IRRIGATION IN THE MURRUMBIDGEE IRRIGATION AREA

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Summary
This paper describes the operation of irrigation in the Murrumbidgee Irrigation Area located in southern NSW, Australia. Government policy was responsible for the decision to establish the irrigation scheme and construction of dams for water storage. The State Water Corporation manages the release of water into the Murrumbidgee River which feeds channels operated by Murrumbidgee Irrigation Limited (MI). The Murrumbidgee Irrigation Area (MIA) and Districts is an area of 480,000 ha of irrigated farmland where 120,000 ha is irrigated annually. It includes 1140 cropping and 950 horticulture farms and 940 small holdings. MI is a private company owned by the farmer shareholders and is responsible for managing and delivering water to farmers. It is also responsible for water pricing, the development and maintenance of infrastructure and environmental stewardship. It operates under specific government legislation and 3 licences. Farmers place water orders with MI one to 3 days in advance of needing the water**.** MI activities in investment, the environment and education, water policy and costs are discussed.

History of Development
In the first one hundred years of the settlement of Australia (from 1978) farmers realised droughts were common causing major impacts on agriculture. In the late 1800's investigations for irrigation along the Murrumbidgee River were carried out and in 1902 the Murrumbidgee scheme was approved. In 1906 the government acquired land to set up irrigation farms and the establishment of associated towns. The Murrumbidgee Irrigation Area (MIA Fig 1) is located in southern central NSW covering approximately 3,624 square kilometres. The topography is generally flat open plains at an elevation of 100-135 metres above sea level (Murrumbidgee Irrigation 2007). The climate is semi-arid with annual rainfall of 406mm and evaporation of 1797mm.

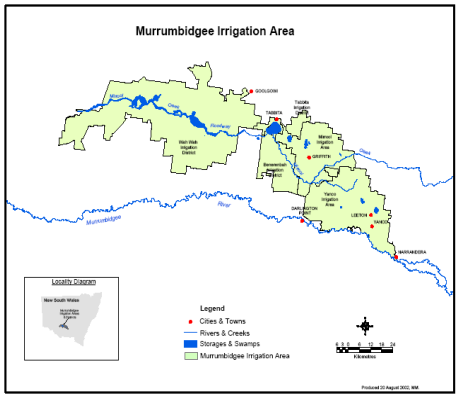

Figure 1. Murrumbidgee Irrigation Area

Two storage dams store the water for irrigation for the MIA. Burrinjuck Dam (Fig 2) receives its water from the mountain catchment while Blowering Dam is part of and receives most of its flow from the Snowy Mountains Hydro-Electric Scheme.

Burrinjuck has been enlarged twice and now has a total capacity of 1,026 million m³. Blowering Dam has a capacity of 1,628 million m³. Their combined storage is 2,654 million m³ which is equivalent to five times the volume of water in Sydney Harbour (Murrumbidgee Irrigation 2007).

Figure 2. Burrinjuck Dam

Supply of Water to the MIA

The State Water Corporation is the river operating division of the state government Department of Water and Energy (DWE) that manages the release of water into the rivers and licenced private users who draw water from the rivers. Murrumbidgee Irrigation is one of the licenced users and places orders for water with State Water. After considering user requirements, river health and stock and domestic supplies, water is released from the dams into the river. Water for the MIA is diverted from the Murrumbidgee River through weirs (fig3). The Main Canal feeds the supply channels that bring water to the farms. Drainage water flows towards Barren Box Swamp. Water from Barren Box Swamp is recycled into a small irrigation supply system. Local government cities and towns are also customers within the system. Water from the main canal is filtered and treated for reticulation to urban residents.

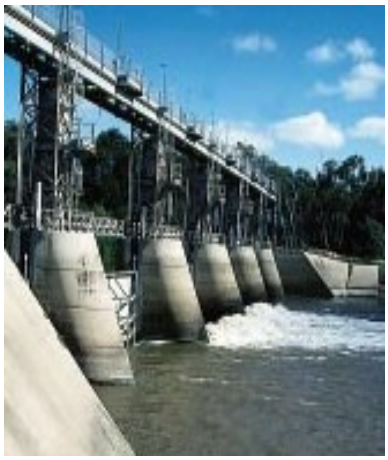

Figure 3 Gogeldrie Weir

Availability of water is dependent on the storage levels of the dams. State Water after assessing storage levels indicates the amount of water to the licensed users as a percentage of allocation. The maximum amount of allocation is 100%. The general security cropping farmers decide what crops to grow and how much they can irrigate depending on the amount of water available and size of the allocation. As a result of the worst single year drought in Australia history in 2006/07 the general security allocation for Murrumbidgee Irrigation was only 10% while another nearby irrigation company on the Murray River, Murray Irrigation Limited had zero allocation.

Murrumbidgee Irrigation Area

The Murrumbidgee Irrigation Area and Districts is an area of 480,000 ha where 120,000 ha is irrigated annually. It includes 1140 cropping farms, 950 horticulture farms and 940 small holdings. The gross value of farm production in the MIA is estimated at about $A700 million.

Most MIA farms were initially designed for dairy and horticultural production, but there was little initial success in production or marketing. In 1924 rice was successfully grown which has changed the landscape and wealth of the region (Murrumbidgee Irrigation 2007).

Rice farmers grow rice in rotation with wheat, barley, canola, maize and pastures for prime lamb, wool and beef cattle production. The typical farm size is 220ha with many farmers owning 2 farms. At 100% allocation the water allocation per farm is 1,400,000m^3. Approximately 55% of the water is used for rice. In normal allocation seasons the area of rice in the MIA is about 55000 ha with production of 525,000 tonnes and average yield of 9.7t/ha.

Horticulturists grow one or a combination of permanent crops that may include winegrapes, oranges, lemons, peaches, apricots, grapefruit, cherries, prunes and plums. Their average farm size is 25 ha. The MIA produces 20% of the total Australian winegrape production and 90% of the NSW state citrus crop.

Murrumbidgee Irrigation (MI)

Murrumbidgee Irrigation is responsible for managing and delivering water to farmers in the Murrumbidgee Irrigation Area (MIA). It is also responsible for water pricing, the development and maintenance of infrastructure and environmental stewardship. In 1913 when the scheme opened it was run by a government authority the Water Conservation and Irrigation Commission which in 1987 became part of the Department of Water Resources. It was privatised in 1999.

It has 2700 farmer customers and 190 staff. It has an annual allocation of 1,221million m^3 with average sales of 800 million m^3. The company has 4500 km of supply and drainage channels and approximately 35,000 structures (Murrumbidgee Irrigation 2007).

The purpose of MI is to:

- Provide leading edge water services
- Improve the environment for future generations
- Develop a competitive profitable business

This means the company has to be commercially competitive and have the potential to provide greater value to shareholders. By 2010 it aims to be innovative in delivering new and improved water related products and services to existing and new customers for the benefit of shareholders and the environment.

Operation

Farmers place water orders with MI one to 3 days in advance of needing the water. MI orders water from State Water for 7 days time. Water comes down the river into the MI supply system and measured on farm with Dethridge wheels. These are being replaced with the more accurate water measurement Doppler meters. Company employees adjust the channel flows to meet the changing needs of customers. Farmers are then billed for the water they use.

Figure 4. Dethridge wheel

Shares
Farmers are shareholders in the company with each 1000m³ they hold representing a share. The total shares each farm has relate to the number of 1000m³ attached to the farm at the time of privatisation. Shareholders elect 4 representatives to the Board of Directors. The Board overseas the management procedures and policy developments eg water transfers.
The operating revenue for MI is about $A21 million from water sales to shareholders, government contribution to channel and drainage refurbishment, EnviroWise projects and irrigators contribution to asset refurbishment.

Licence requirements
MI operates under specific government legislation and 3 licences. These are the:

- Irrigation Corporations Act which authorises MI to operate and act as a company and be commercially viable and requires an approved Land and Water Management Plan (MIA EnviroWise)
- Water Management Works Licence which authorises MI to use existing channel infrastructure and take water for its customers
- Environmental Protection Licence issued by the Department of Environment and Climate Change to operate within certain environmental guidelines. There are a number of sites where MI monitors flow, electrical conductivity, salinity, nutrients and pesticides either on a daily, weekly or monthly basis. There are trigger levels for pesticides requiring notification and action by MI. Groundwater levels are measured twice per year from an extensive network of piezometers.

Investments
MI invests to improve water efficiency. It spent $A29million on the Barren Box Storage and Wetland project to return water to the environment. It was a natural wetland area divided into water storage and wetland cells. The wetland has been returned to a more natural flooding regime. About 20million m³ has been saved for the environment without reducing the amount of water available to irrigators.
The Integrated Horticultural Supply is a $A75 million capital refurbishment program which is designed to replace 260 kilometres of open concrete channels with computerised pressurised systems through pipes enabling farmers to improve water use efficiency using trickle irrigation to replace flood.
Off-farm infrastructure is constantly upgraded to reduce system loss enabling water to be delivered more efficiently and cost effectively.

Environment and Education
The MIA EnviroWise program contributes to the sustainability of farming and protection and enhancement of natural resources. It is a joint venture between MI and government with the program being implemented over 30 years costing farmers $A231 million with $20 million in cash and $211 million “in kind” $A50 million comes from the State and Federal governments. The objectives are to maintain or increase productivity, reduce seepage to water tables and groundwater, maintain drainage water quality, reduce drainage volume, protect natural resources and minimise effects to downstream users.
MI environmental staff coordinate farm programs consisting of projects and activities farmers can implement on their farms. It improves farmer knowledge and skills. The program has 3 sequential stages. Stage 1 is the Farmwise education program about soils, whole farm planning, and recycling. Stage 2 is whole farm planning and stage 3 is about incentives available to farmers for on-ground works. NSW Department of Primary Industries extension staff assist in the presentation of these courses. There are also programs and grants related to biodiversity, re-vegetation, fauna and structural adjustment.
To reduce potential accessions to the water table the suitability of soil for rice growing is regulated by the State Department of Natural Resources. The Rice Environmental Policy

Advisory Group (REPAG) sets the policy. Fields are surveyed using a grid of electromagnetic (EM31) readings which classifies potentially suitable soil. Higher readings are typically heavy clay lower water use soils. Soil cores may also be taken to assess soil sodicity. There is also a hydraulic loading of 30% of rice suitable land per farm allowed to be grown to rice.

Water policy and costs

Irrigation licences for horticulture permanent plantings such as wine grapes are high security licences for which MI charges a higher price compared to the general security broadacre farming licences. High security licences are generally guaranteed their full allocation with no guarantee for general security. General security farmers can buy temporary water from other farmers in any one season. This has been popular during the recent low allocation seasons but the cost is relatively high. If general security water holders have left over water in any season up to 15% can be carried over into the next water year.

In 1999 the NSW government announced removal of subsidies for irrigation services, full recovery of costs for all service operations , the operation of a balanced budget and establishment of an asset replacement fund(Singh,R.,Mullen,J,Jayasuriya,R. 2005). Thus farmers pay for water on a user pays system. Farmers pay for a fixed water charge per 1000m³ which is unrelated to the amount of water used and a variable cost charge per 1000m³ based on the water used in any one season. The fixed charge relates to administrative fees, bulk water charges, asset levy and MIA EnviroWise levy. For a 50% allocation it is about $A12.70/1000m³. The variable charge is about $A13.60/1000m³ giving a total charge of about $A 26.30/1000m³.

Conclusion

Irrigation is very important for the rural areas and communities of southern NSW. Murrumbidgee Irrigation is one of 3 irrigation companies which do a lot more than just supply water to farmers. It links to farmers, industries and government and helps safeguard the environment. MI and farmer shareholders have been challenged by the low water allocations which have averaged only 37% due to drought conditions over the last 5 years. Farmers are under severe financial pressure. Rainfall is near average in 2007 and there are great hopes it will signal the end of the drought and result in replenishment of the very low dam levels. Water savings and improvements in water use efficiency by both the farmers and MI will be needed as climatic change and river environmental demands result in less water for farmers. For Murrumbidgee Irrigation it means improved water ordering and measurement, reducing seepage losses and use of on-route storages. For farmers it means improving water use efficiency with either higher yields per 1000m³ or management systems which use less water.

References

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Acknowledgements

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