.

It is proposing to do this by investing taxpayers' money in three areas:

- on-farm efficiency works (that generate water savings for the environment)
- removal of constraints (such as low-lying bridges and undersized dam outlets)
- other projects as agreed by states.

Water savings for the environment and ensuring sustainable food production

Are these aims compatible or does doing one inevitably cut into the other? In theory all are achievable but in reality we won't know for a decade or so, and then only if we are looking for the evidence. We know how to improve efficiency by cutting losses, and that water should be available for other uses.

Business opportunities for IAL members

So what sort of business opportunities will arise from the extra $1.77B promised by the Commonwealth? It is easy enough to see what sort of opportunities will be available but much more difficult to quantify them - because there is no clarity around the split between the three areas of investment – however, here are my suggestions about the opportunities arising from 2014 onwards:

On-farm efficiency works. I expect this will be similar to the existing On-Farm efficiency programs where we have seen opportunities for; pressurised irrigation equipment and services (pumps, pipes, sprinklers, drip systems, centre pivots, designers, installers and so on), surface irrigation equipment and services (surveyors, designers and earthmoving, including laser levelling and control structures), irrigation management equipment and services (irrigation scheduling tools, control equipment, farmer training etc).

Other projects as agreed by states. Reading between the lines this is likely to be about better management of; the river system, major environmental assets, and places like the Menindee Lakes. The aim will be to reduce losses like evaporation and improve the efficiency of environmental irrigation (environmental works and measures). If so, expect to see opportunities for; engineering consultants, big earthmoving projects, manufacture and installation of large control structures, and maybe system management tools (better software and models).

Removal of constraints (such as low-lying bridges and undersized dam outlets). This is mainly old school civil and water engineering so opportunities for; engineering consultants, big earthmoving projects, manufacture and installation of large control structures, new bridges and roadworks. The likelihood of work for lawyers and legal academics because damage to private and state property as a result of the release of Commonwealth water for environmental purposes might be of interest!

Signing off as CEO

I'm writing this column just days from finishing my time as CEO of IAL. As previously announced I've accepted a position as CEO of the Nature Foundation SA in Adelaide, a not-for-profit wildlife charity which works with and inspires others to save, protect and restore South Australia's natural biodiversity. They own seven rural properties, and are also getting involved in the use of environmental water to restore private wetlands along the River Murray in SA. So my next challenge still involves irrigation – just for different outcomes!

Cheerio to the many people who have helped me in the role over recent times, and I hope to see you at Griffith IAL Conference 29 and 30 May.

IAN ATKINSON
CEO

EDITORIAL

Welcome to this first edition of *Irrigation Australia* for 2013. Our aims for the year are to maintain the quality of published material in the journal and to continue to provide a forum for members to share technical and policy information to support improvements in our industry. The features and articles in this edition have been developed with this in mind, so I hope they pique your interest and provide information that you can use in your enterprise or office.

Our innovation feature focuses on how digital technology is making available all sorts of information and starting to reshape the provision of services – both technical and professional development - to the irrigation industry all around Australia.

Irrigation in WA is something that doesn't get much prominence in the press on the eastern seaboard, where the focus is on the Murray-Darling Basin. We seek to correct that imbalance in this edition with a profile of irrigation and an update on developments in the use of recycled water. Our Irrigation Technology: Rural column continues the WA theme with an article by Rohan Prince about how an upgrade to an irrigation system on a vegetable farm overcame problems with uneven irrigation.

If you think that irrigation in Australia is challenging, then maybe reading Rajeev Khan's article on developing an irrigated landscape in the grounds of a private palace in the United Arab Emirates might have you rethinking your views. It's an interesting description of using technology to overcome an issue of establishing and maintaining a lush landscape in an arid environment.

Don't forget to add to your diaries the dates for the Irrigation Australia Conference being held in Griffith 29 and 30 May.

I hope you enjoy the read. If you have any suggestions for features or would like to contribute an article then please contact me. After all this is YOUR journal.

ANNE CURREY
Editor in Chief

LANDSCAPING IN A DESERT ENVIRONMENT

Rajeev Kale started his career in the landscape industry in 1982, and since then has worked in the Middle East, in Saudi Arabia, Oman and the United Arab Emirates (UAE), the latter for 21 years. A current project is something that few members would be involved in – a landscape development of a private palace – so *Irrigation Australia* asked Rajeev to explain what is involved and to describe some of the challenges. Rajeev takes up the story.

The landscape "boom" began in the early '80s in the Gulf states, driven by a robust oil based economy, with governments diverting substantial funds for beautification programs. This in turn dramatically increased the demand for qualified people to carry out works in the field. As a result, very attractive packages were offered by various multinational companies and government departments to landscape irrigation designers and managers with experience and qualifications, and this prompted me to accept a position.

When I started, the biggest challenge was to endure the harsh climatic conditions through the long summers, and to become a part of the wide multicultural environment. Things have changed in the recent past, in that most cities in the UAE have been transformed into modern metropolises with facilities that encourage all to experience a healthy and a safe lifestyle, especially families. Other opportunities are business based where the government offers assistance to expatriates to set up their own companies, making it yet another attraction to choose UAE for a 'second home'!

The project

One of my current projects is the landscape development and management for a Private Palace in the UAE.

In 2009, Space Plan Landscape Design, a company registered in Perth, was awarded the contract to develop the project from concept stage to implementation, including detailed irrigation design and planting plans. The total size of the project is 130,000 m² with soft landscape areas of about 84,000m² , and a plant population comprising 1280 date palms, 1900 ornamental trees, 39 500 shrubs, 36 000 m² ground covers and 48 000 m² of grass areas.

The irrigation design had to be fully automatic and based on a total peak water requirement of about 486,000 US GPD, considering the ET rates. The primary irrigation water source was groundwater (two bore wells) with potable water available as a backup.

Challenges

The key challenges in designing and installing a fully automatic irrigation system based on ET and soil moisture retention, included the following:

- topography of the site, which had an elevation difference of over 12 m
- high wind conditions
- sizing the UG irrigation holding tank at 1.5 times the TWR per day, the holding tank size was about 2760 m³, making it a very expensive component, which had to be dealt with appropriately
- scheduling format and maintaining uniformity, including reduction of the watering window
- selecting appropriate sprinklers and spray head nozzles.

The main focus when we did the irrigation design was to maximise water use efficiency, especially for the large soft landscape areas, which required irrigation under sandy conditions. The design was based on implementing an ET-based control system and incorporating a natural mineral clay-based soil additive (this was a one-time application).

This approach resulted directly in water application rates being halved to about 240,000 US GPD, and the UG irrigation holding tank size being reduced to about 900 m³. We were able to further reduce the size of the UG tank by re-structuring the irrigation schedule and combining the well water flow rates with the irrigation booster pump discharge rates to the system. As a result the tank size was reduced to 540 m³.

We chose MP Rotator sprinklers for all grass areas because they deliver higher uniformity and greater radius at low flow rates resulting in higher efficiency. Another advantage is that they operate efficiently in the windy conditions, and reduce the watering window by about 50%.

Rajiv Kale explains that as well as the arid environment, developing the landscape and designing and installing the associated irrigation system in the grounds of a private palace, provided many challenges.

Installation

The installation works were successfully carried out by competitive, qualified and experienced irrigation technicians under the direct supervision of SPLD.

Managing the irrigation system is more of a challenge because this task requires dedicated personnel. Unfortunately it can be hard to find suitably qualified people, mainly because irrigation is not an independent profession in the UAE or the Middle East, rather it is generally a complementary service to the landscape industry as a whole. Irrigation design concepts in the UAE follow strictly the norms of all technical aspects required to achieve an optimised and an efficient system.

Post installation management standards are relatively lower in the Middle East in general, compared to Australia. Efforts are being made, however, to reduce the project's carbon footprint by using an efficient control system incorporating a 2-wire system, fewer solenoid valves and wind combating MP Rotator nozzles with a distribution coefficient to about 1.

The UPC (Urban Planning Council) in the UAE has developed strict guidelines for irrigation design, and it is trying to restrict water application rates to about 4 L/m² a day on an average per year. One of the guidelines stipulates the incorporation of the natural mineral clay-based soil additive, which has a proven track record in reducing water use, especially in sandy conditions.

I regularly travel between Australia and UAE, and believe that professional standards in the irrigation industry in Australia have substantially improved in the last few years, something that can be attributed to IAL's certification programs, as well as consumer and policy pressures.

GOOD PRACTICE IRRIGATION MAKES A BIG DIFFERENCE

Left: Sprinkler testing at Baldivis Market Gardens.

Baldivis Market Gardens (BMG) produces summer carrots and winter potatoes on about 60 ha fifty kilometres south of Perth. Owners Sam Calameri and Charlie Bologna recently saw the need to improve irrigation performance as they increase their reliance on applying fertiliser through the irrigation system.

The farm was established more than 30 years ago when water was not seen as such a scarce resource, and irrigation system layout was generally based on pipe length or machinery wheel spacings. This resulted in lateral spacings of between 15 and 16 m and sprinkler spacings of between 13 and 14 m.

Moving laterals and sprinklers is a costly and time-consuming exercise, and for a farm with little downtime between crops, this was not a realistic option to improve sprinkler uniformity. With that in mind, a series of catch-can testing sessions of sprinklers with performance characteristics matched to the existing spacing was done at BMG.

Field testing for sprinkler performance

Four different brands of sprinkler with different nozzles were tested under regular operation in a range of wind conditions. Forty catch-cans in each of the four test areas were placed evenly between two laterals and the width of one sprinkler. Tests were run for a minimum of 30 minutes and the volume received in the catch-can recorded. Performance was assessed by calculating the distribution uniformity (DU) and co-efficient of uniformity (CU).

An acceptable level of efficiency is considered to be greater than 75% DU and 85% CU. Results ranged from 63% DU and 75% CU to 79% DU and 88% CU. Using DU to calculate the scheduling coefficient (SC) showed an improvement from 1.58 to 1.26. Improving DU from 63% to 79% therefore has the potential to reduce the need for extra watering by up to 55%, or total water saving of more than 20%.

The difference in evenness of water application can be seen by looking at the surface map from the catch-can testing. The green colour shows the average application rate on the map, therefore the greater area of green the more even the application. Orange and red indicate lower water than average and the blue-purple indicates higher than average irrigation.

The time taken by Sam and Charlie to do the testing really shows the value they place on irrigation.

'"Irrigation for delivering water and fertiliser to the plants as evenly as possible is essential when you want to grow a good even crop," Sam commented. "And now that we fertigate most of our nutrients, the irrigation is even more important."

The decision to change the farm's 2000 sprinklers was an informed one made through testing which not only showed the best sprinkler for BMG, but also highlighted differences in in-field performance of different brands of sprinklers.

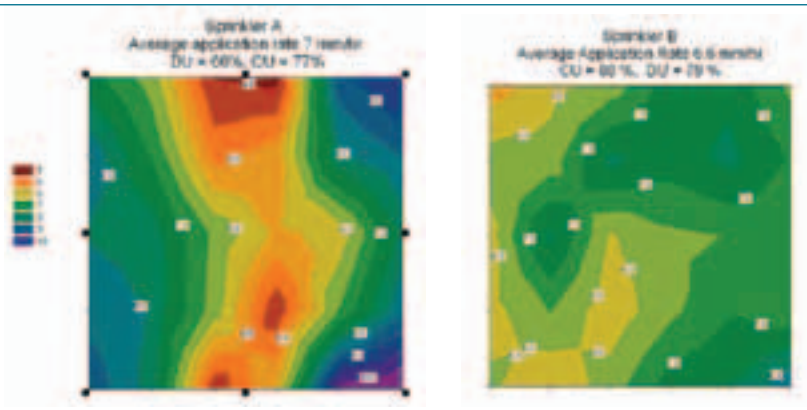
It is important to test a sprinkler in field conditions before a large purchase is made. In this case, not only was the retailer happy to be involved in the testing, but an irrigation company representative also helped with the testing and measurement of the catch-cans.

Regulating pressure saves water

The second improvement made at BMG was the use of pressure regulators. Another issue on some parts of the farm was the difference in pressure in laterals within irrigation shifts and drainage of the laterals, resulting in air in the system damaging the sprinklers on start up. This was the result of adding to sections of irrigation over the years, elevation changes and incorrect initial irrigation design.

To improve this without major site works, pressure regulators with built-in check valves were used. First Sam and Charlie mapped the pressure of each lateral in the problem area of the farm to make sure the pressure regulators should work at the desired pressure. Once the flow and desired pressure and sprinkler type were known, the regulators were selected and installed on a shift.

"The difference was immediate," Sam said. "The water now starts up and shuts off immediately once the shift changes. There are no more leaking sprinklers and the pressure is even from end to end."



Surface maps from catch-can irrigation testing at BMG. Left: below-standard DU and CU and right: acceptable levels.

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- **Goulburn-Murray Water Connections Project:** Main Contractor (JV with Transfield Services) responsbile for the delivery of Stage 2, which commenced Jan 2013, of the $2 billion program of irrigation modernisation works (formally NVIRP) including the planning, design, scheduling and the procurement of services in the Goulburn-Murray Irrigation District, over a 5 year period.
- **Goulburn-Murray Water (Vic) – Hattah Lakes Environmental Flows Project:** Construction of seven 750mm pump columns, a 2100mm RCP, 900mm PE branch pipeline, large regulating structures, penstock gates and levee banks.
- **State Water Corporation – NSW Metering Managing Contractor:** Planning and installation of over 1200 river and groundwater extraction meters.
- **Coliban Water - Raw Water Supply System, Serpentine Water Treatment Plant:** Construction of above ground 600kl storage tank, pump station and associated pipework.

With thousands of litres contained within the lateral lines on BMG, a significant amount of water is being saved on a daily basis through reducing the losses on start-up and shut down.

Modifications seen as an investment

These modifications have come at significant cost, but Sam and Charlie believe that these improvements to their farm are an investment which will be repaid over a couple of years through a reduction in pumping time and fertiliser, combined with a more even crop and improved yields.

The time that Charlie and Sam invested into the improvements, although small, was one of the most valuable contributions. For them to see the difference in the catch-cans and the pressure of different laterals really hit home the benefits that could be made by improving things on their farm. The other important factor was the irrigation industry's willingness to assist in the testing process and obtain the correct sprinklers and fittings required to do the testing correctly.

ROHAN PRINCE, DEPARTMENT OF AGRICULTURE AND FOOD, WA

Craig Nylund and Sam Calameri inspecting the performance of sprinklers during testing at Baldivis Market Gardens

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Making the change – succession planning for the family business

Family business owners work long and hard and deserve to enjoy the fruits of their labours. But when it comes time to retire or move on to something else, what have they got to show for it? There are a number of issues to consider whether you are handing over management responsibility, ownership or both. In this article, succession planner and business coach, Harry Kras and Russell Cummings explore how you can ensure you have a financially secure and enjoyable retirement.

NOT IF BUT WHEN

Where will your business be in five to ten years, or when you decide to spend your time doing something else? Exiting the business is not a question of if rather it is when, and you can benefit from forward planning. Business owner-managers considering exiting their business have two options: transfer (continuity of the business) or termination (cessation of the business).

If you choose to transfer the business, you can:

- transfer to co-owners or unrelated partners – a 'buy-sell agreement' makes it easier
- transfer to related parties (usually family members) – succession planning is needed
- transfer to staff (usually long term employees with the ability and financial resources) – consider the implications
- transfer to third parties – making the business 'sale ready' is critical
- transfer management of the business while retaining ownership of part, or all, of the assets.

Which of the above five options is most likely to apply to your business when the time comes for you to consider making an exit?

The main reasons for exploring exit options and undertaking business continuity planning are to maximise the realisable value of the business and to provide business owners with some peace of mind. This applies whether the business is sold to third parties, partners or employees, or taken on by willing and able family members.

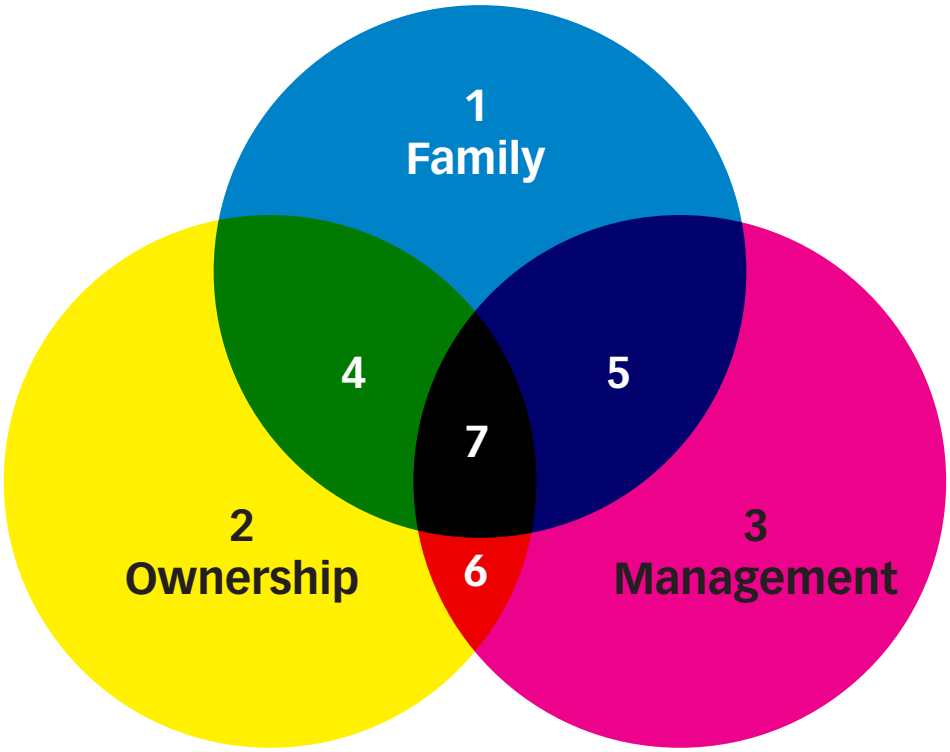

Figure. Perspectives about the family business and its future ownership and management differ depending on your view of the world.

MAIN BENEFITS OF CONTINUITY AND SUCCESSION PLANNING

There are a number of benefits in maintaining continuity of the business and succession planning. The main ones are as follows:

- increase the economic value of the business and provide owners with considered exit options and strategies
- safeguard the long term health of the business and revitalise strategy
- identify, prepare and install successor(s) and map out roles of other family members
- protect and reward loyal employees and perpetuate employment opportunities
- provide financial security for founders and their spouses in retirement
- make the most of family assets, preserve wealth and give opportunities to children by passing on rewards of ownership.

DO YOU HAVE POTENTIAL SUCCESSORS WHO ARE BOTH WILLING AND ABLE?

To have a successful succession, you must ensure that there are willing and able successors (management and/or ownership) to take over the business based on agreed timetables and conditions. Transferring the business to successors is about creating a shared vision for the future of the business and working co-operatively during the transition period to achieve expected results. Simply, it is about creating a win-win strategy based on a genuine partnership.

It is important that you understand that there are a range of different perspectives and that this will often colour their (and your) view of the world and provide you with different challenges.

The figure highlights seven different perspectives based on whether someone is:

- family
- management
- an owner.

It also illustrates the intersections between each circle of influence.

The parties in the family business system have differing perspectives depending on which of the segment they belong to.

1 Non-working family members who don't own shares
2 Investors who neither work in the business nor are part of the family
3 Employees who neither own shares nor are members of the family
4 Family shareholders who are not employed in the business
5 Family members who work in the business but are not owners
6 Non-family employees who own shares
7 Family members who own shares and work in the business.

The people in each segment have their own view of the world, with different expectations, values and rules. When conflict arises it can often be traced back to differences in perspectives and the issue can be addressed by going back to the rules of that segment.

Take a few minutes and draw three interconnecting circles (a Venn diagram) and plot where you and your family sit. Think about the issues that arise for each person.

The common issues include:

- How do we equitably reward family members who have returned to the business/farm and have actively grown the assets for others (often at low wages)?
- How do we hand over management? What is our workforce succession plan?
- How do we reward long-term employees who have contributed greatly to the growth of our business?
- How we extract capital without burdening the business?

WHAT DO I DO?

You can't deal with these issues until you are clear about what you and your family want to do in the future.

Take a few minutes and write a page in answer to each of these questions:

- What do I want for myself?
- What do I want for my family? What does my family want?
- What do I want for my business?

If selling the business is the main option, then there are several questions to consider:

- Is your business your superannuation? Where will your financial security in retirement come from?
- Do you know what your business is worth? Try 'buying' it and you'll find out.
- What creates value in your business?
- Who would buy it and would they pay a premium price?
- What future value would they see in the business?
- Do you know how to make your business sale ready to maximise its value?
- Would your business pass a due diligence process?
- Do you propose to get professional advice?
- Have you implemented risk management/ contingency planning measures?
- What will you do following the sale? What does your 'future diary' look like?

If transferring the business is your primary option, then you need to develop a succession strategy and plan that has elements of transferring ownership and management. The earlier you start on this process the better as there can be legal and taxation implications to transferring assets, structures to establish and management experience to gain. This can often be a five- to ten-year process.

Transferring a business can be accomplished more effectively if you fully understand the process and have planned it well in advance. Planning the transition process not only maximises the sale price, but also increases the likelihood that you can make a timely and graceful exit. It enables you to feel in control because you have a clearer idea of where you are going and how you propose to get there.

INFORMATION

This article describes some of the issues you will encounter when considering succession planning as well as some questions to ask as part of the process. Remember that succession planning is a complex process and you would be wise to seek professional help. You can also find out more by visiting the Family Business Resource Centre on www.fbrc.com.au or other similar websites.

For information on a range of leadership and business issues affecting horticultural businesses, visit www.horticulture-nextgeneration.com.au - the website of the Horticulture - the Next Generation Program.

Harry Kras is a dedicated Family Business Consultant - contact him at hk@fbrc.com.au or visit the Family Business Resource Centre at www.fbrc.com.au

Russell Cummings is a Business and Leadership Coach and is the Project Leader of the Horticulture - the Next Generation Program. Contact him at russell@horticulture-nextgeneration.com.au or visit his website and blog at www.sbdbusiness.com.au

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HARRY KRAS AND RUSSELL CUMMINGS

BANKING WATER FOR THE FUTURE

Australia should prepare now for dry times ahead by 'banking' its water underground when rainfall is plentiful, according to a recent scientific study by Andrew Ross of the National Centre for Groundwater Research and Training (NCGRT).

According to Andrew, Australia needs to start thinking of surface water and groundwater as a single resource – and managing them together, in an integrated way, over time.

Floodwater is a potential source of water for storing underground. This photo shows flooding along Mirrool Creek in southern NSW in March 2012. Photo courtesy Murrumbidgee Irrigation.

Water banking a protection against boom and bust climate

His research points to the benefits of tuning water management to our climatic cycles and to harness the power of floods to help us to deal with drought. That means banking surplus water underground during wet periods and bringing it up for use during dry times. Water banking could be applied at a national scale, taking advantage of the wet/dry climate cycle and the immensity of the country's network of underground aquifers.

As an example of the protection afforded by water banking, in California one water bank holds up to 800 GL for its members; another has released 750 GL back to its members over a recent three-year period.

Water banking is an option that can augment the natural processes of water storage in the landscape, avoiding evaporative losses. In the Murray-Darling Basin up to 3000 GL of water a year evaporates from surface water storages.

Other advantages of water banking are that it can help environmental water managers by allowing them to synchronise supply with specific environmental watering requirements and help the development of water markets by bringing diverse sources of water under common rules of use and trade.

"Historically Australians have relied on dams to provide water for agriculture and cities. This strategy is not sufficient to cope with increasing climate variability or droughts as demand for food and water grows. Water banking can help ensure that there is enough water both for food production and the environment in the MDB – rather than having to close down irrigation when drought hits," Andrew explained.

How much storage?

Although the volume of storage underground is sometimes unknown, vast networks of aquifers such as those in the Great Artesian Basin and the MDB can probably store more than we require.

As an indication of this potential, about 45 GL of water is already stored underground in the Burdekin region of Queensland every year – for use in agriculture and horticulture – and in Orange County California around 300 GL is stored a year, enough for the annual household use of 2.3 million people.

While some people argue that there is no spare surface water to store underground, this ignores hundreds of gigalitres per year in dam spills and floodwater, recycled stormwater and wastewater, irrigation drainage and water entitlement sales.

Objections that storing water underground costs more than storing it on the surface fails to account for the high engineering and environmental costs of dams and reservoirs and the fact that on the surface a third or more per year can be lost as a result of evaporation.

Consistent with rules

Any move to water banking would have to be consistent with national water management principles and guidelines and based on an assessment of the broader impacts of water banking arrangements. In other words, every decision to bank water underground needs to be based on careful analysis of local needs, as well as the suitability of local geology and hydrology. It will be important to ensure the environment is not adversely affected – indeed, it may even benefit from increased groundwater storage.

Good management of groundwater banks also requires some changes to current water management practices. When Australians deposit water in an underground water bank they generally do not retain any legal ownership rights, or have any guarantee that they can recover their water. These rights and guarantees need to be established, Andrew points out.

Also, restrictions on how much of their water entitlement they can carryover from one year to another prevent Australians from saving enough water to buffer them against the next drought. Extended carryover could be developed, with rules to prevent excessive aquifer drawdown during droughts.

According to Andrew this is similar to the way we view banking money so it is available when we need. And we stockpile many other things, like grain or minerals, so there is always a reliable supply on hand. Why should water be any different?

The key message from Andrew's research is that it is time to start banking our water now – before *El Nino* brings us another drought.

For information go NCGRT website www.groundwater.com.au

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Irrigation in WA

When there is a story about irrigation in the media, especially in Australia's east and south-east, the Murray-Darling Basin gets the lion's share of the headlines. Rarely do we hear anything of irrigation in other places such as Tasmania and WA, which both have vibrant sectors. In this issue of *Irrigation Australia* we take a look at irrigation in WA, which is characterised by a dynamic urban sector, big plans for using recycled water in future, and an agricultural sector that is based on both traditional and non-traditional crop production.

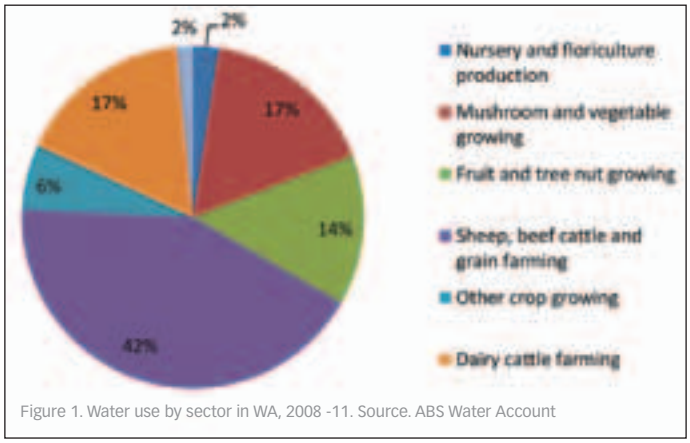

Figure 1. Water use by sector in WA, 2008 -11. Source. ABS Water Account

WATER IN WA – A SNAPSHOT

This summary of water use in WA is from the 2010-11 Water Account published by the Australian Bureau of Statistics (www.abs.gov.au). Some of the features are as follows: gross product per GL of water is high compared to other states; household water consumption is high compared to that in other states, and the price of water to those households is low; the gross value of irrigation production was $805 million, compared to a national total of $12.9 billion; and, perhaps unsurprisingly, water consumption by the mining sector is high (264 GL) in comparison with the national total of 540 GL.

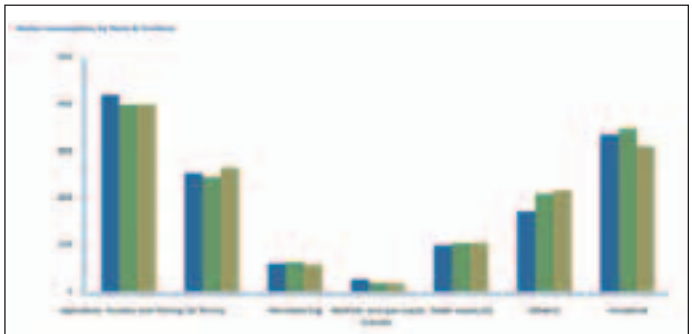

Figure 2. Water use in the agricultural sector, 2010 - 11. Water use for livestock and grain farming is the same as the national average. A large proportion of this water is used to irrigate pasture. Source. ABS Water Account

Key numbers from the Water Account are:

- Water consumption in WA was 1,369 GL in 2010–11, a 1% decrease from 2009–10 when water consumption was 1,386 GL.
- Total water consumption per capita was 583 kL, just below the Australian average of 590 kL.
- The Gross State Product per GL of water consumed was $137 million/GL, the second highest of the states and territories, above the Australian average of $99 million/GL.
- The average water price paid by households was $1.75/kL; this was the equal second lowest in Australia and well below the Australian average of $2.44/kL.
- Household water consumption per capita was the third highest of any state or territory at 132 kL/per person, well above the Australia average of 75 kL/person.
- The gross value of irrigated agricultural production was $805 million in 2010–11, up from $757 million in 2009–10.
- Agriculture used the largest volume of water (319 GL or 23%), followed by households (310 GL or 23%). This was followed by mining, which consumed 19% or 264 GL of total state water consumption; manufacturing, 57 GL or 4%; electricity and gas supply, 18 GL in 2010–11.
- Distribution water losses were 99 GL or 16% of total distributed supply.
- The use of reuse water increased slightly from 17 GL in 2009–10 to 18 GL in 2010–11.
- Rural distributed water revenue accounted for $7 million or 1% of total distributed water revenue in 2010–11 for WA, the lowest percentage of states and territories that received revenue from rural distributed water.

Recycled water a priority for the future

It's no secret that water storages have been under great challenge in WA for over a decade. In December 2012 the total volume stored in the dams supplying water to the Integrated Water Supply System (Perth, Mandurah, Pinjarra, Harvey and the Goldfields and agricultural regions) was at 32.4%; and since July 2001, storages have been above 50% once, in 2009-10.

As a result, a priority for the state has been to access alternative water sources. Historically, bore water has been used by many households in Perth for garden water, and a desalination plant has recently come on stream. Another option being developed by the Water Corporation is the increased use of recycled water.

The key aim of this expansion is to ensure that there is enough water for the state into the future. Part of this involves addressing the challenges of WA's drying climate and growing population and minimising environmental impact by using less water. In response, in 2009 the Water Corporation worked with the community to develop the Water Forever plan to help communities become more climate resilient. Since then the Water Corporation has said that it has progressed well with the plan, thanks to collaboration across state and local governments, business, industry and the community.

The key to the plan is developing a portfolio of options to help manage demand and supply balance by:

- reducing water use
- increasing water recycling
- developing new sources.

Fit-for-purpose recycled water can be sourced from wastewater treatment plants, the wastewater network, or greywater or stormwater. The level of treatment required depends on the quality of water required for end use and the quality of the water collected.

Some of the uses identified for treated wastewater irrigation include:

- irrigating sports grounds, golf courses and public open spaces
- groundwater replenishment
- garden irrigation
- irrigation of food and non-food crops (e.g. trees, woodlots, turf, flowers).

The Water Corporation operates 79 water recycling schemes across the state, which source water from wastewater treatment plants.

In 2011-12 it recycled 13.6% of wastewater (about 21 GL) with 10.2 GL being used to irrigate public open space and woodlots. About 1.2 GL of recycled water was delivered as part of the Groundwater Replenishment Trial in 2011-12. The advanced water recycling plant, which was built for the trial, further treats wastewater to drinking water standards and recharges it to groundwater supplies for potential future use.

WHAT'S NEXT?

The Water Corporation views recycling as an essential part of maintaining a reliable, sustainable and safe water supply and continues to work towards increasing the amount of water that is recycled throughout the state.

Acknowledgment. This article has been taken from material that appeared in the Summer 2012-13 edition of *The Overflow.*

Northern Australia is the location of the largest sustainable supply of Indian sandalwood in the world.

Sandalwood – growing industry for northern Australia

One of the more unusual crops being grown successfully in WA – on the Ord - is Indian sandalwood *(Santalum album)*. Plantations have been established by Tropical Forestry Services Pty Ltd (TFS), a WA company that manages them on behalf of retail and institutional investors. In fact, TFS has the distinction of managing the largest sustainable supply of Indian sandalwood in the world. It has 7000 ha in WA, is currently developing 3000 ha in the NT and is looking to expand into Queensland.

In this article John Doble, water manager with TFS and based at Kununurra, provides some background to sandalwood and its irrigation management challenges.

Sandalwood trees are established between host trees, which are irrigated and managed carefully. These host trees will support the sandalwood trees during its establishment phase of fifteen years.

Indian sandalwood is a hemiparasite. This means we plant the sandalwood with up to five host trees, e.g. *Sesbania, Cassia* and *Dalbergia* spp., which will support the sandalwood throughout its establishment phase of fifteen years. It is after this period that trees are harvested for their oil so the enterprise is a long-term proposition.

The success of the sandalwood depends on how well the host trees are managed. This means that we pay lots of attention to irrigation techniques and scheduling for the host species. Around half our plantations Australia wide are on drip irrigation and half are on surface (furrow) irrigation. We also have plantations that we establish on temporary tape for two years and convert to furrow in year 3. The water sources for our irrigation vary – from Lake Argyle (WA), the Burdekin (Queensland) and underground (NT).

The decision whether to use furrow or drip is very site specific and based on a number of factors:

- soil type – where we have large areas of uniform soils, surface irrigation is preferred
- availability of water – where water is limited, we use drip
- control – in some areas we prefer drip because of the superior control it gives over water application and the enables us to target nurturance
- cost – a important factor in the choice as drip is seven times more expensive to develop and run.

We have harvested small areas of trees already and intend to harvest larger areas each year from now on. We will be milling the harvested material in Australia for the oil and wood products, e.g. for cosmetics, pharmaceuticals, carving materials and incense.

The labour requirements of a sandal wood plantation change significantly over the 15-year

Above: One of the pump stations supplying water (2200 L/sec) to 1500 ha trees that are drip irrigated.

life span. The initial year of establishment is the most labour intensive as most of our properties are planted by hand. There is a lot of casual labour required as it is a seasonal work load. In Kununurra we have around 30 permanent staff and 60 casuals during the season.

As far as managing the irrigation system is concerned, a lot or maintenance work is required on the drip irrigation throughout the year, and we have six permanent and around ten casual irrigation staff at any given time.

IRRIGATION CHALLENGES

Many of the challenges we face are similar to those all farmers in remote areas have to cope with, including a lack of skilled staff, staff retention, expensive logistics and significant delays on parts and materials.

From an irrigation perspective, the different soil types in our plantation on the Ord provide the greatest challenge. The soils here not only change at surface level but also down deep. This is an issue for us because we are growing trees rather than annual crops such as rice which have much shallower roots. Because the root systems on the trees go much deeper we face challenges such as infiltration and targeting root zones. This is especially relevant for our drip irrigation in the later years where we are trying to charge water down deep.

One method is to establish on temporary tape then convert to surface. With this method we are not wasting water down deep and reduce overwatering the trees in the early stages.

We have done a lot of research on pulsing techniques with tape, which has overcome some of our earlier issues of complete soil saturation for an extended period of time. As with most crops, it is important to encourage the plant to search for water to develop a strong healthy root system. This plays a large part in my irrigation scheduling over the first 3-4 years of the trees' life.

BRIGHT FUTURE

There are massive opportunities in the future for irrigating sandalwood. TFS is a relatively new company and research and development is a huge part of our growth and success. As we discover new production techniques our irrigation management skills and knowledge will develop. We are lucky enough to have a management team with a broad range of skills enabling us to challenge conservative irrigation practices within the forestry industry.

JOHN DOBLE, WATER MANAGER, TFS, KUNUNURRA

Adopting drip irrigation to cash in on trash blanketing

The benefits of trash blanketing in sugar cane are well known to cane growers and those who service the cane industry. Protection from soil erosion, weed control and improved soil health are some of the reasons that harvesting green has increased from a virtually non-existent practice to over 75% being harvested green in some regions in less than 30 years.

Not everyone, however, has been able to reap the rewards of trash blanketing. Many growers who rely on surface irrigation on low graded blocks have not been able to easily change from cane burning to green harvesting.

Surface irrigation presents a few challenges when it comes to trash blanketing, the most apparent one being that when cane furrows are filled with residual cane leaves and tops, it makes it very difficult for water to run through the furrow. The solution is either higher inflow rates or deeper flow depths.

A University of Southern Queensland study in 2002 found that there are some issues with this solution, e.g. losses to deep drainage increase, with the maximum loss expected in low infiltration soils at moderate furrow lengths. When green harvesting practices were adopted, the maximum furrow length that could be achieved with less that 15% deep drainage percolation was reduced by 50 to 175 m, depending on soil type.

Growers faced with either increasing pumping capacity or reconfiguring their farm blocks have to evaluate the impact of this extra water requirement on their crop. One of the major benefits of trash blanketing is increased soil moisture retention. When this increased volume of water is applied, however, trash blanketing can work against the ratoon crop, causing waterlogging and damage by fertiliser loss due to de-nitrification and leaching.

A response from a number of growers faced with these challenges has been to change their systems from furrow to subsurface drip irrigation (SDI). The drip tape is generally buried 30 cm below the surface and can be used for up to 20 years. It delivers water and fertiliser direct to the active root zone of the sugar cane, with irrigation water being applied often, often daily in small amounts. This not only reduces the potential for waterlogging but also increases irrigation and fertiliser control to maintain or maximise yield and CCS potential.

Since the first SDI system was installed in Australian cane crops more than 20 years ago, growers and industry have refined the technology to provide an irrigation solution that is not limited to odd-shaped blocks or unique applications, but has proved itself as an economically viable irrigation solution for large scale sugar cane farms. Beyond water conservation and efficiency, many cane growers are adopting drip irrigation to meet the growing pressures of labour constraints, environmental challenges and the need to increase crop optimisation.

While the benefits of drip irrigation are obvious - less water use, more effective irrigation control and a reduction of labour requirement - there are significant capital costs involved with installation and these benefits have not always been enough incentive for a grower to change their farming practices up until now. As fertiliser costs increase and growers seek to reap additional benefits such as the ability to trash blanket, a tipping point is emerging that is causing many cane growers to adopt drip irrigation.

MATT CLIFT, PRODUCT MARKETING MANAGER, JOHN DEERE WATER

The benefits of green trash blanketing in sugar cane are well documented, however, it can be a challenge with crops that are furrow irrigated so a solution has been to convert to subsurface drip.

A new app for looking at the weather

A relatively recent innovation has been the development of Apps to support decision making in all sorts of areas, including agriculture.

In January this year the Australian CliMate iTunes App for farmers was released, with a web-based version due for release in March. This App, which is free, is designed to help farmers make with better decisions about their farming operations based on recent weather and likely climate probabilities.

Using the App, farmers can quickly interrogate the last 60 years of daily rainfall, temperature and radiation data for their location. Seasonal forecasts are provided based on current ENSO conditions. It also calculates heat sums and estimates soil water and soil nitrate accumulation.

The App was developed by the national Managing Climate Variability (MCV) program to help farmers make sense of past climate statistics and forecasts for their own location, to better manage their business.

The question-based logic in CliMate is designed to suit anyone who uses probabilities of weather events in their decision making, including, of course, irrigators. App user, Mathew Pitt, a farmer with mixed enterprises from Tasmania, says that it simplifies the ability to do 'what if scenarios' when assessing options, and it has the ability to give a look behind in the current season for things other than rainfall, e.g. temperature.

The software for the App was developed by David Freebairn and David McClymont from the Managing Climate Variability R&D Program and builds on Bureau of Meteorology data and the Silo database developed by the Queensland Government. It borrows ideas from a range of climate tools developed by other government agencies, including decision support tools recommended on the website www.climatekelpie.com.au.

The seven key tools of CliMate are:

1. How often? What is the chance of planting rain based on an amount of rainfall over so many days? How often is a heat sum achieved in a period of time? What is the probability of temperature being below a critical level for germination or flowering?
2. How hot-cold? When determining an ideal sowing date, when are heat and cold stresses lowest for the optimum flowering time?
3. Season's progress? When adjusting inputs during a crop or pasture season, how does the current season compare with previous seasons in terms of rainfall, temperature, heat sum or radiation?
4. How wet? N? How much water and nitrate have I stored over the fallow? This may help me adjust inputs to better match yield expectations.
5. How likely? Based on current ENSO conditions, what is the probability that rainfall or temperature is greater than or less than key thresholds (e.g. terciles, median) and how reliable have these forecasts been in the past?
6. How's El Nino? What is the current ENSO status based on key atmospheric and oceanic indicators? What is the Australian Bureau of Meteorology's interpretation of this?
7. How's the Past? What have been the monthly and annual rainfall and temperature summaries in the past?

CliMate can be downloaded by searching for 'Australian Climate' in the App store.

Online and up to date

Innovative use of digital technology, including social media, has broadened the scope hugely for getting information out to interested audiences, and those who service the irrigation industry have been quick to recognise this potential. One example is the use of technologies such as YouTube to reach a national (or global) audience quickly and cheaply. Recently the NSW Department of Primary Industries (DPI) has started featuring its WaterSmart Program on its YouTube channel,

Three videos highlight how farmers and government are working in the Sydney basin to boost agriculture and protect the environment by better using water and nutrients.

The videos show how a dairy farm in Camden, a hydroponic truss tomato farm in nearby Austral and an award-winning commercial nursery in north-western Arcadia are changing their irrigation management. As a result these farms now contribute to annual savings of 5,900 ML of water in the Sydney basin.

These savings have been achieved by helping farmers put in more efficient irrigation systems and Australian Government's purchase of water licences in the Hawkesbury-Nepean catchment.

Financed by the Australian Government's Water for the Future Initiative and the NSW Government Climate Change Fund, DPI staff worked with growers to deliver 131 water saving infrastructure upgrades – 92 river water irrigation and 39 town water projects.

You can watch the videos at website www.youtube.com/user/NSWAgriculture or via www.dpi.nsw.gov.au/agriculture/resources/smartfarms

Farms featured are:

- University of Sydney – Westwood Farm. The farm produces irrigated fodder crops for a training and commercial dairy herd. New infrastructure is saving river water and protecting the environment.
- Hok Lam – Greenhouse truss tomatoes. This hydroponic farm has cut town water use by 35%. Run-off is captured, filtered and reused. As a demonstration farm for the project it's now showing other growers how to integrate water efficiency and production values.
- Cameron's Nursery – A commercial garden nursery in Sydney's north is harvesting rain water and treating dam water to save on town water use. Their water-saving innovations have sparked community, industry and government interest.

ONLINE TECHNOLOGY TAKEN UP BY TRAINING ORGANISATIONS

For organisations running courses, a key advantage is that trainers don't have to be situated in the same location to run a course as students can participate from all over the world as long as they have a computer and internet access. This has particular advantages for industries such as irrigation, which has members that are situated all around Australia, many in regional and remote areas. Once, this would have made participating in a course almost impossible.

IAL uses an online program (Moodle) to facilitate its Recognition of Prior Learning process for industry professionals who are seeking certification.

The program allows people to upload samples of evidence required as part of the process. An IAL qualified assessor, usually based near the applicant, then takes this evidence and conducts any interviews necessary as a part of determining whether they meet the grade.

To find out more about this process, contact Debbie Atkins, phone 1300 949 891, email debbie.atkins@irrigation.org.au

Hok Lam explains how upgrades to his irrigation system have saved water in the YouTube video

Getting to know soils better

A knowledge of soils goes hand in hand with irrigation management. Soil type governs at what rate irrigation can be applied efficiently and effectively and without waste, and it also influences how much water can be held within a plant's root zone.

With a new iPad app called SoilMapp we can get to know soils better. The app allows users to access Australia's national soil databases in real time, online. These databases contain the best and most up-to-date information for soil at any location in the country. Irrigation managers and advisors can access information such as soil depth, acidity, salinity, soil carbon, soil water holding capacity and other attributes to help make on-the-spot decisions about farm and irrigation management.

The information in the databases is from the Australian Soil Resource Information System (ASRIS) and APSoil, the database behind the farming systems model, the Agricultural Production Systems SIMulator (APSIM), which is used worldwide. Both these databases are stocked with contributions from thousands of individuals and organisations including the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), state and territory agencies responsible for land resource assessment, Geoscience Australia, and soil research and industry groups. The databases contain information about approximately 85,000 samples from nearly 15,000 locations, some dating back to the 1950s.

The app has been developed by the Australian Collaborative Land Evaluation Program (ACLEP) and CSIRO, with funding from the Grains Research and Development Corporation (GRDC), because understanding soils is essential for sustaining healthy, natural environments and productive agricultural landscapes.

Understanding features such as soil type, water holding capacity, salinity and depth puts information essential to efficient irrigation at the fingertips of irrigators and their advisors. Having this information allows better decision making and has the potential to lead to productivity, environmental and economic benefits.

To download the app, go to the itunes website https://itunes.apple.com/au/

Testing first step to product development and innovation

Testing is fundamental to product development, improvement and innovation in any industry, and irrigation is no different. A number of manufacturers have testing facilities in Australia, including Toro, Philmac and Antelco. In this article Craig Jaensch, compliance and testing engineer at the Toro Australia test facility located at Adelaide, explains the role of testing in innovation and some of the testing procedures undertaken.

The test facility has been located in Adelaide at Beverley since 1999; before this it was located at Murray Bridge. The test facility is multi-departmental and is used by the engineering, production, and quality control departments.

A broad range of product testing can be done encompassing most irrigation product available. Testing capabilities include pressure, flow, indoor distribution testing (CU/DU), rotation speeds, long-term endurance testing, adverse conditions (dirty water, sandstorm environments, high pressure), accelerated UV exposure testing and cyclic pressure testing. Testing is conducted to comply with a range of industry, Australian, international and in-house standards.

Even water distribution is an important attribute for irrigation equipment. The photo shows a sprinkler on test at the indoor distribution test rig.

DEVELOPING NEW PRODUCTS

Any product that comes to us either through the new product design process, or a part or product from an external vendor must go through an exhaustive testing process before it is approved for sale. This applies equally whether the product will be sold into the retail or commercial market. If we take the example of a new tap timer being considered for the retail market, the test regime may consist of the following test parameters: time-out, manual operation, reliability, cyclic pressure (water hammer), side load, UV exposure, and head loss. All of these must meet the minimum in-house requirements for the product to be considered for progression.

Product innovation doesn't normally occur out of the blue, rather it is the result of experiment, research, consultation engineering skills and a knowledge of and feedback from the market. The process of developing a new product starts with a product scope defined by the Engineering and Marketing departments, incorporating any new features or innovation required in the project. Sales teams are also consulted to gauge market or field requirements or opportunities.

At other times, random innovation or improvement concepts generated from within the engineering department (or elsewhere) may present opportunity for an entirely new product, or improvements which can be incorporated into an existing product design.

At this stage, a project team is formed and any opportunities to incorporate innovative design ideas or features are explored.

A design concept proposal is created and presented to the project leaders and product managers. Further field consultation may be required at this point to gauge market acceptance of the new product. At times, some great innovation may be possible to incorporate into a product, but if the market doesn't accept it, it won't sell.

Product CAD (Computer Aided Design) design is then undertaken, incorporating product features, including any stress analysis or flow simulation models to confirm the physical strength and efficient water use of a product. The exponential improvements in 3D CAD design software and flow simulation programs over the past 15 years have revolutionised product design and efficiency of irrigation products. Multiple variations or concepts can be simulated in computer models to confirm efficient water use, reduction of head loss and improved product performance without the need to produce multiple, expensive prototype parts.

Once the design has been settled on, a prototype part or parts may then be hand made, a rapid prototype model (3D printing) produced, or custom manufacture undertaken to produce prototype parts to confirm design concepts. At this stage the prototype can be tested within the design parameters and any further design or development opportunities identified.

THE ROLE OF TESTING IN INNOVATION

Product testing in a controlled, repeatable environment is essential to producing consistent test results and measureable changes or improvements, and is a crucial first step in product development and innovation.

Accelerated testing (dirty water, sandstorm environments, UV exposure and high pressure cycles) can identify potential problems which may take a longer time to become evident in normal use. Destructive testing creates baseline data to which other parts can be measured against. Testing in these harsh environments can drastically reduce the testing and development time normally required, as well as quickly identifying whether a new product or material will 'stand the test of time' in the real world.

Accelerated endurance testing also allows faster testing and verification of new, stronger, or wear resistant materials and manufacturing technologies becoming available in a back-to-back test situation. Using our data acquisition system to monitor test programs, we are able analyse the operation of the products 24 hours a day, 7 days a week.

Field testing is still undertaken, of course, under real world operating conditions to confirm our in-house test results, but without testing in the lab we can't get to the real world.

CRAIG JAENSCH, COMPLIANCE & TESTING ENGINEER
TORO AUSTRALIA, ADELAIDE

3D CAD systems and flow simulation software help to produce innovative and water efficient products (in photo: Daniel Martin, testing technician).

CONSIDER HIGH FREQUENCY FERTIGATION TO REACH NEXT PRODUCTIVITY LEVEL: SOIL SCIENTIST

Pulse irrigation with regular application of small amounts of fertiliser (high frequency fertigation) is not just for greenhouses – growers reap major benefits from employing this practice in open field crops too.

This was one of the key messages delivered recently by Israeli soil science expert Dr Avner Silber, who was in Australia as a guest of Haifa and spoke with growers and industry advisers at the 2012 Australian Almond Conference in the Barossa Valley and a number of seminars organised through the almond and nut industries in SA, Victoria and NSW.

Avner, who works with the Agricultural Research Organisation at the Volcani Centre in Israel, said there was a strong synergistic effect' from adopting regular irrigation with small doses of fertiliser and it resulted in better plant growth.

"High frequency fertigation enhances the 'time-averaged' moisture content in the root region, increasing water availability to plants, as well as nutrient availability," he said.

Although some in the industry consider this approach suitable only for greenhouses, he believes that improved results also could be achieved in open fields and with open irrigation.

"Yield gains that follow increases of fertigation frequency are attributed to the improved availability of non-mobile nutrients, especially phosphorus and micronutrients."

Phosphorus is one of the most expensive inputs to apply and was highly immobile in the soil, but he says that by using pulse irrigation and small amounts of fertiliser, plants achieve improved access to the nutrient and better growth.

Regular fertigation also limits concentrations of immobile elements in irrigation water, reducing environmental pollution.

According to Avner, frequent fertigation improved nutrient uptake through two main mechanisms:

- continuous replenishment of nutrients in the depletion zone near soil roots
- enhanced transport of dissolved nutrients due to the increased average water content supplied.

He cautions that it is also important to use the correct fertiliser in the correct manner for optimal results and urged growers to hone their fertigation skills for further improvements in fertiliser use efficiency and crop productivity.

He said efficient irrigation with latest technology injection systems can lead to increased fertiliser use efficiency and, ultimately, reduced total input use.

Dr Avner Silber says that pulse irrigation with regular application of small amounts of fertiliser (high frequency fertigation) benefits not only greenhouses but open field crops too.

The advantages of fertigation through drip irrigation devices outlined by Avner included:

- accurate and uniform nutrient application
- nutrient application is restricted to the wetted area in the root zone
- volume and concentration of nutrients can be adjusted to specific crop requirements
- reduced time fluctuation in nutrient concentrations
- safer irrigation with sewage effluents or mildly saline water
- convenient use of ready-mixed fertilisers, especially micro-nutrients, which are otherwise difficult to apply accurately
- crop foliage is kept dry, thereby retarding development of plant pathogens and avoiding leaf burn

Note. This article was supplied by Haifa Australia.

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IRRIGATION AUSTRALIA 2013 REGIONAL CONFERENCE 28 – 30 MAY 2013

Sharing irrigation knowledge for better outcomes

Griffith will play host to the Irrigation Australia Regional Conference in May 2013, bringing a range of experts, suppliers and water management professionals to one of the most productive irrigation areas in the country - the Murrumbidgee Irrigation Area (MIA).

Located in the Riverina region of NSW, the MIA is renowned as a diverse agricultural food bowl. With a 100-year history in irrigation and a local irrigation industry equipped with a wealth of knowledge, it is a fitting location for our 2013 Regional Conference.

The city of Griffith was born in the early days of irrigation and designed by Walter Burley Griffin, the architect of Canberra. Water management and efficiency have been the key drivers of its development into a thriving agricultural centre, boasting world-famous wineries and substantial irrigated cropping and livestock enterprises. Griffith is also well known for its cultural diversity and cosmopolitan lifestyle.

The theme *sharing irrigation knowledge for better outcomes* will come to life at the 2013 conference, with leading industry spokespeople covering topics such as irrigation delivery system modernisation, urban irrigation and irrigation farming streams, pressurised irrigation, energy efficient irrigation systems, environmental best practice, design software and much more.

Education will be a major focus of the event, and we will be encouraging conference participants to share their knowledge to generate change and contribute to a prosperous future for the irrigation industry.

Insightful seminars and presentations from experts in irrigation, Q&A sessions, practical workshops, optional field trips, a conference dinner and networking opportunities will be highlights of the three-day event.

The conference program has been developed to engage with all sectors of the irrigation industry, but most importantly discuss the challenges and opportunities facing business and the industry over the coming 12 months. The implementation of the Murray Darling Basin Plan and related infrastructure projects and technology will no doubt be a hot topic throughout the conference.

Bringing together irrigation practitioners, suppliers, consultants, advisors, researchers, water and NRM management professionals, researchers and the local community, the 2013 conference will be the one-stop shop for all things irrigation, exchanging ideas and networking.

For more information, contact conference organisers, Sauce Communications phone 02 6953 7382 or visit www.irrigation.org.au

IRRIGATION AUSTRALIA

IRRIGATION AUSTRALIA'S 2013 REGIONAL CONFERENCE

28 – 30 May 2013

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In May 2013, the Murrumbidgee Irrigation Area hub of Griffith will play host to Irrigation Australia's Regional Conference.

The theme 'sharing irrigation knowledge for better outcomes' will come to life at the 2013 conference, with leading industry spokespeople covering topics such as irrigation water system modernisation, urban irrigation, irrigation farming streams, sessions dedicated to specific irrigation methods including drip, centre pivot and surface, environmental irrigation, system design software and much more.

Bringing together irrigation practitioners, suppliers, consultants, advisors, researchers, water management professionals, NRM staff, researchers and the local community, the 2013 conference will be the one stop shop for all things irrigation, exchanging ideas and networking. Tours of both on-farm and infrastructure modernisation will be a feature of the two day program.

For more information, contact the conference organisers Sauce Communications on (02) 6953 7382 or visit www.irrigation.org.au

ENGAGE • LEARN • EXPERIENCE

UP CLOSE

Irrigation Australia Conference will be held this year 29 and 30 May at Griffith. Andrew Kelly, someone familiar to many members, especially in the supply sector, is helping to organise this key event and making sure the program meets the needs of IAL's varied membership. Andrew has worked with a number supply authorities in his career – in fact he has circumnavigated Australia – and is now based in Buronga NSW. *Irrigation Australia* got Up Close with Andrew to find out more about what he has been up to and what we can look forward to from Irrigation Australia Conference.

IA. What are the main roles you have had in your irrigation career?

Andrew. For the last 16 years I have had the role of CEO or Executive Officer and before that, roles in operational management. But it doesn't start and stop there. I have been fortunate to represent irrigation and water users at State and Federal levels. It is a very important and large industry with many stakeholders.

I am now a consultant and IAL have employed me to be a part of the Griffith Irrigation Australia Conference.

IA. You must have seen a lot of changes in irrigation supply management in that time; what have been the key developments as far as you're concerned?

Andrew. The drought initiated a lot of change. We grew with it, and changed our practices, techniques and organisations' structures. Of course, the modernisation to rural areas is significant. The changes to infrastructure and how we deliver water have changed immensely and Australia has become somewhat of a showcase for it. It is not only the delivery companies; farmers have changed infrastructure for efficiency gains, as have urban authorities.

Water is a precious commodity and we have demonstrated that we are a clever country when it comes to saving water and the environment.

IA. Since you've joined the committee organising the Irrigation Conference what are the main things you have been working on?

Andrew. I am on the committee to help with the knowledge I have with irrigation in Australia, IAL and conference organisation. Sauce Communications are the event organisers and we have a great committee of locals chaired by Iva Quarisa. The committee has expertise in all fields of irrigation and water and a knowledge of the Murrumbidgee area.

We have been busy developing the program so all aspects of water are covered and there is plenty to see and do.

Being a regional conference, the town of Griffith will provide a great venue. There is plenty of irrigation and Coleambally is just down the road - different crops, wine region, great restaurants - so there will be a lot on.

IA. Can you give a taste of the program as it will interest members in the different irrigation sectors?

Andrew. As per the norm we have different streams. It is a chance for all the special interest groups to get together and discuss or workshop the issues. We will of course be looking at modernisation systems as well as on farm, environmental water, new technologies for communication, updates with what's happening in each state with supply companies, and urban landscape presentations. We can assure attendees there will be a lot to take in and there are, of course, tours of the area.

IA. Where was your last holiday?

Andrew. Having lived in Northern Australia for so many years, the Kelly family have always travelled south to visit friends and family for Christmas etc. This year we stayed put and family travelled to us - for us that was a real holiday.

YOUR IAL BOARD MEMBERS

TRIBUTE TO JAMES PATRICK MURPHY

12 FEBRUARY 1930 –
23 NOVEMBER 2012

Jim was the son of dairy farmer parents near Wagga Wagga and gained a scholarship to attend Sydney University where he graduated with Honours in Agricultural Science.

He worked for the Victorian Department of Agriculture at the State Research Farm at Werribee, as an Agricultural Scientist and irrigation specialist for virtually all his career. Jim was professional and dedicated. He was a great organiser with an eye for detail and protocol – touched off with that "bit of Irish" that we loved.

Jim found the most effective way to achieve his aims of improved irrigation efficiency and productivity was to work with farm community and industry organisations and he pursued this ideal with great vigour and success.

Jim worked firstly with VIRPO (Victorian Irrigation Research and Promotion Organisation) in the 1960s, '70s and '80s under the guidance of that great mentor Ernest Jackson. His expertise in organising conferences, equipment field days and IAA annual dinners was legendary.

With the coming of the IAA Jim was a foundation member of the Victorian Region and served on its committees in various roles for many years.

Jim Murphy (left) with John Cornish. Jim was committed and hard-working member of the IAL and its predecessor association IAA. Photo taken about 1996.

Together with John Cornish he organised the IAA's first major National Irrigation Exhibition and Conference in Melbourne and laid the foundations for the exceptional event that it is today.

He was a great mentor and a calming influence when running major field days, exhibitions and conferences.

In 1988 he co-wrote and edited the book *Irrigation for Profit*. Jim also served as a national director of the IAA and was treasurer for some years.

Many IAA members will fondly remember long lunches, longer evenings and early mornings in Jim's convivial company. Being an Australian of Irish descent, the concept of a dry anything – town, country, field day or conference simply didn't register – he even struggled with the concept of a dry cell battery! Every field day had a booth.

Jim was respectful to and respected by his colleagues and by the industry and community leaders he worked so well with. He was very proud of his life membership of the IAA awarded in 1996.

Jim is survived by his wife Maureen of 57 years and by six of his seven children and twelve grandchildren.

It was good to know Gentleman Jim. He was a great mate, a true friend. It was distressing to see him suffer ill health over many years. I'm sure he is now happily sitting there with a beer in hand and every horse he backs is a winner.

We will all sorely miss him.

JOHN CORNISH

BREAKFAST AND A LIFE MEMBERSHIP

At the South East Queensland Region's Christmas breakfast in December last year, long time IAL member, Sid Dyer, got a bit more than bacon and eggs for breakfast; he was presented with his Life Membership plaque. Board members Simon Cowland-Cooper (left) and CEO Ian Atkinson (right) did the honours in presenting the award to a very proud Sid.

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Potentiating energy efficiency savings

In Part 1 of this two-part series, Tallemenco's Rob Welke looks at how irrigation energy efficiency audits can not only identify huge energy savings, but create challenges to modify pump system duties to potentiate those savings.

With rising electricity costs whittling away growers' profits and the carbon tax having its impact, demand for energy efficiency audits is increasing. An audit can represent a sound investment, as demonstrated by audits undertaken by Tallemenco on just four farms in 2012, where over $250,000 in annual electricity savings were identified.

In doing so, however, there have been some interesting challenges for pump duties on those irrigation systems given the need to make changes to pump duties to potentiate energy savings.

There are three main areas where energy can be saved in an irrigation system, as follows:

- most obviously, by replacing an inefficient pump with a more efficient one
- by operating a pump at Best Efficiency Point (BEP)
- by optimising irrigation system hydraulics and operating the pump at a lower head.

By far the biggest savings can be made by optimising system hydraulics and operating the pump at lower head. However, identifying potential energy savings on an irrigation system is one thing, but potentiating those savings is another.

In other words, how do we modify the pump duty to potentiate those identified energy savings?

Let's consider the first two of the above scenarios in turn.

Below: An energy efficiency audit which identifies where energy savings can be made is one thing. Modifying pump duties to take advantage of potential energy savings is another. Photo: Rob Welke

PUMP EFFICIENCY

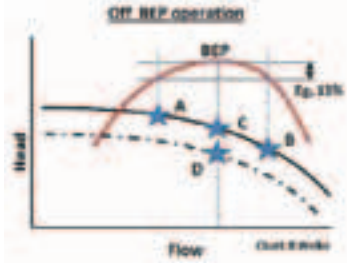
If a pump with 60% efficiency is replaced with one with 75% efficiency, that's a gain of 25% in electricity costs. Going one step further and replacing the motor with a High Efficiency (HE) motor may yield another 1%. All that needs to be done is directly replace the pump/motor with one of the same H/Q duty point.

Case study. In a hydroponics lettuce farm audit in 2012, twelve poly pumps with 43% overall efficiency were recommended to be changed to 316SS pumps with 56% total efficiency, saving the grower 30% of his annual electricity costs. The Return on Investment (ROI) was just over two years.

OFF BEP OPERATION

If a pump is operating away from its BEP, it's the same as running with lower pump efficiency. Even worse, if it is operating too far right from BEP, problems such as short bearing and mechanical seal life may already be evident. However, making that pump perform near its BEP is no simple task. Below is one scenario that can apply to non-VFD applications.

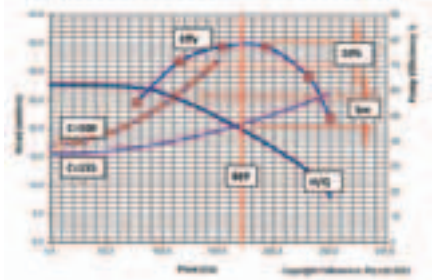
Scenario. Firstly, if it is assumed that the pump was designed to operate at BEP in an irrigation system, it is important to identify possible reasons why the pump may be operating off BEP. If it's operating to the left of BEP, look for reasons why the pumped head has increased, e.g. increased pipe friction due to bio fouling (very common), a part-filter blockage or a partly closed valve on the pipe main, buried and lost. If the pump is operating to the right of BEP, look for recent changes in irrigation sector flows. Emitter orifice sizes may have been inadvertently or deliberately increased or the number of emitters increased. Reversing both these scenarios should bring the pump back to BEP operation.



Pumps running to the left of BEP (point A) or to the right of BEP (point B) require different hydraulic considerations to restore energy efficiency. Ultimately, it may be just as economical to replace the pump with correct duty. Figure: R Welke.

Case study. At a SA farm, a 450-diameter poly rising main installed new with a Hazen and Williams C value of 155 soon degraded to C value of 100 with heavy bio growth inside the pipe. Regular pigging of the pipe helped, but it was not economical to continuously pig, so ultimately the client had to be content with high friction pipes. . It was not economical to duplicate the rising main. The problem was that higher pipe friction caused the pumps to run at a higher head to the left of BEP, producing a double whammy energy efficiency impost of 10% pump efficiency plus 5 m (25%) increased operating head, a combined total of 43%. In this case, pump replacement with a revised duty was a viable remedy.

While this is an extreme case, it serves to illustrate how deteriorating pipes can lead to energy inefficiency. In irrigation pipes, bio film will always increase pipe friction well beyond manufacturer's specification, and usually within the first year. So, when designing pipelines, it's a good idea to devalue manufacturer's pipe friction by up to 15% so that the irrigation system merges in time with the energy efficient sweet spot and maintains irrigation efficiency too.



Rising friction due to bio fouling in pipes can cause pump duty to change significantly. In this case, pump efficiency fell 10% and pumped head rose 25%, totalling 43% energy efficiency losses. Figure: R Welke

INFORMATION

For more information contact Rob Welke at Tallemenco Pty Ltd, email rob@talle.biz, phone 0414 492 256. Tallemenco's website www.talle.biz

Note. Part 2 of this article will be published in the Winter (May) edition of *Irrigation Australia.*

ROB WELKE, TALLEMENCO PTY LTD, ADELAIDE

Soil characteristics and their effect on sports turf irrigation efficiency

Irrigation efficiency is part of the overall improvement in managing irrigation systems to meet water budgeting requirements. Crop factors, irrigation scheduling, irrigation sprinkler performance charts, DUs and CUs, moisture sensors and wetting agents are tools to help improve irrigation performance.

As a turf manager following all the checks and balances for maximising the systems output, it can be frustrating to produce as close as possible to an even coverage only to have, after all the best efforts, patterns with dry patches and uneven turf growth still appearing.

While even water application is obviously important, the soil profile determines how evenly water enters and moves through that profile.

SOIL PROFILES

Water moves through the soil profile under the influence of gravity. What determines how quickly or slowly the water travels down through the soil is the size of the pore spaces.

Large soil particles produce large pore spaces in which water moves freely (sand). Small soil particles produce small pore spaces where water moves slowly (clay and silt).

If pore spaces vary then the water will channel down the larger ones first creating what is known as preferred pathways. This can be simply explained as the path of least resistance. You can see this after a rainfall event of several hours where 10 mm of rain has fallen and plugs are removed or on bare soils the surface is scrapped off by foot. Underneath, dry soil can be seen a couple of millimetres below the surface.

Where did that water go? Even when the weather is very dry, evaporation rates are not high enough in one hour to remove the water, especially when humidity is generally high when it has or is about to rain. And it cannot be used by the plant in such a short period of time. Where it went was down through preferred pathways. These pathways consist of coarser soil particles, plant roots or rhizomes, and the process of making them is referred to as channelling.

COMPACTION

Playing surfaces are continually subjected to compaction, i.e. when soil particles are compressed which in turn reduces pore spaces. This compaction will affect infiltration rates.

Under wet conditions (saturation) fine particles can be drawn to the surface as they float in the water in a way that is similar to when concrete surfaces are worked up to create a smooth finish. Under these circumstances the playing field surface becomes unstable and susceptible to movement. Footprints or wheel tracks will be seen imprinted in the surface. When the soil dries the surface seals making it difficult for water to penetrate. As a consequence, this creates an anti-wetting profile.

During the summer compacted areas where water infiltration has been affected as a result of sealing are characterised by reduced turf coverage; kikuyu *(Pennisetum clandestinum)* playing fields are characterised by patches of couch *(Cynodon dactylon)* becoming obvious. Compacted areas can be identified by pooling of water on the surface under conditions where rainfall exceeds infiltration.

TEST BEFORE YOU START

It is worth using a little science to investigate soil characteristics before constructing turf soil profiles.

As a first step, have particle size analysed so you know what you are dealing with. This can save money and time when you come to irrigation management. Next, check saturated hydraulic conductivity as this will tell you how soils will perform under compaction.

Saturated hydraulic conductivity is measured by compacting the soil and calculating how much water will drain through it in an hour and how the drainage rate will reduce under increasing compaction. Bulk density is also measured in increments of grams of soil per cubic centimetre. A recommended rate is 1.3 to 1.5 g; if the rate is higher, the soil is more susceptible to compaction.

RENOVATIONS

Of course, in many areas managers have little ability to select soils, however, they can manipulate soil profiles by choosing renovation techniques. While this can be expensive, compaction reduction and uniform soil profiles help improve irrigation effectiveness.

> Irrigation maintenance and design is paramount but without knowing and managing the characteristics of the soil profile, it is impossible to achieve uniform water infiltration.

JOHN FORREST, HORTICULTURE/TURF MANAGEMENT LECTURER, CHALLENGER INSTITUTE OF TECHNOLOGY, PERTH

Far left: Turf covers thins out in compacted areas as a result of reduced water infiltration

Left: This photo shows pooling of water as a result of surface compaction.

Coal seam gas: just another land use in a big country

The controversy surrounding coal seam gas exploration and mining is as alive as ever, and it is an issue that polarises opinion and has the potential to divide communities.

In 2011, the Australian Council of Environmental Deans and Directors asked Dr John Williams, former Chief of CSIRO Land and Water Division, to review the science on coal seam gas. John's report is probably the most independent, disinterested nationwide analysis yet undertaken of unconventional gas in Australia. In this article Andrew Campbell and Steve Turton describe two key findings of the review.

The report, which is entirely uncompromised by either industry or activist-group funding, makes two key findings. One, environmental risks (especially groundwater) are serious and neither decommissioning wells nor replenishing aquifers have been properly considered. And two, this is just another land use that needs to be regulated like the others; it shouldn't be seen as a bogeyman, nor should it enjoy exemptions from laws that other land uses have to comply with.

Williams asserts that thorough, independent risk assessment is essential if policy is to respond appropriately to cumulative impacts — positive and negative — of CSG exploration and production.

John Williams and colleagues conclude with a provocative question:

Do we want degraded and collapsing landscapes? If the answer is "Yes" then we appear to be well on the way. If the answer is "No" then we need to seriously reconsider and re-think how we make decisions about how we use our landscapes.

The approach they recommend is to work out what the landscape can sustain: how much degradation can the landscape incur before it starts to lose function? Current development approval processes should be updated to assess CSG (or any other) developments only on the basis of landscape limits and the expected cumulative impacts of the existing and proposed developments.

ENVIRONMENTAL IMPACTS AND RISKS: DEATH BY A THOUSAND CUTS?

Most community concern to date has focused on potential hydrological impacts. The Williams report finds that risks are indeed significant, especially if:

- storage ponds (holding extracted water) overflow in rain or flood
- large volumes of water from coal seams are released into streams
- dewatering of coal seams lowers the local water table, changes flow in other aquifers, or causes land subsidence
- extracted water needs to be replaced at decommissioning.

It also notes the potential biological impacts of CSG operations include:

- clearing patches and corridors of native vegetation for gas wells and pipelines
- fragmentation of wildlife habitat and isolation of populations
- increased risk of spread of feral animals, predation, weeds and diseases
- contamination or loss of water from aquatic ecosystems.

Many of these potential impacts may be relatively minor if gas well operations are sparsely distributed. In practice, wells are often spaced less than 1000 m apart. Where gas operations impose densely on the landscape, they can be expected to compound each other. They may generate new impacts we can't currently predict.

Storage ponds could overflow in flood: are we prepared?

INADEQUATE REGULATION

Industry and government assurances about environmental management are upbeat. But some environmental, community and farmer groups in Queensland and NSW have raised concerns that on-ground oversight and regulation of the CSG industry is playing catch-up at best.

Many in rural communities have expressed concern about the potential hydrological impacts of coal seam gas.

Williams describes the piecemeal and often toothless regulation across state borders and the exemptions that CSG operations enjoy from, for example, native vegetation laws. In NSW, if CSG projects are defined as State Significant Developments they are exempt from a wide range of controls and approvals required for other land uses.

Queensland has more experience with CSG and its framework is more mature, recognising the issue of cumulative impacts from multiple projects. But it still struggles with analysis at a landscape scale. Neither state has a Strategic Environmental Assessment Plan for CSG, nor has a comprehensive Social Impact Assessment been undertaken.

CLEANER THAN COAL?

One of the main arguments for CSG and other unconventional gases is that they are considerably cleaner than coal. It's true that they don't produce detrimental by-products such as sulphur, mercury and ash. And during combustion they provide twice the energy per unit weight with half the carbon footprint.

But they do produce methane, a potent greenhouse gas with 25 times the global warming potential of CO^2. Assessment of fugitive methane emissions from CSG and shale gas production should be based on robust scientific observation and prediction. No independent Australian field studies have been done to date.

In its greenhouse emissions impact, gas is no better than coal if the gas must be converted into and back from a liquid before it can be burnt. This happens with CSG shipped overseas. But burning domestic gas instead of coal avoids the liquefaction step, and consequently produces less greenhouse gas emissions overall.

Industry claims a 70% reduction in greenhouse gas emissions from burning CSG instead of black coal. A recent NSW Parliamentary Inquiry concluded that CSG emissions are, at worst, likely to equal those from coal.

Again, a full life cycle analysis of CSG operations, including managing the environmental externalities of dewatering and disposal of wastewater, would be required to compare net greenhouse gas emissions with coal or any other energy source.

We need to analyse CSG developments at a landscape scale.

JUST ANOTHER LAND USE

A key conclusion of the Williams report is that CSG is in one sense just another land use. It competes with production of energy, water, food, fibre, minerals, and human settlement, and with the need to maintain biodiversity to underpin the ecological functioning of the landscape itself.

Gas production, just like other existing and accepted land uses, poses risks to the condition of nearby water, soil, vegetation and biodiversity. It has the potential to reduce the capacity of renewable natural resources to supply human, as well as ecological, needs.

The surface footprint of CSG operations to date is modest compared with agriculture, or even irrigation. But superimposed on those it is still very significant, and long-term underground impacts may dwarf surface disturbance. Unresolved technical issues are a legitimate concern, especially around groundwater impacts and issues associated with both the disposal/re-use and replacement of large volumes of water.

ACKNOWLEDGMENT

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ANDREW CAMPBELL, CHARLES DARWIN UNIVERSITY AND STEVE TURTON, JAMES COOK UNIVERSITY

AUSTRALIA'S MILLION-YEAR-OLD WATER

Groundwater in Australia varies a lot in age, adding to the complexity of its management.

The most ancient water so far found in Australia is 1,100,000 years old and comes from a region of the Great Artesian Basin in northern SA. With water this old, the National Centre for Groundwater Research and Training (NCGRT) says that it's obvious how long it will take to recharge if it is used quickly and unwisely.

According to the NCGRT water in the southern part of the Great Artesian Basic typically is aged from 100,000 to over a million years, indicating it is not likely to be recharged any time soon – and must therefore be extracted and used with great care and planning.

The good news is that while Australia has very ancient groundwater, much of it is young – only a few years or decades – which means it is being recharged constantly. There is a downside, however, and that is this means it at risk of being polluted by activities and industries on the surface.

As a rule the older water is deeper than the younger water. An example is Perth, which depends for part of its water supply on groundwater. While some of this is young and is replenished regularly by rainfall, the deeper aquifers contain water up to 35,000 years old.

In contrast, groundwater beneath the Darwin's outer rural suburbs is mostly less than 50 years old – and detailed measurements of its age have enabled scientists to predict its rate of recharge with precision, which in turn has helped the city to set sustainable extraction limits for householders and users.

The upshot of this knowledge about groundwater is that determining its age is a vital tool in managing the nation's water supply. Because groundwater comprises around 90% of the nation's reserves of fresh water this knowledge is becoming increasingly vital, especially where there is competition for its use, as is the case between coal-seam gas developers and farmers in some states

While our knowledge is growing, there are still a lot of blank spots on the map of Australia's water ages. Very often we tap a supply of groundwater without knowing how old it is or how long it takes to recharge. The pressure is on us now to know this before we develop new resources – and to manage existing ones better.

Directors' duties

Water is a complex and highly regulated industry. Operating a business in the water industry involves considerable compliance obligations and risks. With directors facing increasing responsibilities and scrutiny across the board in Australia, it is timely to reflect on some of the key duties that you as a director in the water industry should actively adhere to.

DIRECTORS' DUTIES DO APPLY TO YOU

You need not be a formally and validly appointed director of a large public corporation to be subject to directors' duties. Despite common misconception, directors' duties also apply to:

- those who act in the position of a director or in accordance with whose instructions other directors are accustomed to act
- directors of small proprietary companies
- directors of not-for-profits or charities.

AN OVERVIEW OF DIRECTORS' DUTIES

Your duties and responsibilities as a director may be the result of common law (case law), statute law (Corporations Act 2001), or your company's constitution. The duties of directors of co-operatives or incorporated associations will similarly be determined by the applicable co-operative or incorporated association legislation and their organisation's rules. Many of the duties may overlap and a director's action or inaction may breach more than one duty.

At common law, your duties will include:

- acting in good faith in the interests of the company – giving proper and honest consideration to the company's interests as a whole and reasonably believing that an action or transaction is in the company's best interests
- taking care and diligence – informing yourself about the company's affairs and processes and taking independent and informed decisions
- not acting for an improper purpose – not obtaining personal advantage from company decisions, among other things
- not disclosing confidential information received as a result of your position
- retaining discretion – not putting yourself in a situation where you cannot act independently or impartially
- avoiding conflicts of interests – not breaching the relationship of trust and not having a personal interest in a transaction with a company unless appropriately disclosed and authorised.

Under the Corporations Act 2001, should it or similar legislation apply, your duties will mirror some of your common law duties and include:

- exercising care and diligence (section 180) – acting to the same standard as would a 'reasonable person' with your same responsibilities in a company in the same circumstances as yours, or satisfying the requirements of the 'business judgement rule' (discussed below)
- acting in good faith (section 181) – in the best interests of the company and for a proper purpose
- not making improper use of your position (section 182) – not using your position for personal advantage
- not making improper use of information (section 183) – not using information obtained as a result of your position for personal advantage
- disclosing material personal interests (sections 191-195)
- not trading while insolvent (section 588G) – failing to prevent the company from incurring a debt while the company is insolvent or becomes insolvent because of the debt, at a time when there were reasonable grounds for suspecting the company was or would become insolvent.

RELIANCE ON OTHERS AND THE BUSINESS JUDGEMENT RULE

It is essential for directors to judge when they can reasonably and appropriately rely on the information and advice of others, like the CEO or CFO. While there is some limited leeway in the Corporations Act for directors to offer the defence that they had relied on others or exercised their 'business judgement', the courts have not readily exempted directors from their duties on this basis.

CONCLUSION

As a general rule, directors should ensure that they:

- inform themselves of the company's affairs, including its financial affairs, to the extent that they reasonably believe is appropriate
- assess the information or advice for themselves based on their knowledge of the company and its operations
- exercise their independent and informed judgement in good faith
- reasonably believe that their action or inaction is in the best interests of the company.

Note: This article is only intended to provide a summary of the subject matter covered. The article is not intended to be, nor should it be, relied upon as a substitute for legal or other professional advice.

JENNI MATTILA, MATTILA LAWYERS SYDNEY

CHOOSING AN IRRIGATION CONTRACTOR – DO YOU MEASURE UP?

As a contractor, just like any small businesss operator, it's essential to know your market and to understand how you can benchmark the service you provide. One way is to look at the advice being offered to customers about what they can expect in terms of the expertise and service from an irrigation contractor. One source of this advice is the web. Below we have adapted some information from the Rain Bird website (www.rainbird.com/au) that gives tips on choosing a contractor "who will guarantee a job well done". How do you measure up?

What to expect

An efficient, well-organised contractor will be happy to provide you with all the information you need to make an informed choice.

First, the contractor will want to view your property to determine soil conditions, water sources and pressure, planting materials, etc. He or she then will present a formal estimate detailing what they plan to do and the total price for materials and installation. Along with the estimate, the contractor should clearly explain all the specifics to you. There generally should be little disruption to existing foliage, and the average job should take less than a week.

Questions to ask

The best contractors will encourage you to ask a lot of questions. By asking questions, you will know exactly what you will be getting for your money and what to expect from your new irrigation system. Here are a few important questions to get you started.

- What type of product will be used and why? They should tell you what type of controller, valves and rotors or spray heads are best for your landscape.
- Is after-sale service provided? A professional contractor should be willing and able to provide after-sale service.
- Is there a warranty on the system? All work should be guaranteed; a one-year warranty is typical. Also, be sure to ask for names and telephone numbers of recent satisfied customers, so you can call and check references!

You get what you pay for

When choosing a contractor, you should be wary of those who offer to charge you significantly less than other contractors. Low bidders may not be licensed or insured and often use cost-cutting techniques that can jeopardise your lawn and shorten the life of your system.

Watch out for these commonly used tricks of the trade:

- Not including a backflow preventer, where required by local codes to protect your drinking water supply.
- Installing sprinklers too far apart, which makes it impossible for certain areas to receive enough water and causes brown spots during the hot summer months.
- Mixing sprinklers with different application rates on the same line, which causes one area to be overwatered to sufficiently water another.
- Not using special watertight connectors and a protective valve box to safeguard the electrical elements, guard against short circuits and prevent corrosion.

Confidence counts

Above all, you should choose a contractor you can trust and with whom you feel comfortable. It's important that they install professional series products as this will help ensure the job will be done right.

An irrigation system is a complex network of pipes, valves, electrical connections and sprinkler heads. Because it serves as the circulation system for your yard, the design and installation of your system are critical to its success. It's a complicated process requiring a host of equipment, as well as a background in landscape design and hydraulics. This is why it's so important to have a professional contractor design your system.

Acknowledgment. Thanks to Rain Bird for allowing publication of this material.

Certification shows you measure up

One way of demonstrating your knowledge and skills is by becoming an IAL certified professional. The IAL Certification Program covers seven different professional areas, including Certified Contractor. Go to the IAL website for more information, www.irrigation.org.au

IAL CERTIFICATION: A QUICK GUIDE

Since it was introduced in 2006, IAL's national certification scheme has come a long way, with more than 500 certifications having been awarded to professionals in the irrigation industry.

Some benefits to having an industry operated and managed certification scheme include:

- recognition of industry skills and knowledge
- gives customers confidence in the ability of sales staff and contractors
- gives employers knowledge of the skills base of potential employees
- employers can develop a training pathway for their staff.

All of the IAL certifications recognise different skill sets, and are only available to people who can demonstrate a minimum of three years industry experience and have completed a number of units of competency (these used to be called subjects!)

To prove completion of the required units of competency, the applicant needs to provide IAL with a copy of their statement of attainment from a registered training organisation.

Certification requires renewal every two years, and a requirement for renewal is the ability to demonstrate that there has been professional development undertaken during the preceding two years.

In a major development, a partnership between IAL and Challenger Institute of Technology in Perth started in February 2013. This partnership is designed to simplify the process of certification for applicants in WA and will hopefully increase the uptake and recognition of irrigation professionals in the state.

The process that has been put in place in WA is that people seeking certification contact Tracy Martin, the IAL industry development officer. If the applicant already holds the required units of competency for the certification they are seeking, Tracy will be able to process the application. If they don't, Tracy will direct them to Challenger Institute of Technology, where they will undertake a skills assessment to ascertain whether the units of competency will be awarded through recognition of prior learning or whether the applicant will be required to undertake a formal learning program.

For more information about IAL's certification program go to the IAL website, www.irrigation.org.au and go to the Training and Certification tab.

MEET THE TRAINING MANAGER

Training and professional development have been at the core of IAL's activities since it was formed (and before it, of the IAA), making the position of Training Manager an extremely important one. Debbie Atkins has recently taken on the role, and *Irrigation Australia* asked her to explain what this involves and what members can look forward to in 2013 as far as training and professional development are concerned.

Debbie's role involves a number of key activities:

- coordinating IAL training courses
- developing tailored training for IAL members
- managing Irrigation Training Australia, the IAL registered training organisation, through which IAL provides nationally accredited training
- answering training enquiries from members and others
- working with other providers of irrigation training to discuss general training needs and resources in irrigation industry.

Debbie, no stranger to irrigation training, is well qualified for her new role.

She joined IAL doing training support in March 2011, and with the resignation of CEO Ian Atkinson has been given more responsibility for training. Before joining IAL, Debbie worked with the CRCIF for seven years developing training courses and master classes; before that she was in training and professional development with Qld Primary Industries for ten years delivering property planning and leadership courses.

Debbie is working on a number of priority tasks at the moment.

"One of the highest priorities is getting the training calendar set for 2013," she said. "We have some ideas for new courses so there is a fair bit of work going into developing them."

She is also working on a review of the Irrigation Training School, a 2-week course that has been running since 2007, and developing a new streamlined course.

The demand for online courses is growing in lots of sectors, and irrigation is no different. Work is going ahead on the development of online learning capacity for members, including supporting current courses and developing activities for certified irrigation professionals to gain Certified Professional Development (CPD) points.

Certification has traditionally been a very important area for IAL and its members.

"I will be working with Certification Board to review and update certifications, which will include looking at the units of competencies required for certifications and the skill sets," Debbie explained.

Another group she will be working with is the new Professional Development and Training Committee (PDTC). A priority will be to assess what new skills are required in the industry and check if these needs are being met through training courses by IAL and other training organisations.

Debbie Atkins, who has taken on the role of IAL Training Manager, outlines what's in store for 2013.

Irrigation Australia asked Debbie what developments she was expecting in training in 2013 and it appears members have given a strong message.

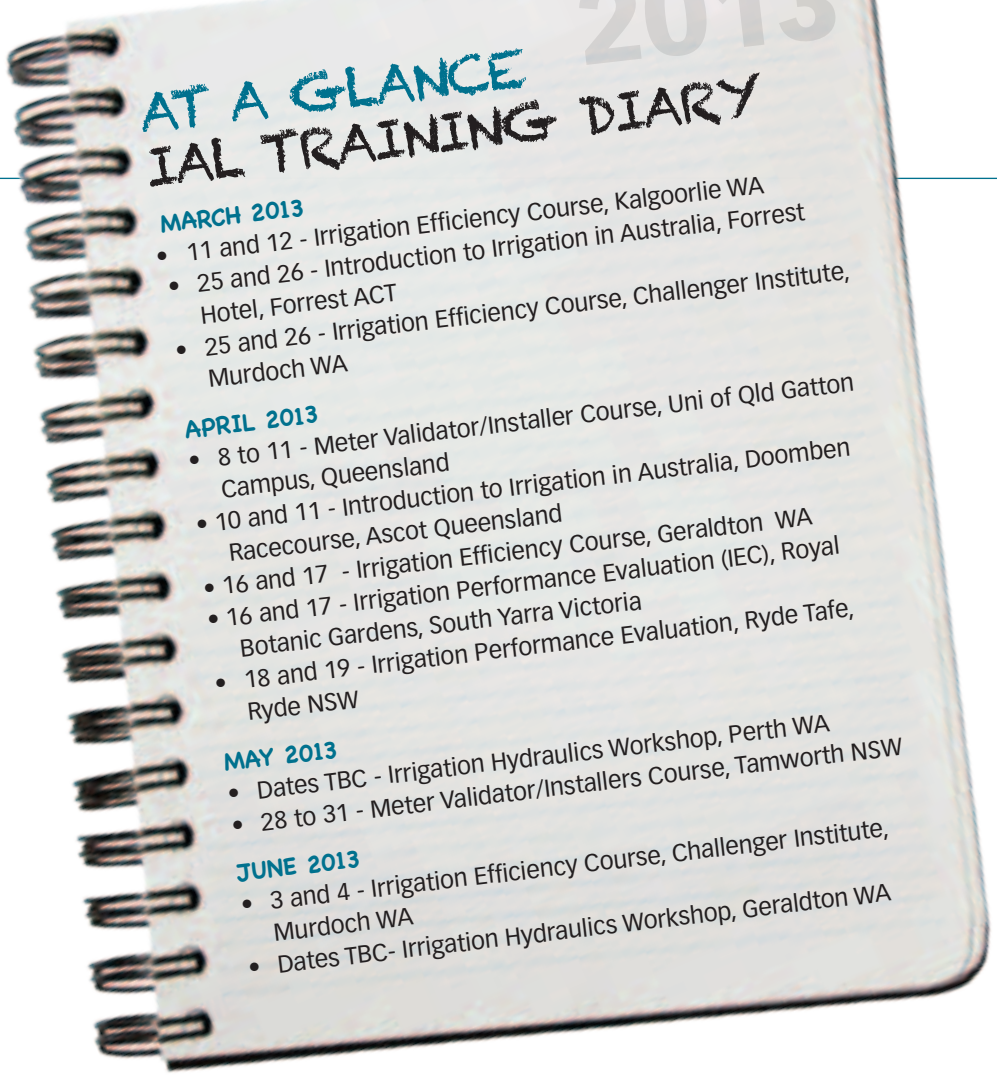
"We have received clear feedback that there is a growing demand for skills and knowledge in pumps and pumping equipment so that's something we will be developing," she said.

And she will be relying on advice and guidance from PDTC about professional development needs in the industry and what IAL and other training providers can do to meet current and emerging needs.

If you would like more information about training and professional development, the IAL website (www.irrigation.org.au) has a wealth of information, and you can contact Debbie on phone 1300 949 891, email debbie.atkins@irrigation.org.au

IAL TRAINING CALENDAR

Looking for training courses? Check out what is organised for the first half of this year, and we are working on adding to the list. If you don't find what you are looking for, go to the Upcoming Courses tab on the IAL website (www.irrigation.org.au) for updates or contact Training Manager Debbie Atkins, phone 1300 949 891, email debbie.atkins@irrigation.org.au.



BOOKSHELF

WATER USE EFFICIENCY FOR IRRIGATED TURF AND LANDSCAPE

IAL member, MacLean-Iedema Award winner and former national board director, Geoff Connellan, has added to his already significant list of achievements by writing a book that's sure to become a reference for managers and operators of turf and landscape irrigation, *Water Use Efficiency for Irrigated Turf and Landscape.*

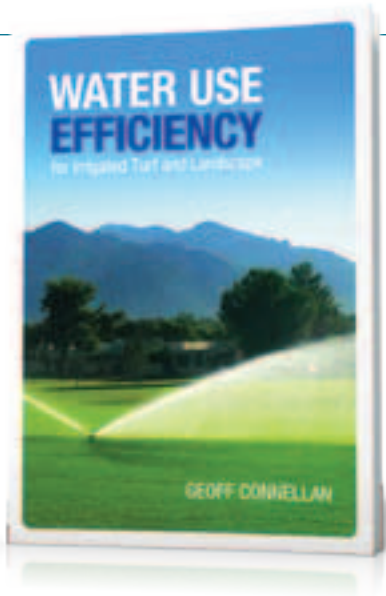
Achieving high water use efficiency in maintaining turf, trees and landscape areas is a core responsibility of open space managers. *Water Use Efficiency for Irrigated Turf and Landscape* provides a logical and scientifically sound approach to irrigation in urban areas in Australia. It is based on green space delivering defined outcomes using the principles of water sensitive urban design and irrigation efficiency.

The book covers all stages of the water pathway – from the source to delivery into the plant root zone. Major topics include system planning, estimating water demand, water quality, irrigation systems, soil management and irrigation performance evaluation.

Clearly presented explanations are included, as well as line drawings and worked examples, and a plant water use database covering more than 250 plant species. A feature is a water management planning template to guide water managers and operators through a process that will deliver a sound plan to achieve sustainable turf, urban trees and landscapes.

Best management practice irrigation principles are outlined and their implementation in open space turf and landscape situations is explained. The benefits and limitations of the various methods of delivering water to plants are covered, together with case studies and guidelines for specific horticultural situations. Methodologies to evaluate irrigated sites are included along with recommended benchmark values.

The book presents the latest irrigation technology, including developments in water application, control technology and environmental sensors such as weather stations, soil moisture sensors and rain sensors.



About the author

Geoff Connellan has 30 years' experience in urban horticultural water management, research and education. His expertise includes water sources, water demand management, evaluation of water use, irrigation technologies and strategies for sustainable irrigated open space. He has provided water management advice on numerous significant turf and landscape sites around Australia.

SMART WATERMARK

CONCERN RISES OVER THE WATER SITUATION ACROSS AUSTRALIAN CITIES

For the first time in the Smart WaterMark Newspoll survey history, the number of Australians who consider the water situation serious has increased.

The sixth wave of the annual Newspoll water saving survey was undertaken in Nov/Dec 2012. As with previous years, a telephone omnibus survey was conducted across Sydney, Melbourne, Brisbane, Adelaide and Perth, and this was supplemented by a national online survey.

After a softening in previous years in how serious residents view the water situation across the five capital cities, the 2012 results show concern about water has risen. Over 82% of respondents think the water situation is serious, up from less than 75% in 2011.

The survey highlights the differences between the capital cities with Perth (91%) and Adelaide (86%) residents most concerned about the water situation and Brisbanites (76%) least worried.

There has been a continued growth in the household use of trigger nozzles on hoses (79% - an increase of almost 20% over the last six years) with an increase in use across all the cities surveyed. Soil wetting agents and mulch are being more widely used, whereas greywater, raintanks and garden irrigation have maintained the same level of use.

Irrigation systems are being used more in Perth (69%) and in Brisbane (20% higher on previous years).

There was a drop in use of rainwater tanks in Adelaide (52%), but growth in Brisbane (52%). Use in Perth is much lower than in any other city.

An astounding 96% of people have actively engaged in water saving around the home. Most people (79%) have taken shorter showers, with the same number of people changing watering habits in the garden. As well, 64% of people stopped washing the car or boat and 54% retrofitted showers, taps or toilets through a government or utility program.

Nearly half (43%) of people have used greywater around the home and garden, while 38% have bought a water efficient product or appliance using a rebate from government or utility. Eighteen per cent of people have reduced their water use around the pool.

There was also a strong correlation found between water efficient activity and being responsible for the water bill.

A copy of the summary the Newspoll report is available from smartwatermark.info.

Note. The survey was undertaken before floods and the heat wave at the beginning of 2013.

Smart WaterMark is a joint initiative of the Australian Water Association, Irrigation Australia, the Nursery and Garden Industry Australia and the Water Services Association of Australia.

Smart Approved WaterMark

SMART WATERMARK UPDATE

We're in the second year of HAL funded research so if you would like to know more check out website.

Smart WaterMark will be presenting at the upcoming Efficient '13 Conference. Join us and other water professionals 5-7 March.

The next Expert Panel meeting is in June. If you have a water saving product or service you would like certified, visit smartwatermark.info, email info@smartwatermark.info or call 02 9223 3322.

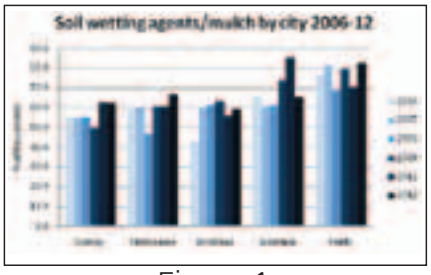


Figure 1

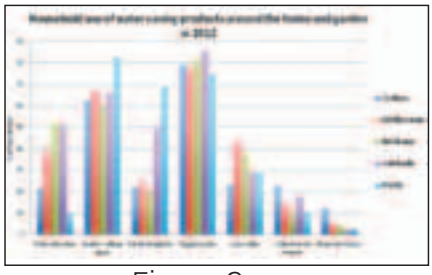


Figure 3

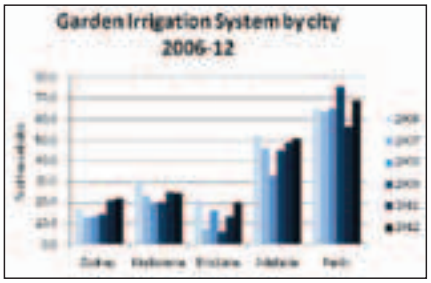


Figure 2

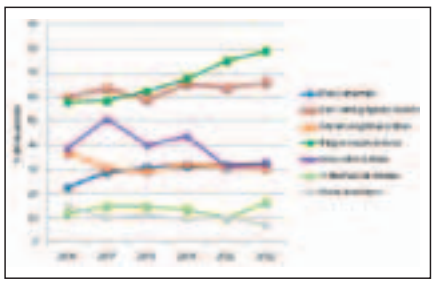


Figure 4

Figure 1: Gardening habits are changing with almost 80% of people using mulch and soil wetting agents.

Figure 2: Continued use of irrigation in urban areas is a positive for industry.

Figure 3: Mulch and trigger nozzles are leading the way in use across Australia, particularly in Perth and Adelaide.

Figure 4: Use of greywater, irrigation and rainwater tanks has plateaued in recent years.

NEW GM FOR XYLEM WATER SYSTEMS AUSTRALASIA

Xylem Water Systems recently announced that experienced water industry professional, John Weaver, has taken up a new appointment as General Manager for Australia and New Zealand of the Applied Water Systems Division. He is now based at the company's headquarters in Mentone Vic.

John has had almost thirty years of experience in senior marketing and management roles with the last fifteen years engaged with leading Australian water businesses.

Xylem Inc. is a NYSE-listed global water technology provider enabling its customers to transport, treat, test and efficiently use water in public utility, residential and commercial building services, industrial, resource industry and agricultural settings.

Xylem does business in more than 100 countries around the globe through a number of leading product brands including Lowara, Flygt, Gould Pumps, Bell & Gossett, and AC Fire Pumps.

"Xylem Asia Pacific has an already strong distributor network in the water technology sector throughout the Asia Pacific region that already provides an exceptionally strong base on which to grow our business.

"I look forward to renewing contact with the many people in the water products sector that I have met and dealt with in my career in the industry" John says.

John Weaver's contact details are care of Xylem Water System Australia Pty Ltd Unit 3/1 Federation Way Chifley Business Park Mentone 3194. Telephone 03 9551 7333 or 0438 770 716 or email john.weaver@xyleminc.com.

See www.xyleminc.com for more information.

John Weaver has recently been appointed as General Manager, Xylem Water Systems Australia Pty Ltd.

WILLEM VLOTMAN, CHAIRMAN IACID, VICE PRESIDENT HONORAIRE ICID

FIRST WORLD IRRIGATION FORUM

Preparations are well underway for the first World Irrigation Forum being held in Mardin in Turkey from 29 September to 5 October this year. The decision to organise World Irrigation Forums every three years was made at the International Executive Council meeting in Adelaide last June.

For those interested, there still is time to submit short communications on the themes following:

Main Theme

Irrigation and Drainage in a changing world: challenges and opportunities for global food security

Sub-Theme 1. Policy, Science and Society Interactions

Topics

1.1 Policy requirements for better governance
1.2 Innovations, extension and improved irrigation and drainage services
1.3 Greater interaction among water users, agents, governmental organisations.

Sub-Theme 2. Challenges and Developments in Financing Irrigation and Drainage Sector

Topics

2.1 Roles of water users, governmental organisations, and private sector in the development of irrigation and drainage
2.2 Financing mechanisms for investments in new technology, and construction, rehabilitation and modernisation of irrigation infrastructure
2.3 Partnership of various stakeholders in financing the irrigation and drainage sector.

Sub-Theme 3. Integrated Water Management Approaches for Sustainable Food Production

Topics

3.1 Water-Food-Energy Nexus
3.2 Challenges of sharing water among the sectors (domestic, industry and agriculture) in consideration with increasing population and climate change
3.3 Irrigation and drainage for environmental sustainability.

Paper submission

The deadline for submission of paper abstracts has passed and notifications of acceptance should reach us soon (see deadlines below). The papers will go through a review process. Authors of selected papers will be invited to make a presentation in 15 minutes using a maximum of 10-15 power point slides. Based on the abstracts received the following is planned:

- the three best proposed papers (one from each sub-theme) to be presented in the plenary sessions of the respective sub-theme (one paper per plenary session)
- from the papers received and accepted under each sub-theme, nine will be presented in the 2nd and 3rd parallel sessions
- other papers can be presented as poster and the authors can participate in the panel discussions and formulation of recommendations.

Authors will be informed about the acceptance of their paper either for oral or poster presentation.

Schedule for submission of full papers

Submission of abstracts (max. 300 words)
15 January 2013
Notification of acceptance
28 February 2013
Submission of paper
30 April 2013
Notification to author if their paper is a poster presentation
30 June 2013

Short communications

In addition to the full papers, short communications are also invited (maximum four A-4 pages), on sub-themes and topics. They should describe new/ promising products (e.g. equipment, software, models, management practices, institutional arrangements. Authors that are accepted will be invited to present their short communication in 5 minutes using up to five slides. The following outline will be used to allocate space for presentation:

- the three best short communications (one from each sub-theme) will be invited for a brief presentation at the plenary sessions of the respective sub-theme (one short communication per plenary session)
- nine short communications under each sub-theme will be scheduled for presentation in the 2nd and 3rd parallel sessions of the sub-themes
- other short communications can be presented as posters.

Schedule for submission of short communications

Submission of the short communication(s)
28 February 2013
Notification of acceptance
30 April 2013
Notification to author, as regards oral/ poster presentation
30 June 2013

References

www.icid.orghttp://www.worldirrigationforum.org

IMPORTANT DATES FOR YOUR DIARY

Date	Place & country	Details
29 September – 5 October 2013	Mardin, Turkey	First World Irrigation Forum. Contact is Mrs Serpil Koylu, Turkish National Committee, ICID (TUCID), email tucid@dsi.gov.tr, serpil.koylu@dsi.gov.tr, website http://www.worldirrigationforum.org See article for submissions and deadlines.
14 to 20 September 2014	Gwangju Metropolitan City, South Korea	22nd International Congress on Irrigation and Drainage. Contact is Ir. Hun Sun Lee, Korean National Committee on Irrigation and Drainage (KCID), email kcidkr@gmail.com, kcid@ekr.or.kr, website http://www.icid2014.org
October 2015	Montpelier, France	66th IEC Meeting, October 2015, Montpellier, France. Contact Secrétaire Général, Association Française pour l'Etude des Irrigations et du Drainage (AFEID) Montpellier France, phone +334 6704 6316, email afeid@cemagref.fr, Website http://afeid.montpellier.cemagref.fr
2016	Chiang Mai, Thailand	67th IEC Meeting, 2016, Chiang Mai, Thailand. Contact is Secretary General, Thai National Committee on Irrigation and Drainage (THAICID), Deputy Director General of Royal Irrigation Department, Ministry of Agriculture and Cooperatives, Bangkok, Thailand, phone +662 243 6963, email thaicid123@gmail.com, website http://www.rid.go.th/Thaicid

IEC – International Executive Council, annual ICID meeting
ICID – International Commission on Irrigation and Drainage, New Delhi India

WATSAVE AWARDS – NOMINATE NOW

The WatSave awards were established in 1997 as part of ICID's Global Water Saving (WatSave) program which has as its aim to promote and recognise water conservation success among member countries.

The awards are presented each year to an individual or a team of individuals for outstanding contribution to water conservation/water saving for increasing the beneficial and/or efficient use of water to develop and improve the sustainable use of the critical resource. The WatSave Awards 2013 will be presented during the 1st World Irrigation Forum and 64th meeting of the International Executive Council to be held in September-October 2013 at Mardin, Turkey.

Do you know and individual or team who made a contribution that should be recognised? Then why not nominate them.

Categories are:

WatSave Technology Award. Awarded for work promoting and encouraging the best technological applications or projects which have been successful in saving water and/or recovering waste waters/low quality waters.

WatSave Innovative Water Management Award. Given to innovation that promotes non-technological interventions and/or innovative land and water management/techniques for increasing the availability of water for different uses; promoting research that leads to substantial savings in water applications or uses; or promoting the development of new policies/approaches for water saving leading to cost effective and beneficial use of water.

WatSave Young Professionals Award. For water saving/ conservation work by young professionals (less than 40 years).

WatSave Farmer Award. Awarded to farmers for proven water saving success story to promote successful water conservation.

Past winners from Australia are Dr Malcolm Gillies, Australia (Young Professionals, 2009) and Dr Amgad Elmahdi (Young Professionals, 2008).

Nominations must be through national committees. These are then reviewed by a panel of five judges, one each from the four regions of ICID (The Americas, Africa, Asia-Oceania and Europe) and the fifth from any region.

For information go to the ICID website. http://icid.org/awards_ws.html

STATE ROUNDUP

RIVER MURRAY MEDAL AWARDED TO SOUTH AUSTRALIAN

In January the Murray-Darling Authority announced that it had awarded the River Murray Medal to Henry Jones from SA. This was the first time the MDBA had awarded the medal to a community member since the medal was created in 1853.

Henry is a passionate campaigner for the Lower Lakes and River Murray. MDBA chief executive Dr Rhondda Dickson said Henry was a wonderful role model for many people living in the Basin who are passionate about the health of the River Murray.

"As a commercial fisherman for most of his adult life, Mr Jones has a deep connection to a nd understanding of this unique and iconic part of Australia.

"In awarding him the River Murray Medal, the MDBA is acknowledging his personal dedication over the years, as well as his passion and wisdom," she said.

For the past decade Henry has contributed his expert local knowledge to the MDBA, including as a member of The Living Murray Community Reference Group and the Basin Community Committee.

More recently, Henry has played an important role to raise awareness of Basin issues and community concerns in the broader debate around the Basin Plan.

River Murray Medals are reserved for individuals who demonstrate outstanding service to the River Murray.

MDBA Chief Executive Dr Rhondda Dickson with Henry Jones, River Murray Medal award winner.

BOM SUMMARISES JANUARY WEATHER

A Bureau of Meteorology overview of the weather for January certainly highlighted how extreme it was. Australia recorded its hottest month on record in January 2013, with both the average mean temperature of 29.68°C and the average mean maximum temperature of 36.92°, surpassing previous records set in January 1932.

The Northern Territory recorded 31.93°C and Queensland 30.75°C, also the hottest mean temperature on record for January for both states.

The heatwave in the first half of January was exceptional in its extent and duration. The national average maximum temperature on 7 January was the highest on record. Numerous stations set records for the most days in succession above 40°C, including Alice Springs (17 days) and Birdsville (31 days). A large number of stations set all-time record high temperatures during the January heatwave, including Sydney (45.8°C on 18 January) and Hobart (41.8°C on 4 January). The highest temperature recorded during the heatwave was at Moomba in South Australia (49.6°C on 12 January).

Late January saw extreme rainfall and flooding for coastal areas of Queensland and New South Wales as a low pressure system associated with ex-tropical cyclone Oswald tracked steadily south between 22 and 29 January, before moving out to sea south of Sydney.

Many coastal areas from Sydney to Cape York received more than 200 mm of rainfall. The most extreme rainfalls were in the region between Rockhampton and Bundaberg, and in the ranges along the NSW - Queensland border region.

Gladstone received 820 mm of rainfall in four days, which exceeded its previous record for a whole month, and more than the annual rainfall recorded in 2011 or 2012. Area-averaged rainfall for the Burnett catchment on 27 January was 204 mm, exceeding the previous record by more than 80 mm. One-day catchment rainfall records were also set for the Mary, Logan-Albert, Kolan and Burrum catchments.

HIGH USE DRIVES RECORD WATER DEMAND

In January NSW State Water Corporation confirmed that extreme weather conditions drove record irrigation demand, which resulted in potentially the highest water delivery rates in more than a decade. As evidence for this the corporation, which operates major dams in regional NSW, was operating at full capacity to deliver bulk water supplies to customers and the environment along 7000 km of regulated rivers.

According to Adrian Langdon, Manager Water Delivery, more favourable seasonable conditions for the irrigation industry coupled with the heatwave conditions and environmental deliveries were the key drivers for demand beyond levels last seen in 2001-02.

Adrian reminded irrigators that they needed to place compliant water orders and extract water in accordance with that water order, and was conducting aerial surveillance to help monitor regulated river systems.

ACCC UPDATES GUIDES TO WATER MARKET RULES

In October last year, Minister for Sustainability, Environment, Water, Population and Communities Tony Burke signed off on amendments to the Water Market Rules 2009 (WMR) and the Water Charge (Termination Fees) Rules 2009 (WCTFR).

To help operators and the community come to grips with the rules and fees, the ACCC has updated its Guides to the WMR and the WCTFR. The guides provide technical guidance to help operators comply with the Commonwealth water rules and compliment other materials previously distributed by the ACCC. All of these materials, including the guides, can be downloaded from the ACCC website www.accc.gov.au/water.

FAO REVIEWS IRRIGATION PRESSURE IN WATER RESOURCES

A major review of irrigation water requirements and water withdrawal for irrigation for 167 countries has just been completed by AQUASTAT, FAO's global information system on water and agriculture. The reason for the review was because agriculture, and especially irrigated agriculture, is the sector with by far the largest consumptive water use and water withdrawal in the world.

As part of the review, regional and country tables have been prepared on areas equipped for irrigation, actually irrigated areas, irrigated harvested crop areas, with special attention to irrigated cereals, as well as water requirement ratios or irrigation efficiencies. The database provides policy- and decisions-makers as well as the scientific community with a complete dataset containing reliable data, calculated in a uniform way, and comparable with each other at country level.

You can access the review at website http://www.fao.org/nr/water/

CRUMBLING BORES 'JEOPARDISE NATION'S WATER'

Director of the National Centre for Groundwater Research and Training (NCGRT), Professor Craig Simmons, warned Australians that 15,000 collapsing bores used for monitoring groundwater – and a half-billion dollar repair bill – are endangering the future of Australia's largest resource, its groundwater.

According to Craig, groundwater accounts for about 90% of Australia's total fresh water and 30% of our daily water needs – and is vital for water supplies, agriculture, industry, mining and the environment.

Much of the information we have about the state of groundwater comes from 23,000 monitoring bores spread across the continent – more than two thirds of which are now falling into disrepair. This has serious consequences for the future and how we manage groundwater.

The figures Craig quoted come from a report late last year a report by the National Water Commission (NWC) that documented the poor condition of the nation's groundwater infrastructure. The report found that 68% of the country's 23,000 monitoring bores were more than 20 years old and at, or near, the end of their useful working lives.

The current replacement cost of inoperative monitoring sites was estimated at $318 million, rising to over half a billion dollars if governments continued to ignore the problem, the NWC report indicated. With use of groundwater increasing, it is crucial that we tackle this issue sooner rather than later.

You can read the NWC report at website http://archive.nwc.gov.au/library/waterlines/90

HWWUE INTO FOURTH ROUND OF FUNDING

The Queensland Department of Natural Resources and Mines announced in February 2013 that HWWUE (Healthy HeadWaters Water Use Efficiency Project) infrastructure funding round four is now open with irrigators able to submit expressions of interest (EOIs) until 5 April 2013 (EOIs received after the closing date for round four and before 15 August 2013 will be considered in round five).

In round three of funding Queensland Murray–Darling Basin irrigators received more than $12 million, following the Australian Government's approval of eight projects proposed under round three of the HHWUE infrastructure funding project.

The works ranged in value from about $270,000 to $8 million, and included: conversion to centre pivot or lateral move systems, conversion to "through-the-bank" irrigation, storage modification and installation of trickle systems.

The projects are located in the Condamine and Balonne and Border rivers catchments and are worth $14.6 million of Australian Government and irrigators' co-investment with an estimated total water savings of 6390 ML per year.

The works are expected to improve irrigators' ability to manage water supply, increase crop yield and realise labour savings among other benefits.

For information about funding or other HHWUE programs go to website www.dnrm.qld.gov.au or contact the project team, phone 07 4529 1321, email hhwue@dnrm.qld.gov.au.

NEW PRODUCTS & SERVICES

MAIT

NEW MAIT RADIO UNITS: A COST EFFECTIVE SOLUTION

MAIT Australia has just announced the introduction of its new mini MAIT radio units, which offer functionality, flexibility, upgradability and integration with existing MAIT systems. The units are an extremely cost effective option to cabled systems for monitoring and/or control, and are the ideal solution for applications involving single valves, or where trenching is hazardous, costly or not practical.

Units are available for various uses in the following range of configurable options:

- Model C – 2 port input + latching solenoid driver
- Model E – Analog output + latching solenoid driver
- Model L – Stand-alone logger
- Model T – Cable replacement transmitter
- Model R – Cable replacement receiver

Each mini radio can control one 12 VDC latching solenoid and two sensors or multi depth capacitance moisture probes. They can also read a wide range of sensors and be used for other control applications such as pump control and automation. Mini radios also provide an easy and affordable solution for adding monitoring sites to existing MAIT systems, where running cable from existing field sites is not possible or practical.

The cable replacement models T (transmitter) and R (receiver) can take a signal at one point and replicate the signal at a remote point, i.e. a switch closure at one location can activate a relay (or valve or pump) at a remote location. A 4-20 mA sensor can be read at one location and that same 4-20 mA signal will be reproduced at the receiver. These stand-alone units are not a part of an iNTELLiTROL network. This means they can work on anyone's equipment, wherever a need arises to read or control a remote sensor or device.

Mini MAIT's can also be used as stand–alone field loggers that operate on 6 x AA batteries. Data can be uploaded in the field using a radio module connected to a laptop; for remote data collection via the internet, a modem and solar panel kit can be connected. Stand-alone loggers can be integrated into a wireless network with the addition of a higher gain antenna and solar panel kit.

A system was recently installed where the client was originally going to install the multi–valve control field radios to automate 34 valves that were spread throughout an existing orchard. Ten of these field radios were to be installed, however, after calculating the distances of trenching required to link four valves to the one field radio with command tube, and considering the likelihood of hitting some of the sub mains throughout the orchard, it was decided that the Mini MAIT option would be more cost effective. The other key advantage of this was reducing the time and labour required for fault finding, repairs and maintenance.

For information go to the MAIT website www.mait.com.au

RAINBRID

NEW R-VAN HAND-ADJUSTABLE ROTARY NOZZLES FOR UNMATCHED TOOL-FREE CONVENIENCE

Rotary nozzles have become well known for their multiple rotating streams of water that provide efficient performance at low precipitation rates; variable arc nozzles are praised for their design flexibility. Now, Rain Bird is introducing a product line that features both the efficiency of rotary nozzles and the versatility of variable arc nozzles—R-VAN Adjustable Rotary Nozzles.

"The R-VAN product line features the world's first hand-adjustable rotary nozzles," said Mike Wendel, product manager for Rain Bird rotors and rotary nozzles.

This is a major advance. Because contractors can adjust R-VANs by hand, there's no need to buy special tools or waste time walking to and from the sprinkler zone to their trucks trying to find that tool. The R-VAN line's tool-free adjustment makes the process a little bit easier on everyone.

Along with their quick and easy adjustment, R-VAN nozzles combine the benefits of rotary nozzles and variable arc nozzles into one unique package. A low precipitation rate reduces run off and erosion, making R-VANs a particularly wise choice for sloped landscapes and compacted or clay soils. A high level of distribution uniformity, thick wind-resistant streams and larger water droplets ensure efficient performance, even in the most adverse conditions.

Requiring fewer models for even the most complex irrigation layouts, R-VAN nozzles give irrigation professionals confidence that their projects will be installed per plan. Because they offer matched precipitation rates across radius and arcs, using R-VANs simplifies the overall design process. And, because they're compatible with all models of Rain Bird spray bodies and a wide variety of risers and adapters, R-VAN nozzles present contractors with an excellent retrofit opportunity.

"Retrofitting standard spray nozzles with R-VAN Adjustable Rotary Nozzles can reduce flow rates by up to 60 per cent and improve water efficiency by up to 30 per cent," Mike explained. "It's a relatively easy upsell opportunity for contractors who want to help their customers use less water but still maintain healthy, aesthetically-pleasing landscapes."

The R-VAN product line currently includes two colour-coded models, the black R-VAN1318 with a radius of 4.0 – 5.5 m and the yellow R-VAN1724 with a radius of 5.2 to 7.3 m. Each model's arc is adjustable from 45 to 270 degrees. Both come with a three-year trade warranty.

For more information about R-VAN Adjustable Rotary Nozzles, or any of Rain Bird's other irrigation products, visit www.rainbird.com/RVAN or Freecall 1800 424 044

THE WATER SHED

Located in what many would call paradise, the tropical far north of Queensland is home to irrigation business The Water Shed. The Water Shed has served the area for the past 27 years providing and servicing all aspects of irrigation, with emphasis on banana crops.

The Water Shed started operating in 1986 in a small showroom on the northern outskirts of Innisfail, and through hard work and perseverance our small pumping and irrigation business has grown to meet a growing customer base. As a result of demand increasing for service in the Tully area, another store was established there in 1989. Emphasis was then placed on increasing the product range from pumps and irrigation to include swimming pool chemicals, pool pumps, pool accessories, branded power products and garden care equipment.

In 1995 the business bought a complex in an Innisfail Industrial Estate, and transformed the existing building into a showroom and office area and built a shed at the rear to house a small engine workshop and store stock.

The introduction of GPS survey for irrigation projects in 1998 was ground breaking for the irrigation industry and, coupled with computer aided drawing programs, resulted in far more accurate designs and drastically reduced the turnaround time for irrigation quotes.

The Water Shed then introduced poly pipe butt welding with a HF 225 Poly Welder. Following the success of the 225 Welder we bought a bigger 355 machine to service the demand for even bigger pipe welding. Then a Poly Extrusion Welder was introduced, allowing the fabrication of special fittings and tanks. The Water Shed now offers the only complete poly pipe fabrication service in the area.

In the mid 1990s The Water Shed, in association with Hardie Irrigation (now Toro), developed a Waterbird sprinkler with the ideal flow rate and diameter of throw to achieve the most efficient delivery of water to banana crops.

There has been a lot of water under the bridge, through the pumps and out of the sprinklers in 27 years, and The Water Shed is still proudly supplying quality brand products and state of the art irrigation systems.

For information go to website www.thewatershed.com.au

RURALCO

SMART WATER FORMS EXCLUSIVE DISTRIBUTION PARTNERSHIP WITH RURALCO

New Zealand's progressive water technology company, Smart Water, has announced an exclusive distribution partnership with Ruralco Holdings Limited.

The new partnership will provide Ruralco's customers with access to Smart Water's unique wireless tank level system through its ProWater Nationwide and CRT groups. ProWater Nationwide provides specialist services and resources that support efficient water use and management and many CRT retailers also have a strong focus on water-related services.

Launched after two years of rigorous research, design and development, the Smart Water wireless tank level system fills a void in the market for a high-tech, but affordable, water management solution. The innovative technology behind the system, coupled with its user friendly software interface and very simple installation process, has been well received in many markets.

Manufactured in New Zealand to high quality standards, the system has been designed to provide for a long, trouble-free service life. It's also very competitively priced to ensure its accessibility to both domestic and industrial customers who demand the highest levels of quality and performance in extreme applications.

The Smart Water system not only communicates tank levels, it stores water use from each tank in its memory. One of the advantages of this is that it allows abnormal use to be monitored. When abnormal use is detected, the system alerts the user allowing for a potential leak to be rectified before an entire tank reserve is lost. For example, abnormal use can be triggered by a failure in the plumbing system or when a tap has inadvertently been left running.

The system can monitor up to nine tanks and to display use details for each. When water supplies are critical, this feature can be extremely valuable. Monitoring also allows for more efficient water use, consequently increasing the effective 'time to empty' period.

Each tank shows a 'days remaining' figure based on the recorded use and water remaining. Decreasing water use by improving water efficiency increases the days remaining. This information, as well as many other details, are clearly displayed on a full colour, 2.8" TFT LCD touchscreen. The LCD unit can be easily fitted into a wall or supplied in a stylish desk mounted enclosure.

Full installation instructions are provided with each product. Videos detailing how to install the systems are also available via the Smart Water website at www.smartwatertech.co.nz

The system can also have a wireless pump controller integrated into it which will control most kinds of domestic and rural water pumps. Custom levels can be set to turn the pump on and off at source and destination tanks or infinite sources such as bores and rivers. The pump controller software boasts a huge range of features which provide for the most basic through to the most complicated installations.

For more information, email info@prowater.com.au. To find your nearest ProWater Nationwide or CRT store go to www.prowater.com.au or www.crt.com.au

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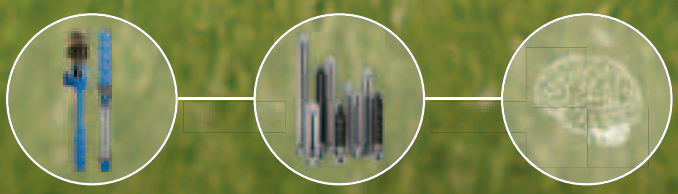

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Let's Solve Water

NEW PRODUCTS & SERVICES

SDS CONTROLLERS

COMPACT, PERFORMANCE AND VALUE

The SDS range of controllers is the result of a four-year development program to design a world class, commercial, two-wire irrigation control system.

The controllers are the most compact in the industry and offer outstanding performance, ease of service and exceptional value. The controllers are positioned in the market to satisfy both turf and agricultural applications. They are currently available in 48-, 72- and 96-station models.

One of many advantages of the system is the elimination of separate valve decoders. A technical partnership was formed with Bermad Water Control Solutions in Israel to design a solenoid coil with an embedded microcontroller. The result of this partnership is the amazingly compact DataCoil™. The coil continually communicates its status back to the controller. The coil's built-in power regulation ensures long life and efficiency.

For non two-wire installations, SD Systems provide the RelayCube™ solution. This device plugs anywhere into the two-wire line to convert the controller into a conventionally wired system. This flexibility allows it to run both two-wire DataCoils™, as well as any conventional coils.

The system also supports the use of DataNodes™. These devices can be placed anywhere along the two-wire cable and connected to infield sensors or water meters. The status and information from the DataNodes™ is instantly reported back to the controller.

Looking to the future, SD System controllers also provide its users the option to water by time, volume, or precipitation.

A standout feature in the SD Systems range is industry-leading communication. The controllers are supported by a PC central software program with a capacity of up to 400 sites - with Apps for iPhone, iPad, and Android Samsung Galaxy SII + SIII, all available at no charge.

The controllers are configured for 4G LTE, 3G, GSM and WiFi communication via our secure SignalNet server at a low annual fee. As a result, all communication to the controllers is near instant.

One of our customers, Curtin University in Western Australia, recently standardised on the system with over 35 controllers online.

They use our PC software for central control, with iPad and iPhone Apps for maintenance and mobile monitoring. The system's performance has been outstanding, exceeding all the irrigation requirements for the universities' multiple campuses.

To learn more about SD Systems, visit us at www.signal.com.au.

PROWATER

PROWATER NATIONWIDE ON SHOW AT CRT CONFERENCE

The CRT National Conference is one of the largest agricultural trade expos in Australia bringing together over 900 delegates to share in key product learnings, the latest industry trends and unique buying opportunities.

ProWater Nationwide, one of Australia's newest water specialist groups, attended the conference to showcase its offering to the CRT network. ProWater Nationwide provides an extensive range of services and resources to meet the water management and irrigation needs of agricultural, commercial, domestic, industrial, mining and horticulture markets.

More than 30 CRT Local Blokes with a strong focus on water related activities have joined ProWater Nationwide. Their membership provides them access to leading irrigation and water supply companies, training programs and group purchasing advantages.

ProWater Nationwide suppliers, Davey Water Products, Philmac and Iplex Pipelines also attended the conference to detail their product ranges to CRT retailers and bring them up-to-date with the new technologies in the water industry.

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NEW PRODUCTS & SERVICES

IRRISYS

TASMANIAN farmers are some of the most proactive when it comes to looking at new irrigation practices, according to Irrisys, a company developing more efficient ways of using water.

Company head Damien Butler says the introduction of VRI (variable rate irrigation) and IRPCS (remote pressure control) with single dropper control and 1 psi resolution has changed the watering game.

"This level of control provides the perfect stepping stone for the next generation of control and monitoring," Damien said. "The development of our remote pressure control system has changed the way people use their irrigation pumping systems and provided irrigation designers with scope to try new and exciting methods to control and manage water."

The system is designed to work in conjunction with a VSD (variable speed drive) and provides set duty control regardless of static variation. For example, if a pivot system is working on a circle with 30 m static differential from the cart to the highest point on the property, the irrigation designer would have designed the system at this highest point. As a result the system works perfectly well but it is highly inefficient when it comes to managing the power required to run the system.

As an example, consider a situation where the end span of the pivot requires 25 psi to work effectively at the highest point. However, when the irrigator moves around the circle and reduces in elevation by the estimated 30 m, an additional 42 psi (theory base assumption) will be delivered — making the total end span pressure in excess of 67 psi.

This is hugely inefficient. The Irrisys solution is to look at the pressure on the end span and send that information back to the motor via low frequency VHF radio. The motor control system is configured to react, based on the feedback from the sensor on the end span against the required programmed pressure. As the irrigator moves down and around reducing static height, the pump simply ramps back to compensate and as a result maintains the minimum operating pressure required.

This shouldn't be confused with local pressure control at the pump as it does not provide the same benefits or level of control as IRPCS. To understand the fine points of how this works you need to have a high level understanding of the electrical engineering behind the product, but luckily Irrysis does this for you. The system works by reducing the current draw (amps) on the motor and as a result it decreases the kilowatts used.

"The irrigation tariff works on kilowatt hours and therefore a reduction in kilowatts produced per hour results in a lower pumping cost," explained Damien.

Irrisys is now testing its new remote web-based monitoring system which will bring all the farm's assets into one system. This is being achieved by linking Fieldlink radio systems into a network with an access point to the web—all developed by Irrisys.

The user will have a display showing all critical information about their property, and as a result will have a finer level of control with VRI, IRPCS and VFD technology.

For more information contact Damien Butler, phone 0419 384 624, email damien@irrisys.com.au

ADVERTISERS INDEX

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Available in single, double or triple pump units, Southern Cross SBI-E variable speed automatic water pressure systems use the proven stainless steel SBI vertical multistage pump combined with IQ variable frequency drives with stainless steel suction and discharge manifolds. SBI-E units provide reliable and efficient pumping performance across a wide range of duties with flow rates of up to 80m^3 per hour and heads up to 100 metres.

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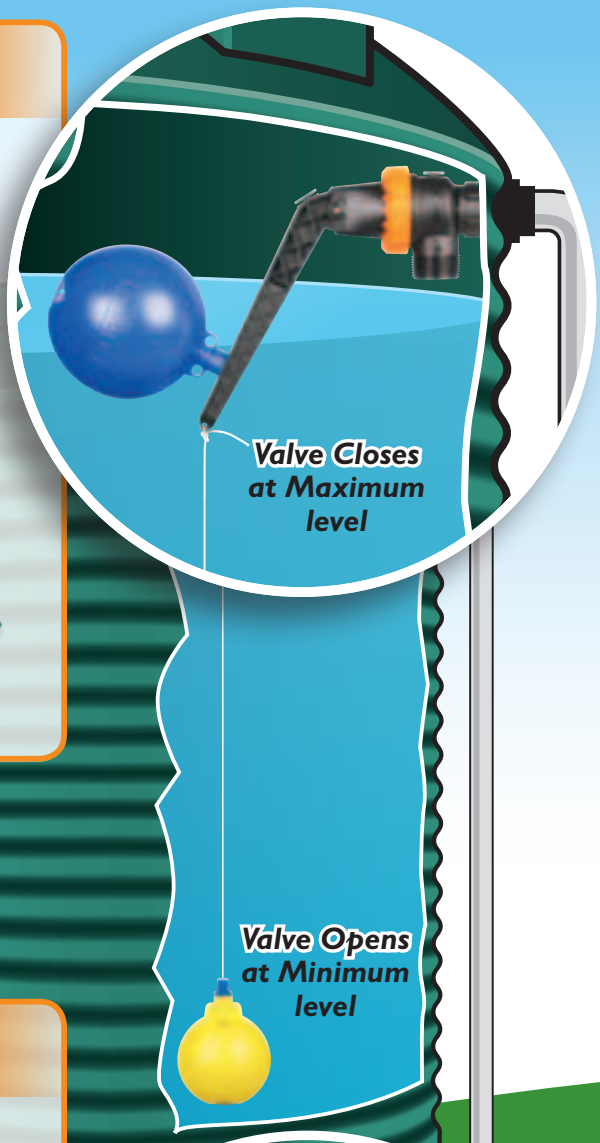

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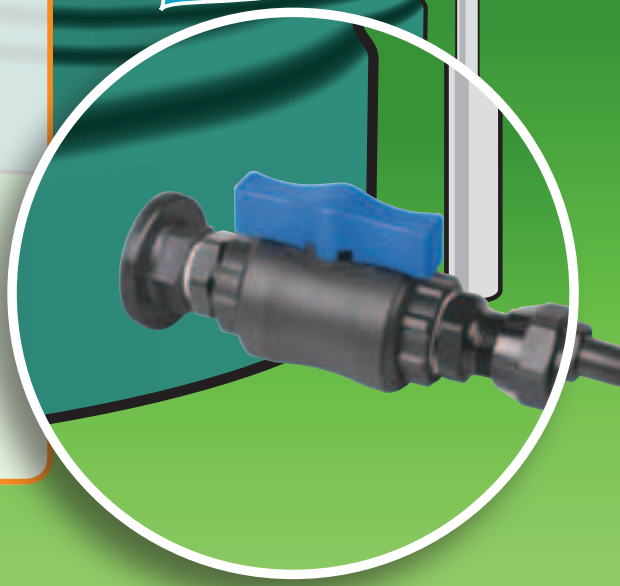

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