

Leading Edge, supported by the Society for Engineering in Agriculture and the Australian Centre for Precision Agriculture, provides a local and worldwide window on engineering and PA research.

## GIS helps growers achieve 85 per cent WUE

By Gary Alcorn

Advanced technology, including geographical information system (GIS) mapping, is helping Central Irrigation Trust (CIT) members in South Australia's Riverland region achieve 85 per cent water use efficiency (WUE).

Barmera CIT Land and Water manager, Gavin McMahon is a former Queensland BSES extension officer and manager, so he knows smart water management is crucial to farm viability.

"In the irrigation industry we will have to produce more using less water".

"We manage nine privatised South Australian irrigation districts supplying 1600 customers who want the optimum return from every megalitre of their allocation pumped from the River Murray," he said.

The Riverland region produces 25 per cent of Australia's wine grapes and more than 30 per cent of Australia's citrus — all

### CIT cites five steps to better water management

1. Only profitable farmers can invest in high technology;
2. State of the art water supply systems are essential;
3. Investigate and adopt the latest distribution technology;
4. Implement and use accurate water measurement aids; and,
5. Practise water management with a passion.

of which is irrigated.

Water dedicated to the schemes is pumped and piped to customers. The scheme uses 120 kilometres of pipeline to sustain 13,000 hectares of high value crops including wine grapes, citrus, stone fruit, almonds and pistachio nuts.

In the Riverland there is a substantial program designed to improve water use efficiency and reduce impacts of salinity.

"We have the most advanced distribu-

tion and application practices of anywhere in Australia," Gavin said.

Right now the Riverland is four years into a major drought, one of the most severe in the past 100 years, and this has given growers the added incentive to implement measures which lift WUE.

### EYE IN THE SKY

That's where GIS mapping has excelled. Low-flying aircraft capture high-resolution (down to 30 cm) images of each farm.

These images are then matched with precise ground survey maps of the same area to produce a detailed irrigation demand database for each irrigated block.

Electronic metering capturing real-time data enables managers to track and monitor water use frequently.

With enthusiastic grower cooperation, CIT staff gathered actual water-in and use weather data and cropping factors to determine crop water use. These inputs are collated to determine water use effi-

### Australian Society for Engineering in Agriculture

The society contributes to the development of a strong engineering involvement in agriculture to aid economic growth and environmental sustainability for the entire Australian community.

#### WHO CAN JOIN SEAG?

Membership is open to anyone interested in the application of engineering to agriculture and related industries. This includes scientists, farmers, surveyors, technical officers, engineers, manufacturers, distributors and processors.

#### REGIONAL BRANCHES

Members can contact their local branch to discuss activities.

NSW: Helen Fairweather 02 6881 1211  
Qld: Guangnan Chen 07 4631 2525  
Vic: Brendan Williams 03 5381 1975  
SA: Paul Harris 08 8303 7880  
WA: Chas Holmes 08 9457 2876  
Tas: John McPhee 03 6421 7674

or [www.ncea.org.au/seag/seag.htm](http://www.ncea.org.au/seag/seag.htm)



Open channels were replaced with pipes.

ciency for every farm.

The benchmark set in the water allocation plan is for every grower to be 85 per cent efficient which allows for 15 per cent of applied water for leaching salt out of the root zone.

“All of our districts have obtained efficiencies of greater than 80 per cent with most reaching the 85 per cent benchmark.

“CIT employs high technology to improve our products and keep our costs down. We are using Tyco Magflow electronic water meters to keep track of every drop in what is virtually a closed system,” Gavin said.

These meters can monitor very low flows of five litres per second used by drip irrigators with exceptional accuracy and can be read easily by growers in the field.

“We are investigating the possibility of automatically relaying all data to CIT offices. Currently we send out monthly water-use graphs to all our customers so they can compare consumption on a month by month basis or with the past two years’ data,” he said.

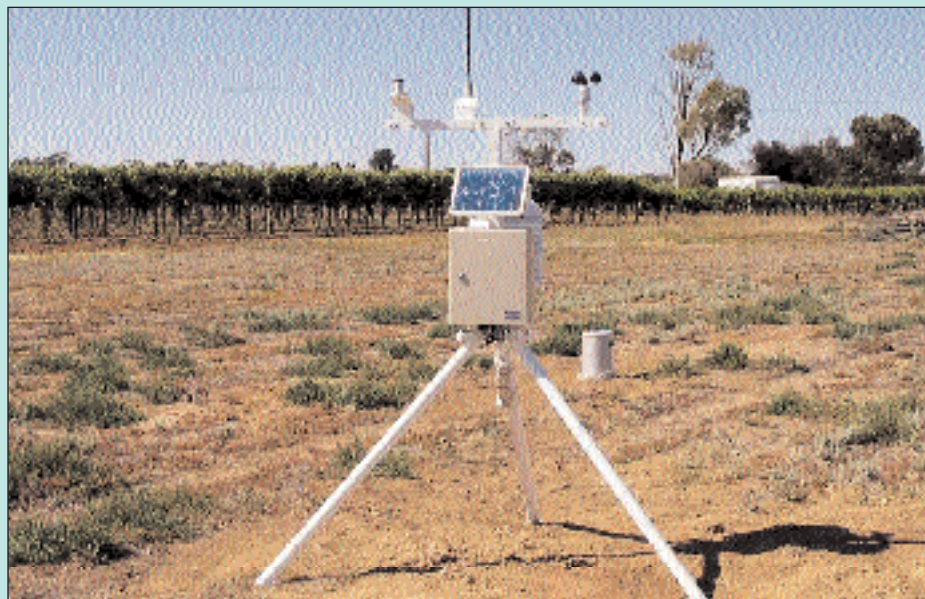
### GROWER EDUCATION TOOL

To assist in improving water use efficiency, CIT also facilitates forums where growers learn more about their systems and what neighbouring growers are doing. This strategy enables them to fine tune their on-farm water management.

“These farm-based packages have become a very effective grower education tool which allows them to over-view data and refine management of water transport and use,” Gavin said.

So what are components that make CIT a highly efficient irrigation system?

- Water-wasting open channels are replaced by buried pipelines;
- Fully automated river pumping stations deliver water on-demand 24 hours a day, seven days a week every week of the year;
- A computerised water ordering system allows orderly distribution and grower flexibility;
- Furrow irrigation is replaced by under-tree/vine low-throw sprinklers or drippers;
- Accurate water measurement occurs in all stages;
- Soil water levels are monitored on farm; and,
- In-field weather stations supply relevant meteorological data for irrigation scheduling and determining water use efficiency.



**In-field weather stations supply relevant meteorological data.**

Further refinements to this system continue with night-rate off peak electricity being introduced to minimise the cost of pumping waters.

Lifting water from the river to elevated storages before distribution is a major cost input so gaining the most competitive price is important.

“We can provide this high tech system with a water price of around \$50 per ML,” says Gavin.

### So can this system be used in cotton irrigation systems?

Gavin McMahon says the systems they operate work well for their situation. Other areas and regions need to look at their own situation and pick the benefits

from the best systems.

“More accurate monitoring of water is one easy step we should all strive for. Many areas are not monitored or have equipment that is not accurate.

“Automating systems is also an area where improvements can be made. Automating distribution systems will reduce losses from overflows.

The GIS mapping and farm paddock database plans can be applied across most crops and used in water use calculations for every farm.

“But it must be remembered that we service higher valued crops and as a result our operating environment is different,” he said.



**Furrow irrigation is replaced by under-tree/vine low-throw sprinklers.**