



Rural Water Use and the Environment: The Role of Market Mechanisms

This paper has been prepared in response to the Productivity Commission's and follows a visit by commission staff to Murray Irrigation in January 2006.

About Murray Irrigation

Murray Irrigation is an unlisted public company and the largest privatised irrigation company in Australia. The company's Members are the irrigators it provides services to, and they own both Shares in the company and Murray Irrigation Water Entitlements.

We provide irrigation and drainage services to our Members in southern NSW. Water for irrigation and a four town water supplies is delivered from the regulated Murray River to approximately 2,400 landholdings through our irrigation channel network, across 748,000 hectares. The company also delivers an environmental extension and incentive services through the Murray Land and Water Management Plans to an area which takes in almost one million hectares, including our own area of operations, and the adjacent East Cadell district.

When the company was established in 1995 our members operate approximately 1,600 commercial farm businesses, a number which had declined in the following decade through amalgamation of ownership to around 1,200 farm businesses. Primary enterprises include rice, dairy, cereal grains and livestock for meat production.

Murray Irrigation has two main NSW Murray Regulated River Water Access Licences

- 1) water licence for 1.2 million entitlements of NSW general security water which is 72% of the licensed general security entitlement in the NSW Murray;
- 2) conveyance licence.

State Water and the Department of Natural Resources identify our licences as above the Barmah-Millewa Choke. Murray Irrigation's water supply is stored, released and managed through storages and regulators operated under the direction of River Murray Water, the Murray Darling Basin Commission's operational arm. Water supplied to Murray Irrigation's shareholders is also subject to interstate water sharing arrangements contained in the Murray Darling Basin Agreement. More information about Murray Irrigation is available on our website www.murrayirrigation.com.au, particularly from our *2005 Sustainability Report*.

Murray Irrigation has distributed its water entitlements to members through the issue of shares and water entitlements in the company. To date, Murray Irrigation Water Entitlements have included a portion of the company's conveyance licence – 17% – which is retained by the company if entitlements are traded from the company.

To date the company's Shareholder Members, our landholders and our water users have been one and the same. Their interests, those of the company, and of the locally communities in which we all work and live have generally co-incided. With the changes being introduced now, it is possible that our shareholders, landholders and water users could become three different groups of people with conflicting interests and market driven motives that discount the well being of local communities.

Annual water trading

Murray Irrigation believes the annual water markets provide the main market mechanism for delivering water to high economic value uses. The power of the annual water market is often understated outside the irrigation industry.

Murray Irrigation and its shareholders are net importers of water through the annual or temporary water markets, even in years of full allocation.

In 2004/05 the NSW General Security allocation was 49% irrigators.

The annual allocation to the company totalled	794,386ML
Supplementary water totalled.....	41,773ML
Carryover totalled	173,608ML
Additional annual trade totalled	63, 873ML

During the 2004/05 season the rice industry negotiated with Snowy Hydro Ltd to allow individual irrigators to take an advance on their future allocations. This is the fourth contract negotiated with Snowy Hydro Ltd, and forms a part of the existing trading options available. Advance negotiated by the rice industry totalled 104,142ML

Total water available in 2004/5 season was 1,113,909ML (including conveyance flows).

Compare this with the last year of full allocation for the region, the pre-drought 2001/02 season, when the NSW General Security allocation was 105%.

The annual allocation to the company totalled.....	1,543,752ML
Carryover totalled	119,043ML
No Snowy Advance or Supplementary Water was available in 2001/02 year.	
Even with 1,662,795ML available to the company,	
existing water markets allowed individual irrigators to bring in:	
Additional annual trade of.....	85,669ML

Total available in 2001/02 season 1,748,464ML (including conveyance flows).

Murray Irrigation facilitates annual trade where ever possible. The company has no restrictions on annual trade in or out of the company’s area of operations. There is a farm water use limit to control the intensity of irrigation water use on properties in our region to reduce the potential environmental impacts from irrigation. However with an average irrigation intensity of less than 2ML/ha few irrigators reach their water use limit. In a landscape with an average rainfall between 350 and 390mm, this level of irrigation is equivalent to 200mm of rainfall).

The company operates a water exchange for buyers and sellers which trades between 60,000ML and 70,000ML of water a year, much of which comes from within Murray Irrigation. However the exchange is also open to buyers and sellers outside the company’s area of operations. The exchange can be viewed through the company’s website www.murrayirrigation.com.au, including a seasonal history of sales.

The variability of prices listed on the water exchange reflects not only water availability from season to season, but also water availability within a season.

Prior to water allocation announcements on the 15th of each month water trading activity slows, followed by a peak in activity when there is little or no increase in allocation.

There is particularly so during the peak spring rice planting period. September and October allocation announcements are vital. March is also a peak trading period for autumn water

planting. A zero increase in allocation on March 15, 2006 resulted in a day of record water trade, with 2226ML sold. The water exchange also provides a good barometer of water prices and is used as the benchmark for trades by parties involved in private water transactions. In 2002/01 when the NSW Murray General Security allocation was 105% the average price per megalitre traded on the exchange was \$40.82. In 2004/05 season when the allocation was 49% the average price per megalitre was \$70.13. This shows the effectiveness of the existing annual trading market mechanisms in moving water from less economic to more economic farm businesses.

- Trading on the annual or temporary market allows water users to buy water without the need for the capital purchase of water entitlements.
- It provides an opportunity to expand irrigation based on the resource available, rather than on fixed water requirements.
- For those who irrigation operations may be sub-economic, they have the ability to generate income from the sale of the annual yield on their entitlements,
- The product is virtually guaranteed. Annual trade deals only in water which is held in storages and available in the current season.
- Any physical delivery issues or restrictions are immediately assessable; they are not part of modelling based on a series of predicted variables which may have unknown impacts on third parties.
- Because the annual market (particularly Murray Irrigation's water exchange) provides a clear price benchmark, it discourages wasteful water use, where trading offers a more valuable return

Annual trade restrictions

Our customers are particularly frustrated by what appear to be artificial limits placed on annual water trade by other state jurisdictions, NSW Trusts, other NSW Irrigation corporations and even NSW State-endorsed Water sharing plans in the Murrumbidgee Valley. These often appear as convoluted barriers inending protect continuation of socialised under-use, unfair cap management, lower local market prices, protection of over use and other local quirks. It is clear from the NWI's stated aims, that artificial barriers to annual trade will be eliminated, however we are yet to see any significant evidence of this.

In 2005 Murray Irrigation staff met with irrigators who own or operate farms in both the Murray and Murrumbidgee Valleys to discuss how these annual trade restrictions can be eased. One of these farmers indicated that he had strategically invested in properties in both valleys, to mitigate water allocation risk. However his investment had been seriously undermined by a multitude of restrictions on annual trading rules imposed in the Murrumbidgee Valley. We believe his position is not unique.

We acknowledge that there are physical limitations on the delivery capacity of the river systems, including the Tumut Choke in the Murrumbidgee and Barmah Choke on the Murray River. However, in addition to physical constraints, we believe rules within the Murrumbidgee water plan and additional rules implemented by Murrumbidgee Irrigation and GMW in Victoria complicate and restrict annual trading.

Table 1: Comparison of Murray and Murrumbidgee Valley temporary trading rules

Murray Valley	Murrumbidgee Valley
Trade into and out of the NSW Murray Valley for high security and general security allocations closes on May 31.	Trade of general security allocations out of the Murrumbidgee Valley and trade of high security and general security allocations into the Murrumbidgee Valley ceases on January 31.
Intra-valley trade ceases on May 31.	Intra-valley trade ceases on February 28
	High Security Closing date to trade high security allocations out of Murrumbidgee Valley is September 1
Murray Irrigation Limited	Murrumbidgee Irrigation
Murray Irrigation places no restrictions on annual trade. All of a landholdings total allocation can be traded.	Murrumbidgee Irrigation requires: Nomination of intention to trade annual allocation water by August 1 Limit of 75% of base allocation on entitlements (general or high security) can be traded. When allocation increases occur two week limit to lodge intention to trade portion of increased allocation. Withdrawal of intention to trade, or subsequent annual purchase of water considered overuse against irrigator.

Murray Irrigation’s New Constitution

On January 2006 Murray Irrigation Limited’s members adopted a new constitution that allows sale of Murray Irrigation water entitlements to non members, without the need to transfer the entitlements from our licence. The new constitution also allows water entitlements to be sold from our licence in compliance with the National Water Initiative. However, there is no limit on the number of entitlements which can owned by non-members. These changes provide the market (irrigators, investors, government, environmental trusts, speculators etc.) with access to Murray Irrigation’s 1.45 million Water Entitlements. This is in line with the Water Management Act, 2000 (NSW), which provides for land and water in the regulated Murray system to be owned separately. Water entitlements can be owned by non-landholders, including irrigators or investors from interstate. A summary of the changes is presented in Table 2.

In conjunction with the new constitution and the changes to ownership options, the company has introduced an exit fee which will be applied only to water entitlements traded permanently from the company’s licence. Marsden Jacob Associates (MJA) calculated the exit fee using Murray Irrigation’s actual costs 2003/04 – 2004/05 and budget costs 2005/06 – 2009/10. The costs recovered from the exit fee are and NPV calculation of the costs incurred by the company in the core function of supplying water to customers. Non-core activities, bulk water payments and activities funded by the Land and Water Management Plans and government funded asset renewal under the “deed with respect to funding works Murray” were all excluded. The exit fee is based on a 50 year calculation and has a discount rate of 4% real (pre-tax). It is assumed a 30% tax rate will apply to the on the exit fee received by the company.

The exit fee has been introduced to ensure current shareholders are not disadvantaged by the actions of other shareholders who decide to sell their entitlements and possibly turn their properties to dryland operations. This would leave a dwindling number to pay for the costs of

the infrastructure and operation and maintenance. It is our preference that the debt for the irrigation infrastructure continues to be linked to the water entitlements, rather than with what may become dryland properties which may be subsequently less able to pay because of the lower productivity of dryland farming.

The company will be closely reviewing the trends in water entitlement trading, to adjust its water pricing structure if necessary. Currently the pricing structure is generally a 50:50 balance between fixed and usage charges. However this is essentially a fixed cost business, with the recent drought experience confirming up to 90% of costs attributed to ongoing operation and maintenance, regardless of water allocations or water use. Significant changes in water use in the region could force a change to more closely reflect the real cost ratio.

Table 2: Summary of water ownership and trading changes

Pre January 31, 2006	Post January 31, 2006
Memorandum and Articles of Association	Company Constitution
Ownership of Murray Irrigation Water Entitlements	
Restricted to those who owned a landholding in the company's area of operations and who therefore also owned Murray Irrigation Shares and Water Entitlements.	Open to anyone.
Trading of Water Entitlements	
Landholders could only sell up to 40% of entitlements issued to their holding at the time of the company's formation in 1995.	All but 5 of the water entitlements on a landholding can now be sold.
Entitlements could not be sold to buyers external to Murray Irrigation if the sale would reduce the company's general security entitlements to less than the number held at privatisation.	The Board in approving a dealing (transfer) of Water Entitlements is to have regard to the Water Management Act NSW and the principles of the NWI Agreement (Clause 3.7 (a)) of our constitution. Initially this means up to 4% of our general security entitlement can be transferred from our licence. In 2006/07 this is 48,000ML.
External buyers (non Murray Irrigation landholders) were required to transfer Murray Irrigation water entitlements from the company's licence.	External buyers can now own entitlements without having to transfer those entitlements from the company's licence. The company's fixed annual charges will apply.
Where water entitlements were transferred from the company's licence the company retained the portion of the conveyance licence issued as part of Murray Irrigation Water Entitlements. (Effectively 0.17 of each entitlement or 17% of the total entitlements held).	Where buyers choose to transfer entitlements from the company's licence, the company retains the portion of the conveyance licence issued as part of Murray Irrigation Water Entitlements. (Effectively 0.17 of each entitlement or 17% of the total entitlements held).
No exit fee applied when entitlements were transferred from the company's licence.	An exit fee of \$447.73 per entitlement applies to those water entitlements which are traded permanently from the company's licence. (This effectively applies to 0.83 per cent of each entitlement, or 83% of the total entitlements held.) There is no ongoing annual charge to either the buyer or seller of these entitlements.

Permanent trading

Changes made by Murray Irrigation, and through the NSW Water Management Act are already in force. In contrast, the Victorian Water Management Act 2005 which allows separation of land and water and unbundling of water rights will not become effective until 1 July 2007. In addition permanent sale of water entitlements out of districts is limited to 2% of entitlements (although this will be increased to 4% in 2006/07). The Victorian Government's White Paper, proposed that ownership of water entitlements by non-water users in each supply system would be limited to 10 percent of entitlements.

Victoria also has rules which limit the operation of the annual market, despite the NWI seeking the immediate removal of annual trade barriers.

Murray Irrigation's, NSW and Victorian trading rules (as understood by Murray Irrigation) are summarised in the Table 3 below and compared with NWI agenda. Murray Irrigation acknowledges in the NSW Murray that compliance with Ministerial Council CAP on diversions is managed through allocation policy in the NSW Water Sharing Plan and not through barriers on annual trade.

Table 3: Summary of NSW and Victorian Trading Rules

	Murray Irrigation	NSW Murray	Victoria
<p>Annual trade NWI target <i>Immediate removal of annual trade barriers</i></p>	<p>Farmers can sell all the water available on farm No charges apply to annual transfers Water can be transferred (sold) to another Murray Irrigation member or another licence holder in NSW, or Victoria. NSW Murray rules apply to transfers to and from Murray Irrigation's licence, these rules relate to physical delivery capacity i.e. Murray Irrigation cannot be transferred downstream of the choke Transfers close on 31st May Within Murray Irrigation many transfers can be made electronically and can be completed within minutes.</p>	<p>All available water can be transferred to another licence in NSW, Victoria or SA, subject to physical delivery capacity. i.e. no transfers downstream of the Barmah/Choke Transfer fees apply - \$25 minimum, plus \$1/ML up to \$75 Transfers close on 31st May Manual system for transfer processing, can take four weeks or more.</p>	<p>Farmers can only transfer 30% of their allocation Transfer fee \$65 Transfers to NSW close on 28th February</p>
<p>Permanent trade NWI target <i>Victoria and SA to remove barriers to permanent trade at the same time NSW amends its legislation</i> Full implementation by 2006 of compatible, publicly accessible, reliable registers</p>	<p>Murray Irrigation members can sell all except five water entitlements from their landholding. (Five water entitlements must be kept on each landholding as a stock and domestic water supply.) Non landowners can own Murray Irrigation Water Entitlements, no limitations on ownership of Water Entitlements Separate register for landholdings, water entitlements and members Water Entitlements register allows encumbrances to be registered Water Entitlements can be transferred from Murray Irrigation's licence, up to 4% each year ~50,000 entitlements An exit fee only applies when Murray Irrigation Water Entitlements converted to NSW Murray General Security water.</p>	<p>Land and Water separated Individuals can own water entitlements in NSW without owning land in NSW Register established with Land Property Information (LPI) for ownership of water entitlements Encumbrances registered with LPI To own water in NSW you need a Water Access Licence, No restrictions on who can own a NSW Water Access Licence NSW legislation passed (December 05) that allows NSW to impose fines on ICs that do not comply with NWI NSW legislation passed to include NWI risk assignment framework</p>	<p>Non landowners cannot own water Permanent trade out limited to 2% of water entitlements in any year. NSW irrigator cannot purchase Victorian water unless part of the interstate trading project NSW irrigator cannot purchase Victorian Water Right Victorian Water Resource Management Act will not be implemented until 1st July 2007</p>

Mechanisms for expanded permanent trade

There are two mechanisms for expanding permanent water markets between states and between valleys:

1. Trade based on tagged entitlements, which can be at retail level, for example trade in Murray Irrigation entitlements or tagging at State and Valley level
2. Trade based on exchange rates.

Water trade based on exchange rates results in the buyer owing entitlements that are the same, and remain the same as the sellers. Water trade based on exchange rates converts any water purchased into the same product as those already owned by the buyer. Once converted the water entitlements permanently reflect the seasonal allocations and reliability of the receiving location. Exchange rates use modelling to establish a conversion rate, which reflects the long term average variation in reliability between the different systems.

By definition Exchange rates, which are based on long term average differences in reliability will result in third party impacts in either the selling or receiving valley when ever the seasonal allocation is different to the long term average in both valleys.

For example Murray Irrigation understands that an Exchange Rate of one applies to sale of entitlements from the Victorian Goulburn gravity irrigation areas to the Victorian Murray gravity irrigation area. In recent years there have been substantial differences in the seasonal allocation between the Victorian Murray and Goulburn system, these are outlined in the table below

Table 4: Comparison of Goulburn and Victorian Murray annual allocations

Year	Goulburn			Victorian Murray		
	Open Allocation	End Allocation	Sales	Open Allocation	End Allocation	Sales
2000/01	48	100	0	100	100	100
2001/02	55	100	0	100	100	100
2002/03	34	57	0	100	100	29
2003/04	0	100	0	16	100	0
2004/05	0	100	0	46	100	0
2005/06	2	100	0	85	100	41

With an Exchange rate of 1:1 if an irrigator sold Water Right to another irrigator in the Murray System, in 2001/02. The buyer would have had received an end of season allocation in 2002/03 of 129%, however in the seller's valley the end of season allocation would have been only 57%. The additional water the buyer has received will have to come from other Murray irrigators who were not involved in the transaction, unless it was guaranteed from the source valley which also effectively takes water from other users.

As well as differences in the end of season allocations, differences also occur during the season, which has an impact on irrigators' irrigation planning decisions.

The extended years of low allocations, and differences in the severity and length of drought between valleys has highlighted the weakness of using Exchange rates. If substantial volumes are traded permanently between valleys using Exchange rates there is potential for significant third party impacts.

A further weakness of using exchange rates is their reliance on assumptions behind annual allocation policy and irrigation demand and water use, if these assumptions are incorrect or annual allocation policy changes the exchange rate will be incorrect.

For example, in NSW water users have a choice of carrying over to the next water user, up to 50% of their entitlements. Irrigator behaviour in response to carryover will impact on the amount of NSW general security allocation available.

In the past five years, Murray Irrigation has carried over volumes varying from 64,620ML in 2000/01 173, 680ML in 2004/05. The volume carried over from year to year can be very difficult to predict. The assumptions used in developing the NSW Murray Water Sharing Plan have been proven wrong by real events in the years that followed, with much higher levels of carry over than anticipated.

Murray Irrigation's preference for the expansion of interstate trade is tagging, including "retail tagging". The advantages of expanding interstate trade based on tagging include;

- Eliminates third party impacts on irrigators and also the environment
- Removes requirement to adjust the Murray Darling Basin Ministerial Cap, to establish Cap Exchange Rates and to change the already complex inter state water sharing arrangements.
- Provides water owners with the opportunity to own a range of entitlements with different reliabilities and different features, for example NSW general security water entitlements include provisions to carryover unused entitlements to the next season, this option is not available in Victoria or South Australia.

Murray Irrigation also recommends that inter valley trading is also based on "tagging" where a Murrumbidgee water entitlements could be owned by an irrigator in either the NSW Murray, South Australia or Victoria, but the available water will be determined by the announced allocation in the Murrumbidgee Valley. Expanding permanent trading based on tagging, also allows seasonal supply constraints to be recognised. Seasonal supply constraint issues which limit opportunities for transfers between valleys within the season do vary depending on water availability and also annual trading patterns. For example water can only be transferred to the Murrumbidgee Valley in some seasons because of physical delivery constraints in the Murrumbidgee.

Actual Exchange Rate

The NSW Water Sharing Plan allows for conversion of NSW general security water to NSW high security water, the actual Exchange rate is not included in the Water Sharing Plan. Prior to the gazettal of the NSW Water Sharing Plan and the recent low allocation years which have prevented conversion from general security to high security, the ratio 0.5, i.e two general security water entitlements are required to provided one high security entitlement.

Murray Irrigation understands that actual modelling completed by the Murray Darling Basin Commission indicates the actual conversion rate is 0.63, which means one general security entitlement will provided 0.63 high security entitlement.

In the event Governments proceed with using Exchange rates as the basis of expanded permanent trade it is essential the Exchange rate is based on actual modelled, Exchange rate

and the not the conservative rate proposed by the NSW Government and currently being proposed to NSW general security entitlement holders.

Table 5: Comparison of NSW Murray High and Low Security allocations

Year	NSW Murray HS	NSW Murray GS	
	Opening allocation	Opening allocation	End of season allocation
2000/01	100	9%	95
2001/02	100	17%	105
2002/03	100	0	8
2003/04	100	0	55
2004/05	97	0	49
2005/06	97	0	

There would seem to be an inherent conflict between the use of exchange rates and maintenance of the current security of yield for existing water entitlement holders in connected systems. Provide more or less water in order to supply “exchanged” entitlements will affect the short term and long term yield and also the capital value of all existing entitlements.

Trading options for the environment

There currently seems to be an uncompromising stance that water for the environment should be purchased as water entitlements. In the same way that property and commodity trading has an endless variation of ownership, use and trading arrangements, the separation of water entitlements from land as a result of the National Water Initiative has created new possibilities, in the same vein, for water.

Outright ownership of water entitlements is only one option, possibly the most expensive, and one which may not necessarily meet the needs of the environment. In fact, the victims of “sales deal is effectively a hybrid product available only in some years.

A matrix of available solutions may include some of the following.

- Smart engineering solutions including channels and pumps to re-use existing environmental flows more than once. The 410,000MLs released so far this year for the Barmah-Millewa forest has not even come close to running through the Perricoota Forest, downstream of the Barmah-Millewa, which is also one of the Murray’s six icon sites. A simple and relatively inexpensive cutting has been proposed which would have allowed water from the Barmah Millewa to be re-used in the Perricoota Forest. Recycling and reusing water is a common practice among region’s irrigation farmers, in order to maximise water efficiency. However the proposal for the new diversion works has not even made the design phase. Government water managers could achieve some really good results with very little extra water, by re-using the existing environmental entitlement for more than simply re-flooding areas of the Barmah-Millewa Forest.

- The use of annual markets: Managed environmental flows are often based on trigger events such as minor floods. There is no reason why the Environment, as a legitimate water user, shouldn't enter the market and buy water for a season or event on a needs basis. Purchases made on an annual basis would have a specific, targeted environmental outcome, and would be far cheaper than buying entitlements. As "water savings" projects may fall short of their targets annual trade provides a much more focused and cost effective option
- The development of better commercial water instruments as alternatives to the outright purchase of water entitlement or water rights. For example, Government could enter into long term leases with irrigators for the portion of water entitlements above a nominated allocation level – say 70%. This sort of deal protects farm businesses from losing their initial water allocations which are so important to their ongoing viability, but provides environmental flows in seasons of higher water availability when they are far more likely to be useful.
- Technology for water swaps. Some farmers with relatively high entitlements per hectare will value increased investment in centre- pivots, in-ground piped supply systems, remote sensing and automated control systems and may be prepared to give up water entitlements to install these systems if such a transaction was tax-effective, simple and transparent. These transactions would lead to more productive farms, less waterlogging of intensive irrigation districts and significant water for environmental flows.

Apart from simply providing more water, the issue of flow seems a one sided argument, and irrigators are always on the losing side. Proposals to reconfigure the barrages at Lake Alexandrina, or even to lower Lake Mulwala by a 100 millimetres to provide better environmental outcomes are met with howls of protest – often from the very same people who demand irrigators give up water.

Irrigation communities represent the only engine room of growth in inland, rural and regional Australia. Whilst we all value our native forests and the wildlife that depends on a healthy river system, the measures we take to improve the health of these features must not be ham-fisted and at an unacceptable cost to this vital sector of rural Australia.

Irrigators know they must do more with water in future- simply to survive in the lopsided world of rural commodity trading. Likewise, commonsense demands that Governments adopt a matrix of solutions, including investment in engineering and civil works that assist better water management, and innovative water market instruments, with real, measurable outcomes as a key investment criteria.

Accounting for water recovered

Because water for environmental purposes will be taken from the exiting pool available for agriculture, whether purchased on the free market or not, irrigators are concerned about the accounting methods applied to this water.

Transparent systems for water accounting are vital, particularly water savings will be a major challenge. Water recovery (Snowy and NWI for the Murray River) will highlight this issue, particularly important in terms of third party impacts.

Relevant issues that need to be considered include the source of the water being recovered:

- What is it that is being recovered and where from?
- Reliability - variability between years, average volumes recovered could vary substantially between years with quite different impacts on water users;
- Features of water recovered eg. carryover.
- Is it measurable? This is highly relevant where water recovered is currently not a licenced entitlement or a licenced entitlement which is unmetered.
- What is the water's Cap volume?
- Identification of limitations on the water's availability and where the water can be delivered to – geographic, channel capacity, other limitations.
- If a register and an account for environmental water is established, who will be responsible for managing it and how effective are will the accounting systems be?
- Validation – is the water real?
- The conversion of this water to “average quantities” is to be avoided to prevent third party impacts.

The company is concerned that the water recovered for environment retains its characteristics is not converted to another product, as has happened with other environmental water. The Barmah-Millewa Forest allocation was taken from the NSW Murray Regulated River General Security resource, but quickly assumed a higher level of security than general security; no evaporation losses were applied to water carried over, and the whole of the allocation could be carried over.

At the same time NSW general security irrigators could only carry over half of their water entitlements, and a five per cent loss factor applied to account for evaporation in the storages. While the carry over loss factor has been addressed, and other conditions surrounding the allocation and use of this particular allocation assist irrigators, the key issue about the change of characteristics without adequate compensation remains. Water stored and released incurs a cost, and this will apply to environmental water as much as water to water used for irrigation or town supplies. Governments should be prepared to meet these costs.

Given that environmental water will come from existing consumptive use, and most particularly the resource available for irrigation, the management of that water to achieve the best possible outcomes is of prime concern to Murray Irrigation. How will environmental water be managed, how will the priorities for its use be determined and how will the benefits of its use be assessed? Local and wider communities are keen to have some input into priorities as the movement of this water from production to environmental outcomes has the potential to significantly affect those communities through a reduction in the wealth generated by the productive use of that water.

More water is not necessarily the only or best solutions for achieving environmental outcomes, and cost benefit analysis of water/other actions versus environmental benefits and community impacts needs to be undertaken.

On-farm decision making

Within Murray Irrigation's area of operations irrigation intensity is relatively low, on average less than 2ML per hectare. For most of the irrigators in this region water savings through either improved farm layouts or new technology are vital in maintaining farm viability and are used immediately to expand production.

Water efficiency improvements also help address regional environmental impacts and productivity issues related to rising water tables, soil salinisation, water logging and loss of productivity. The company is the principal implementation authority for the Murray Land and Water Management Plans, a 30 year natural resource program launched in 1995. It is funded by federal, state and local governments and landholders. Through the program farmers are able to access incentives for approved works including farm planning, storage and recycling systems and vegetation works. This funding is expected to continue until 2010. In more than a decade of implementation the program has contributed to major improvements in the regional environment and improved farm productivity. Government funding of \$67.5 million over 10 years has leveraged significant investment from landholders – an estimated \$347 million based on the company's annual survey of landholders. Many landholders have commented publicly that without the incentives provided through the Murray LWMP program they would not have been able to undertake the farm improvements and make the efficiency gains they have.

The Murray LWMPs have a series of targets agreed upon in conjunction with the Department of Agriculture, Forestry and Fisheries, and the Murray Catchment Management Authority. Whole farm planning and the construction of storages and recycling systems are key strategies in improving water use efficiency, farm productivity and environmental health. In 2004 an analysis was undertaken to determine who had participated in the program, and which factors made a landholder more or less likely to become involved.

The *Murray Land and Water Management Plans Mid Term Review Report 2003-04* identified the following points in its executive summary.

“Market research and extensive data analysis has revealed that the key drivers to LWMP involvement include:

- Holding size – as holdings size increases generally LWMP participation increases;
- Enterprise type – as the irrigation enterprise intensity increases so does LWMP involvement (i.e. rice and dairy enterprises are highly involved in LWMP works);
- Age – age analysis undertaken in Denimein found that as age increases, LMWP participation declines (especially in the over 60 age group);
- Water use – generally as megalitres used increases so to does LWMP participation in on farm works.” (page 5)

A further review completed in 2005 called *Factors Affecting the Rate of Adoption of Best Management Practice in the Murray irrigation Limited Area* (RMCG 2005) attempted to identify the key barriers for participation. This report may help inform the commission's consideration of farmer related decision making. A copy of the RMCG report can be downloaded from the following link on the company's website:
<http://www.murrayirrigation.com.au/download/3241890.pdf> .