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### Abstract

The operations of water markets are becoming more and more crucial in facilitating both environmental and micro-economic reform agendas. Council of Australian Governments (COAG) water reforms and the National Competition Policy rely heavily on market mechanisms to facilitate a more efficient allocation of water resources and alleviate the financial impact of full cost recovery. Under the new capping initiative of the Murray-Darling Basin Commission, where total extraction from the river cannot exceed the 1993-94 level of development, water markets have become the only possible way of getting access to more water. This paper surveys how buyers and sellers in the water markets of the Goulburn-Murray Irrigation District in Victoria and the River Murray in South Australia perceive the operation of these markets.

### Introduction

Water markets have developed in the south-eastern part of Australia during the last 15 years. It is anticipated that water trade will help alleviate the social impact of raising water prices under a full cost recovery regime. Trade will allow farmers who are not able to pay full cost recovery prices to opt out of irrigation farming partly or fully, convert to dryland farming or leave farming altogether (COAG, 1994). Markets will also facilitate the reallocation of scarce water resources while

annual allocations dwindle under the Murray-Darling Basin Commission's capping initiative. The concept of water markets and their early workings have over the past years been reported in *Water* (Pigram et al., 1994; Stringer, 1995; Bjornlund and McKay, 1995; Bjornlund and McKay, 1996; McMullan, 1996).

Both McMullan (1996) and Bjornlund and McKay (1996) argued that the early water markets in Australia were thin, with only few participants active in the market at any given time, and that as a consequence price formation was difficult and erratic. Both Bjornlund and McKay (1998) and Colby et al. (1993) were therefore only capable of explaining 54% to 58% of the price variation when analysing prices paid in the water market using regression analysis or 'hedonic functions.' This paper discusses how the market participants have perceived the early operation of such markets in Victoria and South Australia and looks for evidence that these markets have

matured.

In the US, it has been widely accepted that thin and immature markets have caused wide fluctuations in market prices and outcomes (Colby et al., 1993; Brown et al., 1982; Gardner, 1985). The study by Brown et al. was important in identifying the impact of market efficiency on water prices and outcomes. Their finding was that in more efficient markets, prices are highest and have the least variation; transfer processes are the shortest, and transfer costs are the lowest. The efficiency level of a market was determined by a number of factors such as:

- the number of buyers and sellers active in the market
- the presence of a group of professional intermediaries such as brokers who facilitate the flow of information regarding supply, demand and market prices
- the presence of clear and certain approval processes providing certainty to market participants.

Gardner looked at the impact of the

**Table 1** How sellers and buyers heard of transferable water entitlements 1994-96

Method	GMID, Vic % of		River Murray, SA % of	
	Sellers	Buyers	Sellers	Buyers
Newspaper	37.0	36.2	23.1	12.0
Radio or TV	3.0	1.0	1.0	2.0
Public meeting	20.0	4.8	2.9	8.0
Friend or family	5.0	22.9	26.9	22.0
Other	33.0	35.2	39.4	55.0
No answer	2.0	1.9	0.0	0.0

size of the trading area and found that the larger the trading area and the more varied the water uses, the higher the water prices and the larger the overall benefits from trade.

During surveys of water sellers and buyers in the Goulburn-Murray Irrigation District in Victoria (GMID) and along the River Murray in South Australia, market participants were asked a number of questions about their perception of the transfer process including:

- how they obtained information about water trade
- whether they were satisfied with the help they received from the authorities
- whether they disliked any part of the process
- whether a third party broker was involved who helped them produce any irrigation and drainage management plan (IDMP).

**Sources of Water Trade Knowledge**

Table 1 shows how the sellers and buyers first heard about transferable water entitlements (TWE). Within the GMID, newspapers were the most common information source. Other sources were public meetings for sellers, and family and friends for buyers. This was possibly because many sellers had moved into the area recently for non-farming reasons, whereas most buyers had lived and farmed in the region for many years.

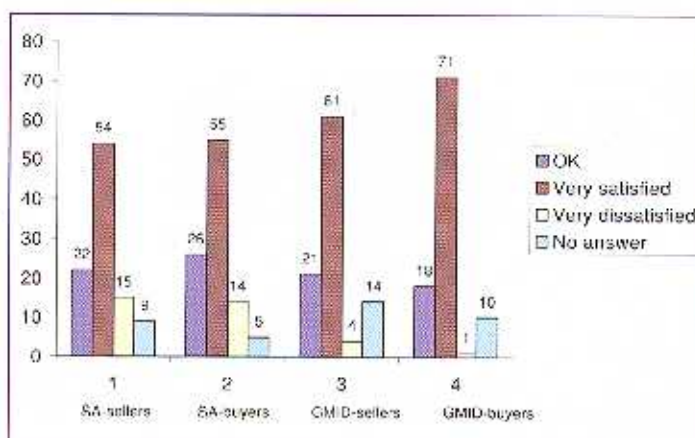
Along the River Murray in South Australia, for both sellers and buyers the most common method of getting information was through newspapers or friends and family. The buyers got their information from other sources more often than the sellers.

**Table 2** Dissatisfaction with transfer process in GMID, 1994-96

	% of sellers	% of buyers
Eastern district	25.0	26.4
South-western district	50.0	33.3
North-western district	21.4	20.0
Private diverters	23.1	40.0
Total for area	29.0	30.0

**Table 3** Dissatisfaction with transfer process along River Murray, SA, 1994-96

	% of sellers	% of buyers
Irrigation areas	40.0	25.0
Private diverters	17.6	47.1
Based on location:		
Lakes area	7.1	50.1
Lower Murray	20.0	50.0
Riverland area	36.9	37.2
Total for area	32.7	40.0



**Figure 1** Satisfaction with information provided by authorities

Looking at the difference between irrigation area irrigators and private diverters, it was found that private diverters most often quoted other sources, mainly the relevant government departments—the Department of Environment and Natural Resources (DENR) and then Engineering and Water Supply Department (E&WS). In the Lakes Area, public meetings were a more common source, due to the extensive use of government-sponsored public meetings in the development of five-year management plans in the Angas-Bremer Proclaimed Region (Bjornlund, 1995).

**Assessment of Information Provision**

Sellers and buyers were asked how satisfied they were with the information they received from the water authority. Their answers are tabulated in Figure 1.

Sellers and buyers along the River Murray in South Australia were more dissatisfied with the authorities than those in the GMID. In both areas the sellers were generally more dissatisfied than the buyers. Again, this could be expected since they were often involuntarily scaling back their operations or leaving farming altogether. Anecdotal evidence and the negative response to the survey by many respondents would support this assumption.

The higher level of dissatisfaction along the River Murray in South Australia could perhaps be explained by

the more uncertain transfer process in that area. Approval of trade is linked to the production of an IDMP but there are no clear guidelines regarding what is acceptable.

This contrasts with the situation in the GMID, where specific rules exist to determine how large an allocation per irrigated hectare an irrigator can have. This provides a high level of certainty about the likely outcome of an application, especially since potential water buyers can obtain approval of purchase

before negotiating with a seller.

**Attitudes to the Transfer**

Asked whether there was any part of the transfer process they disliked, 29% of the sellers and 30% of the buyers in the GMID said, 'Yes,' but with a variation in response between the regions (see Table 2).

It is clear that the more the sellers are being pressured to sell, the more they dislike the process. A significant proportion of sellers who disliked the transfer process were in the south-western region, where most involuntary transfers took place and the rate of bankruptcy was the highest. It is also the region where the most community animosity has been expressed against water trade due to the expected water export. It appears that the commercial farmers disliked the process most.

Table 2 also indicates that a larger proportion of the private diverter buyers disliked the process. This could be because a smaller proportion of these buyers used brokers in the transfer and were personally involved in the associated paperwork (see Table 5).

Along the River Murray in South Australia, 33% of the sellers and 40% of the buyers said they disliked some part of the transfer process. Table 3 shows the variation in responses between private diverters and irrigators in irrigation areas as well as the three river locations.

**Table 4** Element of transfer process disliked, GMID and River Murray, SA, 1994-96

	River Murray, SA		GMID, Vic	
	% of sellers	% of buyers	% of sellers	% of buyers
Advertising, intrusion on privacy	—	—	17.2	0.0
Time factor	61.8	32.3	—	—
Cost factor	8.8	30.0	17.3	10.0
Red tape, time taken	17.6	20.0	37.9	66.8
Restrictions on water purchases	0.0	7.5	—	—
Forced sale	11.8	0.0	—	—
Disagreement with paying for water	0.0	10.0	—	—
Various private reasons	—	—	20.7	16.4
No answer	—	—	6.9	6.8

Within irrigation areas, it was mainly the sellers who disliked part of the process, whereas among the buyers it was mainly the private diverters. This was to be expected since it was mainly the private diverters who were subject to the DLNR approval process and production of the IDMP. Sellers in the Riverland area were most dissatisfied.

Table 4 shows the parts of the process with which the sellers and buyers were dissatisfied. Among the sellers the time factor was by far the biggest problem, followed by red tape. These were possibly correlated.

Along the River Murray in South Australia, a group of sellers (12%) with annual allocations for vegetable production in marginal areas said they disagreed with being forced to sell. When the government irrigation areas were refurbished the allocations of these growers were upgraded to formal licences as a kind of compensation. However, it was not found feasible to connect many of them to the new supply system and they were forced to sell their licences. Cost was the most important factor for the buyers because they had to produce the IDMP and obtain permission.

Within the GMID, only three objections were specified. First was an objection to advertising what was considered to be a private business matter. Second was an objection to the transfer cost. The third objection, which concerned the largest group, consisted of the time taken to complete the process and the red tape involved. Among the buyers 'red tape' was the only substantial objection. The 'various private reasons' related to individual transfers. For example, one buyer disagreed with paying for water at all.

**Transfer Costs**

During the interviews the buyers and sellers expressed a major dislike of the transfer cost. Tables 5 and 6 report the costs on a per ML basis in the GMID and along the River Murray in South Australia.

Table 5 indicates that a significant number of sellers and buyers in the GMID indicated zero transfer cost. This raises some concern since both buyers and sellers should have some cost, if only for application fees and advertising. Otherwise, the transfer costs for buyers were quite consistent, around \$14-15 per ML throughout the GMID, with the exception of the south-western region where the mean cost was only \$4 per ML. This possibly reflects the fact that most of the larger transfers took place in that region with only 42 per cent of all buyers purchasing less than 50 ML.

region seems to be very high when compared to the other regions. This could be because almost 75 per cent of all sellers sold less than 50 ML. On the cheaper side, sellers in the north-western region paid the least in transfer costs, with an average of \$8.54 per ML.

Table 6 shows the range of transfer costs on a per ML basis along the River Murray in South Australia during the 1994-96 period, with overall little difference between the average transfer price for sellers and buyers. Considering that it was the buyers who had to produce the IDMP, this was unexpected. However, the market consisted of a large number of small-scale sellers but only a small number of buyers amassing large volumes of water (Howe et al., 1990)

Between irrigation areas and private diverters some differences emerge. Buyers in the irrigation areas paid less than the private diverters, probably because they used brokers much less frequently and many did not have to produce an IDMP (only 47% compared to 72% for private diverters).

Transfer costs for sellers in irrigation areas were more than twice those for

buyers, probably because the sellers used brokers twice as frequently as the buyers. For private diverters the opposite was true—the sellers paid only half of what the buyers did, reflecting the fact that the buyers had to produce the IDMP.

The figures for the Lakes Area and the Lower Murray were difficult to analyse because of the low numbers and the high level of missing answers. However, there was a trend for costs to be much lower in these regions, especially among the sellers. This is probably because the IDMP was less costly here since activities in this area do not affect the salinity of the water abstracted at Morgan to supply Adelaide and do not have the high groundwater salinity levels that occur in the Riverland area.

**Brokers**

The use of brokers in the transfer process is set out in Table 7. Brokers were more widely used along the River Murray in South Australia than in the GMID. However, the use of brokers increased in both areas. In the GMID buyers increased the use of brokers by 36% and sellers by 47%. This is a sign

**Table 5** Percentage of buyers and sellers with \$/ML transfer costs, GMID, Vic, 1994-96

\$/ML	0	0-10	10-30	30-50	50+	Mean
<b>Eastern</b>						
Sellers	17.2	17.2	31.0	17.2	17.2	33.19
Buyers	8.8	50.0	28.8	10.0	2.5	15.01
<b>South-western</b>						
Sellers	5.9	29.4	58.8	5.9	0.0	14.54
Buyers	14.3	85.7	0.0	0.0	0.0	4.00
<b>North-western</b>						
Sellers	9.1	45.5	45.5	0.0	0.0	8.54
Buyers	0.0	68.8	12.5	12.5	6.3	16.54
<b>Private diverters</b>						
Sellers	33.3	25.0	20.8	12.5	8.3	14.65
Buyers	11.8	29.4	47.1	11.8	0.0	14.08
<b>Total area</b>						
Sellers	18.5	25.9	35.8	11.1	8.6	20.43
Buyers	8.8	50.0	28.8	10.0	2.5	14.15

**Table 6** Percentage of buyers and sellers with \$/ML transfer costs, River Murray, SA, 1994-96\*

\$/ML	0	0-10	10-30	30-50	50+	Mean
<b>Irrigation areas</b>						
Sellers	17.1	4.3	35.7	18.6	8.6	26.36
Buyers	31.3	12.5	31.3	3.1	3.1	10.89
<b>Private diverters</b>						
Sellers	35.3	11.8	8.8	2.9	5.9	13.03
Buyers	17.6	16.2	33.8	7.4	10.3	25.83
<b>Lakes area</b>						
Sellers	42.9	28.6	0.0	0.0	0.0	1.57
Buyers	25.0	25.0	25.0	12.5	0.0	13.01
<b>Lower Murray</b>						
Sellers	40.0	0.0	0.0	0.0	0.0	0.00
Buyers	7.1	21.4	42.9	0.0	14.3	29.32
<b>Riverland</b>						
Sellers	19.0	3.6	32.1	16.7	9.5	26.64
Buyers	24.4	12.8	32.1	6.4	7.7	20.59
<b>Total area</b>						
Sellers	23.3	6.8	26.2	13.6	7.8	22.74
Buyers	22.0	15.0	33.0	6.0	8.0	21.20

\*Missing data: Among the buyers 18% and among the sellers 22.1% did not know their transfer cost

**Table 7** Percentage of buyers and sellers using brokers for water trade

	Buyers 1987-94 <sup>1</sup>	Sellers	Buyers 1994-96	Sellers
GMID, Vic	46.0	45.3	62.6	66.7
River Murray, SA	57.6	52.6	62.0	72.8

<sup>1</sup> In Victoria, 1992-94

**Table 8** Mean prices paid in the GMID water market (\$ per ML)

Region	1992-94	1994-96
East	313 (34)*	360 (56)
West	289 (65)	325 (65)
Private diverters	170 (129)	267 (145)

\* Figures in brackets are standard deviations

of a maturing market.

Further analysis of the use of brokers showed that in the GMID during the period from 1994-96 brokers were most widely used by buyers in the north-western region (76%) and the eastern region (70%) against only 56% in the south-western region. The most significant difference was among private diverters. Only 30% of these buyers (mainly commercial farmers) used a broker, compared to 56% of the sellers.

The increase in the proportion of private diverter sellers using brokers during the 1994-96 period was probably due to the general increase in private diverter activity in the market caused by the introduction of trade between private diverters and government irrigators who traditionally have used brokers more widely.

Along the Murray River in South Australia the use of brokers increased by only 9% for buyers, whereas sellers increased their use by 38% due to the introduction of trade between irrigation areas and private diverters. Within irrigation areas a much smaller proportion (only 38%) of the buyers used brokers compared to private diverters.

On the other hand, sellers in irrigation areas used brokers on a par with private diverters (73%). In South Australia a large number of irrigation area irrigators sold water to private diverters who traditionally use brokers more widely. This is probably a reflection of the more rigid approval procedures for private diverters. An analysis of market prices shows that sellers using brokers do benefit from their brokers' increased market knowledge.

**Maturing Market**

As stated above, the use of brokers in the transfer process is a sign of a maturing market. Another sign of this is the increasing use of consultants to produce the IDMPs. During the period from 1987-1994, 28% of the buyers produced their own IDMP, whereas during the period from 1994-1996 only 8% of the buyers produced their own plan.

The proportion of water buyers who found the IDMP significantly changed their farm management went up from 28% to 40%. This is a reflection of the increased use of private consultants.

A further development is that real estate agents and valuers are expressing interest in operating in the market (Bjornlund, 1994). This has resulted in some brokers calling for a code of practice to be developed (Land and Water News, 1998).

**Market Activity and Prices**

Figure 2 shows the steady expansion of the market in South Australia up to 1996 and a strong upward trend in prices. There seems to be more fluctuation in maximum rather than minimum prices. This reflects the rapidly increasing price level and a permanent shortage of supply. Anecdotal evidence suggests that 1998 market prices are consistently above \$1,000/ML.

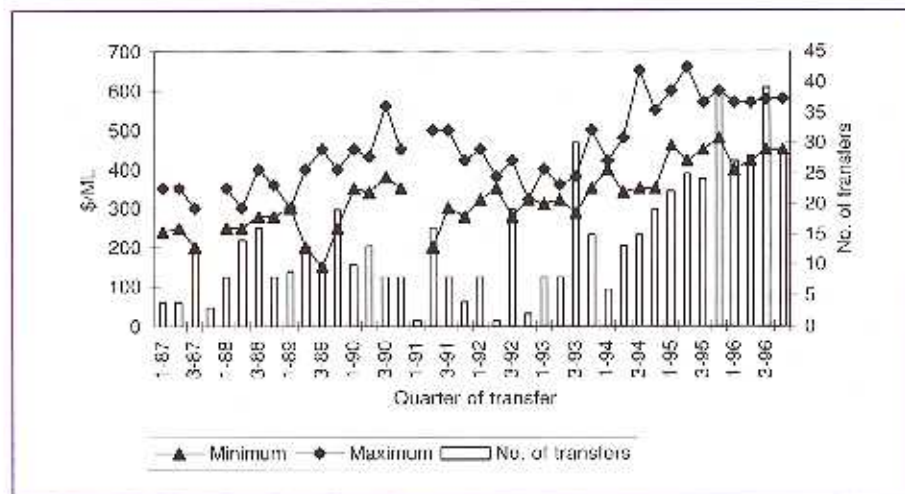
The minimum price fluctuates very little especially when comparing with the minimum prices in the GMID. In South Australia there seems to be more fluctuation in maximum prices, reflect-

ing rapidly increasing price levels and a permanent shortage of supply. Reflecting this development, analyses of prices paid in the water market (again using hedonic functions) during the 1994-96 period increased their explanatory power to 69% compared to the 54% reported by Bjornlund and McKay (1998) during the 1987-94 period.

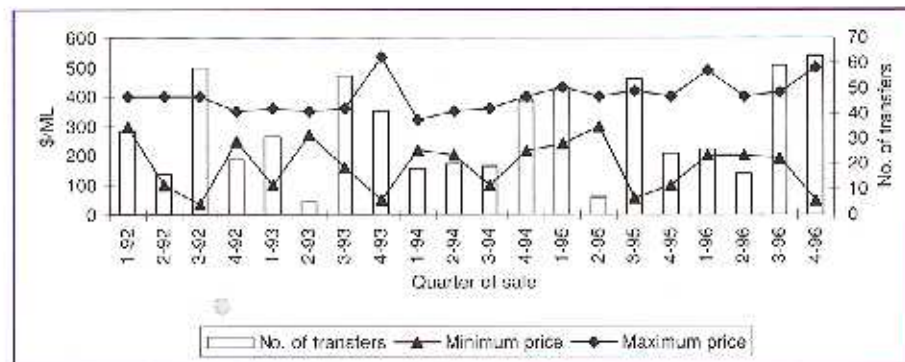
Figure 3 shows that the water market in the GMID until the end of 1996 remained relatively stable with respect to market activity and maximum prices whereas minimum prices showed wide dispersion. This dispersion is caused by spatial restrictions on trade as well as the limitations on trade between government irrigation areas and private diverter up until 1994.

After 1994 some spatial restrictions were removed and trade was introduced between irrigation areas and private diverters. These changes allowed increased trade between producers of lower and higher valued commodities as well as trade from private diverters, mainly using water as drought security, to farmers within irrigation areas using water very intensively.

Table 8 shows mean prices paid and accepted by government irrigators within the Western and Eastern parts of the GMID periods as well as private diverters during the 1991-94 and



**Figure 2** Minimum and maximum prices and number of transfers, River Murray, SA, 1987-96



**Figure 3** Minimum and maximum prices and number of transfers, GMID, Vic, 1992-96

1994-96. It indicates that mean prices have evened out across traditional price boundaries and that prices have increased. This supports the findings of Gardner (1985).

Despite the fact that trade has fully opened up, prices received by private diverters remain lower (see Table 8). Analysing water market prices (again using hedonic functions) during the 1994-96 period supports the presence of market inefficiency and indicates its cause. The analysis suggests that private diverters receive lower prices if they are selling to other private diverters, whereas if they are selling to farmers in irrigation areas the prices paid are on a par with market prices paid in irrigation areas. This shows that private diverters are still not aware of the change to trading rules and their implications for water prices.

**Conclusion**

The irrigation communities have become more familiar with the market and more confident with its operation and the opportunities it presents for both buyers and sellers. The increased use of brokers and agents as well as the increased market activities and the removal of spatial and other impediments to trade have caused the market to mature.

The article indicates some dissatisfaction with the operation of the market, especially along the River Murray in South Australia. For the future operation of water markets it is imperative that the transfer processes be streamlined and predictable procedures be developed which offer water buyers more certainty of outcome and limit the

costs associated with water trade.

During the research for this article the authors searched regional newspapers for information on the operation of water market and to their surprise found very little discussion of the topic. This finding, coupled with the dissatisfaction found amongst various water market players, indicates a need for the authorities to do a lot more work to educate the irrigators.


**Acknowledgements**

The Land and Water Resources Research and Development Corporation in Canberra funded this research as a part of the project, 'Do Water Trade Policies Achieve Environmental and Socioeconomic Goals'

**References**


Bjornlund H (1994) The Water Industry: Challenges and Opportunities for the Real Estate Profession. Paper presented to the Fourth Australasian Real Estate Educators Conference, Auckland University, January 1994.  
 Bjornlund H (1995) Water Policies and their Influence on Land Uses and Land Values. The Ango-Bremar Proclaimed Region: A Case Study. *Property Management*, 13 (2), 14-20.  
 Bjornlund H and McKay J (1995) Can Water Trading Achieve Environmental Goals? *Water*, 22 (5), 31-34.  
 Bjornlund H and McKay J (1996) Transferable Water Entitlements: Early Lessons from South Australia. *Water* 23 (5) 39-43.  
 Bjornlund H and McKay J (1998) Factors Affecting Water Prices in a Rural Water Market: A South Australian Experience. *Water Resources Research*, 34 (6), 1563-1570.  
 Brown L, McDonald B, Tysseling J and

Dumars C (1982) Water Reallocation, Market Proficiency, and Conflicting Social Values. In Weatherford G D, Brown L, Ingram H and Mann D Eds. *Water and Agriculture in the West U.S.: Conservation, Reallocation, and Markets. Studies in Water Policy and Management, No. 2*, Westview Press, Boulder, Colorado, 191-256.  
 Colby B G, Grandall C and Bush D (1993) Water Right Transactions: Market Values and Price Dispersion. *Water Resources Research*, 29 (6), 1565-1572.  
 Council of Australian Governments (1994) Communiqué. Meeting of COAG in Hobart, 25 February 1994.  
 Gardner B D (1985) Institutional Impediments to Efficient Water Allocation. *Policy Studies Review*, 5 (2), 353-363.  
 Howe C W, Boggs C S and Butler P (1990a) Transaction Costs as Determinants of Water Transfers. *University of Colorado Law Review*, 61 (2), 393-405.  
 Land and Water News (1998) Water Traders Need a Code of Practice: Agents, Land and Water News, 2 (9), 7.  
 McMullan J (1996) Water Trading in Victoria: Possible Controls. *Water*, January/February, 34-37.  
 Pigram J J, Musgrave W F, Hooper B P, Dudley N J and Bryant M J (1994) Co-operative Federalism and Water Reform. *Water* 21 (4): 21-25.  
 Stringer D (1995) Water Market and Trading Development in Victoria. *Water*, 22 (1), 11-14.  
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