NATIONAL PROGRAM FOR Sustainable Irrigation

Irrigation update

sustainable irrigation

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Sustainable irrigation project wins WA award

A National Program for Sustainable Irrigation research project that demonstrated centre pivot irrigation could improve water use efficiency and pasture production won the 2005 Western Australian Environmental Award for water conservation management.

The project, located on the dairy farm of Dale Hanks in the Harvey Water Irrigation Area, also demonstrated improvements in pasture quality and minimised nutrient and water run-off.

The Harvey Water Irrigation Area is WA's primary irrigated dairy region, supplying Perth and the state's south-west with 40% of its milk. Irrigation water is supplied by the Harvey Weir, WA's first irrigation system built in 1916, with pastures watered by surface irrigation of paddocks.

Harvey Irrigation Systems Project principal investigator Ken Moore said that when the project was envisaged in 2001, there were no centre pivots being used for dairy pasture in the region.

"Dale Hanks was approached about trialling the centre pivot system on his property by Rob Kuzich, the owner of a south-west agricultural water management company," Ken said. "A lot of time and planning went into setting up the demonstration, which began in 2003."

The project compared centre pivot to surface (or flood) irrigation over two seasons

Harvey dairy farmer Dale Hanks, with daughter Taylah, checks soil moisture levels as part of an award-winning project funded by the National Program for Sustainable Irrigation.

on Dale's dairy farm.

The centre pivot system used 29% less water in the first season and 31% less water in the second.

"Additionally there was no water or nutrient run-off from the centre pivot site, however this was not the case with surface irrigation," Ken said.

Pasture yields under the centre pivot irrigation were 54% higher per hectare than under surface irrigation in 2003-04, and double that of the surface irrigation the following season.

Pasture quality was also improved, with the trial recording a higher average percentage of crude protein and energy under centre pivot irrigation and a lower average percentage of fibre.

Ken said the research also found that in the second year, the performance of surface irrigation (both in terms of water-

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Research topics scoped for Program priorities

Scoping studies undertaken in 2005 for the National Program for Sustainable Irrigation will help direct research priorities for the Program according to chairman Denis Flett.

Mr Flett said the Program's approach ensured investing partners set the agenda and enabled government irrigation sustainability priorities to be combined with the outcomes sought by industry.

"Engaging in this process empowers and brings efficiency in investment for those parties that contribute to the Program," he said. "Through collaborative investment, we can focus on the drivers that influence the entire irrigated production system – and the communities which depend on them – in a coherent way.

"World-class research efforts by the Program and its partners have already generated valuable knowledge, resources and on-farm tools that will enable irrigators to improve production and profitability while also improving environmental outcomes and increasing water-use efficiency."

Last year the Program reviewed five major topics in order to develop research plans (details of each study are available at **www.npsi.gov.au/knowledge.asp**):

Reduction of evaporation from farm dams

Evaporation from farm dams accounts for huge net water losses from farms and catchments – this scoping study estimated that more than 7000 gigalitres per year are lost in this way from Queensland's section of the Murray-Darling Basin. The study noted that quality evaporation and seepage data was needed to better support decisions by resource managers about the viability of reduction measures.

Huge net losses of water are incurred due to evaporation from farm dams.

From this study, the Program has commissioned work to determine the significance of night-time evaporation from dams as this is routinely excluded from estimates.

Total system harmonisation

Total system harmonisation (TSH) is an approach to streamline and balance natural and consumptive water system requirements within a catchment or river basin.

The scoping study identified TSH opportunities through improving irrigation systems such as channel automation, synchronising management of storages on- and off-farm, and changes to the crop mix.

TSH relies on tools and models needed to understand the impact of water-use decisions on other users in a catchment, therefore depending on 'intelligent systems' (sensors and decision-support models) to collect and integrate on-farm and off-farm monitoring data.

The Program will invest in TSH research to better understand how a whole-of-system approach to improving efficiencies would work.

Common hydrological features in Australian irrigation areas

Building on knowledge compiled for the Australian Groundwater Atlas, this scoping study investigated the feasibility of developing an accessible summary of groundwater systems to aid irrigators' shared understanding of the linkages between surface and groundwater systems.

It recommended a framework for describing irrigation regions, and the Program has determined that research in this area should progress so that reliable information can be produced on every irrigation region in Australia.

Improving plants' water-use efficiency and potential impacts from soil structure change

Phase one of the Program identified that water-use efficiency depends on more than managing water applications. This scoping study looked at the tools and techniques used to understand the impacts of long-term irrigation on soil structure, and identifying the effects of soil structure change – within and around the root zone – on the flow of water and rate of movement of salts along various pathways.

The Program has worked with several commodity partners to develop and test management strategies to minimise and reverse soil degradation under precision irrigation.

Soil-water and salt movement associated with precision irrigation systems

This study recommended that core research related to soil structural decline and subsequent agronomic responses should be considered within a program investigating the impacts of precision irrigation with saline water. Further work on the prediction of soil hydraulic properties is considered essential, as are the development of tools and monitoring protocols for assessing soil structural stability under irrigated crops.

The Program will invest in a project to respond to these needs, assessing best management practices for specific crops on certain soil types and providing technical support to another project team interpreting the findings for other climate zones and commodities.

Steven Falivene, winner of the National Program for Sustainable Irrigation/ANCID Travel Fellowship, pictured at Mildura during the 2005 ANCID conference.

Falivene wins travel fellowship

An outstanding vision for the future of sustainable irrigation in Australia has won Steven Falivene the prestigious 2005 National Program for Sustainable Irrigation/Australian National Committee on Irrigation and Drainage (ANCID) Travel Fellowship, valued at $7000.

The whole process of research conception to farmer extension will be the focus of his trip, which will take him to Florida and California in the United States and on to the home of drip irrigation in Israel.

"I want to bring back practical techniques and methodologies to improve water management, focusing particularly on root zone management in relation to environmental and productivity results. I see this knowledge being particularly valuable for semi-arid areas in Australia," he said.

Steven's Fellowship was announced at the *One life, one river, our future* conference in Mildura. The conference, organised annually by ANCID, has brought over 400 irrigation stakeholders together to examine the future for sustainable irrigation in Australia.

Steven said the win was challenging and he wants to investigate three distinct experiences of root zone nutrient management.

"Australian horticultural growers have moved to drip irrigation, and from fertilisation to fertigation," said Steven.

"That step raises environmental concerns about how we use fertigation and issues such as whether we are leaching nutrients past the root zones. In the USA, they have passed a Bill whereby farmers are now responsible for demonstrating they are not polluting the waterways. They are looking at ways to develop production mechanisms and set up checks and balances that are practical but at the same time protect the environment, especially river systems.

"In Florida, there is a well-established system sitting over a water table," said Steven. "They have a lot of experience in monitoring nutrient movement while in California, they're just starting out. I will be looking at how they've gone about it and whether we can apply that approach in Australia. I especially want to learn about their experiences and approaches in motivating growers to participate.

"Then I want to go to Israel, which is the home of drip irrigation, and where there will certainly be a wealth of experience that we can draw on as the use of fertigation develops in Australia."

Winner of the 2004 fellowship, David Allen of Bathurst, returned to Australia with a wealth of information on geophysical instrumentation in use around the world. His PhD studies involved imaging aquifers.

Instrumentation and methodology currently in use in Australia could be substantially improved, Mr Allen said, potentially saving massive volumes of water.

"The Fellowship was very beneficial in enabling me to gain access to the engineers and manufacturers of the latest technology in this area," he said.

"I was able to talk to the people involved in developing the equipment, and I was also able to get my own hands on it to see what it could do. With this knowledge we can determine optimum ways of utilising underground water resources and storage capacity. It also gave me the opportunity to make some important contacts overseas."

Government confirms continued funding for Program

The Australian Government has confirmed its commitment to sustainable irrigation research and development. Minister for Agriculture, Fisheries and Forestry, Peter McGauran, recently announced a further $500,000 from the Natural Heritage Trust over the next two years to support the work of the Program.

This follows the announcement of support from Land & Water Australia for another three-year phase.

In his announcement, the Minister pointed out that irrigated agriculture contributes more than a quarter of the total value of Australia's agricultural production, on less than one per cent of agricultural land. The gross input to the Australian economy generated by agriculture was $36.5 billion in 2003-04.

Program Coordinator Murray Chapman said the success of the Program has been its ability to identify just what science is needed to provide practical advances.

"The Program has chalked up major successes in creating measurable results for production and environmental management, Mr Chapman said. "It has provided clear signals of investor priorities and played a valuable purchasing role for research advisers such as the CRC for Irrigation Futures and others. The establishment of research project steering committees that represent investors, technical experts and end-users has aided early adoption.

Program Coordinator Murray Chapman says the success of the program has been its ability to identify the science needed to provide practical advances.

"We have seen real results in gains in water use efficiencies and water management and these results are being applied on-farm by irrigators now. We have also undertaken research that is helping policy makers and infrastructure developers to plan for the future, leading to greater viability for regional communities in Australia."

The current Phase of the Program will be completed in June 2006. Mr Chapman says a focus of Phase 2 will be promoting partnerships on fundamental issues in irrigation across commodities.

"The Program provides a unique mechanism for irrigation research investors to collaborate and determine research priorities. This also means they can be ahead of the game, because investors have access to early adoption of improvements in water management," Mr Chapman said.

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use efficiency and pasture production) was improved after centre-pivot irrigation.

"It appeared that waterlogging from surface irrigation slowed pasture growth and resulted in more unwanted weeds," he said.

Ken said the project had generated considerable interest among local farmers as it had clearly demonstrated the benefits of centre pivot irrigation, however farmers would require information and technical support to adopt the system via a 'learn and grow' approach to integrate water application and scheduling, and pasture, grazing and nutrient management.

"Farmers will need to examine the returns from their existing surface irrigation systems in comparison to what could be achieved under a centre pivot system – the results achieved in this project might not be achieved to the same degree on other farms due to soil differences and relative skills and management practices," he said.

"The purchase of a centre-pivot system is a major investment so farmers need to do their sums properly."

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The National Program for Sustainable Irrigation is managed by Land & Water Australia on behalf of the partners. The partners include irrigators, water authorities, research agencies, state and Commonwealth departments and commodity groups. For information about becoming involved in the Program, please contact:

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