

# Angas Bremer Irrigators lead the nation

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## ABSTRACT

In the Angas Bremer district, by 1981 the annual use of groundwater for irrigated agriculture had increased to four times the annual groundwater recharge. Over the subsequent twenty years a reduction by 80% in groundwater use has been achieved. Keys to this success have included determined local leadership, teamwork and good communications involving irrigators, their community and specialists from Government agencies.

Both the farmgate \$ income and the area of land irrigated have increased while the volume of irrigation water used has decreased. This was achieved by developing innovative water management policies, by the exchange of groundwater licences for lakewater licences, by building locally-funded pipelines and by changing crop types.

## KEY WORDS

groundwater, sustainability, community, Irrigation-Annual-Reporting, management, policies

## INTRODUCTION

Water supplies are being over-exploited in many countries. Examples include the Ogallala aquifer in America, the Aral Sea in Russia, the Yangtse and the Yellow rivers in China and the Tigris and the Euphrates in the Middle East.

In Australia, groundwater resources are being over-used in the Condamine and the Lockyer Valley in Queensland, in the upper Namoi in New South Wales, near Perth in Western Australia and on the Northern Adelaide Plains in South Australia. (Figure 4)

South Australia's Angas Bremer irrigation district is attracting national interest for its leadership in water resource management.

Over a period of 20 years, the region's irrigators have saved their over-exploited groundwater resource, increased economic returns, and expanded the area of crops under irrigation. (Figure 1)

This has been achieved by empowering the community to develop and adopt bold, new, long-term water management policies.

The district is 60km south-east of Adelaide and is named after the Angas and the Bremer rivers. It is one of South Australia's premium wine-grape regions, growing 5,000ha of grapes. (Figure 5)

This little-known region, rich in alluvial soils washed down from the Adelaide Hills, also grows potatoes (500ha), lucerne hay (400ha), brussel sprouts and a unique crop of special cane used in the manufacture of reeds for clarinets and other musical instruments.

Since 1980 Langhorne Creek irrigator Robert Giles has been one of the many locals to work for irrigation reform. In 1997 he became chairman of the locally-elected Angas Bremer Water Management Committee.

### **Aquifer over-pumping**

In 1981, annual groundwater use had reached 26,600 megalitres, four times the estimated annual recharge of 6,000ML.

Mr Giles said that before the area was proclaimed and managed under the Water Resources Act, bore pumps were starting to suck air and irrigators were forced to deepen bores.

He said that if irrigators hadn't made dramatic changes, water levels would have continued to drop and salinity would have increased to the point where the water was unsuitable for irrigation.

The necessary changes were made.

Leading local Irrigators worked closely with specialists from Government departments to develop solutions and win community support for tough water management policies. Their determination has led to an 80 per cent reduction in groundwater use (Figure 1).

Mr Giles said the key to winning the support of all growers had been strong leadership and the local input in developing and implementing the policies.

### **Increasing Aquifer Recharge**

Individual irrigators have played an important role in changing water use in the district.

Ron Nurse was one of them. He set out to stop the lowering groundwater levels and the rising water salinity by undertaking experiments to increase the aquifer recharge on his property.

This was achieved by directing winter floodwater into his bore. This process has become widely used and known as Aquifer Storage and Recovery.

Use of this technology was encouraged in the Angas Bremer region, with up to 30 recharge bores used, achieving a maximum annual recharge of more than two thousand megalitres in 1992.

### **Decreasing ground-water irrigation**

Water management policies which reduced ground-water use included cuts of 30% to the volumes of all licences and additional reductions when licences were sold.

Because the Angas and Bremer rivers flow into lake Alexandrina, Government approval was won for policies which encouraged conversion from ground-water to lake-water licences. Irrigators who converted to lake-water avoided the 30% cut but incurred increased costs to transport the lower-salinity lake-water to their crops.

In addition to building individually-owned pipelines, one group of irrigators invested in a locally-funded, state-of-the-art, community pipeline scheme to transport water up to 17 kilometres from Lake Alexandrina to their high value crops.

Over the 20 year period, the implementation of innovative water resource management policies has enabled the Angas Bremer region to double the irrigated area to 6,800 hectares, while reducing the combined lake and groundwater irrigation from 26,600 megalitres to 17,500.

The combination of astute management policies and a large increase in grape prices in the early 1990s, provided the incentives needed for many Angas Bremer irrigators to change from lucerne hay to grapes.

Compared with one hectare of lucerne, wine-grapes require only one quarter of the water (2.5 megalitres per hectare or 250mm/yr). Premium quality grapes currently return more than ten times the lucerne farm-gate income per megalitre of irrigation water.

Many irrigators have also significantly improved their water management skills and installed monitoring equipment and more efficient water delivery systems, such as centre-pivots.

### **Irrigation Annual Reporting**

All the one hundred and sixty Angas Bremer irrigators have, over the past five years, taken part in a simple, low cost process called Irrigation Annual Reporting.

Each grower has collected and recorded data including their annual water meter readings and the area of each crop type under irrigation.

The data has been collated into district Irrigation Annual Reports and distributed to each grower.

Each year, public meetings and training workshops have been held to present and analyse the information.

Mr Giles said Irrigation Annual Reporting has become a valuable educational tool.

“Each year we are benchmarking ourselves and comparing our practices between years and with other Irrigators,” he said (Figures 8 & 9)

“Irrigation Annual Reporting has made us much more aware of what we are doing and of the opportunities to improve.”

### **Reducing Drainage: FullStop**

It has been acknowledged that the increased use of water imported from Lake Alexandrina, combined with reduced ground-water use is likely to cause the water-table to rise.

Water-tables returning even to their pre-1950 levels may adversely affect some recent irrigation developments sited close to the lake.

To combat this problem Angas Bremer irrigators are implementing a number of novel strategies to monitor and manage the water-table levels.

One strategy is the use of watertable-monitoring wells.

The growers have each contributed \$800 to install six-metre-deep wells on their properties.

They use the wells to measure watertable levels and record them in their Irrigation Annual Reports.

The irrigators are also installing the latest CSIRO technology, a \$30 device called the FullStop, which flags a warning to STOP irrigating as soon as the root-zone depth has become FULL of water.

Mr Giles said the FullStop had already resulted in changes to irrigation practices during pilot tests on 10 properties over the past year.

“At each irrigation, some growers now irrigate for half the amount of time” he said.

“With feedback from the FullStop, we can learn to improve our irrigation practices before we cause drainage problems.”

### **Tree planting**

Angas Bremer irrigators are enlarging the area of deep-rooted winter-active vegetation as one part of their management of the water-table.

The root-zone of the vegetation will intercept winter floodwaters, assist with irrigation drainage and draw water from the watertable.

It is a community-initiated vegetation-planting and management program aiming to protect existing red gum swamps and to increase the area of vegetation.

The program requires each irrigator to maintain a minimum of two hectares of deep-rooted winter-active vegetation, for every 100 megalitres of allocated water.

### **Code of practice**

Demands from the public for responsible environmental management are increasing.

A code of practice is being implemented in the Angas Bremer region to provide accreditation to growers who are successfully improving their irrigation management.

To comply with the code, growers must complete Irrigation Annual Reports, must minimise drainage below their rootzones and must plant and maintain deep-rooted, winter-active vegetation.

Growers who meet the code will be accredited.

The benefits to growers from accreditation are still being developed. Three benefits are: the right to promote their good environmental management by using a new logo, the minimisation of data-collection-and-reporting requirements and automatic compliance with the water module of a new grape growers Environmental Management System.

### **Environmental Management System**

An Environmental Management System is a tool used to document environmental management and to show that it is responsible.

A pilot system is being developed for wine-grape growers.

Angas Bremer grape irrigators are working in partnership with their Industry and the Murray-Darling Basin Commission to ensure that accreditation under the Angas Bremer Code of Practice will provide automatic compliance with the water module of an Environmental Management System without requiring additional work or duplicate record-keeping by the irrigators.

## **CONCLUSION**

The Angas Bremer experience has shown that a seemingly impossible goal (of reducing groundwater use by 80%) can be achieved when people commit themselves to achieving their goal, they combine their resources, they “dream the same dream” and they work together.

## **ACKNOWLEDGMENTS**

My thanks to Peter Roberts and to Krista Eleftheriou who provided valuable editorial assistance.

## **REFERENCES**

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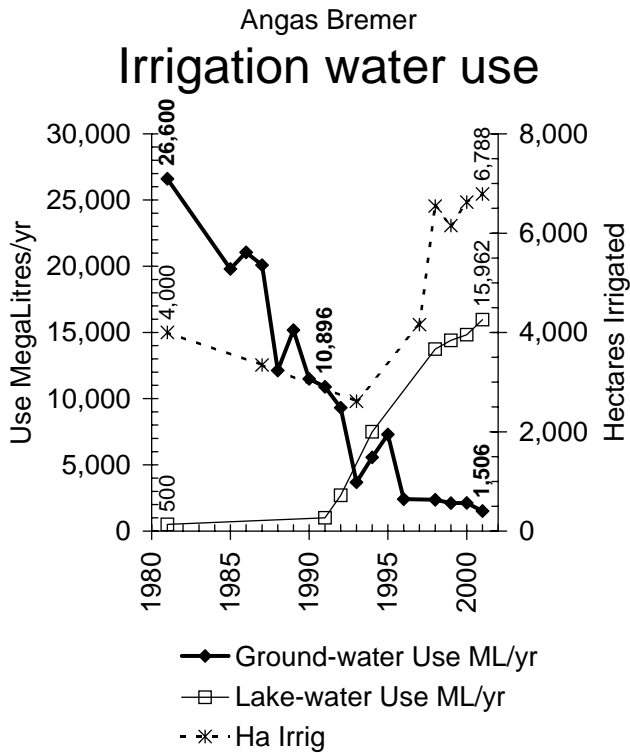
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## **CONTACT**

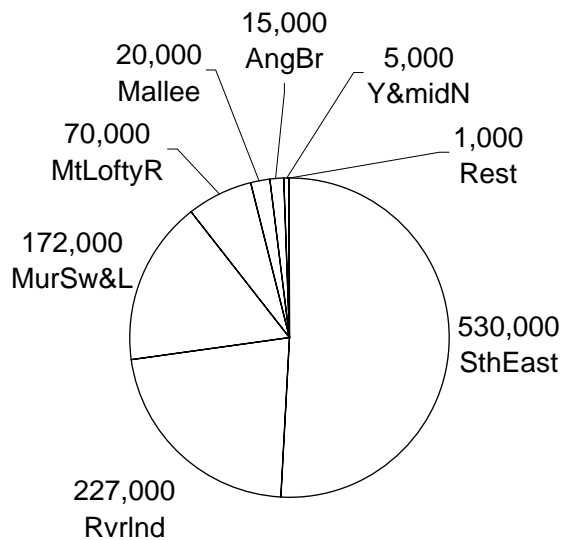
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ABML.xls Chart 2 (2)  
 Data: Watery Sources  
 Chart: Tony Thomson (08) 8463 6855

Figure 1 Ground-water use has fallen while lake-water use and the area irrigated have increased

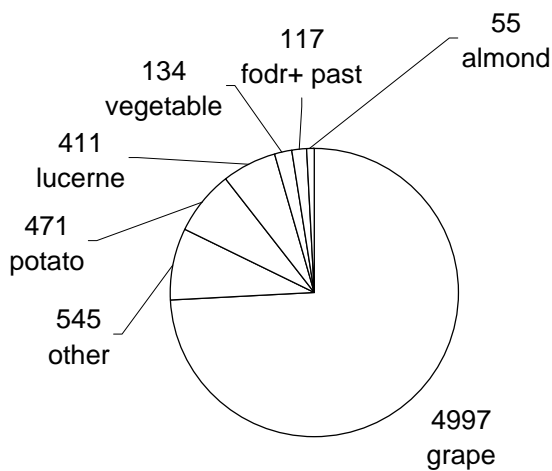
### Sth Aust 1996-7 Irrig 1,041,000ML



sacur967d.xls Chart 1 (3)  
 Data: ha from Aust Bureau Statistics 96-7,  
 ML/ha: pasture 14.3, grape 4.3, rest 5.4  
 Chart: Tony Thomson (08) 8463 6855

Figure 2 Water use in the Angas Bremer district is small compared with the South East and the River Murray.

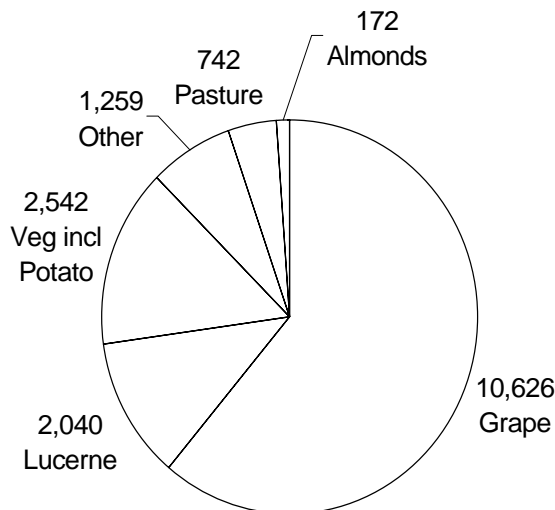
### Angas Bremer 2000-01 Irrigated 6,729ha was 6,625 ha 99-00



ANREP00-01b.xls Chart 3  
 Data: Irrigation Annual Reports 2000-01  
 Chart: Tony Thomson (08) 8463 6855

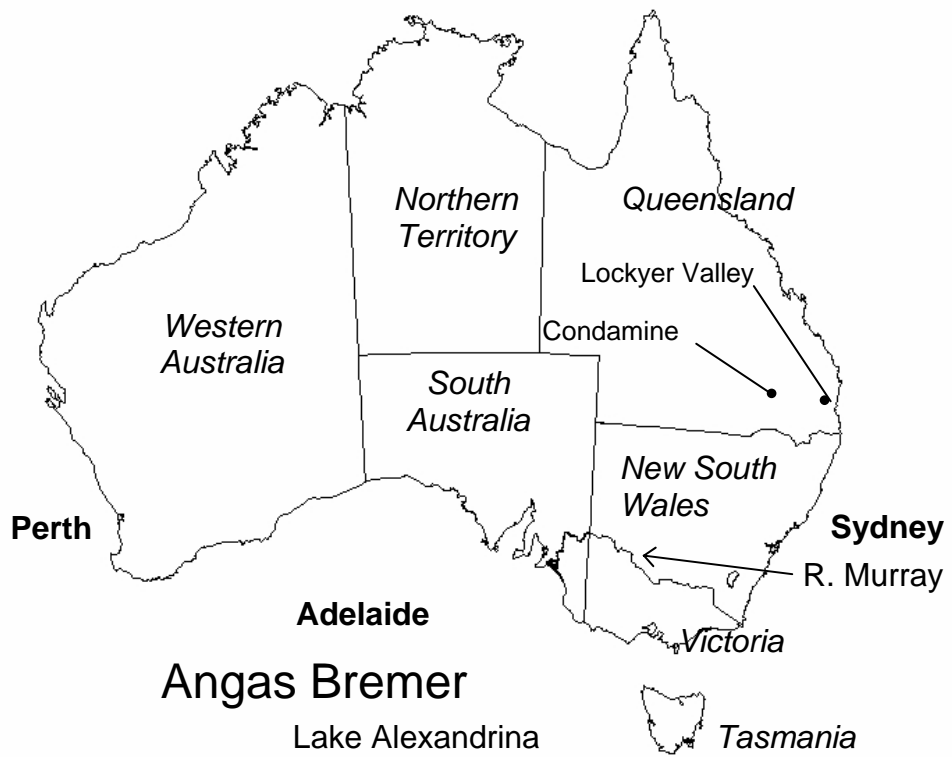
Figure 5 Grapes, potatoes and lucerne are the main crops irrigated in the Angas Bremer

### Angas Bremer 2000 - 01 Irrig 17,467ML



ABML.xls Chart 1 (4)  
 Data: Angas Bremer  
 Irrigation Annual Report 2000 - 01  
 Chart: Tony Thomson (08) 8463 6855

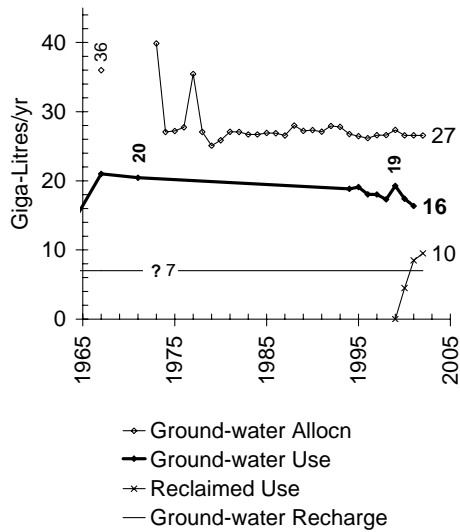
Figure 3 Most of the Angas Bremer irrigation water is used on grapes, lucerne and vegetables



**Figure 4 Map of Australia showing some locations where groundwater resources are being over-used.**

## Nth Adelaide Plains

ground-water and reclaimed water



NAPAllocUse.xls Chart 1 (5)  
 Data: Glen Wood from Ingress, Tony White - reclaimed,  
 Rocco Musolino - 1930 to 1967  
 Chart: Tony Thomson (08) 8463 6855

Figure 6 Water use on the NAP is still more than double the recharge. Allocations total almost 4 times recharge.

## Underground Proclaimed Area

		Condamine Dalby QLD	
Yr Proc		1966	
Recharge	ML	27,800	= R
Alloc @ Proc	ML	72,228	= 2.6 x R
Yr 1st meter		1979	
Used 1st meter	ML	40,376	= 1.5 x R
Use 93-4	ML	72,228	= 2.6 x R
Alloc. 94-5	ML		

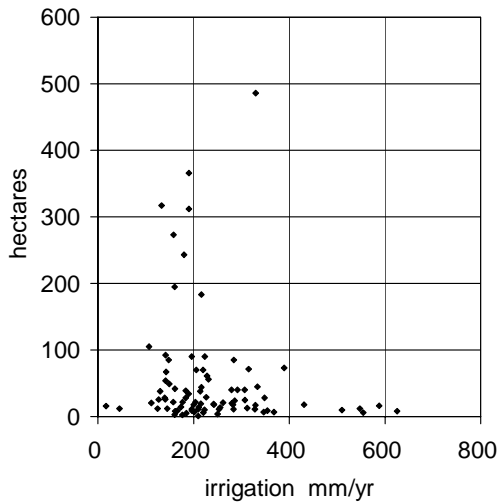
Source: David Free  
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Figure 7 In the Condamine, water use is more than double the recharge.

Angas Bremer 99-00

Grape 4,665 ha

4,084 ha 98-9



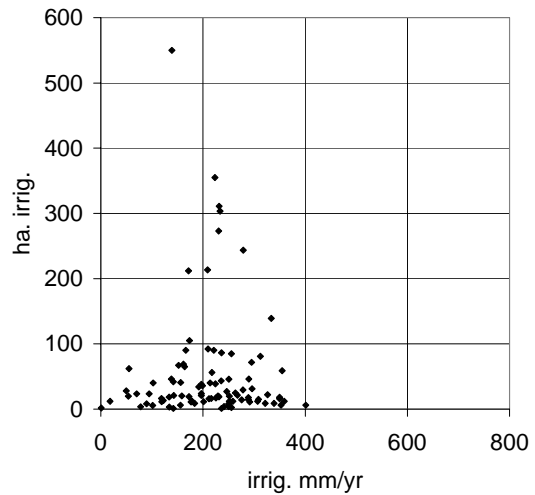
ANREP00.xls Chart6  
 Data: Irrigation Annual Reports 99-2000  
 Chart: Bruce Allnutt (08)85360114

Figure 8 Grape growers report a wide variation in the irrigation mm/yr which they applied

Angas Bremer 2000-01

Grape 4,997 ha

was 4,665 ha 99-00



ANREP00-01b.xls Chart 6 (3)  
 Data: Irrig Annual Reports  
 Chart: Bruce Allnutt (08) 8536 0114

Figure 9 Only one grape grower applied more than 350mm in 2000 - 01