
Are “Water Markets” a Viable Option?

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A *S DEVELOPING countries look for the best way to allocate scarce water supplies, many economists and environmentalists are advocating “water markets.” The good news is that the prerequisites needed for a viable water market are the same as those needed for good water management.*

Throughout history, one of the major determinants of successful societies has been their ability to provide a safe and reliable supply of water for their members. Techniques to do so have continually evolved since the inception of irrigation in Mesopotamia.

Recently, many economists and environmentalists have touted “water markets” as the most promising tool for use in water management. These markets involve the annual or permanent transfer of the water use rights between a willing buyer and a willing seller in exchange for compensation determined by supply and demand, the cost of mobility (i.e., the cost of building additional infrastructure), the reliability of the supply, and the cost of mitigating any environmental and third-party effects. This transfer value should not be confused with the price or tariff paid annually for the use of the water—a rate that should reflect the full recovery of the pro rata costs of administration, operation, maintenance and capital recovery. This rate, set on an escalating scale, has also been used as a disincentive for waste and inefficient use.

For economists, water markets represent the most efficient way to allocate a scarce resource, while for environmentalists, the markets appear to be a way to stave off building more dams and reservoirs. However, many engineers and sociologists view such markets with suspicion. For them, these markets are regarded as a path toward monopolistic control of a vital resource and misallocation between the “haves” and the “have-nots.”

At this stage, developed countries—particularly the United States—have had considerable success with water markets, whereas developing countries are just beginning to move in this direction. The results so far are quite mixed, with some water markets working much better than others. The question is to what extent the successes can be duplicated in different cultural and geographic settings. The answer lies in developing good water-management practices and in creating transferable water use rights. From this foundation, water markets will emerge where they make sense.

Advantages of water markets

Governments can opt to transfer water supplies in many ways, ranging from expropriation (with or without compensation), reallocation through directive, or reallocation through a market-based incentive system. What does the last option have to offer? The advantages of water markets include:

Increased efficiency. Experience has shown that users (i.e., the owners) of the water use rights are fully capable of making sound business decisions regarding their own assets. Those who make bad decisions fail economically and are replaced by others. Water markets provide these stakeholders with the ability to control decision making and the opportunity to derive financial benefits. This encourages an efficient use of the resources as owners are faced with the alternative of developing ways to use water more effectively in order to derive financial gain through the sale of the surplus. Owners can also profit from

these gains to purchase the technology and assets necessary to improve efficiency. For example, a farmer might sell a part of his inefficiently used flood irrigation supply and, with the proceeds, buy a sprinkler system that allows more timely and complete irrigation with resultant increases in yield. This market process provides a voluntary method for the evolution of scarce water supplies to their highest and best use.

Delay of new infrastructure. Because water markets encourage the most efficient use of existing supplies, they tend to delay the time when resources must be spent to develop new supplies. They should not, however, be viewed as a substitute for all infrastructure development because most major transfers require additional transportation and storage systems. For example, agricultural water diverted during stream runoff periods for use during the growing season could be used for municipal purposes but would require the construction of sufficient storage facilities to make it available year-round. New conduits may also be needed to deliver the supplies to their end users. These costs, along with any other direct economic costs, should be reflected in the value of the water use right.

Removal of political favoritism. In areas where water is reallocated by governmental decree, politicians and bureaucrats are pressured to allocate water supplies based upon political influence. The political system is asked to make complex resource allocation decisions outside of its traditional role of setting policies and enacting legislation. A market system removes this responsibility from the political arena and places it with the owners of the water use rights.

Given all of the above advantages, it is not surprising that water markets have sprung up in developed countries wherever water rights are legally transferable. This has primarily occurred in the United States.

Several developing countries have moved or are contemplating moving in the direction of

market-based reallocation systems. In some places, informal water markets have existed for decades, despite the fact that they were not legally sanctioned (e.g., in parts of Algeria, India, Morocco, Pakistan, and Tunisia). In the southern part of the State of Ceara, Brazil, a functioning system of water use rights and market-based transfer of those rights has been in existence since before 1900. In northern India, a very active market-based system for transferring water derived from privately owned tube wells has developed informally.

Of the newer systems, Chile's water market is the most active, despite some initial allocation problems (e.g., the initial public auction of surplus undeveloped supplies has concentrated the control of future supplies in the hands of a few). Mexico has now adopted a system that should eventually permit the allocation and transferability of rights between individuals, water user associations, and irrigation districts. Brazil is exploring the water market option (e.g., in the State of Ceara in the northeast) although there is not yet universal acceptance of the concept of definable and transferable water rights. Peru recently modified its constitution to allow the allocation of water rights and the transferability between users and is now working on a new water law to implement these constitutional provisions.

Prerequisites for success

If water markets offer so many advantages, why are they not used universally? The reason is that a successful market relies upon certain prerequisite conditions that may be difficult for a given country to meet for political, economic, or cultural reasons. Without these conditions, a functioning market cannot succeed. The conditions are:

A definable right. There must be a defined property right to the use of a certain amount of water—there is not a market for sunshine because it cannot be defined, controlled, and traded. In almost all nations, the actual ownership of water resources is held in trust by either the nation or the state, but the right of use is granted in a variety of forms. These include perpetual concessions, permits, licenses, contractual rights, and outright ownership. The right must be measurable in precisely defined terms and be easily measured in the field using practical methods easily understood by the user.



In the western United States, water rights often take the form of shares of stock in user-financed companies that developed water supplies with private capital during the late 1800s and early 1900s. All water constitutionally belongs to the states, but the right to use it is a property right vested in the user through an allocation process. This "right of use" can then be traded within the marketplace, with varying degrees of regulatory control.

Greater demand than supply. Demand is created by the product's desirability as well as its scarcity, which can come about through any limitation of the supply (i.e., location, timing, drought, or unusable water quality). Most successful water markets have developed in semiarid areas, where scarcity creates competing demands.

Product availability. Society needs water on a continuous basis, but water occurs at the whims of nature. As a result, it must be con-

served through storage, just as fruit must be stored in refrigerated warehouses after the harvest. In some areas, nature has provided storage through snowpack or groundwater, but in most instances, the storage must be developed and managed. Once man has exercised dominion over water, it becomes a product that can be traded within a market-based system.

Societal acceptance. Society must accept the concept of the free transfer of water use rights through a market system, or the market will be doomed to excessive regulation and possible extinction. This area touches on societal perceptions and cultural traditions; it can even involve religious beliefs.

In some societies, where water is considered a gift from God, the idea of its use being traded as an article of commerce has yet to be accepted. What is actually being traded, however, is the right to the use of the infrastructure that stores and delivers the water. For most societies where water is scarce, there is a growing recognition that some method of inventory, allocation, and measurement is necessary to assure equitable distribution. For example, the lack of defined water use rights in the State of Ceara, Brazil, has resulted in the concentration of the use with those who have the location and the resources to divert the water—those located downstream receive what is left, if any. Recent efforts, however, have been directed at creating equity

through establishing defined water use rights as property rights and an administrative system to enforce those rights.

A good administrative and regulatory structure. A system of administration must be put in place to assure both the buyer and the seller that their respective rights will be honored and enforced. This involves keeping an accurate registry of the rights and their ownership, as well as an accounting system that ensures that users receive the proportional share to which they are entitled. Until such a system is established and confidence in its reliability, fairness, and equity develops, a market-based transfer program cannot function satisfactorily. In northern India, for example, the lack of a defined allocation and administration system is resulting in the overuse of the aquifers—beyond their safe-yield capacity—thus placing the resource in danger of being depleted. A determination of

the safe yield of the aquifers and an allocation of pumping rights would help to assure the sustainability of the supply.

Sufficient mobility. There must be either an adequate infrastructure to transport the water supplies to the buyer or the economic and technical ability to construct one. In the São Francisco River Basin of Brazil, for example, a water use right has little value to states located outside the basin unless a transportation system is developed to carry the water to the place where it is needed. The value of the right must be discounted by the amount that it would cost to build the needed canals, pumping plants, and reservoirs.

A fair and equitable initial allocation system. A fair and equitable system of initial allocation of the use of water must be implemented, recognizing historical uses but not rewarding waste. This requires careful evaluation of the parameters of use. These parameters must include the consideration of societal needs such as environmental concerns, subsistence needs, and historical use, as well as the reliability of the annually available water supplies. While the use of a public auction for initial allocation has been advocated by some, its use in actual practice has resulted in large blocks of water going to economically strong entities who have no reasonably foreseeable beneficial use. This can result in monopolistic control over future development and use of the supplies. A high tax on the non-use of an allocation is touted as a solution, but it would unfairly penalize those who can demonstrate a justifiable and foreseeable future need for the supply.

In the initial allocation scheme of a newly developed water use rights system, proper allowance should be made for the water needed to maintain reasonable aquatic and riparian habitats. Where an initial allocation for environmental purposes is not possible because long-standing historic uses and entitlements have pre-empted the total supply, the water market provides a means by which environmental advocates can enter the marketplace and acquire the water to enhance the environmental quality of the stream. Where new water projects are proposed, water markets allow the cost of environmental mitigation to be reflected in the value of the water use rights.

A fair reallocation system. There must be an equitable system of transferring water rights that enables the reallocation of rights to different uses as needs change. The Colorado-Big Thompson Project, which allows the transfer of rights on both a temporary rental basis and on a permanent transfer basis, is a model project in this regard. Users can adjust every year to meet annually variable needs,

and rights can also be permanently transferred to meet the changing needs of growing cities, industries, and agriculture using the market system. The only regulatory controls required are that the title transfer be registered and that the need for the water be demonstrated.

Potential problems

Even with all of these conditions in place, however, some degree of government intervention may be needed to prevent abuse.

Speculation and monopolies. Care must be taken to prevent the wholesale acquisition of available supplies without a demonstration of present or reasonably foreseeable need. Even the stock and commodities exchange markets penalize the development of monopolistic positions. Various methods have been used to deal with this issue, rang-



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ing from regulatory controls over the market transfer to a prohibitively high tax for holding a right without developing it within a reasonable time. Once the market transfer system has been in place for a while, the value of the water use right becomes well known and the opportunity for abuse or manipulation decreases. However, every effort must be made initially to provide education and full information to the owner so that the seller is just as well informed as the buyer.

Subsistence user. The question of allowing the transfer or sale of water rights used for subsistence must be dealt with or it could result in social costs over the longer term—that is, those who have sold the rights during good water years will fall back on the social system for support during the drought years. One possible solution to this problem would be to limit the transfer of subsistence level water use rights by attaching them to the land necessary for subsistence farming. The real answer to this problem, however, lies in

the education of the user as to the real market value of the asset.

Third-party impact. Perhaps the toughest problem facing administrators is the objective consideration of the effects of water transfers on third parties. This situation typically occurs when the transfer involves removing the supply from its basin of origin or drying up one area to provide a supply to a different area. However, these same concerns must be addressed even when such transfers occur through governmental decision, and it may be easier to address them in a market-based transfer system because transaction costs should reflect the real cost of compensation to the area of origin.

In California's Imperial Valley, the loss of water to saline groundwater is being decreased by canal lining, with municipal users bearing the cost. Agricultural users are not losing any net supplies but instead are receiving system improvements and cash payments in exchange for the municipal users' receiving the salvaged water. This type of agreement works only where the salvaged water would otherwise be lost to beneficial use, but even in this case, the question has arisen as to how this approach affects the water supply in Mexico.

In practice, equitable water reallocation is frequently controlled through regulatory or judicial means, or, in the interest of expediency, ignored. Those with the most political power or the most financial means generally succeed in obtaining the necessary water allocation. In the olden days in the western United States, it was said that the best water right was to be upstream on the river with a shovel in one hand and a shotgun in the other. The market system provides an alternative to these methods.

Conclusion

As water shortages grow worldwide, interest in water markets as a mechanism for increasing the efficiency of water use will also grow. More experience with them is needed, especially in diverse cultures and geographic regions. But regardless of whether a water market is planned or just evolves, good water resource management calls for (1) a system of water use rights to allocate the resource, (2) a system of administration to ensure the integrity of the water rights, (3) a good infrastructure system to capture, store, and distribute the resource, and (4) an efficient institutional system to manage, operate, and maintain the entire process. If these prerequisites are in place—with water rights clearly transferable—a market-based system for their transfer will inevitably evolve. ■