



# Market-Based Instruments for Water Demand Management II: Water Markets

## Highlights

- Water markets seek to use the incentives provided by market setting to allocate water more efficiently and foster water use efficiency.
- Market design, implementation, and transaction costs can limit trading and anticipated efficiency gains.
- The environmental and social effects of water markets are not well documented.
- Achieving social and environmental benefits requires appropriate regulation, which constrains market operations.

## Background

While regulation has often led to improvements, it is expected that market-based instruments (MBIs) can bring similar or better results at lower cost by harnessing market forces, rewarding continuous improvement, and stimulating technological development.

During the past century, with increasing scarcity, governments have limited access to resources through licensing systems, defining who can use them under what conditions. In the face of continuing resource depletion, the introduction of markets has sometimes been proposed and implemented to foster a more efficient and sustainable use. Markets also offer a non-political means to solve conflicts over access resources.

In theory, in a perfectly competitive market, willing buyers and sellers could meet to exchange water or water rights, and an equilibrium price would be found, reflective of all the values put on water. Thus water markets would ensure that the right to access and use water goes to those who value it the most, and would consequently go to the highest value uses. Implementing markets could, in principle, reduce state intervention, in particular the need to determine who can access water. However, the state still has to intervene, for example to determine the total amount of water that can be traded, or to organize trading to ensure environmental or other social goals are met. The implementation of markets may, in fact, be better described as transforming the regulatory functions of the state.

Markets are often built over existing resource management frameworks, and therefore may co-exist with other institutional arrangements, and associated property rights systems. There are basically two other types of such arrangements: community-based management (associated with common property of a resource) and state-controlled (e.g., through licensing), the latter now largely dominating in industrialized societies. The recent policy movement toward integrated water resource management (IWRM) at the watershed level, however, has close links with the principles of community-based management.

This note examines the use of trading mechanisms (“water markets”) to foster sustainable water use. A companion briefing note, *Market-Based Instruments for Water Demand Management I: Prices and Taxes*, examines the role of pricing and taxes for water demand management.

### Water Markets, Property Rights and Constraints to Trading

Water markets are easier to implement with clear but detailed definitions of property rights to reduce the risks perceived by water users. However, achieving this can be cumbersome. In the Rio Grande Basin of Texas, it took 15 years to clarify pre-existing water rights. In addition, the mobility, volatility, and variable (changeable) quality of water makes it difficult to define and regulate as private property.

In practice, there are always some limits – that can be more or less severe – to the security of title provided to water rights holders. An important constraint to water trading is the need for governments to keep open the option of intervening to ensure environmental objectives, among other public goals, are met. The challenge is to make such interventions predictable to reduce risks and uncertainty for users.

An important political barrier to implementing markets is the fear that they will lead to the commodification of water (water becomes a tradable commodity as opposed to an essential service, or right), making it accessible to whoever can pay for it, including through importations, irrespective of other social and environmental goals.

### Transaction and Institution Costs

Most economic and other benefits accruing to the adoption of markets suppose low transaction costs. Proposals to introduce markets in resource rights often do not account for the costs of transition to a new administrative system. However, all these costs can be high, and specific strategies have to be designed to lower them. These costs can include:

- modifying the system of rights;
- mechanisms and information to facilitate trade;
- third-party and environmental effects, for example, the consequences of introducing water markets on source communities (where the water is coming from), on downstream users, or on changes in in-stream flows (the quantity of water that flows in a water course);
- creating the capacity and changing the role of officials to introduce and administer a new policy instrument in the absence of prior experience; and
- regulatory oversight, monitoring, and enforcement (trading requires measurement and continuous monitoring to ensure precise knowledge of the quantity of water traded, and of its effects).

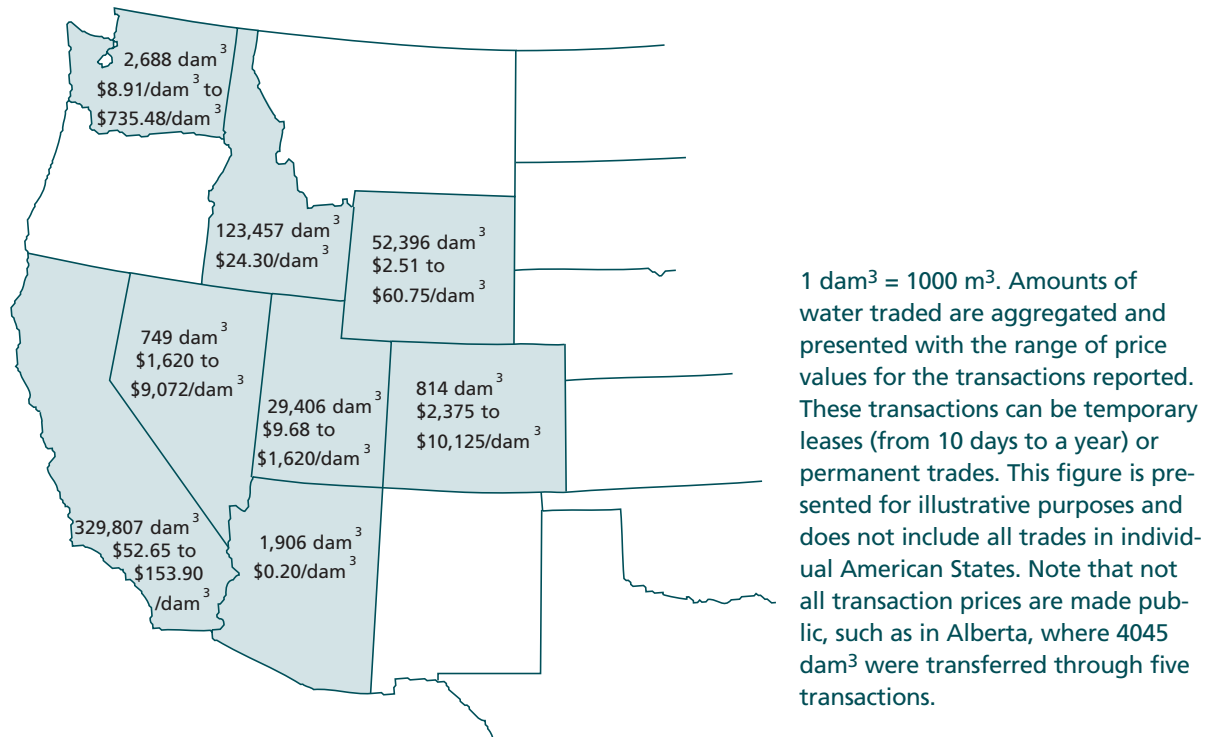
Given the potential importance of such costs, markets may become more attractive with increasing scarcity.

### Water Markets in Practice

Water markets have developed in areas of high water scarcity such as Chile, Australia, the western United States and southern Alberta, where rights to access the resource exceed its availability. The overall importance of market exchanges is variable. In Chile, they are the main allocation tool while in California, they represent from three to six percent of total water supply. It may be obvious, but still worth noting, that markets can only develop where there is infrastructure to allow water to circulate.

The older water markets were first implemented in 1981, in Chile, when changes to the water code were adopted. They are also the least regulated, where most water management decisions, including creating a local market, are made by individual water rights owners and private associations of irrigators. Recent analyses suggest that a number of issues still have to be resolved, including dealing with externalities, and

Water Trades in Some American States, 2003-2004



Source: Water Strategist. Analysis of Water Marketing, Finance, Legislation and Litigation. September and November 2004.

a better definition of water rights. These explain why, in practice, trading is still limited in many regions of the country. In addition, markets have not had the effect of increasing efficient water use in agriculture. The social effects of Chilean markets also need more study.

In California, trades occur mostly between water agencies, often on a temporary basis. Some main features of the evolution of this market from 1990 to now include the central role of state institutions in putting a water market to work, the water access flexibility markets can provide in periods of shortage, and significant remaining points of conflict. These include the social implications for source communities (i.e., where the water can be imported from); the need for conjunctive management of surface and ground water; and maintaining funding to ensure allocation of water for the environment.

In Texas, where a market started in 1986, design is rather simple, with minimal regulatory constraints on trades. It has had the intended effect of allowing more efficient water allocation, but has not contributed to a reduction in water use in the agriculture or municipal sectors. In fact, a water market can provide a substitute for water conservation for the individual user since the risk of water shortage can be addressed through buying water instead of investing in more efficient technologies. From a social perspective, it appears that smaller farmers and less well-off municipalities are disadvantaged.

When first implemented, water markets in Australia led to economic, social, and environmental problems because the licensing systems were not designed for them. As a result, the country began exploring and implementing new reforms to make markets more viable. These include the separation of entitlement and allocation systems. In addition, licence conditions will address environmental issues, such as salinity.

While the Australian water trading approach has had positive effects on the environment and communities, these are in great part due to appropriate regulation. For example, to be involved in trading, farmers have to show that they have adopted water efficiency practices. This being said, there are emerging social issues, such as the difficult position of smaller family farms and the effect on some source communities of large water transfers. These substantially reduce economic activity in these areas.

In Alberta, the transfer of an allocation under a licence has recently been authorized, allowing entry of new water users where water is fully allocated. Transfers can be made on either a permanent or temporary basis, with government approval, which can be obtained only when an approved management plan is in place. The Alberta government has the right to withhold 10 percent of the water transferred for environmental needs. Since 2002, five transfers have occurred in the South Saskatchewan River Basin.

### Conclusion

Water markets have been analyzed mostly for their economic effects. Reviews indicate that properly designed water markets can be a means to allocate water more efficiently. They can generate new, more profitable uses of water. Most trades occur within the agriculture sector, or between the agriculture and urban sectors.

However, the above examples also show that water traded in markets may not be used more efficiently. In addition, potential negative social effects of markets have to be taken into account. The Australian example nevertheless suggests that in regions of high water scarcity, markets can have social and environmental benefits to the extent that they are constrained by appropriate regulation.

More analysis is needed to better understand transition costs from existing management regimes to trading, the environmental and social effects of existing water trading experiences, and the more successful approaches taken to address these issues.

### Further Reading

Ait Ouyahia, M., B. Cantin, and I. Campbell. 2005. *Economic Instruments for Water Demand Management in an Integrated Water Resources Management Framework*. Policy Research Initiative Report: Ottawa.

*Canadian Water Resources Journal*. Forthcoming, Spring 2005. Special Issue on Economic Instruments for Water Demand Management.

*Water Resources Research*. August 2004. Special Issue on Water Markets.