

The Allen Consulting Group

Transaction costs of water markets and environmental policy instruments

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Contents

| | |
|--|-----------|
| Chapter 1 | 1 |
| <i>Introduction</i> | <i>1</i> |
| Background to this study | 1 |
| Background on water markets | 2 |
| Market instruments and the environment | 3 |
| This report | 5 |
| Chapter 2 | 7 |
| <i>The evolution of markets for water</i> | <i>7</i> |
| Water reforms | 7 |
| Regulatory trading framework | 9 |
| Chapter 3 | 11 |
| <i>Transaction costs in existing water markets</i> | <i>11</i> |
| What is included in transaction costs? | 11 |
| Private transaction costs | 12 |
| Assessment of private costs | 13 |
| Government transaction costs | 20 |
| Factors influencing the scale of transaction costs | 22 |
| Potential strategies for reducing transaction costs | 24 |
| Chapter 4 | 25 |
| <i>Transaction costs of environmental policy instruments</i> | <i>25</i> |
| Environmental impacts of water use and trade | 25 |
| Market instruments for managing environmental externalities | 25 |
| Transaction costs of environmental policy instruments | 28 |
| Chapter 5 | 33 |
| <i>Conclusion</i> | <i>33</i> |

Chapter 1

Introduction

Background to this study

On 13 December 2005 the Productivity Commission embarked on a commissioned research study titled *'Rural Water Use and the Environment — The Role of Market Mechanisms'*. The study is to address one component of the National Water Initiative (NWI), namely an assessment of:

- the feasibility of establishing market mechanisms for the efficient use of rural water and water-related farm management strategies and;
- the feasibility of market based instruments for dealing with rural water-related environmental externalities (for example, in-stream salinity, pollutants, sediment and nutrients).

The Productivity Commission has identified **transaction costs** as being an important consideration when weighing up the costs and benefits of establishing water markets and market based instruments (MBIs) for managing environmental externalities.

Transaction costs could limit the practical feasibility of using certain types of market mechanisms and could render some market-based policies inefficient or ineffective, as transaction costs consume resources that could be used for other purposes. Transaction costs may also be impeding permanent water transfers under existing institutional arrangements and trading rules.

NWI provisions explicitly note that water markets should be designed to “minimise transaction costs on water trades, including through good information flows in the market and compatible entitlement, registry, regulatory and other arrangements across jurisdictions” (NWI clause 58, ii).

As part of its research project, the Productivity Commission engaged the Allen Consulting Group, in conjunction with Dr Stuart Whitten of CSIRO, to undertake a brief scoping study of the various issues relating to transaction costs. The purpose of the study was to examine:

- the type and magnitude of transaction costs associated with water trading under current institutional structures;
- strategies that could be employed to reduce these transaction costs;
- the type of transaction costs are (or could be) associated with implementing the various types of MBIs available for managing environmental externalities; and
- the likely scale of these transaction costs (using a qualitative assessment).

Background on water markets

Water markets are already well established in Australia, albeit a thin market for permanent and interstate trades. About 90 per cent of trades are temporary transfers¹. The total value of water traded in 2005 was approximately \$400 million, half of which represented temporary transfers².

Similar approaches have been taken in each State and Territory in setting up institutional arrangements to facilitate water trade. However, the specifics of the trading structures — for example, trading rules, the system for registering trades and the extent of ‘unbundling’ of water rights into various entitlements — differs from one jurisdiction to the next.

The current system of entitlements across Australia is something of a moving feast; jurisdictions are progressively implementing reforms as part of their commitments under the NWI. ‘Old’ forms of water licences are gradually being converted to ‘new’ forms which are more clearly defined, secure and tradeable. In the past, trading has generally been confined to entitlements associated with regulated rivers (in which supply is regulated with storage infrastructure). In some States, the market is progressively being broadened to include tradable entitlements for unregulated rivers and infrastructure access. Future market developments may include the introduction of derivatives (futures and options), the relaxing of restrictions on inter-sector trade and streamlined administrative structures to promote interstate trading.

To date, water trading is estimated to have generated significant economic benefits in the Murray Darling Basin. In Victoria alone it has been estimated that water market reforms have added as much as \$12 million per annum to the gross value of irrigated agriculture production³. The Australian Bureau of Agricultural and Resource Economics has estimated that more widespread use of water trading in the MDB would increase output by approximately \$48 million annually⁴.

Most of these gains come about through the reallocation of water to higher value irrigation activities/areas, the activation of ‘sleeper’ licences, and the improved capacity for irrigators to manage seasonal risk by purchasing water on a temporary basis to finish off crops. The establishment of markets puts a ‘scarcity price’ on water which, in turn, drives innovation and investment in efficient irrigation technology.

¹ Temporary trades are also referred to as seasonal assignments in some jurisdictions.

² Personal Communication, 3 March 2006, Tom Rooney, Waterfind.

³ Department of Natural Resources and Environment, The Value of Water. A Guide to Water Trading in Victoria.

⁴ Bell, R and A. Blias (2002) Capturing Benefits from the Removal of Impediments to Water Trade, ABARE Conference Paper 02.01, 46th Annual Conference of the Australian Agricultural and Resource Economics Society, Canberra.

However, the gains from trade need to be viewed in the context of the public and private transaction costs associated with establishing and maintaining water markets. The initial costs of setting up an enabling framework for trade, including unbundling land and water rights, are thought to be high, although little attention has been directed at estimating the size of these costs. In addition, there are ongoing public costs associated with administering water trades, monitoring water use and maintaining the integrity of the trading system through enforcement. The private sector also incurs costs — for example brokerage fees, information search costs and registration costs.

Transaction costs are therefore an important factor to consider when evaluating market mechanisms for managing water resources. At a practical level, high transaction costs for water traders are likely to lead to thin markets, denying the potential efficiency gains to be realised from trade. From a broader economic perspective, the relevant measure of net efficiency improvement is whether the gains to society from trade outweigh the total ‘efficient’ transaction costs incurred by government and market participants⁵.

Market instruments and the environment

Transaction costs are equally important when assessing the feasibility of market based instruments for managing environmental quality dimensions of water use and trade.

Environmental externalities are said to occur when there are environmental side effects of irrigation activities (water harvesting through to delivery and use) that are not taken into account by the consumptive user and which affect society’s wellbeing. Externalities may be positive or negative. Positive externalities arise when water users generate environmental benefits that are valued by society, yet no payment or compensation is made. Negative externalities arise when the environment is damaged in some way, and society’s wellbeing is reduced as a consequence. The root cause of these externalities is the absence of property rights for environmental goods and services — which prevents the parties from negotiating a payment for provision of a good (or cessation of a bad) due to the high transaction costs involved.

Market based instruments (MBIs) aim to address the problem of externalities by creating property rights and/or price signals where none currently exist. In essence, MBIs are policy tools that attempt to influence behaviour by introducing new market signals or changing existing signals. This definition embraces:

- the creation of new markets — for example, the creation of property rights and rules to facilitate a market in discharge rights or salinity credits;
- taxes and subsidies, both of which influence price signals and impact on resource use; and
- provisions that help existing markets work better — for example, removal of barriers to trade, redefinition of property rights in existing markets, improved enforcement of rights and information provision.

⁵ Efficient costs refer to the least cost combination of inputs for undertaking a trade, subject to meeting environmental and social objectives.

MBIs can improve the efficiency of achieving environmental objectives or targets. Compared to prescribed uniform standards, market instruments help to reduce the overall cost of meeting a standard by allocating most of the burden to those individual water users that have the lowest marginal cost of complying with the standard. A rights-based approach can also promote private sector participation in environmental markets, thus providing a means through which environmental demands can be signalled.

There are a number of avenues through which MBIs can work:

- facilitating market-based reallocation of water entitlement to the environment, (for example, through government or private sector entry into the market as an “environmental manager”);
- creating incentives to water users and suppliers to make water savings for environmental purposes (through defining rights to conveyancing losses and subsequent government purchase of these rights for environmental purposes);
- meeting water quality objectives or targets (through defining tradeable rights for irrigation discharge — for example, salinity credits or nutrient discharge credits, or through an offsets scheme); and
- promoting environmental improvements by pricing externalities (through either subsidies or taxes).

Some of these approaches are reasonably well developed and have been operating for some time. For example, the Hunter River Salinity Trading Scheme was established in 1995 to manage point-source salt discharge by mines and power stations. The Murray Darling Basin Commission’s Salinity and Drainage Strategy (SDS) has adopted a salinity offset scheme and established a register of salinity credits. Under the SDS, no State can construct or approve any proposal that would have a significant adverse impact on the salinity of the River Murray unless it has previously earned salinity credits by contributing to salinity mitigation works⁶. Similarly, debits are made to a State’s salinity account if interstate water trades are made that result in adverse salinity outcomes.

Externality charges exist in some states. For example, the ACT Government has introduced a water abstraction charge and Victoria levies a salinity charge on irrigation water use in some districts.

Other MBIs are still at the pilot stage or are only being applied on a small scale. Examples include:

- Murray Wetlands Working Group’s strategic use of water sales and allocations for wetland management;
- some instances of “borrowings” from environmental allocations for consumptive use in extreme years;
- use of salinity offsets to manage impacts of irrigation development in South Australian irrigation areas; and

⁶ A ‘significant impact’ is defined as a change in average daily salinity at Morgan which the Commission estimates will be at least 0.1 EC within 100 years after the estimate is made. Activities that may generate significant impacts include drainage and irrigation works, water trades, land use change, salt interception works and environmental management actions such as wetland management or environmental flow releases.

- recharge offsets to manage groundwater recharge impacts of rice in Coleambally Irrigation Area.

A number of other MBIs are still at a conceptual stage. For example, proposals have been put forward to establish an environmental ‘manager’ of water who would exploit the countercyclical demands for irrigation water and environmental water by trading water between these two uses. Other proposals include the use of auctions or tender mechanisms to facilitate government ‘buy-back’ of water for environmental uses or the provision of subsidies to pay for works that generate environmental benefits. Cap and trade or similar schemes have also been suggested as a way to manage irrigation and in-stream salinity. Some of these schemes were investigated in Round 1 of the National Market Based Instruments Pilots Program and there are proposals to make greater use of salinity credit trading based around the existing MDBC register of salinity credits.

Given that environmental constraints are a significant component of the regulatory approvals process for water trading, MBIs may offer the potential to lessen the existing level of environmental restrictions placed on water trading by allowing greater flexibility. Thus, there are potential synergies between markets for improving water use efficiency and market instruments for managing environmental quality.

However, MBI design and implementation is not a costless exercise. Therefore, it is necessary to ensure that the *additional* transaction costs incurred under a MBI for managing externalities do not outweigh the benefits that arise from addressing the targeted externalities and the potential benefits from reducing the cost burden of the water trading approvals process.

This report

As there are only a few instances where MBIs have been employed to address water-related externalities, we have taken the approach of firstly investigating the type and size of transaction costs experienced in setting up and operating conventional water markets in four States (Queensland, New South Wales, Victoria and South Australia). This provides an initial point of reference against which a qualitative assessment is made of the transaction costs that are likely to be incurred under various MBIs for managing environmental externalities.

The structure of the report is as follows:

- Chapter 2 summarises how water markets have evolved from a former system of non-tradeable water licences and the common features of regulatory frameworks that have facilitated water trading in each State.
- Chapter 3 examines the private and public transaction costs associated with setting up, operating and participating in existing water markets. In this chapter we use the case studies to draw inferences about the factors influencing the scale of costs and what strategies could be used to reduce the costs.

- Chapter 4 considers a range of MBIs that could be employed to manage environmental impacts associated with water use and trade. A qualitative assessment of the type and probable scale of transaction costs involved with each of the alternatives is undertaken. From this analysis, we make observations about the instruments that seem to provide most promise in terms of low transaction costs.
- Chapter 5 draws overall conclusions from the study.

Chapter 2

The evolution of markets for water

Water reforms

Over the past decade significant progress has been made in establishing institutional and legislative frameworks to facilitate water trading. While the States maintain the ownership rights over water, Governments have provided irrigators and supply utilities with conditional entitlements to access and use water. A number of these entitlements (or products) are now tradeable. The fundamental reform that has occurred is the separation of water rights from land title, such that water entitlement can be traded separately to land. Most States have moved, or are moving, to the next step of unbundling water entitlements into three distinct components:

- a tradeable ‘long term’ right, or entitlement, to a share of the consumptive pool;
- a tradeable right to water, allocated from time to time pursuant to the share (typically an annual volumetric allocation which is traded on a ‘temporary’ or seasonally assigned basis); and
- a right to use the water at a specified site (not tradeable).

The rationale behind this unbundling, accompanied with making the rights tradeable, is to harness market forces in allocating water efficiently among users. As depicted in the left hand side of Figure 2.1, further unbundling and trading of water rights is possible. For example, there is scope for defining:

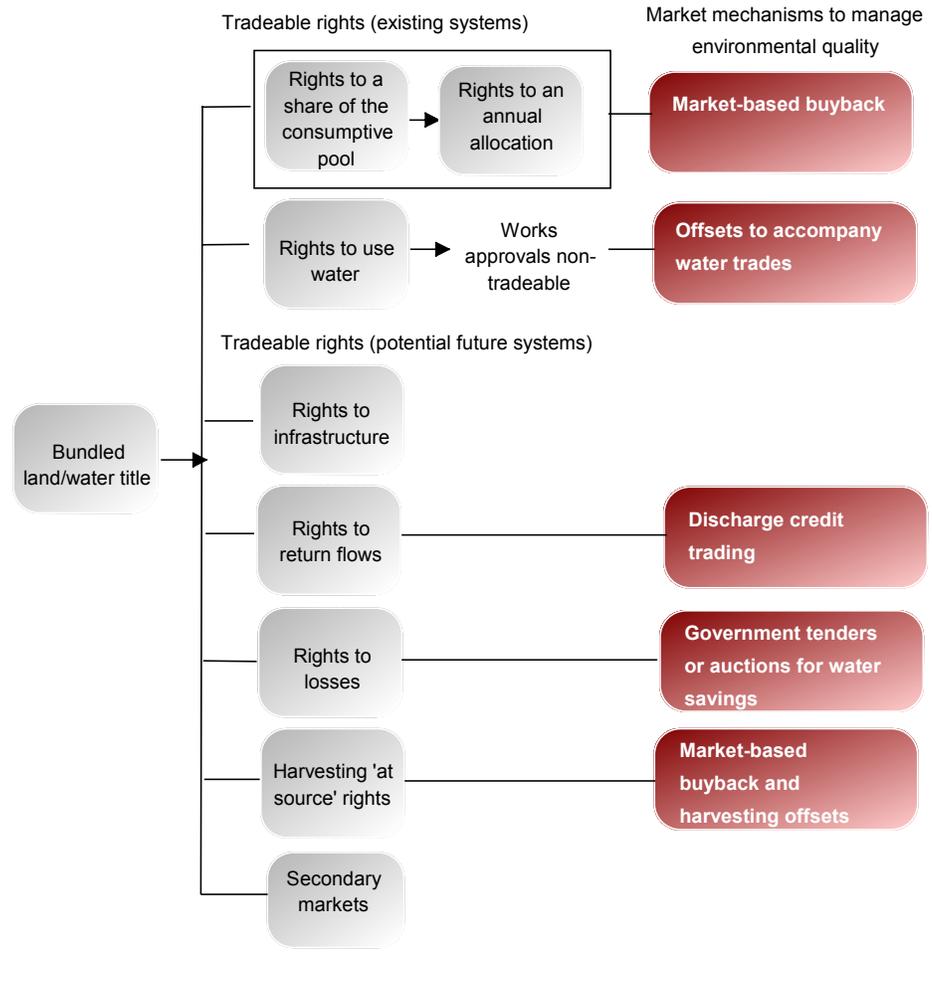
- Infrastructure rights (the right to build, operate or have an interest in works to take and control water).
 - In some situations where delivery capacity is constrained, tradeable rights to infrastructure could improve the efficient allocation of access to available delivery capacity and stimulate efficient levels of investment in new infrastructure. NSW and Victoria have made provisions in their water management legislation for delivery rights to be specified.
- Rights to return water to the river or recharge the aquifer.
 - Tradeable rights to the quality of water discharged to a river or aquifer represents a market-based approach for managing water quality externalities.
 - Tradeable rights to the volume of water discharged is another possibility. At present, these rights are implicitly allocated to the ‘discharger’, as he has discretion over the amount of water that can be discharged from his property. In other words, the discharger has the right to any water ‘savings’ – which in effect are not true savings in a whole of system context because the water is no longer available to the environment or downstream users.
- Rights to conveyancing losses, caused through seepage and evaporation.

- Water losses in the supply and distribution system could be ascribed a market value if the rights to losses were defined and traded. This would provide a financial incentive to minimise losses. True losses from the system are caused through seepage to saline aquifers and evaporation. Other forms of so-called ‘losses’ actually recharge aquifers and rivers, and therefore belong to category of recharge rights above. Some of these rights have already been codified and allocated in some systems (such as within NSW irrigation districts) while they remain un-codified in others (such as in riverine transmission systems).
- Harvesting or source rights — which involves codifying property rights relating to capture of surface water runoff in upper catchment areas. Codification of these rights would require the water supply implications of land use change to be explicitly considered. For instance, the development of forestry in the upper catchment may require the developer to purchase water allocation from downstream irrigators.
 - South Australia has recently implemented such a policy. Provision has been made for approximately 59,000 ha of plantation expansion, without the need to secure water allocations to offset the impact of commercial forest expansion. Further expansion of plantation forest beyond the 59,000 hectares, or in water resources management areas where the area set aside for forest development has been reached, may be accommodated provided the forest proponent offsets the impact on the water budget by securing an appropriate water allocation.
- Secondary markets, namely trading in options and futures. These instruments could serve as a valuable risk management strategy for irrigators who wish to cap their exposure to price risk in the physical water market. They could also reduce the need for regulators to manage different classes water entitlement with different supply reliabilities.
 - Future contracts that allow forward sale/purchase of water entitlement at an agreed price;
 - Call options that allow the forward sale to a buyer of the right to acquire access to water on an agreed basis, if the buyer wants to exercise the option at a time;
 - Put options that provide the holder of water entitlement with the right to sell access on agreed terms, a time in the future, should the water holder want to exercise the option at the time.

As indicated above, some jurisdictions are currently exploring the benefits and costs of these and other trading possibilities⁷. Expanding the range of products or rights available for trade involves transaction costs which must be weighed up against the potential benefits of increased trading possibilities.

⁷ For a review of prospective water products and transactions, see ‘Water Trading in Australia — Current and Prospective Products’, Prepared by ACIL Tasman for the Water Reform Working Group, June 2003.

Figure 2.1

UNBUNDLING OF WATER RIGHTS TO FACILITATE MARKETS**Regulatory trading framework**

Transaction costs in water markets are highly influenced by the regulatory arrangements underpinning water trade. The brokerage firm Waterfind estimates that there are approximately 30,000 trading rules in the national water market⁸. A stand-out feature of existing water markets is that private buyers and sellers must seek government approval before a trade can proceed. Approvals processes and accompanying trading rules and have been developed with the aim of protecting the environment and the interests of third parties from adverse impacts that may result from certain trades. Specific objectives include:

- the prevention of adverse environmental impacts (changes to river flows, salinity etc.);
- the protection of the rights of third parties to ongoing supply reliability and water quality;

⁸ Personal Communication, 3 March 2006, Tom Rooney, Waterfind.

- ensuring that the trade is hydrologically possible and whether any exchange rate should be applied to take account of losses; and
- that the trade does not result in any adverse social or equity impacts on specific regions — for example, leaving irrigation assets ‘stranded’ or causing reduced viability of agricultural communities (as a result of transfers of water for urban use)⁹.

One of the regulatory responses to undesirable trade externalities is to place restrictions on trade. For example, policies set in a number of NSW, Victorian and South Australian irrigation areas limit or prohibit permanent trades out of the district. Similarly, most States generally limit trading to within-sector trade and do not allow transfers between urban and rural sectors. These restrictions represent ‘hard constraints’ on some types of trade.

Other forms of regulation represent ‘soft constraints’, or add friction to the market. As noted above, a common feature of the trading systems developed in each jurisdiction is the requirement for regulatory approval from government before a permanent or temporary trade can proceed¹⁰. State approvals processes and trading rules require that a water entitlement transfer does not lead to adverse environmental impacts or diminish the entitlements of other users (in terms of supply reliability and/or water quality). The approvals process inevitably adds costs to market transactions – both in terms of assessment costs and time costs.

A variety of complementary market mechanisms may have a role to play in freeing up the regulatory approvals process, thus promoting trade (through reducing the transaction costs of trade and potentially allowing an increase in number of trades approved) and concurrently addressing externalities. The right hand side of Figure 2.1 summarises several rights-based approaches for dealing with environmental impacts. In broad terms, these approaches involve a range of possibilities including:

- the establishment of markets in environmental quality rights (such as salinity);
- the facilitation of market-based reallocation of water entitlement to the environment (through government or private sector purchase of entitlement or water savings); and
- developing offset mechanisms to mitigate the adverse environmental impacts of specific trades.

These environmental MBIs, and the likely scale/type of transaction costs associated with each (in qualitative terms), are explored in greater detail in Chapter 4. Aside from environmental externalities, restrictions on trade imposed for the purposes of preventing the ‘stranding’ of supply assets could be relaxed with the introduction of exit fees combined with the unbundling of delivery rights from water access rights.

⁹ Victoria has established a policy that places a 10 per cent cap on the share of water, in regulated systems, that can be held by non-irrigators. This policy aims to prevent speculators entering the market.

¹⁰ There are differences across the States with respect to who is responsible for different types of approvals. In Victoria the rules are determined and applied by the rural water authorities on behalf of government. In other States, approvals for temporary trades within regulated river systems are the responsibility of the water provider, while approvals for permanent trades (and temporary trades outside regulated river systems) remain the responsibility of government.

Chapter 3

Transaction costs in existing water markets

What is included in transaction costs?

The economic literature contains a number of definitions of transaction costs. Some definitions are narrow in that only the direct costs of making a transaction are included. Others are broader and include policy mechanism design costs and the costs of developing enabling institutions. In this study we categorise transaction costs as belonging to one of three categories:

- A. Ongoing costs directly involved in effecting market transactions. Costs are incurred (and/or activities are undertaken) by various parties taking part in the trade, for example:
 - Government — approvals process, assessment of impacts, registration of trades, monitoring and enforcement of entitlements, and periodic reviews of trading rules. These activities represent a mixture of fixed and variable costs (the latter of which are influenced by the number of transactions).
 - Private buyers and sellers — information search costs, negotiation and contracting costs, lodgement of applications to trade, certification and compliance costs, settlement of contract, defending property rights and taxes on transactions (for example, exit fees, stamp duty and capital gains). These are principally variable costs as they are incurred each time a trade is made¹¹.
 - Brokers – cost of administering the trade on behalf of the buyer and seller. Brokerage fees cover some of the private transactions noted above.
- B. Setup costs of developing market-enabling institutions, such as the development of registers and water accounting frameworks. These are principally costs incurred by government and are mostly fixed costs.
- C. Cost of changing the institutional environment and legal system, usually borne by government.

The boundaries between the different classes are not necessarily distinct. A narrow definition of transaction costs limits the cost items to those denoted in category ‘A’. A broader definition includes the initial costs of setting the enabling institutions and architecture for a market (B costs). Where governments must enact regulations to clarify or create property rights, such as in the case of water rights, these costs may also be included within the scope of transaction costs as denoted in category ‘C’.

¹¹ Although there is a small fixed component, comprising ‘start up’ costs incurred by traders – including time costs of learning about the market and trading rules and, in some jurisdictions, the requirement for a ‘use’ approval (in the form of a land & water management plan or works approval)

Private transaction costs

Water trading involves a number of transaction steps. Figure 3.2 illustrates a typical sequence of steps for enacting a permanent trade in which water is transferred from one location to another¹². The exact number of steps varies from one jurisdiction to the next depending on the type of titling system in place. For instance, NSW and Queensland have established a register and titling system that is modelled on the Torrens land titling system. Victoria has a simpler but potentially less robust system of title registration. It diverges from the Torrens system in several ways — notably because it is a decentralised register, public access to the register is not assured and third party interests (eg. mortgages) are not formally registered on the entitlements¹³. The Victorian Government is currently in the process of reforming this system to address these deficiencies.

Temporary trading involves a similar set of transaction steps, with the exception of step four (register search) and step eight (registration of the trade), both of which are specific to permanent trade. The settlement step is required by both forms of trade except that for temporary trade the settlement process is much simpler. Government approval of a temporary trade typically results in immediate execution of settlement. The risks of non-payment by the purchaser after execution, or non-refund by the seller if the trade is refused, are normally mitigated by a broker holding the agree moneys in trust pending approval. In the case of permanent trade there is the additional complexity of making and discharging mortgages on the title.

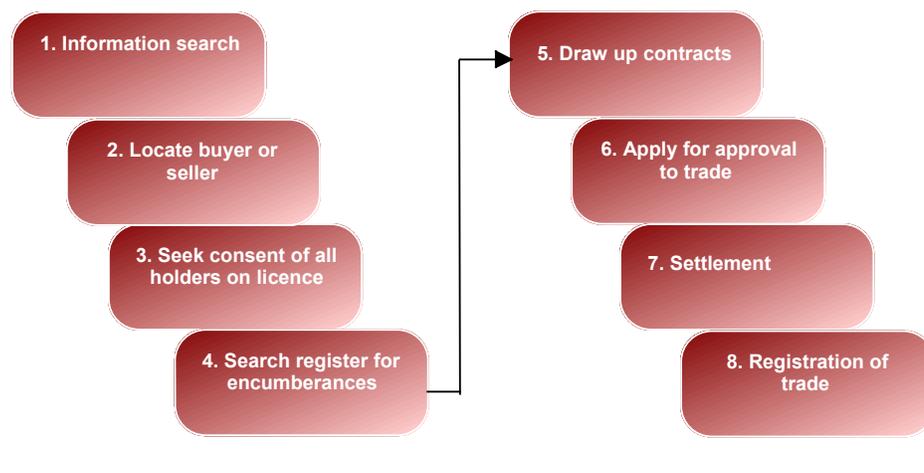
Each of the steps identified in Figure 3.2 impose a cost on water traders, either directly through government fees and brokerage charges, or indirectly through the cost of time associated with undertaking the transactions.

It is common for irrigators to engage the services of a broker to assist with some or all of these transactions. A variety of broker services are available. Some provide a full service and undertake all the steps in Figure 3.2 on behalf of clients. Others provide a partial service, for example only handling the lodgement of application forms.

¹² Another form of permanent trade is a change of water entitlement ownership with no change to the location of use.

¹³ ACIL Tasman and Freehills (2004), An Effective System of Defining Water Property Titles, Research Report prepared for the Department of Agriculture, Fisheries and Forestry and Land & Water Australia.

Figure 3.2

TYPICAL TRANSACTION STEPS — PERMANENT WATER TRADE**Assessment of private costs**

Four specific irrigation regions were examined to illustrate the approximate magnitude of private transaction costs associated with permanent and temporary water trading. The irrigation areas are:

- Queensland — Emerald Irrigation Area
- New South Wales — Murrumbidgee Valley (excluding Murrumbidgee Irrigation Corporation channel system which operates an internal trading system that is not subject to government fees for internal trades);
- Victoria — Goulburn-Broken
- South Australia — River Murray

The cost analysis focuses on trades *within* each of these regions. The water entitlements traded are based on regulated river systems (or supplemented systems in Queensland parlance). In each of the four cases it is assumed that the buyer has the relevant water use licence required for the region in which the trade is being undertaken (additional transaction costs would apply if a buyer had to acquire a use licence and/or a works approval to utilise the water) and that the permanent transfers involve a ‘whole of entitlement’ transfer to a new owner and a new location within the irrigation district (that is, there is no requirement for the title to be subdivided with consequent costs).

Table 3.1 summarises the government fees, charges and taxes associated with water trading in each of the four States. Exit fees are not included as a cost item in the table because these fees only apply to out-of-region trades (in some States and some irrigation areas). Brokerage fees are also excluded as these costs are dealt with separately in the next section.

The fees and taxes vary across the States. The cost of a permanent trade ranges from \$275 in Victoria (with no stamp duty payable) to \$500 in South Australia (plus stamp duty). The variation in costs between the States is due to the different types of registration systems in place, differing approval processes, and differing levels of cost recovery being achieved by user fees. These factors are discussed further in the section that examines ‘Government transaction costs’.

With the exception of South Australia, the cost of making a temporary trade is significantly cheaper, ranging from \$65 in Victoria to \$112 in Queensland (before income tax on proceeds of trade). The fee for undertaking temporary trading in South Australia is \$500 — that is, the same as the fee applying to permanent trades.

The tabulated transaction costs should be viewed as indicative of the fees incurred by water traders rather than a definitive summary. This is because the fees relate to a specific set of circumstances, as set out in our assumptions above. Government fees and charges, and brokerage fees, vary depending the nature of the transaction.

One particularly important factor influencing costs is whether or not entitlements are sub-divided prior to undertaking a permanent trade, and whether a mortgage(s) need to be made or discharged on the entitlement. In all States, partial trade of entitlements requires licences to be split, incurring an additional administrative step before trading can take place. Where mortgages are held over the entitlement, the process is significantly more laborious and requires removing a mortgage off the title, splitting the entitlement share, selling the share then remortgaging the other part. This process is estimated to cost over \$1000 in government fees and settlement costs — and adds considerably to the time taken to complete a trade. These costs are likely to pose a significant disincentive to permanent trade. NSW is in the process of modifying its trading structure to allow mortgages to be held over individual entitlement shares, thus allowing non-mortgaged units to be sold separately without attracting a high transaction cost. It is our understanding that in all other States the titling system is not set up in a way that allows this splitting to be done easily, nor allowing mortgages to be held on parts of entitlements.

Table 3.1

PRIVATE TRANSACTION COSTS – GOVERNMENT FEES AND CHARGES

| State | Application fee for approval | Registration of trade | Taxes | Other costs |
|------------------------|--|-----------------------|--|--|
| NSW | | | | |
| Permanent | \$250 | \$73.25 | Stamp duty varies according to the status of the water entitlement. Trading of entitlement shares held by irrigators in a private irrigation corporation attract a duty of 60c per \$100 of sale value. Trades of statutory water licences attract a nominal duty of \$10. Stamp duty is not payable on other dealings. Capital Gains Tax applies | There is a requirement to obtain a use approval if one is not already in place (\$113). |
| Temporary | \$25 flat fee plus \$1 per ML assigned, up to a maximum fee of \$75. | Not Applicable | Income tax on proceeds of transfer | |
| Queensland | | | | |
| Permanent | \$246.10 for transfer of ownership plus \$83.90 for an application to change allocation to a different location. | \$131.50 | Stamp duty on \$100,000 transfer would be \$2,350 Capital Gains Tax applies | Land & Water Management Plan required before approval. Plan assessment fee charged by government is \$173. |
| Temporary | No government approval required within 'supplemented' schemes. Trades managed by Sunwater at no cost to customer. Approval must be sought for trades of unsupplemented water. Application fee of \$111.80 applies. | Not Applicable | Income tax on proceeds of transfer | |
| Victoria | | | | |
| Permanent | Buyer to pay \$145 for transfer application - payable to Goulburn-Murray Water | Not Applicable | No stamp duty Capital Gains Tax applies | Buyer to pay \$130 fee for channel capacity and salinity/drainage assessment – payable to Goulburn Murray Water. |
| Temporary | Buyer to pay \$65 for transfer application – payable to Goulburn Murray Water | Not Applicable | Income tax on proceeds of transfer | |
| South Australia | | | | |
| Permanent | \$500 | \$6.15 | Stamp duty on \$100,000 transfer would be \$2,830 Capital Gains Tax applies | Buyer could be required to pay an additional assessment fee of \$132 in certain circumstances. |
| Temporary | \$500 | Not Applicable | Income tax on proceeds of transfer | |

Brokerage and exchange fees

Owing to the relative immaturity of the water market, there are few brokerage firms operating in Australia and the fees they charge for specific customers (in specific locations) are not publicly disclosed¹⁴. However, a general guide to brokerage fees is provided in table 3.2. On-line brokers provide a range of services, ranging from a ‘full service’ (that includes the ‘matching’ of buyers and sellers through to settlement, conveyance and registration of the trade) to a partial service that is limited to lodging application forms to the relevant government agencies.

Some online systems, such as Waterfind, operate a system of ‘direct negotiation’, whereby prospective buyers and sellers are able to register their intent to sell/buy. Prices for water are then struck through direct negotiation between buyers and sellers. Other exchanges, such as Watermove, use a pooled price system.

Sunwater, Queensland’s principal government-owned rural water supplier, has recently established a free exchange service for its customers. The SunWater Exchange only facilitates temporary trade.

The South Australian Department of Water Resources has established a Water Trading Noticeboard which allows water traders to post advertisements for the sale, lease or purchase of water. This is a free service to assist buyers locate sellers of water.

Table 3.2

FEES CHARGED BY MAJOR BROKERAGE FIRMS

| Broker | Temporary | Permanent |
|----------------|--|--|
| Watermove | Buyer: \$55 per trade plus GST Seller: 3% of total value plus GST, or A minimum fee of \$55 up to a maximum fee of \$550 | Buyer: \$110 per trade plus GST Seller: 3% of total value plus GST, or A min fee of \$550 up to a maximum fee of \$4,400 |
| Water Exchange | Seller: 2.5% of total value. Min fee of \$50; max fee of \$750. | Seller: 2.5% of total value. Min fee of \$50; max fee of \$750. |
| WaterFind | Buyer: 1.5% of total value Seller: 3.0% of total value | Buyer: 1.5% of total value Seller: 3.0% of total value |

Note: These fees are indicative only. Brokerage fees and charges vary across regions.

Time for regulatory approval of trades

The turn-around time for trading approvals is an important element of transaction costs, particularly for permanent trades. The time taken to receive approval for temporary transfers is between one and seven days. According to Waterfind, South Australia has the longest approvals process for temporary trading (taking up to seven days), while Goulburn Murray Water has reduced its approval time to one day. Brokers regard a turn-around time of three days to be an acceptable industry standard.

¹⁴ Compared to energy markets, water markets are relatively immature in the sense that volumes traded are low — particularly for permanent trades — and regulatory frameworks for facilitating trading are still evolving. Until recently, the demand for brokerage services has been limited because trades have mainly centred on temporary trades, which require less ‘servicing’ than permanent trades.

Gaining approvals for permanent trades tends to be a much longer process as there are typically more steps involved and the trading rules are generally more complex. Most States have developed a system of ‘pre-approved’ trades, which require only a basic level of assessment before approval can be given. Trades falling outside this envelope require a greater level of scrutiny, sometimes involving on-site visits by the regulatory agency and/or specific modelling. Waterfind regards a benchmark of 4 weeks as acceptable and achievable. However, in reality, few states are operating at this level¹⁵. New South Wales tends to be the slowest in approving trades (up to 6 months for trades not meeting ‘pre-approved’ criteria), partly because this State uses a land-based titling system which involves a higher administrative burden than other registration systems — although it also offers a higher degree of security and flexibility to entitlement holders. The time taken for approvals in Victoria is substantially less — only 4 to 6 weeks.

Table 3.3

TYPICAL TIME FOR REGULATORY APPROVALS

| State | Temporary | Permanent |
|-----------------|------------|------------------------------|
| Queensland | 1 day | 1 week for pre-tested trades |
| New South Wales | 3 days | Up to 6 months |
| Victoria | 1 day | 4 to 6 weeks |
| South Australia | 5 – 7 days | 6 to 8 weeks |

Queensland Land & Water Management Plans

In Queensland, buyers and lessees of water allocations require a land and water management plan (L&WMP), approved by the Queensland Department of Natural Resources and Mines (NR&M), before irrigating land using water taken under the allocation. An exception to this requirement exists when a water allocation is purchased with land as a ‘going concern’, provided the seller does not already need to operate under a L&WMP. An approved L&WMP is also required for water taken under seasonal assignment for two consecutive water years, or two out of three consecutive water years. The user is responsible for preparing the plan, and thus incurs the cost. The Department of NR&M charges a fee for assessing the plan. There are three different fee levels, depending on whether or not a previous plan has been approved by the NR&M for the property:

- (a) approving a previously approved plan, if paragraph (b) does not apply \$57.70
- (b) approving a previously approved plan, if the plan to be approved applies to additional land or provides for a different or additional irrigation method \$115.40; and
- (c) approving a new plan \$173.00

¹⁵ There is currently no national system for benchmarking approval times or standardised procedure for measuring approval times, however some water utilities and government agencies report this aspect of service delivery as a key performance indicators in their annual reports.

Taxes incurred on transfer of water

One of two taxes could apply under Commonwealth tax legislation upon the trade of water — ordinary income tax or capital gains tax (CGT). The laws and principles governing the application of these taxes is not straight forward and will depend on the facts and circumstances of the owner and the transaction. But in general, the proceeds from selling a water entitlement on a permanent basis will be subject to CGT, while the proceeds from transferring an entitlement on a temporary basis (seasonal assignment) will be treated as ordinary income and be taxed subject to the laws applying to primary production income. The Australian Taxation Office has developed a set of guidelines on this matter¹⁶.

Stamp duty is payable on the sales proceeds of permanent trade in Queensland and South Australia. In New South Wales, duty on water trading varies according to the status of the water entitlement and the circumstances in which the trade is made. Trading of entitlement shares held by irrigators in a private irrigation corporation attract a duty of 60c per \$100 of sale value — consistent with section 33 of the NSW Duties Act 1997, which pertains to sales of marketable securities. Trades of statutory water licences attract a nominal duty of \$10. Stamp duty is not payable on other dealings. Water trades are exempt from stamp duty in Victoria.

Costs as a proportion of value traded

Table 3.4 summarises the volumes and value of water traded on a permanent basis in three States in the current or previous financial year (only 2004-05 statistics are available for Queensland). In Queensland and New South Wales, the average volumes traded per transaction are approximately the same — in the order of 100 ML per trade. Prices obtained for water in these States is also similar, ranging from \$1,429 per ML in New South Wales to \$1,560 per ML in Queensland. Thus, on average, the total value of a transaction in these States is approximately \$160,000. It can therefore be concluded that for straight-forward trades (which do not involve complex settlement procedures) the basic transaction costs charged by government and brokers would not be a constraining factor as the total cost constitutes only about 3.5 per cent of the total value of the trade (or \$5,600).

In the Goulburn Region of Victoria, the volumes traded per transaction are significantly lower than those in the northern States (approximately 20 ML as opposed to 100 ML). Currently, market prices for water in Victoria are also lower than those in northern states. For the 23 trades that have occurred in 2005-06 (year to date, 1 April) in Goulburn Region, the average value per trade is about \$23,000 (or \$1,025 per ML). However, despite the lower value of each trade, transaction costs are unlikely to be a significant deterrent to permanent trade because irrigators in this Region incur relatively low transaction fees¹⁷ (buyers incur \$255 government plus broker fees and sellers incur 3 per cent brokerage — through Watermove).

¹⁶ Australian Taxation Office website: www.ato.gov.au/print.asp?doc=/content/52585.htm

¹⁷ Notwithstanding that, in some circumstances, other transaction costs associated with trades such as time delays in receiving approvals and legal costs associated with mortgages over titles, could make the total cost to participants much higher.

In the case of temporary trade, the volumes traded are typically lower than those traded on a permanent basis. Based on sales data from the Waterexchange, temporary trades in New South Wales, Victoria and South Australia, the average volume traded is about 60 ML per trade and water is currently selling for about \$40 per ML. So transaction costs in these States, as a percentage of the value traded, are as follows:

- New South Wales — 3.1 per cent
- Victoria — 2.7 per cent
- South Australia — 21 per cent

From this analysis it would appear that in South Australia, the government application fee of \$500 for temporary trade could be a significant disincentive to engage in trade, given that it constitutes about 20 per cent of the value of a typical trade. In the other States, the transaction costs, as a proportion of total value, are similar to those incurred in permanent trading and would probably not be a significant deterrent to trade.

The volumes traded per transaction in central Queensland on a temporary basis (seasonally assigned) are about the same as those for the southern states — typically 60 ML per trade. However, water is currently trading at higher price. For example, in the Nogoia McKenzie region (where Emerald Irrigation Area is situated), the pool price for temporary water is currently \$75 per ML¹⁸. Therefore, on average, the total value of a temporary trade is currently about \$4500. Based on an application fee of \$112 for gaining approval for trade, the cost of trade as a percentage of traded value is about 2.5 per cent. Again, it is unlikely this cost would impede trade.

Table 3.4

VOLUMES AND VALUE OF PERMANENT TRADE

| | Units | Queensland (2004-05) | New South Wales (2005-06) ^A | Victoria (Goulburn) (2005-06) ^A |
|--------------------------|-------|-------------------------|--|--|
| Number of transfers | No. | 180 | 30 | 23 |
| Total volume traded | ML | 18,370 | 13,626 | 520 |
| Average volume per trade | ML | 102 | 112 | 23 |
| Average value per ML | \$/ML | 1,560 | 1,429 | 1,025 |
| Average value per trade | \$ | 159,120 | 160,048 | 23,174 |

^A 2005-06 year to date.

Queensland statistics from Cox, R (2006) Local Government and Water Trading, a paper presented at the Water06 Conference, 1-2 March 2006, Brisbane.

Victorian statistics from Watermove Exchange, pool prices for permanent trades of unused water right/diversion licence in Central and Greater Goulburn trading zones.

NSW Statistics from Department of Natural Resources website:
www.wma.dipnr.nsw.gov.au/wma/WaterTradeSearch

¹⁸ Sunwater Exchange: <http://www.sunwater.com.au/exchange.htm>

Government transaction costs

It is important to consider the costs incurred by government in setting up, operating and maintaining a trading system because not all these costs are passed onto market participants. Transaction costs incurred by government include:

- ‘Category A’ costs, which are the *ongoing* costs directly involved in effecting market transactions. For example the cost of the approvals process, assessment of impacts, registration of trades, monitoring and enforcement. These activities represent a mixture of fixed and variable costs (the latter of which are influenced by the number of transactions).
- Category B costs, which include the setup costs of developing market-enabling institutions, such as the development of registers and water accounting frameworks. These are principally costs incurred by government and are mostly fixed costs.
- Category C costs, which are the costs of changing the institutional environment and legal system, usually borne by government.

The regulatory approvals process and local trading rules under existing institutional structures are complex and costly to develop, maintain and operate. The following review of costs incurred by water resource management agencies in three different States provides an insight to the scale of these costs.

New South Wales

The NSW government estimates that its management of licence dealings in 2004-05 cost \$8.5 million, which includes the one-off cost of licence conversions (from former Water Act 1912 licences to new Water Management Act 2004 licences) and ongoing costs of administering works/use approvals and the assessment of licence dealings. To date, approximately 7000 licences have been converted to tradeable Water Access Licences.

The on-going cost of licence dealings is expected to rise to \$11.7 million in 2006-07¹⁹. The forecast cost increase is due to:

- more rigorous assessment requirements for some categories of transactions under the Water Management Act 2004,
- an increase in the volume of transactions due to ongoing licence conversions; and
- an increase in the volume of approvals (water use and works approvals), reflecting the larger number of approval categories under the Water Management Act 2004.

¹⁹ Department of Natural Resources Submission to IPART to Set Bulk Water Resource Management Charges from 1 July 2006, September 2005.

According to a submission made by the New South Wales Department of Natural Resources (DNR) to the Independent Pricing and Regulatory Tribunal (IPART), the transaction fees charged to NSW irrigators and other licence holders have historically recovered only about 20% of the cost of processing licence dealings. In its submission, the DNR is proposing move to full cost recovery over the next five years²⁰. IPART is yet to determine whether the DNR is performing these tasks efficiently and whether the full fee increase is justified.

The NSW Government also incurs fixed costs associated with administering the licensing system, such as the development and maintenance of water accounts and flow models and compliance monitoring tasks. In 2006-07 these costs are forecast to be \$4.8 million. By definition, these costs are incurred regardless of the number of transactions administered, and on this basis the DNR is proposing to recover its fixed costs through a water resource management charge levied on all bulk water users.

The costs outlined above do not include the management and operation of the Water Access Licence Register, which is the responsibility of the Department of Land and Property Information (LPI). However, it is our understanding that the Register is operated on a full cost recovery basis so the registration fee can be taken as an indicator of the ongoing cost of Register operation and maintenance.

Queensland

In Queensland, the Department of Natural Resources and Mines (NR&M) is responsible for regulating and managing the water licensing system, including the processing of licence dealings. The cost of undertaking these tasks, in 2003-04, was estimated by NR&M to be approximately \$13 million, out of a total budget for water resource management of \$68 million²¹. At present, there are 7235 tradeable water allocations in Queensland.

NR&M charges fees for licence transfers (summarised in Table 3.1) but these fees do not recover fully all the costs associated with processing transactions. A share of the costs are recovered through water charges but it is not known how the NR&M allocates costs between 'general' water resource management and services specific to processing transactions when determining its fees and charges. Of the \$68 million identified above, approximately 37 per cent is recovered through water charges. It is not known what additional revenue is recovered through licence transaction fees.

The management and operation of the water titles register is undertaken by the Queensland Resource Registry, a business unit within NR&M. As is the case with NSW, the cost of managing registrations is not included in the identified costs of managing the water licensing system (the \$13 million figure).

²⁰ To the extent that these costs represent variable costs, this proposal would result in a significant increase in fees for water traders. However, it is likely that there is a component of fixed costs in the \$11.7 million figure, meaning that some of the fee increase would be offset by the forecast increase in demand for transactions.

²¹ Sourced from a report to the NR&M by ACIL Tasman — Water Management Charges, 2004.

Victoria

The legislative framework governing water allocation and entitlements in Victoria has been in place for somewhat longer than other jurisdictions and has some important differences. A hierarchical entitlement structure exists whereby Bulk Entitlements are defined in volumetric terms and issued to water authorities, which are obliged to supply the subsidiary delivery entitlements held by their customers, and environmental flows. End user entitlements are of two forms:

- water rights, which apply to irrigation schemes; and
- private diversion licences, which apply to regulated streams outside irrigation schemes.

Both these types of entitlements are tradable (subject to approvals). Each water authority is responsible for managing its Bulk Entitlement and thus the trading system within their respective catchment areas. The water authorities are required by law to keep registers of water rights in their districts.

It is difficult to determine the costs incurred by these authorities in managing water trading in their respective areas as this information is not reported. However, some broad estimates can be made. In the case of Goulburn-Murray Water (G-MW), revenue from transaction fees in 2004-05 was approximately \$1.7 million and its budget for general management and administration expenditure was \$8 million, a proportion of which would be dedicated to managing trades²². G-MW supplies about 2 million ML of water to 14,000 properties. It is not known what additional costs are incurred by the Department of Sustainability and Environment in undertaking centralised management and regulatory functions related to water trading.

In 2004 the Victorian Government released a White Paper — Securing Our Water Future — which outlined the Government's reform agenda in water. Among the proposed reforms is the objective to unbundle existing water rights into a water share, a delivery capacity share and a licence to use water on a site. The Government is proposing to spend \$7 million over four years in developing a legal framework for unbundling, building a new water register and connecting the register to authorities' administrative systems.

Factors influencing the scale of transaction costs

A wide range of factors influence the scale of transaction costs incurred in the set-up and ongoing maintenance of water markets. The main factors are:

²² Goulburn-Murray Water — Water Plan 2006-07 – 2007-08 submitted to Essential Services Commission pricing review, October 2005.

- The extent to which water rights are “unbundled” (rights to water use, water access, infrastructure access, rights to losses, rights to discharge to rivers etc.). Unbundling gives rise to some new transaction costs, including the cost of defining the separate rights and developing appropriate regulatory systems. However, there are also some potential cost-savings to be gained from unbundling. For example, in NSW the separation of access rights from use approvals has removed the requirement for public advertising of, and on-ground environmental assessment for, each and every permanent trade (a requirement under the former Water Act 1912). Permanent trades can be achieved by transfer of a water access licence dealing alone, provided the works and use associated with the water do not change²³. Thus, the net impact of unbundling on transaction costs needs to be assessed on a case-by-case basis — and weighed up against the benefits of providing water users with greater flexibility in the way they can access water and infrastructure.
- The complexity of the regulatory approvals process.
 - Complex regulations and trading rules impose high monetary and time costs on both government and market participants.
- The hydrological complexity of the region.
 - for example, the interconnectivity between groundwater and surface water resources, the number of streams that need monitoring and the complexity of environmental issues.
- Whether or not the system is operating at maximum sustainable yield (level of water resource exploitation).
 - In situations where systems are operating at (or above) sustainable yield, the approvals process for must take account of potential supply reliability impacts and environmental externalities — which calls for greater precision in metering and modelling flows.
- Whether or not the delivery infrastructure system is working at full capacity in times of peak demand.
 - where this is the case, the approvals process must take account of potential supply reliability impacts.
- The administrative efficiency of government in processing trades and other dealings.
- The level of competition in the broking services market.
- The size of the market. Economies of scale can be achieved in markets with many participants as fixed costs are spread over a large number of traders.
- The level of taxes charged (stamp duty, capital gains tax, income tax and exit fees).

²³ Personal Communication, 12 March 200, Mark Hamstead, Hamstead Consulting (formerly Manager of Water Reform Unit, NSW Department of Natural Resources).

Potential strategies for reducing transaction costs

There are a number of strategies that could be employed to reduce transaction costs in water markets.

- Increase the range of circumstances in which trades are ‘pre-approved’, circumventing the need for individual assessment each time an application for trade is received. This has already occurred to a large extent with the creation of ‘trading zones’ in most States. An extension of zones across state boundaries, where appropriate, could significantly increase liquidity in water markets.
- Introduce environmental offsets to allow greater flexibility in the approvals process. Use of pre-approved offset ratios, potentially based on impact zones (as opposed to trading zones) in order to facilitate incorporation of differential spatial impacts could account for potential environmental impacts outside of the water trading approval process. This is similar to existing requirements in South Australia with respect to the salinity impacts of water licence transactions but would require use of pre-set transparent offset rates.
- Streamlining of the registration and approvals process. There may be some scope for improving the efficiency of these processes through developing efficiency targets, with appropriate incentives for government agencies to meet the targets. The targets could include time-limits for approvals. Avenues where efficiency gains could be made include:
 - the bundling of concurrent or linked approval processes may be an avenue where efficiency gains could be made; and
 - the outsourcing of registry services and components of the assessment process to the private sector (within a contestable market for provision).
- Removal of stamp duty on permanent trades. Taxes and duties on transactions contribute to ‘market friction’ and therefore steps to reduce or remove these arbitrary taxes would assist in promoting trade.
- Improve information dissemination and accessibility about trading rules, fees and market conditions. Publicly assessable, clear and concise information would encourage increased participation in water markets.
- Improve monitoring technology — in particular technologies that allow remote real-time monitoring of water flows in channel and river systems.
- Increased maturity and ‘depth of market’ in the provision of brokering services, including conveyancing. This could include, for example, public registers of individuals and firms who provide these services.

Chapter 4

Transaction costs of environmental policy instruments

Environmental impacts of water use and trade

Water storage, use and trade can have environmental side-effects. These impacts are classified as ‘externalities’ when the impacts affect the values of a third party (such as the community) — and the impacts are not taken into account in water use decisions due to the absence of property rights for environmental quality. In other words, the impacts are ‘external’ to water use decisions.

Examples of externalities associated with irrigation are:

- irrigation-induced salinity, where application of water to crops and pastures increases the water table and mobilises salt, which then discharges to water ways.
- nutrient, sediment and pollutant runoff from irrigation farms;
- increased water extractions, causing dissolved salts and other pollutants in water ways to increase in concentration; and
- changes in the natural flow of rivers, caused by irrigation infrastructure and summer release of water — which has an impact on the aquatic ecosystem and riparian environment.

Some of these externalities can be exacerbated by water trade, as the transfer of water entitlement from one location to another can trigger environmental impacts.

Market instruments for managing environmental externalities

MBIs have only recently gained prominence in the policy arena as a tool for addressing environmental externalities. In the past, the predominant response by government to managing externalities has been one of prescriptive regulation (for example, permit conditions) or programs that rely on voluntary action by landholders. Until recently, less attention has been focused on promoting change through market signals.

MBIs have the potential to deliver environmental quality targets at lower cost to society than prescriptive regulation because they:

- distribute the cost burden to those individuals with the lowest marginal cost of supplying environmental improvements. This is of particular significance in regions where there is large heterogeneity among water users with respect to their cost of meeting targets.
- promote innovation in developing technologies to deliver the environmental improvements.

There is also the possibility of using these instruments to ‘free up’ the water market as rigid restrictions on trade (for environmental reasons) can be relaxed and replaced with a flexible market instrument. MBIs have the added advantage, over more prescriptive regulations, of promoting transparency in the costs of meeting environmental objectives.

There are numerous MBIs that could be used to ‘internalise’ environmental externalities. At least six different approaches have been proposed to date, some of which are already being piloted. The following is a brief description of these:

- **Market-based reallocation of water.** This policy proposal involves the opening up of the water market to allow public or private acquisition of water entitlement or allocations for environmental purposes (either on a permanent basis, temporary assignment or lease). The intent of the strategy is to enable water rights to be leased or purchased for the purpose of making tactical releases of water to meet specific environmental objectives. Entitlement could be leased back to irrigators at particular times of year (within or across years) when supplementation of environmental flows is not required. If large volumes of water are involved care would need to be taken that water purchased or sold does not unduly impact on markets.
 - Within this framework, there may be scope for private sector conservation enterprises (PSCES) to become players in the market. In some circumstances, PSCES may have sufficient private incentive to purchase environmental water rights (or other environmental rights) if this produces an excludable benefit — for example, the securing of water rights may improve catch rates for a fishing club²⁴. Public non-excludable benefits may ‘piggy-back’ on these actions. Alternatively, PSCES may be able to tap into philanthropic motivations and secure water rights using an appropriate trust fund.
- **Externality pricing.** This involves the levying a charge on water use or pollutant discharge to reflect the marginal environmental cost (in terms of welfare reductions to society) from the externality. As discussed before, externality pricing is already used in some States. There are a number of complexities in designing and applying externality pricing which are comprehensively discussed in a recent Productivity Commission Staff Working Paper²⁵. Not least of these difficulties is setting an appropriate charge in a spatially heterogeneous damage environment and where levying a charge on water use may prove an imperfect proxy for the agent of damage.

²⁴ In the United States, the Oregon Water Trust (a not for profit organisation) purchases water on the market for in-stream flow purposes, primarily for fish habitat. The Trust has negotiated over 50 temporary and permanent transfers since its inception and protected flow in over 450 river miles throughout Oregon. Similar trusts are now being established in other western States.

²⁵ Dwyer, G., Douglas, R., Petersen, D., Chong, J. and Maddern, K. (2006) Irrigation externalities: Pricing and Charges. Productivity Commission Staff Working Paper, March 2006.

- **A system of water savings certification.** This allows irrigators and water suppliers to convert any ‘savings’ to entitlements that can be sold to government, either through a tender process or through an auction. The government could subsequently retire the entitlements so as to secure this water in perpetuity for the environment, or it could lease back the entitlements at certain time of the year when supplementation of environmental flows is not required. A certification system is required because true water savings are limited to reductions in evaporative losses or reductions in seepage to saline aquifers, as all other water ‘losses’ ultimately benefit the environment as return flows.
- **Auctions for environmental services.** This scheme would operate in a similar manner to the water savings certification scheme, except that instead of the government purchasing water savings, the product being purchased would be environmental improvements (or services). As with the certification scheme, a tender or auction mechanism could be used to increase the efficiencies of the purchase (in effect a subsidy).
- **Environmental offset schemes.** These schemes provide a means by which users can offset their ‘on-site’ environmental impacts by investing in beneficial activities ‘off-site’. For example, in the United States ‘wetland mitigation banks’ have been set up to generate offset credits that can be purchased by developers to offset damage caused by the draining and development of wetlands. These schemes operate under the principle that ‘like for like’ replacements, or better, should be sought when offsetting on-site damages.
- **A pollutant credit (or permit) market.** There are two basic variants of a market for water pollutants, each of which are described in box 4.1. In principle, both forms could be established to promote improved environmental quality. For example credit markets could be developed for:
 - managing irrigation induced salinity and other pollutants; and
 - meeting end of valley salt targets, where both irrigators and dryland farmers contribute to the salinity concentrations.

Box 4.1

MARKET TRADING SCHEMES FOR WATER POLLUTANTS

There are two basic variants of market trading schemes for water pollutants:

One is a **cap and trade arrangement**, whereby an aggregate pollutant target is set for industry (say, the irrigation sector) and the shares of this target (permits) are allocated to individual irrigators. Individuals who exceed their allowable level of pollution discharge must buy additional permits or credits to cover their above-quota discharges. Those that discharge below their allowable limit can sell surplus permits. There is scope for efficiency gains in meeting the aggregate target where different individuals face differing marginal costs of abatement.

The other is a **baseline and credit arrangement**, whereby individuals that maintain their discharges below a regulatory baseline are eligible for receiving credits, which can be sold to those individuals whose discharges exceed the baseline. The principal difference between this scheme and a 'cap and trade' arrangement is that in the former, permits to an aggregate cap are not allocated to individuals. This means that the system is open-ended because industry participants can enter the market and cause the aggregate level of discharge to increase. All that is required of the new entrants is that they remain in compliance with the specified baseline, which is usually defined in terms of units of discharge per period of time (or a proxy for discharge reduction such as proportion of farm converted to forestry).

Transaction costs of environmental policy instruments

It is beyond the scope of this study to make a detailed assessment of the transaction costs likely to be associated with each of these MBIs. To do this would require a close examination of specific instruments designed for particular externalities and locations. However, some broad generalisations and comparisons can be made about the nature and scale of costs associated with the six MBIs listed above.

Table 4.4 provides a qualitative assessment of the various types of transaction costs associated with each MBI. A simple scaling system of low, medium and high is used to indicate the relative magnitude of each cost item. Table 4.5 provides a key to the scaling system and gives some examples of what is meant by the rankings low, medium and high.

Table 4.5

GOVERNMENT TRANSACTION COSTS

| Policy instrument | Government transaction costs | | | | | | |
|-------------------------------------|------------------------------|---------------|----------------------|---------------------|------------|-------------|-------------|
| | Community consultation | Policy design | Enabling regulations | Ongoing Maintenance | Monitoring | Enforcement | Policy risk |
| Environmental manager | Medium | Low | Low | Medium to high | Medium | Low | Low |
| Pricing externalities | Medium to high | Medium | Medium | Medium | Medium | Low | Medium |
| Water savings certification | Low | Low | Medium | Medium | High | High | Medium |
| Auctions for environmental services | Medium | High | Medium | Medium to high | High | High | Medium |
| Offset schemes | Medium | Low | Low | Medium | High | High | Medium |
| Credit trading | Medium to high | Medium | Medium | High | High | High | Medium |

Table 4.6

KEY TO QUALITATIVE SCALE - GOVERNMENT COSTS TABLE

| Cost item | Qualitative Scale | | |
|---------------------------------------|--|---|--|
| | Low | Medium | High |
| Community consultation and planning | Policy likely to be uncontroversial and main points of engagement known. Few perceived costs to participant and/or an equitable sharing of costs. | Some controversy in policy. Participant perceptions of costs are unclear and/or there are significant costs to some players. | Highly controversial policy with significant costs perceived by participants and/or an inequitable distribution of costs. |
| Policy design | Much of the design architecture already exists. | Existing information is not in the right form but can be adapted. Little new information needs to be collected. | Substantial amounts of new information needs to be collected to enable the design phase to proceed. |
| Enabling framework and regulations | No new legislation required, little or no new regulations required. Implementation can proceed through existing structures and processes | Templates for legislation and regulations available in other jurisdictions. Some new structures and processes required for implementation. | New legislation and/or regulation required. Structures and processes for implementation must be 'built from scratch'. |
| Ongoing maintenance and certification | Homogenous treatment of landholders – no site visits required. Minimal modelling required. | Heterogeneous treatment of landholders with up to one site visit per annum. Moderate modelling required. | Heterogeneous treatment of landholders with more than one site visit required per annum. Heavy use of modelling. |
| Monitoring | Effective monitoring systems already in place. | New monitoring systems need to be developed at a 'moderate' cost. | New, high cost monitoring systems need to be developed to maintain the integrity of the policy. |
| Enforcement | Self-regulating with little need for enforcement. | Existing mechanisms in place with a well defined, rarely contested set of penalties. | Prosecution requires action through law courts and penalties likely to be regularly contested. |
| Policy risk | Strong science and robust processes in place for sharing risk between government and participants. Low risk of incorrect allocations or perverse incentives. | Proven policy instrument, however application to a new location or issue poses a degree of uncertainty about environmental outcomes and could potentially give rise to compensation claims from participants. | Unproven policy instrument with limited scientific knowledge underpinning the environmental externalities being addressed. |

The main points to be drawn from this assessment are as follows:

- The Environmental Manager option is considered to have relatively low policy design and set-up costs because it utilises existing water markets to reallocate water to the environment. The main transaction costs would be the monitoring of environmental outcomes subsequent to flow releases and the costs of administering the manager's fund.
- Credit trading schemes are likely to have the highest transaction costs due to the challenges of modelling and monitoring diffuse discharge (and establishing appropriate proxies for this where necessary), developing certification schemes to underpin the 'quality' of the credits being traded, and the costs of setting up and operating a credit register.
- Offset schemes could offer a cheaper (albeit less efficient) alternative to credit trading. Monitoring and enforcement costs would still be high but the demand on resources to design the policy and build enabling frameworks would be significantly much lower.
- A water savings certification scheme has some desirable features because it would be readily accepted by the water industry – and thus the community consultation costs incurred by government would be relatively low. Much of the design architecture for certification schemes is well established. However, the cost of monitoring and enforcing the scheme could be relatively high — for example, there would be a need to measure and accredit the reductions in water losses and install a system of ongoing monitoring to ensure that the savings are maintained in perpetuity.
- Auctions and tenders for environmental services are attractive in the sense that they can be targeted to achieve specific environmental outcomes in a short timeframe (where necessary) with a reasonable degree of certainty. Based on experiences with the Bush Tender scheme in Victoria, these types of schemes enjoy a high level of community support. However, policy design costs are considered to be 'high' — as are the costs of monitoring and enforcement. There is also the risk that the schemes motivate outcomes that would have been delivered in any case (the crowding out of private sector contributions through public sector provision is a risk of these policies).
- Externality pricing is a relatively straight-forward policy mechanism compared to the other schemes. Tariffs on water use (or other inputs) are easily implemented and collected. It is therefore regarded to have low enforcement costs. The principal transaction cost item associated with externality pricing is the collection of information for determining an efficient externality charge that will deliver the desired level of environmental improvement. This requires information about the responsiveness of irrigator's to price and the biophysical relationships between irrigation activities and the externalities being targeted.

The challenge of setting environmental targets

As discussed above, the principal aim of MBIs is to promote efficiency gains in achieving a specified environmental target by facilitating the delivery of the target in such a way that the marginal costs of different irrigators/suppliers (in contributing to the target) are equalised. What MBIs cannot do is address the overall efficiency condition of equality between marginal benefits and marginal costs. This is why a target (or say, a cap on the level of salinity) must be specified. Without a regulated target, there would be no financial incentive for irrigators to provide environmental services and no scarcity conditions to drive the market²⁶.

The setting of caps and targets is predominantly the task of government, in consultation with stakeholders. Establishing the marginal benefit of environmental improvements is difficult and requires the collection of information about community preferences and values. This is a costly task, and one that is often overlooked in deliberations about the relative merits of MBIs. Furthermore, targets need adjusting from time to time with changes in community values and changes in the marginal costs of environmental provision (as technology improves etc). In well functioning markets, this type of adjustment takes place in response to information flows between buyers and sellers. In the case of environmental markets, this type of information flow is slow to emerge and costly to generate²⁷.

²⁶ There could be ways to promote participation of private conservation groups in the market but the public good characteristics of environmental benefits, together with a ‘crowding-out’ of the market by government provision of environmental goods, present challenges.

²⁷ Bennett, J (2003) Environmental Values and Water Policy, Australian Geographical Studies, 41(3).

Chapter 5

Conclusion

This study has taken a broad perspective on what is included and defined as a transaction cost. We regard this as appropriate if different policy mechanisms for promoting economic efficiency in rural water use are to be validly compared and assessed.

The study finds that existing water markets in Australia are highly regulated. This is a function of the physical characteristics of water, the externalities associated with supply and use, and a function of the immaturity of the water market. It is only in recent years that water rights have been unbundled and there is still some way to go in the reform process.

The cost of developing and operating water markets is high — as exemplified by the experience of NSW which has an ongoing expenditure of approximately \$17 million per annum in operating its trading system.

Environmental concerns relating to water storage and use have prompted the designers of water markets to develop trading rules that either increase the transaction costs in the market or restrict certain trades from occurring. These measures could be giving rise to substantial opportunity costs in circumstances where economically beneficial trades are prevented from occurring or are impeded.

For this reason, there are potentially high payoffs from exploring policy instruments that achieve environmental objectives, whilst at the same time providing water users greater flexibility to trade. MBIs also offer the potential for exploiting inter-farm differences in the marginal costs of providing environmental goods and services.

The six MBIs examined in this report represent either incremental modifications to existing rights-based systems (for example, the Environmental Manager and Water Savings Certification schemes) or new systems that require extensive design and planning before they can be implemented. The schemes also differ from one another in the extent to which they deliver environmental outcomes through reallocations of water (to the environment) as opposed to targeting specific environmental pollutants or damage (for example, salinity and nutrients).

This study has not attempted to put forward ‘best bet’ options for managing externalities, as this would require a comprehensive assessment of all features of a scheme and the relevant problem being addressed – not just transaction costs. However, we have provided some broad transaction cost criteria that can be used to compare the various MBIs and we have undertaken a preliminary assessment of how the different policies rank against these criteria.