

Water Wheel

National Program for Irrigation Research and Development

PROGRAM COORDINATOR'S REPORT

Welcome to another edition of *WaterWheel*. NPIRD is currently developing its investment strategy for Phase 3 of the Program. This process is progressing well with a final decision on the short-listed applications addressing water use efficiency and environmental impacts being made in September.

Also, the program has recently called for projects addressing a further two priority areas identified in the program plan – socioeconomic/ policy issues and irrigation knowledge and its use. Projects are being sought to address the following issues:

- irrigation supply and price risk management
- socioeconomic impacts of national water policy reforms
- irrigation industry networks
- postgraduate scholarships and travel fellowships.

I am also pleased to welcome four new members to the NPIRD Management Committee: Mike Logan, Wayne Meyer, Andrew McCrea and George Nielson.

Mike Logan joins the committee as a result of his recent appointment to the LWRRDC board. A highly respected cotton grower from Narrabri, Mike brings to the committee a wealth of experience in both irrigation and environmental management issues.

George Nielson joins the committee as a new representative for Queensland irrigators. George has had a strong involvement in all aspects of the sugar industry and is current chairman of the North Burdekin Water Board. His involvement will strengthen NPIRD's understanding and appreciation of tropical irrigation management.

Andrew McCrea, from Water and Rivers Commission, is the nominee of the West Australian members. WA has joined the national program as financial members this year. Andrew will provide linkages with irrigators for the Ord and South West Irrigation regions of WA, as well as agencies with an interest in irrigation R&D.

CSIRO Land and Water also joins NPIRD as a funding partner. Dr Wayne Meyer, Program Leader (Sustainable Agriculture), a well known authority in irrigation R&D in Australia, will represent CSIRO. His background and experience will add substantially to the Management Committee.

There are now 39 privatised/corporatised irrigation districts throughout Australia, supplying irrigation water to 1.75 million ha or 70% of Australia's 2.5 million irrigated ha.

Three years ago the NPIRD developed a benchmarking framework for these entities in an attempt to encourage continuous improvement in system efficiency and service delivery. The committee is currently reviewing a new proposal that if approved, will provide funding for ANCID (the Australian National Committee on Irrigation and Drainage) to implement an annual benchmarking program. It is expected that ANCID will eventually fund the annual activity from member contributions.

Details of the new proposal will be available within one month. Copies of previous benchmarking reports and can be obtained by contacting me on 0269641873 or email <mcs@webfront.net.au>.

Brett Tucker

Program Coordinator

what's inside

Focus on WA

NPIRD news

**A new way to
save water and nutrients**

**National Irrigation Science
Network up and running**



Land & Water Resources Research & Development Corporation

This publication is managed by the Land & Water Resources Research and Development Corporation (LWRRDC), GPO Box 2182, Canberra ACT 2601.

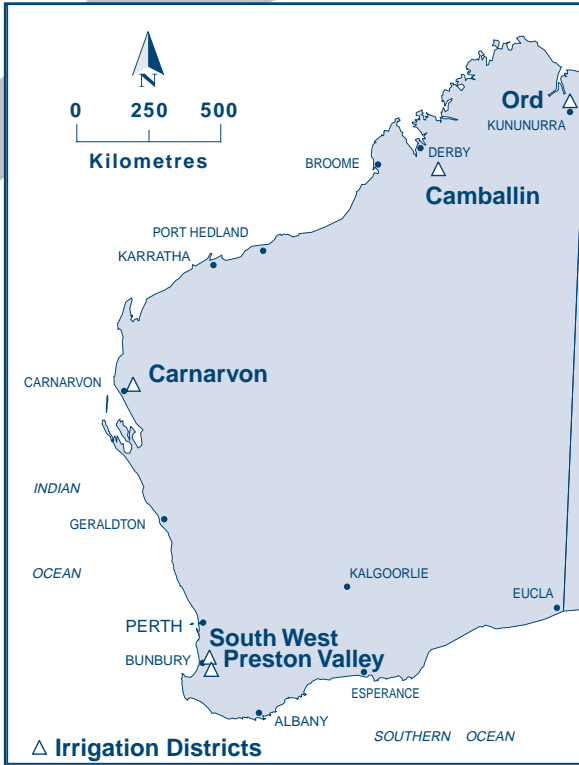
LWRRDC's mission is to provide national leadership in utilising R&D to improve the long-term productive capacity, sustainable use, management and conservation of Australia's land, water and vegetation resources. The Corporation will establish directed, integrated and focused programs where there is clear justification for additional public funding to expand or enhance the contribution of R&D to sustainable management of natural resources.

LWRRDC's Home Page is: www.lwrrdc.gov.au



FOCUS ON WESTERN AUSTRALIA

Western Australia and Queensland are often identified as states of opportunity for irrigation development. And a quick glance at the map below shows that there appears to be much potential in terms of land and water available in WA.



- Licensed use for irrigation is 68% from scheme supply and 32% from self supply
- 73% of irrigation water is from surface water sources and 27% from groundwater.

IRRIGATION IN WA

In a recent trip to WA, *Waterwheel* visited two of the largest suppliers of surface irrigation water in WA irrigation areas, the South West and the Ord, to look at irrigation developments there.

South West Irrigation

South West Irrigation is centred around Harvey in the south-west of the State. This is the site of the State's first irrigation scheme, which was established in 1915 to serve 1,350 ha of land. A feature was that drains were built first to reduce winter waterlogging. Irrigation supply channels were built later.

The system now has seven source dams, all water from which is delivered by gravity (no energy costs). It has:

- 148 km of concrete channel
- 284 km of earth channel
- 57.4 km of pipeline
- 1,500 water checks and diversions
- 1,000 active supply points
- 561 irrigation customers
- total irrigable area of 34,370 ha.

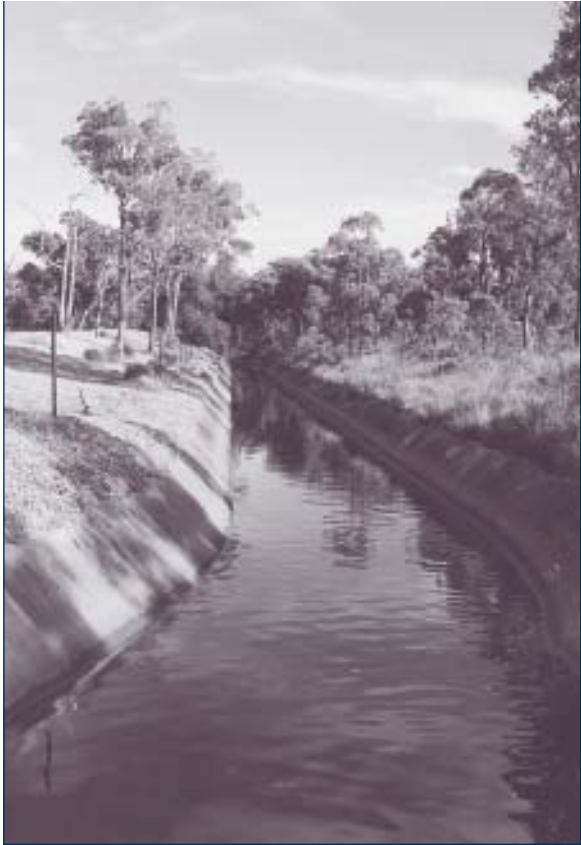
South West Irrigation was privatised in 1996 and is a company owned by the local irrigators in a two-cooperative structure. One cooperative owns the assets while the other is contracted to carry out work on them.

Debris and trash in channels are a problem for water supply authorities everywhere. The team at South West Irrigation, including engineer Steve Icton, have come up with this trash rack, which has proven to be very successful.

Trash is lifted up by the fingers and dropped on a conveyor belt, which takes it to the side on the channel. According to Steve Icton, the trash rack has even been able to remove dead kangaroos!



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South West Irrigation has found shotcreting to be an effective way of lining their drains rather than using traditional construction methods.

Irrigators own shares in the cooperatives, which gives them a Transferable Water Entitlement (historically based on 9.2 ML/rated ha). The Transferable Water Entitlement can be traded on a free market so that water can flow to where its economic return is greatest.

Irrigators have recognised the importance of R&D



This number of dethridge wheels is an unusual sight on any irrigation scheme.

Sugar cane is a major industry in the Ord



and pay an 80c a ML levy to a fund specifically for the purpose.

Ord Irrigation

In the last 10 years, the fortunes of the Ord have been revived. A range of crops such as sugar cane, bananas, mangoes and melons are now grown, as well as trees crops such as sandalwood. In the last decade crop values have increased from \$10 million a year to \$60 million.

Increasing the size of the Ord irrigation area is a project being developed at present by joint venturers, Wesfarmers and Marubeni, with the support of the WA and NT governments. Wesfarmers is an Australian company based in Perth while Marubeni is a Japanese trading company which trades a large range of commodities including sugar and is involved in developing sugar mills and refineries around the world.

Ord Stage 2 could eventually triple the 14,000 ha size of the irrigation area. Sugar is seen as a major cropping enterprise for Stage 2, as well as horticulture.

Water supply is the least of any problems in the Ord. Argyle Dam is the supply source and, depending on which sign you read, it contains from nine times to 18 times the amount of water in Sydney Harbour when it starts to overflow down the spillway.

With the engineering having been largely sorted out for the project, much energy is being put into Native Title negotiations and finalising environmental approvals. It is acknowledged that these negotiations have delayed the project but there is great confidence that it will still go ahead. While it is dependent on these negotiations, developers plan to begin work on irrigation infrastructure and developing farmland next year.



ANCID TO COORDINATE BENCHMARKING PROCESS

In the wake of a pilot benchmarking study of rural water supply authorities completed last year, the Australian National Committee on Irrigation and Drainage (ANCID) has taken on the role of continuing to coordinate the benchmarking process and collating data.

The pilot study was funded by the National Program on Irrigation Research and Development (NPIRD) and Council of Australian Governments (COAG). ANCID will be supported in its role by NPIRD and Agriculture, Fisheries and Forestry Australia (AFFA).

According to Stephen Mills, Chairman of ANCID and board member of Goulburn-Murray Water, the major benefits of the benchmarking process for rural water authorities are it:

- gives a set of common reporting indicators to focus business activities on
- gives pointers as to why different authorities perform differently for particular benchmarks
- gauges improvements in the performance of individual authorities over time
- highlights opportunities for future research.

"As a body that represents the water authorities we see the development and implementation as our core business," said Mr Mills.

"This is a large part of the reason we were willing to become involved in coordinating the process in future," he added.

SAVING WATER AND NUTRIENTS: A NEW WAY

Richard Stirzaker and Paul Hutchinson, CSIRO Land & Water, Canberra

There are many ways to schedule water, but few are quick and easy enough to be embraced by a large number of irrigators.

CSIRO Land & Water has tried to fill this gap by introducing a new method for scheduling irrigation and a new device to go with it. The method is to turn the water off when rootzone has been refilled. This is in contrast to current soil-based scheduling methods that involve monitoring soil water content and waiting for the point at which irrigation should be turned on.

The new device is a wetting front detector that is buried at an appropriate depth in the soil and gives a signal when the soil profile is full. It is called a *FullStop* – because it stops irrigation when the soil is full.

The *FullStop* is a funnel-shaped device that produces liquid water when a wetting front moves through an unsaturated soil. The funnel converges the stream lines causing the soil to become saturated at its base. Water then moves through a filter into a cavity and activates a float switch. The accuracy of this method has been demonstrated over the past two years in a range of horticultural crops and soil types.

LWRRDC funded a pilot project over the last irrigation season to find out if water collected from the funnel could be used to help farmers better manage nitrate and leaching requirements. The *FullStop* was modified to store a sample of water from each wetting front. Experiments were carried out under sugar cane, capsicums, tomatoes and turfgrass in collaboration with CSIRO Tropical Agriculture and the NSW Agriculture.

The *FullStops* routinely collected water each time the wetting front reached the bottom of the rootzone, and these samples often contained high concentrations of nitrate. The nitrate was clearly leaving the rootzone and so gives the farmer rapid feedback that irrigation and fertiliser strategies need to be adjusted. The *FullStop* also monitored the accumulation and leaching of salt under a mix of saline and fresh irrigation water.

CSIRO Land & Water is planning a series of farm based trials to develop the *FullStop* to the commercial stage.

For more information contact Richard Stirzaker, phone 02 6246 5570, email <richard.stirzaker@cbr.clw.csiro.au> or Paul Hutchinson, phone 02 6246 5551, email <paul.hutchison@cbr.clw.csiro.au>.

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BENCHMARKING IRRIGATION SYSTEM PERFORMANCE USING WATER MEASUREMENT AND WATER BALANCES

Tony Meissner, Department of Environment, Heritage and Aboriginal Affairs, SA

In this article Tony Meissner gives us an overview of a conference he attended in the US in March this year. The conference was sponsored by the US Committee on Irrigation and Drainage and held at San Luis Obispo in California, 10 to 13 March.

At the conference a number of concept papers were presented on aspects of calculating irrigation system performance, water balance components and measuring water balance components. Papers were also presented on practical problems within irrigation districts and regions in the USA, Canada, Sri Lanka, and Australia.

Dr Charles Burt, Director, Irrigation Training and Research Centre, Cal Poly emphasised the need to define the boundaries of the system for determining irrigation system performance. Not only the spatial boundaries (3-D) but also the temporal boundaries should be known. These boundaries include identifying which parts of the irrigation system we are trying to determine performance values for, ie. the conveyance system, on farm delivery or irrigation district.

It is also important to know over what period we are measuring. For instances, in long term measurements soil water storage is a minor component of the total balance. Double counting of water can occur, especially when dealing with both groundwater and surface water sources.

In presenting data on irrigation system performance, the confidence level or interval is not

often presented. If one of the components has a large confidence interval then this has implications for any derived values. Often drainage, ET, or conveyance losses are determined as a closure term eg. by difference. Hence a large error in one term can result in large errors in the closure term.

External irrigation performance figures, eg. for an irrigation district or region are not necessarily an indication of internal irrigation performance. Other indices may need to be used to indicate how well irrigation is being managed within an irrigation district.

The issue of beneficial *vs* non-beneficial water use and reasonable water use was discussed. These terms have arisen in response to the environmental lobby concerns of irrigated agriculture in the USA, particularly in California. There is a danger that this could shift the focus from what crops need to an argument about legal definitions.

An interesting paper was given on *Hydronomic Zones*. A hydronomic zone has both a hydrological meaning and an economic meaning. In this system of classifying irrigation performance there are six zones – Natural Recapture, Regulated Recapture, Stagnation, Watershed, Ecological, and Final Use.

The Land & Water Resources Research and Development Corporation sponsored Tony's attendance at the conference through funds allocated by NPIRD's National Irrigation Efficiency group. The Strategic Investigations and Education Program of the Murray-Darling Basin Commission funded the project work reported.



Laying of buried drip tape on the surface of raised vegetable beds, Santa Maria, California.

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NATIONAL IRRIGATION SCIENCE NETWORK

Jeremy Cape, Interim NISN Coordinator, Adelaide

Have you ever found it difficult to access information or people to do with irrigation research and development? If you have, you're not alone.

A consultation done last year, and initiated by the CSIRO Land and Water, found that this was an issue for many people in the irrigation industry.

The National Irrigation Science Network (NISN) is one positive response to this issue. The network was established in February 1999 to coordinate irrigation R&D across the industry and to raise the profile of irrigation science activities. Its aim is as follows:

To improve returns from investment in irrigation science by improving networking, coordination and strategic direction across research providers and by linking with purchasers of R & D who will continue to undertake the operational planning and funding.

Activities such as networking and promoting irrigation science capability have been identified as ways for the network to do this.

Networking. The NISN will develop a database of irrigation science skills in Australia. This database will include details of individual and organisational skills, also specifying the availability of these skills for work with other members of the network. The database will be available to other NISN members as well as to the wider irrigation community. It will be restricted to the field of irrigation science research and education provision and will be published on the Web.

Coordination. The NISN will help purchasers of R&D and education services to source expertise. This activity will be linked to the database of skills. The network will also act as a hub of information to do with irrigation R&D, referring members and others to appropriate individuals and agencies.

Communication. The networking and coordinating activities of the NISN are part of improving communication within the R&D community.

The NISN website will play a major role in this and will be used to highlight relevant issues as they come up.

Promotion of irrigation science capability. The NISN will work with other organisations such as NPIRD, the AIC, IAA and ANCID to highlight the need for and importance of irrigation research.

Brokering of projects. The NISN will provide a mechanism for members to assemble skilled project teams for specific jobs.

WHO WILL BENEFIT FROM THE NETWORK?

There are six major groups who will benefit from the activities of the network.

- People involved in research and development and education providers.
- R&D funding agencies.
- State and Federal agencies.
- Water supply authorities.
- Commercial sector.
- Irrigators.

WHAT'S NEXT?

The following activities are proposed for the next six months of the network.

1. Continue the consultation process with research groups
2. Develop a NISN website
3. Complete a communications plan for the network to promote its activities and potential, in particular to potential members
4. Develop membership guidelines and structure for the NISN
5. Begin the process of signing up joint venture partners to the network
6. Begin building the database of irrigation science skills

MORE INFORMATION

For more information you can contact Jeremy Cape, phone 08 8303 8552, fax 08 8303 8550, email <nisn@adl.clw.csiro.au>.

LWRRDC's R&D newsletters

LWRRDC publishes a number of newsletters which help land, water and vegetation resource managers and researchers share R&D program specific information. These include:

- *FOCUS* - Dryland salinity R&D program newsletter
- *Intersect* - LWRRDC general newsletter
- *CLIMAG* - Climate variability in agriculture program newsletter
- *RIPRAP* - Riparian land management R&D program newsletter
- *Rivers for the Future* - River health and algal programs magazine.

Streamline is the natural resources database supported by LWRRDC. To subscribe to, or to receive a brochure about Streamline, phone Pam Handyside on (02) 6236 6267 or email <infoscan@acslink.aone.net.au>

To be placed on the mailing list for any of these free newsletters contact LWRRDC on phone (02) 6257 3379, fax (02) 6257 3420 or email public@lwrrdc.gov.au for a Communication Request Form.

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In June this year the Management Committee met at Narrabri in NSW. Several activities were on the agenda, including presentations from local researchers at the Cotton CRC on irrigation related research in progress, a meeting with local irrigation farmers and farm tour, a dinner with the local regional committee and members of the Irrigation Association of Australia, as well as assessing project applications.

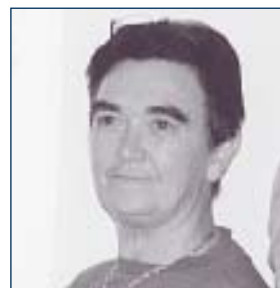
The meeting was significant in another way as well. It was the last for chairperson, Christine Forster, who retired after serving two terms on the LWRRDC Board.

Christine, who is a Victorian farmer with a long association with irrigation research and development on a national basis, will be missed from NPIRD, particularly by the management committee members.

She said "NPIRD has provided national focus for the irrigation industry, working in partnership to stimulate the research necessary to protect the industry's access to the resource it depends on."

"The next decade will see increasing pressure on the

Retiring NPIRD Chairperson, Chris Forster, attends a tour of local cotton farms at the Management Committee meeting at Narrabri in June.



availability of water for irrigation and irrigation research and development will help us find ways to make this scarce resource go further," Ms Forster said.

Stephen Mills, from Victoria, will act as interim chairman of the interim management committee until it is finalised.



Cotton farmer, Mike Logan, shows Management Committee members around his property, on the outskirts of Narrabri. The Logan property is the only one in the world to have gained accreditation under ISO 14001.

PROGRAM REVIEW COMPLETED

A review of NPIRD's performance from 1993 to 1998 was completed by Peter Chudleigh earlier this year. Conclusions from the review included the following:

- NPIRD has successfully provided a collaborative industry/government framework for coordinating and investing R&D funds in the national interest for irrigation in Australia
- outputs and outcomes of the program have been in line with its objectives and strategies
- the program has had a strong catalytic effect through stimulating further interest and activities with respect to water use efficiency and benchmarking
- coordination of projects has been excellent and the program has been well managed
- the program, through coordination, has improved the use of skills that are already available and this has positively influenced irrigation research capacity

- NPIRD has contributed significantly to education and training initiatives for the irrigation industry
- economic evaluations indicate that the rate of return to investment is positive.

The review also recommended the following improvements:

- NPIRD should consider wider representation on the Management Committee
- NPIRD should clearly specify its intention regarding strategic research funding
- technology audits should be considered for selected areas to improve adoption
- NPIRD should continue to strive to develop stronger linkages with other R&D funding organisations
- performance criteria should be developed at the program level.

For more information about the review, contact Program Coordinator, Brett Tucker.

SIXTY TWO FUNDING APPLICATIONS RECEIVED

Sixty two applications for project funding were received by NPIRD in May. Proposals for the priority R&D areas of Water Use Efficiency and

Environmental impacts of and Effects on Irrigation were assessed by the Management Committee in June and successful applicants asked to submit detailed proposals.



IRRIGATION AUSTRALIA 2000 CONFERENCE AND EXPO

Irrigation Australia 2000 Conference and Expo will be held in Melbourne 23-25 May 2000 at the Melbourne Exhibition and Conference Centre.

The conference and expo is the biggest irrigation event in the Southern Hemisphere and is a unique opportunity to meet people involved in the irrigation industry both in Australia and from overseas and to see and hear about the latest in irrigation technology.

The theme of the conference is *Water – Essential for Life*. Topics being covered include:

- ❑ water policy, legislation and regulation
- ❑ economics of irrigation
- ❑ environmental issues
- ❑ managing, operating and maintaining irrigation systems
- ❑ new irrigation technologies
- ❑ managing with less water
- ❑ irrigation scheduling
- ❑ irrigation education and extension.

Registration forms are available from Conference Secretariat PO Box 2349, NORTH BRIGHTON Vic, 3186.

Phone 03 9530 6777, fax 03 9530 6526, email <services@profconferences.com>.

SODICITY CONFERENCE

Soil sodification is one of the most insidious forms of natural resource degradation facing Australian agriculture. It has been recently reported that sodicity appears to be increasing across much of Australia (LWRRDC Occasional Paper 17/97) and that most farmers aren't using soil amendments (SCARM Technical Report 70).

A three-day conference will be held at the Institute of Sustainable Irrigated Agriculture (ISIA), Tatura, Victoria, on 28 February-1 March 2000 to bring together a range of agricultural industries with a major interest in sodicity. The conference will include oral and poster presentations, a half-day field trip, conference dinner and an interactive workshop to discuss future research directions. Keynote speakers from overseas (USA, Israel and New Zealand) will also be featured. Topics to be covered include:

- ❑ sodicity in irrigation waters (groundwater, wastewater and drainage water)
- ❑ sodification of agricultural soils
- ❑ sodicity problems in agricultural systems
- ❑ amelioration and management of sodic soils.

For more information contact :

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NPIRD Mission. To provide leadership for national irrigation research and development and facilitate the adoption of technology that improves natural resource sustainability and the economic viability of irrigation regions.