

## Tradable Property Rights to Water

### How to improve water use and resolve water conflicts

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In most countries, water is still regarded as public property. Public officials decide who gets it, at what price, and how it is used. The government also takes responsibility for building and operating the necessary hydraulic infrastructure for water delivery. The track record of such administered systems of water allocation has not been impressive. Despite growing water scarcity and the high costs of hydraulic infrastructure, water is typically underpriced and used wastefully, the infrastructure is frequently poorly conceived, built, and operated, and delivery is often unreliable. Water quality has not been well maintained, and waterlogging and salinity have not been properly controlled. These systems also have tended to favor the relatively wealthy. Wealthier farmers manage to get easier access to water rights, which are usually obtained without charge and for whose use farmers pay only a small fraction of the cost of building and operating the associated irrigation infrastructure. Similarly, while the better-off residents in many cities in developing countries enjoy access to cheap, municipally supplied water, many of the poor in the same cities must resort to very expensive private water truckers to meet their daily needs.

Recent government efforts to improve the management of water resources

have moved away from building hydraulic infrastructure to strengthening institutions, improving pricing policies, and handing management down to water associations and communities. This approach has worked well when public funds have been available, when institutions have been strong and effective, and when there has been close cooperation among water users. But as public finances become more strained and conflicts among users grow, the chances of this approach being successful grow slimmer.

Instead, governments should establish mechanisms that provide better incentives for people to use water efficiently. One way to do so is to charge a price for water that reflects its true scarcity. But this is difficult to do in practice, especially for irrigation water, which accounts for the bulk of water use. Irrigation water charges are typically well below the cost of obtaining additional water (its long-run marginal cost) and often below the cost of operating and maintaining the irrigation infrastructure. Raising water charges to the long-run marginal cost would result in prices that would bankrupt many farmers—an option that is usually politically and socially unacceptable. A more realistic way to bring about efficient use is to allow water trading. Some water-



### **Water markets at work**

Poor public sector allocation of water has led some water users in developing countries to buy and sell water commercially, which helps resolve water shortages and improve the productivity of water. Most of the water trading has taken place between farmers. A 1990 survey of surface water systems in Pakistan found active trading for irrigation water in 70 percent of the watercourses studied. In India, an estimated one-half of the area irrigated by tubewells belongs to farmers who buy water. In the Maghreb countries, private arrangements for trading water exist among farmers, even though it is illegal. But such transactions have been limited to spot sales of water or to the sale (lease) of water for a single year rather than to permanent sales of water rights. The difficulty in enforcing contracts in such a market has tended to confine the transactions to users in the same sector, often neighboring farmers. The lack of secure, long-term access to water under such a system discourages investment in activities that require access to large quantities of water. Thus, such water markets realize only a small part of the potential gains from trade.

To allow water users to secure water on a permanent basis, and to facilitate water leasing, some countries have begun to pass legislation to permit tradable property rights to water:

- Under Chile's 1981 water law, the state grants existing water users (farmers, industrial firms, water and power utilities) property rights to water without charge. It auctions new water rights. Subject to certain regulations, these rights can then be sold to anyone for any purpose at freely negotiated prices. They may also be used as loan collateral.
- In recent years, Mexico and several states in Australia have established property rights to water, though they have initially placed substantial restrictions on inter-sectoral trading.
- In the Northern Colorado Water Conservancy District in the United States, water brokers assist in millions of dollars of water trades annually and commercial bankers routinely accept water rights as loan collateral.
- Peru's 1993 constitution treats land and water resources equivalently, and thus permits tradable property rights to water. A draft water law proposes that these rights can be traded, leased, or used as collateral. Property titles would be given free of charge to those who already hold water rights either implicitly by custom or explicitly through licenses and permits. Rights for presently unused water would be auctioned subject to protections that ensure that the availability of water to others is not reduced, that there is enough water to maintain a minimum ecological flow, and that people in neighboring towns retain their accustomed access.

scarce countries have adopted this alternative, permitting informal sales of water for a season or permanent sales of property rights to water (see box).

### **Advantages of tradable property rights to water**

#### ***Improved productivity of water***

Tradable water property rights endow water with an implicit value or "opportunity cost." That creates a built-in incentive to conserve water and to put it to the most productive use. For example, if farmers were able to sell their water rights at freely negotiated prices, some might choose to generate extra income by selling any surplus rights to a neighboring city where the water has a higher value.<sup>1</sup> Often they can generate a surplus by using more efficient irrigation techniques or by switching to less water-intensive crops. Thus, a tradable water property rights system can lead to voluntary conservation and increases in the productivity of water without having to increase water charges. In fact, in Chile, water charges *fell* following the introduction of the tradable water rights regime. The fall occurred because this regime facilitated the transfer to user groups of the responsibility for carrying out operations and maintenance (O&M) activities and for setting water charges and because users were able to carry out O&M activities at a much lower cost than the government. Despite the lower water charges, the opportunity to sell water ensures that scarce water is not used wastefully.

#### ***Sound investment***

Tradable water rights can help shift water to higher-value uses in a way that is cheaper and fairer than some of the present alternatives. These alternatives include building expensive new hydraulic infrastructure, confiscating water from farmers, or substantially raising water charges to force farmers to conserve water and to free up water for higher-value uses, such as for "raw" city water. Although the conveyance infrastructure to transfer traded water must already exist or be built, the cost of building it is often less than that of developing new sources of water. Thus, the city of La Serena in Chile was able to meet its rapidly growing demand for water by purchasing excess water rights from farmers at a lower cost than the alternative of contributing to the construction of

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the proposed Puclara dam. (The construction of the dam has now been postponed indefinitely.) Farmers got a good price for their water and faced incentives to use more efficient irrigation techniques. Better incentives to conserve water also help control soil salinity, which is caused primarily by overwatering. Therefore, by creating tradable water rights, Chile was able not only to avoid the water conflicts that often arise when governments confiscate water from farmers and divert it to urban domestic consumption, but also to avoid the environmental costs associated with new dam construction and soil salinity.

Farmers also benefit from having more secure water rights and an asset that can be used as collateral for lower-interest loans. Secure water rights are particularly beneficial for small farmers, who have been most vulnerable to reductions in their water allocation over time and who have few other sources of collateral. And because of their divisibility, water rights give large farmers the possibility of mortgaging only part of their water rights for small loans, rather than their entire land and water holdings.

### ***Increased investment and growth***

In addition to stimulating growth directly by improving the productivity of water, tradable property rights to water will encourage investment and growth in activities that require assured supplies of large quantities of water. The existence of such rights assures investors that their water rights will not be subordinated to those of other users during times of shortage and that, in fact, they will be able to buy water from those with a less valuable use for it. Thus, Chile's 1981 water code allowed investment in fruit production to proceed rapidly, and helped make Chile a major fruit exporter.

Tradable rights should also stimulate private investment in new hydraulic projects. The secure rights will give potential investors the confidence that, once they obtain the rights to the water generated by their investment (for example, storage reservoirs and conveyance infrastructure), it will be theirs to keep or to sell to others (farmers, industry, hydropower and water companies). Secure rights to water could also attract private investment to large public hydraulic projects

under construction, enabling them to be completed faster and more cheaply. Public projects tend to run into enormous delays and cost overruns because governments run out of money and because there is less incentive than in private projects to control costs. If a government wanted to privatize an ongoing project, it could do so by selling the hydraulic infrastructure and unallocated water and land rights associated with the project, but with the condition that the buyer respect existing land and water rights.

### **Creating tradable rights**

Water has several unique characteristics that present special challenges for policymakers designing a framework for a well-functioning market in water rights. The issues relate to defining water rights when water flows are variable, measuring water, enforcing contracts, building the necessary infrastructure to transport water, minimizing damage to third parties, protecting against environmental degradation, and avoiding monopolistic pricing practices. Finally, a market for water rights will not lead to adequate investment in some potentially high-return activities (flood control, drainage, prevention of soil erosion, siltation reduction) that by their nature are not profitable for a private investor.

Most of these market imperfections and the policy issues they raise are not peculiar to a water system based on tradable rights. All water systems must deal with them. Water rights need to be assigned and enforced even under an administered system, and the conveyance infrastructure still must be built. But a market system increases the value of water, so there is more incentive to clearly define water rights, to improve measurement and enforcement, and to establish an efficient mechanism to resolve disputes. Similarly, the same environmental laws and institutions needed to enforce environmental quality under an administered regime can operate under a tradable water rights regime. Moreover, water user associations, which can play a useful role under either an administered allocation system or a water market regime, are more likely to be established or strengthened if water rights are well defined and transferable.

Market imperfections can best be addressed by appropriately formulated laws, regulations, and taxes.

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For example, difficulties in defining water rights in the face of variable water supply can be handled by defining water rights as a percentage of stream flow (as in Chile) or by specifying different classes of rights (as in Colorado).<sup>2</sup> Similarly, defining water rights suitably or implementing appropriate legislation can help reduce negative hydrological effects on third parties that could occur when water is transferred to other activities.<sup>3</sup>

For the most part, there is little danger of widespread monopolies in consumptive water rights. Monopolies could occur, however, following privatization of hydraulic projects with large amounts of unallocated water rights or in nonconsumptive water rights for hydropower. To avoid this risk, countries should develop an appropriate regulatory framework before privatizing any large hydraulic infrastructure, introduce a tax on water rights holdings while simultaneously removing any land tax surcharges on irrigated land, and establish regulations determining power tariffs.

How the initial property rights to water are allocated is crucial to the acceptance and success of a water market. The approach will vary according to country. Where there is already a well-functioning registry of water rights, it is sufficient to simply reregister the rights in a newly created property rights register. Where the existing registry contains many overlapping property rights (the sum of water rights exceeds the water available), however, it would be better to base the initial allocation on past usage. Where there are gross abuses of water rights, it is probably best to assign rights on the basis of need or with a reasonable upper limit on irrigation water per hectare. In all cases, it is important to ensure that the rights of the poor are respected.

## Conclusion

Under a tradable water rights system, the public sector's role in the construction, operation, and

maintenance of hydraulic infrastructure can be reduced to financing selected high-return activities with strong positive externalities or public goods characteristics. The market—not the government—will determine the allocation and pattern of water use and the prices charged for water rights. Water user associations will determine water charges for operations and maintenance. But there is an important role for government in formulating laws and regulations to establish tradable property rights to water. The design and implementation of this legislation should pay particular attention to the initial allocation of water rights, dispute resolution mechanisms, creation and maintenance of a water rights registry, and the minimizing of negative hydrological third-party effects. Public authorities also will need to design and enforce environmental laws.

This approach has the potential to increase the productivity of water use, improve operations and maintenance, stimulate private investment and economic growth, reduce water conflicts, rationalize ongoing and future irrigation development, and free up government resources for activities that have a public good content or positive externalities. And it is likely to especially benefit the poor and to help conserve natural resources.

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<sup>1</sup> The price of property rights to water has little relation to the water charges or tariffs for operation and maintenance activities. To use an analogy from the condominium market, one can think of the price of water rights as the purchase price for the apartment and the water tariff as the condominium fee.

<sup>2</sup> To learn more about these and related issues, see Mark Rosegrant and Hans Binswanger, "Markets in Tradable Water Rights: Potential for Efficiency Gains in Developing-Country Irrigation," *World Development* 22, no. 11 (1994).

<sup>3</sup> For a discussion of third-party effects and various solutions, see World Bank, "Peru: A User-Based Approach to Water Management and Irrigation Development," Report No. 13642 PE (World Bank, Latin America and the Caribbean Country Department III, Washington, D.C., 1995). The paper discusses many of the issues in this Note in greater detail.

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