

Efficiently Allocating Scarce Water Supplies:  
An Economic Perspective and the Role of Water Markets

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**Extended Abstract**

With rising populations and increasing demands on food production, the efficient management of water resources is an issue that will continue to grow in importance. This is especially true in areas in which two or more competing regions share a common water resource. Such shared resources can be in the forms of aquifers, lakes, or most commonly, river basins. Since the 1970s, supply augmentation strategies to meet increasing water needs have diminished, and policy makers have increasingly focused on demand management alternatives, including voluntary water transfers to efficiently allocate limited water supplies among competing uses. Water demands have also changed as expanding urban growth, changes in agriculture, and increasing concern for the environment compete for water.

It is frequently said that the problem of water is not one of physical shortage but rather, one of governance. This statement is partly but not entirely correct. While physical shortages frequently arise when supply is inadequate to satisfy all potential water demands within a specific sub-region at a period of time, there is often an abundance of water overall within the region. In this situation, the solution is one of matching demand with supply, of ensuring that there is water at the right location, and the right time of year, and at a cost that people can afford and are willing to pay for. However, if it is impossible to manage the water supply through reservoir storage, conjunctive management, and/or delivery systems to satisfy total demand then a real physical shortage exists. In this situation, economic efficiency dictates that the scarce water resource should be allocated to its highest valued economic uses. By allowing the water resource to flow to its highest valued use through a market transfer, the market place will assure that the water resource is efficiently used. When a market is working efficiently the last unit of water will be allocated to that use where the marginal net benefit (economic return) to society is greatest.

Economists generally view fixed proportional water allocation schemes, be they for a regional, municipal are, industrial use, and/or environmental protection as inefficient because such allocation schemes generally fail to allocate water to its highest social use on the margin. Water trading based on transferable water rights has been advanced as a solution to this problem. Trading helps equalize the marginal prices faced by various water users, thereby providing information about the value of water in alternative uses and creating economic incentives that lead to efficient allocations. The socially efficient price (marginal value) maximizes the net economic return to the water resource because scarce water supplies are allocated to those uses and/or individuals that have the highest net

economic value for the water resource. Moreover, an efficient market exchange increases the economic welfare of both the buyer and seller.

It is important to emphasize that the price most users pay for water reflects its acquisition cost and not its scarcity value, or net marginal economic value. Water users generally pay only for the capital and operating costs of the water supply infrastructure and there generally is no charge for the water per se. Water is owned by the state, and the right to use it is given away for free. In places where water is cheap, this is almost always because the infrastructure is inexpensive, or the water is being subsidized, rather than because water is abundant. Thus water acquisition cost, or supply cost, is often much less than the economic value the water provides in use.

It is also important to distinguish between *marginal value (or cost)*, *average value (or cost)*, and *total value (or cost)*. The marginal value measures the change in total value, or total cost, associated with a unit change in water use, whereas the average value (or cost) is average over total water use. Total value (or cost) is total water use multiplied by average value (or cost). There is only one case where the average and marginal measures are the same. When marginal value (or marginal cost) is constant as quantity changes, then marginal value (or cost) coincides with average value (or cost). In general, marginal value and marginal cost are *not* likely to be constant, and marginal value generally declines with quantity. The difference between marginal value and marginal cost of using an additional unit of water in a specific use is the marginal net value, or economic return, that the marginal unit of water generates in the specific use. The *net* economic return of using water in a specific use generally declines as more water is dedicated to a specific use because the marginal value is decreasing and marginal cost may be increasing. An efficient water market allocates that last unit of the water resource to the use that provides the greatest marginal return and maximizes the total economic return to the resource.

In summary, efficient water markets allow market forces to allocate water supplies to their highest economic value, while adequately compensating sellers of those supplies above the benefits they would receive if they used the same unit of water. By marketing water, economic regions have a flexible policy tool that provides them with a means to improve their respective economic welfare associated with the use of a shared water resource. A lack of well-defined property rights and allocation agreement ambiguity can lead to inefficient allocation of water resources. When water rights are clearly established, efficient reallocation trades can be generated annually to maximize the joint economic welfare of the trading regions.

Despite criticisms by other disciplines against using an economic approach to efficiently allocate scarce water supplies among competing uses, economists have shown that by efficiently allocating water to their highest economic values maximizes social welfare. The attainment of the social optimum often involves establishing the marginal value for water-based environmental values that are not priced by private markets. However, economists have developed a variety of non-market procedures for determining the economic value of water in these various uses.