Water Wheel

National Program for Irrigation Research and Development

Irrigation research funding

In the last decade irrigated agriculture has grown in importance in terms of its contribution both to regional economies and to the growth of value adding industries such as dairying, wine grape growing and horticulture.

In this time irrigation research and development projects have been funded by a number of groups, including agencies, Murray-Darling Basin Commission and commodity R&D corporations. However, none has played the unique role that NPIRD has. NPIRD is the only program whose core business has been the funding of irrigation R&D in Australia.

The end of June saw the third and final phase of the National Program for Irrigation Research and Development completed. This marks 9 years of successful irrigation research and innovation, funded by the Federal Government, through Land & Water Australia, and CSIRO Land & Water, industry bodies and State Government agencies from around Australia.

During this time almost 100 projects were funded by the program, a number of which produced research of national and international reputation. Examples are partial rootzone drying and water supplier benchmarking. Partial rootzone drying technology was developed with support from NPIRD, Grape and Wine R&D Corporation and Horticulture Australia Ltd. This technology, which delivers major benefits in terms of water savings and enhancing yields, was rated among the top 100 innovations of the 20th Century in a review conducted by the Powerhouse Museum (Sydney) and the Australian Academy of Technological Sciences and Engineering.

The framework used for benchmarking the performance of rural water supply authorities has been taken up internationally by the International Committee on Irrigation and Drainage and is at present being trialled in six countries. Further, NPIRD work on water use efficiency (WUE) underpinned major new state-based programs aimed at improving irrigation WUE in New South Wales and Queensland.

Management Committee Chairman, Stephen Mills, congratulated everyone who had been involved in the program - supporting bodies, researchers, irrigators and the people behind the scenes - for their commitment to the program and for contributing to its success.

While NPIRD may be finishing up, this doesn't mean the end of the commitment by Land & Water Australia to irrigation research and innovation. Rather, the work done through NPIRD provides an ideal launching pad for a new direction in irrigation research.

This continued funding of irrigation research and innovation is crucial to the industry in Australia.

"As we enter the 21st Century, a challenge for the irrigation sector is to confront issues such as increasing demands for water for environmental, urban, industry and catchment use; decreasing water quality; climate change and its effect on rainfall; increasing the number of times extracted water is used; and new technologies," said Mr Mills.

"These and other issues mean that there has never been a more important time for well targeted, generic research and innovation to maximise Australia's opportunities," he added.

what's inside

Land & Water Australia
research · development · innovation

This publication is managed by Land & Water Australia GPO Box 2182, Canberra ACT 2601.

Land & Water'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. It 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.

Land & Water's Home Page is: www.lwa.gov.au

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Agriculture WA - Ord Irrigation Cooperative - South West Water (WA)

FOCUS ON SOUTHERN RURAL WATER

Irrigation in southern Victoria – a diversity of challenges

Background
Southern Rural Water (SRW) operates three irrigation districts and licensing functions covering the southern half of Victoria (see map). The three irrigation districts are Bacchus Marsh and Werribee in the Western District and Macalister in central Gippsland.

Map. Southern Rural Water area.

About Southern Rural Water
The diversity of conditions and consumers across the three irrigation districts managed by SRW presents significant challenges in water supply management. Recently, SRW have had to manage periods of water shortage across much of its domain and in the same period cope with flash floods at two of its weirs. Farmers, growers and graziers constitute the predominant user group of water throughout Southern Victoria, but SRW also harvest and supply water to non-metropolitan urban water authorities and Latrobe Valley electricity generators, who hold bulk entitlements.

Irrigation is one of three principal components of SRW operations, the others being licensing and headworks. Licensing operations manage the 4100 customers licensed to take water from rivers and streams and a further 3000 groundwater licenses. The headworks operations manage the storage and harvest of water, on behalf of bulk entitlement holders, from four major systems and seven large dams at Pykes Creek, Merrimu, Gisborne, Melton, Blue Rock, Yallourn and Glenmaggie.

The irrigation business delivers an average of 177 000 ML each year to 1600 properties. Delivery performances for the three irrigation districts are presented in tables 1-3.

Major issues – achievements and future directions
Major environmental issues facing SRW include management of blue green algae, nutrient and salinity impact, downstream flows and groundwater resources. Water supply security, conservation and efficient use of water resources are other issues concerning SRW and are shared by irrigation operations throughout Australia.

Blue green algae. Last year, the CSIRO was commissioned by SRW to prepare a report of the risks blue green algae poses in its storages. This will be used to assess the development of a risk management strategy and, if necessary, to modify the rapid response system currently in place. The CSIRO report will also form the basis of information sheets for distribution to stakeholders so that they can be better informed of the risks and implications of blue green algae outbreaks.

Nutrient and salinity impact. The diversity of conditions across SRW's operating area is obvious from the range of environmental challenges faced.

In the eastern (Macalister) irrigation area, reduction of nutrient levels is a major issue. The Macalister Irrigation District Nutrient Reduction Plan has been progressing through landholder extension, water monitoring, nutrient research and investigation activities, as well as processing 'whole farm plans' and continuing development of drain management plans. The 'whole farm plan' involves undertaking research on a whole farm scale, looking at the movement of nutrients in the soil and the responsible management of nutrients in an irrigated dairy situation. It is the only one of its kind in the Southern Hemisphere involving a commercial dairy farm.

Furthermore, a Prescription Farming Centre has been set up at Maffra by Pivot where farmers have their fertiliser requirements exactly blended to match the needs of their soils, as determined by annual soil tests. Computerised spreading trucks and trained operators ensure that exactly the right amount of nutrients are applied, at an optimum

DESCRIPTION	2000/1	1999/0	1998/9
	ML	ML	ML
Water brought into the system	224,308	223,368	232,995
Water rights and entitlements delivered	117,307	122,489	112,797
Seasonal sales delivered	34,232	31,629	32,353
	%	%	%
Water delivered to customers	68.6	69.6	65.4
Water lost within the delivery system	23.3	20.8	25.3
Water passed as outfalls from system	8.1	9.6	9.3

Table 1. Delivery performance – Macalister Irrigation District

DESCRIPTION	2000/1	1999/0	1998/9
	ML	ML	ML
Water brought into the system	4,481	4,034	3,908
Water rights and entitlements delivered	2,508	2,469	2,384
Seasonal sales delivered	600	232	108
Outside District sales	342	218	196
	%	%	%
Water delivered to customers	77.0	72.4	68.8
Water lost within the delivery system	14.5	15.5	13.7
Water passed as outfalls from system	8.4	12.1	17.5

Table 2. Delivery performance – Bacchus Marsh Irrigation District

DESCRIPTION	2000/1	1999/0	1998/9
	ML	ML	ML
Water brought into the system	12,906	12,842	11,330
Water rights and entitlements	8,445	9,094	8,240
Seasonal sales	2,013	1,119	768
	%	%	%
Water delivered to customers	81.0	79.5	79.5
Water lost within delivery system	16.9	18.3	18.3
Water passed as outfalls from the system	2.1	2.2	2.2

Table 3. Delivery performance – Werribee Irrigation District

time, to feed the plants which feed the herds so that they continue to produce world class quality milk, meat and leather products.

In the western (Werribee and Bacchus Marsh) irrigation area, SRW are involved in the Wellington Salinity Plan which constitutes 18 groundwater pumps extracting over 4,500 ML of groundwater annually, on behalf of the Wellington Salinity Group.

Downstream flows. SRW have completed three Streamflow Management Plans, for the Merri, Gellibrand and Upper Latrobe Rivers and commenced development of twelve more for priority streams in southern Victoria. Environmental Management Plans have been developed for three of the seven reservoirs managed by SRW with the remaining four to be completed during 2001/02. These programs aim to improve flow regimes and modify storage operations to create more natural downstream flows.

Groundwater resources. Groundwater management activities have involved the installation of 200 groundwater monitoring bores and provision of assistance to committees of stakeholder and community representatives to complete five draft Groundwater Management Plans, at Denison, Nullawarre, Sale, Wy Yung and Yangery.

Water management – quality and supply. Apart from the blue green algae and nutrient management initiatives being undertaken to ensure high water quality, SRW have 69 flow monitoring sites on waterways and drains it manages and contribute to a further 67 sites in the state network. Contributions are also made to West Gippsland

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and Werribee Waterwatch to undertake additional water monitoring and community education activities.

Significant savings in the Werribee and Macalister Irrigation District have been achieved through replacement of open channels with pipelines. Water for Growth projects on the Avon and Merri Rivers are soon to be initiated. These projects will explore opportunities for better water use, with the water savings being directed into flow regimes that provide better environmental outcomes.

Security of supply is a core activity that receives ongoing attention. Risk management strategies and plans to deal with failure of dam or irrigation supply structures, contamination of water and periods of drought have been developed and are regularly revised. A comprehensive management and surveillance program for all major headworks structures has been established and is subject to regular review and audit. All existing systems aimed at safeguarding security of supply continue to be developed further.

Research and Development

SRW has established links and cooperative partnerships with a number of research institutions, including the Arthur Rylah Institute, Macalister Research Farm, the Cooperative Research Centre for Catchment Hydrology, CSIRO and the Royal Melbourne Institute of Technology. Many of the present and future projects have been mentioned in the preceding section and involve a commitment of over $200,000 during 2001/02. Other R&D projects include a recently completed water quality study on the Werribee River and, over the next two years, SRW plans to spend $650,000 on erosion control around its storages.

Whilst much of the Werribee Irrigation District is serviced with concrete lined channels, a steady program has been under way in recent years to replace these, when life expired, with pipeline. Although pipelining is a more expensive capital cost, the benefits in terms of both longer life and lower maintenance costs, as well as the potential for saving water, are sufficiently attractive to warrant this additional investment. Also, as the urban areas of Werribee and the City of Wyndham grow, it is essential that the risk posed by open channels - especially the Main Channel through which water can flow at quite high speeds - is eliminated. In this situation, pipelining is funded jointly by SRW and the developers of the new estates.

Further information on the activities and directions of SRW or a copy of the latest annual report can be gained from its website at <www.srw.com.au> or by contacting Vere Gray, Authority Secretary, phone 03 5139 3162.

Photos courtesy Southern Rural Water.

Lake Glenmaggie, located on the Macalister River in central Gippsland, is the water storage for the Macalister Irrigation District (MID), which is the largest of the three irrigation districts in southern Victoria. The lake holds some 191,000 ML, but the flow characteristics of the Macalister River can fill the lake twice over in a normal year. For this reason the Glenmaggie Weir is topped with fourteen radial gates, which can be opened to release water into the lower river at predetermined rates and thus avoid uncontrolled spills or floods threatening the downstream environment. In the picture, two gates are open to allow additional flows to pass. As well as this, essential environmental flow requirements are passed via the hydro electric power station located below the weir. Water can also be passed either directly into the river through an outlet tunnel or, in cases of extreme danger, into the MID itself via the main channel outlets.

LAND & WATER AUSTRALIA SUPPORTS NEW SUSTAINABLE IRRIGATION PROGRAM

At its board meeting held in April, the board of Land & Water Australia approved funding for a new irrigation program to begin in July 2002. The program will be called the National Program for Sustainable Irrigation.

The board demonstrated its commitment to a new national Research & Innovation program by allocating $1,500,000 to it over the next three years. The board has stipulated that increased industry funding will also be a key component of the program.

According to Management Committee chairman, Stephen Mills, this decision is a very important one for the irrigation community in Australia and a vote of confidence in the work completed under the National Program for Irrigation Research and Development.

"The knowledge generated under the NPIRD program will form a sound platform on which to build the new program," he said.

"Now it is essential that industry supports the new program to ensure its success," he added.

Meetings are being held around the country with potential funders of the new program.

NATIONAL PROGRAM FOR SUSTAINABLE IRRIGATION RESEARCH THEMES

The focus of the new program will be sustainable irrigation.

Its aim is

To provide Australia with research and innovations to achieve sustainable irrigation.

Three research themes have been identified for the program, as follows:

Enhancing sustainability of irrigation
Some of the issues to be researched under this theme are:

- improve understanding of sustainable irrigation
- provide measures of sustainability from which unsustainable practices can be identified
- provide indicators of progress towards sustainability at the landscape level (and which can be developed to provide a set of progress indicators at farm level)
- understand the size of change needed to achieve sustainable irrigation.

Exploring future visions and values
Issue areas include the following:

- predicting future business environments for irrigation, including global drivers
- seeking radical breakthroughs in irrigation concepts, designs and plant production systems
- exploring methods to minimise the environmental footprint of irrigation.

Informing public policy development
Areas for research include:

- improving understanding of water property rights and trading regulations
- understanding the needs of different regions, particularly in developing areas such as northern Australia
- identifying the distribution costs and benefits of sustainable irrigation
- identifying the social, economic and environmental consequences of failure
- enhancing the adoption of ecological risk assessment approaches.

NPIRD will conclude, as scheduled, on June 30, 2002. NPIRD projects which are mid-term will be managed by the new National Program for Sustainable Irrigation.

Information
For information about the National Program for Sustainable Irrigation contact:

Murray and Liz Chapman
Program coordinators
Phone: 03 5763 3214
Email: rplan@benalla.net.au

PHASE 3 RESEARCH PROJECTS

During Phase 3 of NPIRD (1999-2002), 26 projects have been funded. Fifteen of these are in progress at present, and eleven have been completed.

Completed project
Completed projects are as follows:

Best management practices for subsurface drainage design and management	*Dr Evan Christen, CSIRO Land & Water*	Using information gathered in a national workshop to examine past methods in subsurface drainage and to determine current issues affecting subsurface drainage in the various regions across Australia, develop a manual of best practices for designing and managing subsurface drainage in irrigated areas. Published as an *Irrigation Insights*. Available through Land & Water Australia.
An information package on soil water monitoring	*Dr Phil Charlesworth, CSIRO Land & Water, Townsville*	An information package collating and summarising current scientific knowledge about soil water monitoring, including the range of devices available and their relative features. Published as an *Irrigation Insights*. Available from CSIRO Publishing and IAA and on NPIRD website, <www.npird.gov.au>.
Publish and distribute the Horticultural Refurbishment Best Practice Manual	*John Mapson, Secretary, ANCID, Tatura*	To review and refine the implementation plan for the Horticultural Refurbishment Best Practice Manual and have this printed and distributed. Copies of the manual available through the IAA.
Visiting Fellow, Bob Sojka, on the topic of Polyacrylamides (PAM) in Irrigated Agriculture	*Dr Aravind Surapaneni, DNRE, Tatura*	To evaluate the potential of PAM in Australia to minimise off- and on-site impacts of irrigated Agriculture on the environment and identify regions and industries that will benefit most from use of PAM. Report available on NPIRD website, <www.npird.gov.au>
A review of genetic algorithm (GA) technology for irrigation water ordering systems	*Dr Q.J. Wang, DNRE, Tatura*	To detail the current state of research into GA technology; analyse the future applicability of GA for water ordering systems; quantify likely demand from industry; recommend a way forward and future role (if any) for NPIRD; consider private versus public benefit issue as it relates to any future project; and increase awareness in Australia of NPIRD investment in GA technologies to date. Report available on NPIRD website, <www.npird.gov.au>
National workshop on the management of nutrients and sediment in irrigation return water	*Pat Feehan, Goulburn-Murray Water*	To conduct a workshop on the issue of managing nutrients and sediment in irrigation return water and prepare a report that establishes the current state of knowledge and future R&D needs. Report available from Pat Feehan, email <patf@g-mwater.com.au>

Current projects

Projects in progress are as follows:

Investigating the practicalities and potential fo evaporation losses from on farm storages – C Christiansen, Queensland Department of Natu and Mines, email <col.Christensen@dnrm.qld

Improving the water use efficiency of horticultu Brian Loveys, CSIRO Plant Industries, email <brian.loveys@csiro.au>

Rigorously determined water balance benchma Humphreys, CSIRO Land & Water, email <liz.humphreys@csiro.au>

Sustainable management of the Burdekin Delt ter systems – Dr Keith Bristow, CSIRO Land & <keith.bristow@csiro.au>

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ol
ral Resources
l.gov.au>

ural crops – Dr

arks – Dr Liz

ta groundwa-
Water, email

Improved irrigation scheduling for crops underlain by shallow, fresh watertables – Dr Peter Thorburn, CSIRO, email <peter.thorburn@csiro.au>

Benchmarking irrigation service providers – John Mapson, ANCID, email <johnmap@g-mwater.com.au>

Determining whole-of-system water use efficiencies for NSW river valleys – Dr Nick Austin, NSW Agriculture, email <nick.austin@agric.nsw.gov.au>

Nutrient removal from rural drainage – Ross Plunkett, Goulburn Murray Water, email <rossp@g-mwater.com.au>

Stage 2. Assessment of ecological risk associated with irrigation systems in the Goulburn Broken, Ord and Fitzroy catchments

Enhancement of the water market reform process: a socio-economic analysis of guidelines and procedures for trading in mature markets – Dr John Tisdell, Griffith University, email <j.tisdell@mailbox.gu.edu.au>

Development of guidelines for quantification and monitoring of seepage from earthen channels – Ian Moorhouse, Goulburn-Murray Water, email <ianm@g-mwater.com.au>

Developing the concept of satellite links in on farm irrigation R&D for improved R&D integration across Australia – Geoff Calder, South West Irrigation, email <gcalder@swia.com.au>

Improving water quality from subsurface drainage systems in irrigated agriculture (post graduate scholarship) – John Hornbuckle <john.hornbuckle@csiro.au>

Identifying of risks and developing conceptual models. Phase 1 of project, assessment of ecological risk associated with irrigation systems in the Goulburn Broken, Ord and Fitzroy catchments.	*Pat Feehan, Goulburn-Murray Water* *Dr L.J. Duivenvoorden* *Andrew McCrea, Water and Rivers Commission, WA*	To develop the likely ecological risks associated with irrigation systems in the Goulburn Broken, Ord and Fitzroy catchments as Phase 1 of a larger project to develop a generic ecological risk assessment framework.
Review of natural resource planning and implementation processes used in selected irrigation regions throughout Australia (mainly in the Murray Darling Basin) over the last 15 years	*Snowy Mountains Electricity Commission*	This joint project with Murray Darling Basin Commission examined land and water management and salinity management plan areas to: document processes used for plan development and approval and whether the processes changed as a result of monitoring; document how plans were implemented, financed and monitored; assess the relative performance of each model; report on consistence across plans; review methodology and calculations of salt loads and River Murray implications for each of the plans on the MDBC Salinity and Drainage Register; and document all findings and use them as the basis for a series of workshops to determine whether a consistent or better approach can be developed to document findings from each workshop.
Stage 1. Managing water allocation risk – an irrigator toolkit	*Charles Thompson, Rendell McGuckian, Bendigo*	To prepare kits for the dairy and rice industries that help irrigators make decisions about short and long term optimum water entitlement for their farms. Report available on NPIRD website <www.npird.gov.au>. For information about kits contact Charles Thompson, email <rendmcgk@bendigo.net.au>
Socio economic issues affecting positive change in irrigation communities	*Noel Beynon and Onko Kingma, CapitalAg Consultants, Canberra*	A report on the socio-economic research needs of irrigation communities in making structural changes in the next thirty years. Report available on NPIRD website, <www.npird.gov.au>.
Developing a national electronic communications strategy and research skills database	*Jeremy Cape, National Irrigation Science Network, Adelaide*	To establish more effective industry networks by developing a national information strategy for the irrigation industry to include commercial industry, government agencies, research and educational institutions and industry bodies, and to facilitate the national dissemination of technical information. Report available on NPIRD website <www.npird.gov.au>.

PRD MAKES TOP 100

In a recent review of Australia's scientific and technological innovations the technique of partial rootzone drying (PRD) was recognised as one of the top 100 discoveries of the past century. The review was conducted by the Powerhouse Museum in Sydney and the Australian Academy of Technological Sciences and Engineering. Details can be found on the Powerhouse Museum web site <*http://www.phm.gov.au/australia_innovates/*>

PRD was included as the 12th and most recent innovation in the agriculture and food category, which commences with "Federation wheat" in 1903.

Developing the technique has been the result of a collaborative research project involving the CSIRO, Grape and Wine Research and Development Corporation, Adelaide University and the South Australian Research and Development Institute.

It has been nurtured over the last six years by NPIRD. The technology has the potential to reduce irrigation water inputs while maintaining crop yields.

According to NPIRD Management Committee Chairman, Stephen Mills, PRD is truly a quantum leap.

"PRD gives us the opportunity to take advantage of natural phenomenon by altering the watering regime, reducing the amount of water applied without compromising yield or quality."

PRD update

In this article Project Leader, Dr Brian Loveys of CSIRO Plant Industry, brings *WaterWheel* readers up-to-date with recent PRD research.

"Following the initial NPIRD funded two-year project we have continued to develop the PRD technique with additional NPIRD funding, and close links with a new Horticulture Australia project are allowing us to study a greater range of crops", he said.

Dr Loveys continues to work with grapevines, while Ron Hutton from New South Wales Agriculture is working on citrus at Yanco Agricultural Institute, and Ian Goodwin and Harold Adem, Natural Resources and Environment Victoria, are concentrating on stone fruits and pears at Tatura.

A central theme of all the work is to assess how the PRD technique can alter the crop's water requirement and it is becoming evident that this is often a lot less than the amount currently supplied through irrigation.

Dr Loveys reported on the degree of interest in PRD and said that there are a number of projects with a PRD theme in the CRC for Viticulture.

These include such topics as effects on crop quality and rootstock response to PRD. Another project is looking at salt management under a PRD irrigation regime as well as the impact of poor quality water.

In a recent MDBC survey that reviewed adoption of various technologies it was found that grower awareness and adoption of PRD techniques was high. Questions raised relate to various practical issues, for example do horizontal bands of moisture induce the same physiological response as watering alternate sides of the plant?

Questions to be answered

"These are important questions and they need to be addressed if we are to gain maximum benefit from strategic irrigation management practices such as PRD", said Dr Loveys.

Research has so far revealed that, while each of the crop species has different physiological responses to stress, it should be possible to take advantage of the response and reduce water applications.

"It gives us the opportunity to take advantage of natural phenomenon by altering the watering regime, reducing the amount of water applied without compromising yield or quality." Dr Loveys said.

Not only does the response vary from crop to crop, but differences have also been observed between different rootstocks. For example a Shiraz vine on a Ramsey rootstock behaves differently to a Shiraz vine on a Shiraz rootstock, especially in terms of its response to stressful conditions.

The impact of PRD can be significant. As an example, Dr Loveys quoted figures for the Sunlands and Golden Heights area in South Australia where the main crop is citrus. In the 1980s irrigation application of from 12 to14 ML/ha a year were common. This has been reduced to between 7 and 8 ML/ha through improved irrigation systems and the use of soil moisture monitoring to schedule irrigation, but PRD techniques offer the potential to reduce water application even further to around 4 to 5 ML per ha.

Ron Hutton is growing citrus trees at Yanco with similar low water inputs using PRD treatments.

"What we are doing is helping nature along. The PRD treatments seem to make the trees more responsive to changes in the weather. Using sap flow sensing techniques we have shown that on a mild day only small differences are observed between PRD treated trees and trees watered with conventional strategies. On a hot dry day of high water vapour pressure deficit the trees watered with PRD strategies will shut down, while the remaining trees will transpire at a higher rate, requiring more water."

"I think of PRD as giving nature a helping hand." said Dr Loveys.

PRD - THE WINGARA EXPERIENCE

In a previous issue of *WaterWheel* we reported on the experiences of PRD at Wingara Wines at Red Cliffs in Victoria. We caught up with Chris Brodie, who was then managing the trial for the winery, to get an update on developments with PRD in the last 2 years.

Recognising PRD as one of the top 100 discoveries of the past century is very exciting, according to Mr Brodie, who is a viticulturist with the Wingara Wine Group.

Mr Brodie, who is based at the Wingara Wines Katnook Estate in the South Australian Coonawarra district, said, "It's great that the research guys are getting the credit that's due to them.

"Although, we have been using the technique just over four years at our Deacon Estate winery at Red Cliffs, Victoria, it is still so new in relative terms."

He said, "We are definitely achieving less water use and in three out of four years we have seen a great improvement in grape quality. The overall quality has been boosted so much that the whole trial has been successful."

"As a result we doubled the size of the trial from 6 to 12 ha. We are still learning so much, but we are going to be here for a long time, so it is all about long-term thinking."

Mr Brodie said, "PRD is rapidly gaining the attention of people in the Australian wine industry. We recently had the Wine Industry Technical Conference in Adelaide and the amount of PRD research work being done and displayed on posters gained much more attention than ever."

"We are looking forward to being involved in the future PRD research." He said.

WATER AUTHORITIES IN INTERNATIONAL BENCHMARKING TRIAL

Some of our readers may be familiar with a benchmarking process that the major irrigation water providers in Australia have been involved in for the last four years. These providers cover the six states of Australia and include 47 water supply systems.

The process, which was initially funded by the National Program for Irrigation Research and Development and Agriculture, Forestry and Fisheries Australia and managed by the Australian National Committee on Irrigation and Drainage (ANCID), benchmarks the providers using 62 indicators covering the general areas of:

- Operational performance
- Financial performance
- Environmental performance
- Business performance.

Examples of these indicators include:

- Cost recovery ratio
- Salt balance
- Volume of drainage water reused
- Water delivery efficiency
- Injury frequency rate
- Water supply cost (ML/ha)
- Volume of water delivered relative to entitlement
- Water quality
- Nature conservation initiatives
- Heritage initiatives.

Taking benchmarking to the world

The benchmarking reports produced in Australia have been highly praised by the International Commission on Irrigation and Drainage (ICID).

ICID has representation in 57 countries around the world and is represented in Australia by ANCID.

One of the aims of ICID is to introduce benchmarking to the irrigation and drainage sector internationally. As part of this process ICID, through the International Programme for Technology and Research in Irrigation and Drainage Secretariat (IPTRID) of the Food and Agricultural Organisation of the United Nations, is developing a framework and undertaking the international benchmarking of the irrigation and drainage sector.

Last year IPTRID published its guidelines for benchmarking performance in irrigation and drainage. This publication was designed for use by those countries collecting and processing data to enable a consistent approach to benchmarking within the irrigation and drainage sector worldwide.

2000-2001 Benchmarking report released

The 4th annual benchmarking report on the Australian irrigation industry has just been released by ANCID. It provides data on 65 indicators for forty supply systems, covering the bulk of water supplied for irrigation. Copies are available for $35 from:

John Mapson
Goulburn Murray Water
Phone: (03) 5833 5500
Fax: (03) 5833 5502

PROJECT UPDATE

Keeping you up-to-date with NPIRD projects

SOCIO ECONOMIC REPORT

A final report on the socio-economic research needs of irrigation communities in making structural changes in the next thirty years, *Socio-Economic Research And Development For Irrigation Communities,* has been posted on the NPIRD website, <www.npird.gov.au>

The report by Noel Beynon and Onko Kingma from CapitalAg Consultants identifies 16 interrelated 'research topic areas' for socio-economic research, development and extension for consideration by NPIRD. These topic areas are categorised into four themes, as follows:

- **Social arrangements** - covering values, institutions and the debate on the structure of irrigation communities.
- **Economic activity** - covering the issues relating to farming enterprises, business structures, development of markets for inputs and products, and the scale and scope of industries supporting agriculture.
- **Learning** - covering issues relating to innovation, capacity building and the development and uptake of knowledge.
- **Supporting structures** - covering issues relating to governance, structural adjustment, planning processes, operational arrangements, and support measures.

This work will inform the new National Program for Sustainable Irrigation's research program.

SUBSURFACE DRAINAGE IRRIGATION INSIGHT RELEASED

This 177-page publication is part one of a project, *Best Management Practices for Subsurface Drainage Design and Management.* It reviews current practices, and from this a best practice manual has been developed.

The *Irrigation Insight* brings together all the available knowledge regarding subsurface drainage for irrigation. It is in two sections:

- Part 1 - a summary and comparison of the range of practices across Australia
- Part 2 - regional reports providing detailed information on subsurface drainage practices for each region.

Part 2 of the project was to develop a best practice manual. This has been completed and is available from CSIRO Land & Water.

Title of the report is:

Christen, E.W. and Ayars, J.E. (2001), *Subsurface Drainage System Design and Management in Irrigated Agriculture: Best Management Practices for Reducing Drainage Volume and Salt Loads,* Technical Report 38-01.

You can view it on the CSIRO Land & Water website: http://www.clw.csiro.au/publications/technical2001/tr38-01.pdf.

WORKSHOP LOOKS AT EVAPORATION CONTROL FOR ON-FARM STORAGES

As part of the NPIRD project, *Investigation into the Practicality of and Potential For Evaporation Control for On-Farm Storages,* a workshop was held at Toowoomba 23 April at the Department of Primary Industry Conference Centre.

Thirty-five participants representing a mix of industry, government, consultants, researchers and farming community attended the workshop. According to Col Christiansen, project coordinator, participants made a special effort to attend with many of them travelling long distances, from as far away as Melbourne.

Workshop program

The workshop program included presentations on the physical aspects of evaporation, economic assessments, control methods and some case studies. Several workshop sessions were based on these presentations, and considered the following:

- control methods
- cost/benefit factors
- options for integrating methods.

The morning session examined practicalities, economics and thoughts beyond the scope of established evaporation control methods.

The afternoon sessions considered a range of environmental issues and a focused on the future of evaporation control.

A major outcome of the day was overwhelming support for continued research into evaporation control with particular emphasis on farm level trials and economic analyses at farm and regional levels.

More information

For information about the workshop or the project, contact Col Christiansen, phone 07 3896 9620, email <Col.Christiansen@nrm.qld.gov.au>.

2000 ANCID TRAVEL FELLOWSHIP

In 2000, the Australian National Committee on Irrigation and Drainage (ANCID) introduced a $5,000 travel fellowship award for a 'young scientific achiever in irrigation research and development'.

Nick Austin, of the NSW Water Use Efficiency Advisory Unit, was awarded the 2000 Fellowship at the ANCID Conference in Toowoomba. The 2001 Travel Fellowship was awarded to Jeff Camkin of the WA Water Corporation, and this year's Fellowship will be awarded at the ANCID

Conference in Griffith NSW, 1-4 September 2002.

Land & Water Australia, through NPIRD, has sponsored the award since its inception.

2000 TRAVEL REPORT

by Nick Austin

My aim was to study the use of climate-based estimates of crop water requirements to manage efficiency and growth in water use.

Background

Evapotranspiration (*ET*) represents the single largest component of the water balance in irrigation. However, in Australia, *ET* is currently determined climatically in numerous ways. As a result, *ET* data collected in different States, or even different regions within one State, may not be directly comparable. This causes much confusion and severely hampers comparison of irrigation performance and development of sound water policy. My aim was to study 'standardised' approaches to *ET* determination, and the ways in which the information is used to improve water use efficiency and manage growth in water use.

Travel itinerary

I left Australia 30 May 2001 and returned 8 July. During that time I travelled to Idaho, Utah and California and to several provinces in South Africa, visited numerous research institutions and met with 78 researchers. Table 1 is a summary of the places and key people visited. Everyone I met was exceedingly helpful, willingly sharing their time and expertise, but I am particularly grateful to Professor Rick Allen, Dr Rick Snyder, Mr Charles Crosby and the South African Water Research Commission.

Key observations

- North America, South Africa and Australia are all facing very similar challenges in relation to equitable sharing of scarce water resources.
- There are several effective agro-meteorological networks in operation in both North America and South Africa, providing crop water use data for irrigation management and for water policy development. There are also exciting developments in remotely sensed (satellite) *ET*.
- Cost benefit analyses conducted on *ET* networks clearly demonstrate that the benefits of such networks far outweigh the costs.
- Several projects are generating 'real-time' efficiency indices for irrigation districts, by combining *ET* data and records of water usage.
- In the more water-short areas, *ET* data are used to set water use limits, based on crop type and area grown.

Outcomes and recommendations

Effort should be directed towards standardising the measurement and reporting of *ET*, crop water requirements and water use in Australia. Irrigation water use should be more rigorously assessed against crop water requirements. The role of remotely sensed *ET* data in this respect should be explored.

More detail is provided in the full travel report, contact Nick Austin, email <nick.austin@agric.nsw.gov.au>.

Table 1. Summary of places and people visited.

Location	Institution	Key People
Kimberly, Idaho	USDA NW Irrig. & Soils Research Lab	J Wright
	University of Idaho Research & Ext. Centre	R Allen
Twin Falls, Idaho	Idaho Department of Water Resources	A Merritt
Logan, Utah	Utah State University	W Walker
Davis, California	University of California, Davis	R Snyder, W Pruitt
	USDA Natural Resource Cons. Service	A Carvajal, D Johnson
Sacramento, Calif.	US Bureau of Reclamation	T Slavin
	Department of Water Resources	L Kiger, B Davidoff
San Luis Obispo, CA	CalPoly Irrig Training & Research Centre	C Burt, S Styles
Fresno, California	USDA Water Management Research Lab	T Trout, R Soppe
Broadview, Calif.	Broadview Water District	D Cone
Pretoria	International Water Management Institute	H Murray-Rust, D Merrey
	Institute for Agricultural Engineering	A van Niekerk, A Louw
	Water Research Commission	G Backeberg, G Green
	Dept Water Affairs and Forestry	J Geringer, F van der Merwe
	University of Pretoria	I van der Stoep
Pietermaritzburg	University of Natal	R Schulze, G Kiker
	Computing Centre for Water Resources	M Dent
Bloemfontein	University of the Orange Free State	A Bennie
Kimberley	Lower Riet Irrigation Board	H Postumus
Douglas	Orange-Vaal Irrigation Board	W Bruwer
Stellenbosch	Department of Agriculture	A Roux
	Institute for Agricultural Engineering	F Koegelenberg

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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.

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