

Water Issues in Wisconsin is a series of publications designed to focus attention on the economic value of the state's water resources. It is primarily intended for Extension educators and resource professionals involved in dealing with water issues throughout the state. Other titles in this series include:

The Economic Value of Water: An Introduction (G3698-1)

Water as a Public Good: Property Rights (G3698-3)

Developing Estimates of Water Value: Stated Preference Models (G3698-4)

Developing Estimates of Water Value: Revealed Preference Techniques (G3698-5)

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How Does the Market Value Water Resources?

Water is essential to the economic, environmental and social health of our society.

Whether you own a resort in Minocqua, work for a Great Lakes shipping company in Superior or canoe the Wisconsin River, you are benefitting from Wisconsin's rich and abundant water resources.

Clearly, Wisconsin residents place a great deal of value on the state's water as evidenced by their willingness to devote scarce

public resources to its maintenance. What is less clear is how this value translates into monetary or dollar terms.

Why should we make the effort to look at water

resources in terms of market value? The main reason is because understanding the market value, as well as the non-market value of water is crucial to increasing our awareness of water's importance. Making informed decisions about our use of natural resources is the only way by which we will be able to maintain the quality and quantity of the water we have come to expect in Wisconsin.

In this publication, we examine this issue by describing the limitations of the market in explaining our public interest in maintaining and improving the

quality of water resources. In addition, we discuss why the market, in some cases, is unable to place an economic value, or price, on our water resources.

A unique economic perspective

Natural resources are unique from an economic perspective because much of the value we place on them is not directly observed in the marketplace. This is particularly true of water resources. For example, we

don't typically pay to use water.¹ The only costs associated with water are incurred for its extraction, transportation, treatment or disposal.

The fact that we do not pay to use water resources in Wisconsin is quite deceiving because it may suggest that water has no

economic value. While we know this is not the case, in Wisconsin water is *treated* as if it had no economic value. Former politician and noted conservationist Richard D. Lamm explained the situation quite clearly when he stated:

It is ironic that we treat our most valuable resource as if it were worthless. We are quick to understand the value of gold or oil or beef. Yet we take for granted the water to mine and mill the gold or to feed and process the beef (Freshwater Foundation 1986).

*We only know
the worth of
water when
the well is dry.*

Ben Franklin

¹ In general, there is no charge for withdrawing water from a water body or for using groundwater. We pay a water bill for the water used at home but the price is based on the costs associated with the extraction, cleaning and disposal of wastes—not on the water itself. Indeed, we value water itself but rarely do the prices we pay reflect the water that we consume.

If water is such an important part of the lives of Wisconsin residents, why don't we pay to use it? To answer this question, we first must examine how dollar values, or prices, for goods and services are determined in the marketplace.

Assigning prices for goods and services

From an economic perspective, the term "value" has a very precise definition—it is the price individuals are willing to pay for goods or services. This economic concept is known as **willingness-to-pay (WTP)**. Willingness-to-pay is a function of people's tastes and preferences as well as their ability to pay, or income level. Everyday, we make choices based on our willingness to pay. In other words, we will only pay as much for the item as it is worth to us. For most common everyday goods, people have a well-established idea of what they can and will pay.

Market supply and demand

The amount of a good or service available also influences its economic value. This simply refers to the notion of supply and demand at work. The dollar value of a good is determined by the relationship between how much of it is available (supply) and how much people are willing to pay for it (demand). If demand for a particular good is high, but there is simply not enough of it to go around, the market price will also be high. At a high price, some consumers may not be willing or able to pay. Hence, these consumers are excluded or removed from the market.

Given that water is in limited supply and that we have significant consumption demands, we must begin to consider the market's ability—or lack of it—to allocate resources efficiently. Simply stated, we now must understand the relationship between willingness-to-pay and the market price of a good or service.

In a perfectly competitive market, prices are set so that the quantity supplied matches the quantity demanded. This can be illustrated with a demand and supply graphic. The demand curve describes a consumer's willingness-to-pay and ability-to-pay for various quantities of a good (figure 1). The market demand shown in figure 1 represents an aggregate of quantities of individual demands. Demand increases as price decreases—as seen by its downward slope.

The other side of the market deals with the costs associated with supplying goods and services. The supply curve describes the relationship between the quantity of a good offered for sale and the price received for it (figure 2). Market supply represents the aggregation of the quantities offered for sale by all firms and is directly associated with the costs of producing these goods and services. A producer will continue to produce and offer for sale more of a good as long as the price received for it continues to increase—as evidenced by its upward slope.

When examined together, the market supply and demand indicate the optimal price of a good or service (figure 3). The intersection of the market supply and market demand is the point at which the quantity supplied equals the quantity demanded. This is where market price is determined (the price at which all goods produced are in turn sold).



Wisconsin Department of Tourism

Shipping is one of the industries that depends on Wisconsin's rich water resources. This vessel is docked in the Sturgeon Bay shipyards.

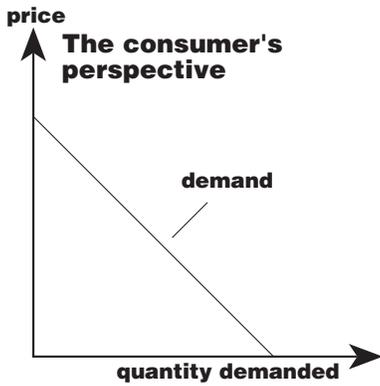


Figure 1. A typical demand curve
As price decreases, the quantity demanded increases. We, as consumers, demand more when prices of a good or service are lower.



Figure 2. A typical producer's supply curve
As price increases, the quantity supplied by producers increases. Businesses will supply more of a good or service if the price is higher.

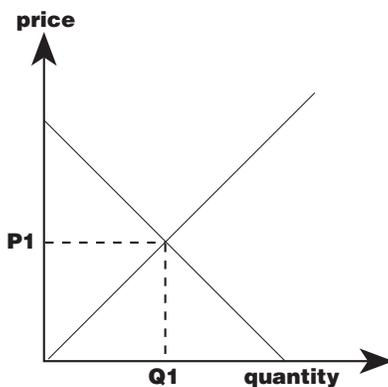


Figure 3. The market equilibrating price (P1)

This is found where the market supply curve meets the market demand curve. At this point, the quantity demanded is just equal to the quantity supplied.

The market price of a good or service is directly related to people's willingness and ability to pay for it, but the relationship between an individual's willingness/ability to pay and the good's market price can be quite confusing. The market price of a good may not necessarily represent the individual willingness-to-pay for that good. For example, the market price of a gallon of milk may be \$1, but many individuals would be willing to pay more—say \$2 or \$3—for a gallon of milk. Market prices reflect only the lower limit of the willingness-to-pay for a particular good. Therefore, market prices are not an exact measure of an individual's willingness or ability to pay for that good.

Net benefits

To obtain a measure of an individual's willingness-to-pay for a good, the **net benefit** of a good or service to the individual—not the market price—must be determined. The net benefit represents the amount individuals would be willing to pay for a good beyond that which they actually do pay.

To measure the net benefit of a good, economists use the concepts of **consumer surplus**² and **producer surplus**. For an individual, consumer surplus represents the positive difference, gain or benefit between what the individual is willing and able to pay for a good and the price dictated by the market. If the market price is greater than the individual's willingness to pay the price, the good will not be purchased and consumer surplus is zero.

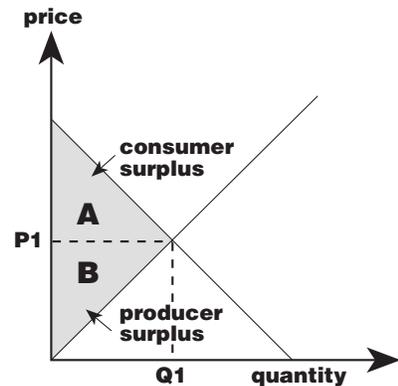


Figure 4. The net benefit
Net benefit is equal to a combination of consumer and producer surplus.

In figure 4, the area below the demand curve and above the equilibrium price (A) shows the aggregate consumer surplus of a good among all consumers. By purchasing additional units of a good, beyond the equilibrium quantity, the cost to produce the good exceeds society's willingness to pay for it. The consumer surplus represents the net benefit of the good to the consumer.

The producer surplus is the area below the equilibrium price and above the supply curve (B). The producer surplus represents the profits earned by producers above and beyond their production costs. The producer surplus is otherwise known as the net benefit of the good to the producer. Together the consumer and producer surplus represent an approximation of the good's net benefit to society.

² *Consumer surplus* represents the price individuals would be willing to pay for less of a good. It provides individuals with benefits exceeding those for which they actually paid.



Consumer and producer surplus are often used to determine a measure of the good's net benefit to society, but the net benefit can only be determined if the good has an observable market price. For example, the net benefit of a Great Lakes fishery can be determined by using the demand curve for a fish species and the supply curves of commercial anglers, public agencies that manage fisheries and supporting industries that produce recreational angling. In this manner, economists may be able to observe and estimate the net benefit of a good to society.

Are water markets the answer?

Formal water markets in Wisconsin would allow competition to deal with many of the issues involving the economic value of water.³ If water was marketed, it would possess some exact monetary value. If water use had a market price, it would be very easy to make decisions about how to parcel out the state's water resources. We would simply allocate water use to its highest value. In other words, water use would go to the highest bidder.

When resources are allocated at their highest financial value, they are said to reach economic efficiency. Putting aside the issue of equity, some would argue that establishing water markets would be the obvious solution to managing the state's water resources.

In Wisconsin, however, water markets have not been established for a variety of reasons. First, water shortages have not been as acute as they have been in areas such as the western United States.

Second, water in Wisconsin is both publicly owned and provided. Water is a public good and establishing a market for it would alter some long established traditions.

Third, to establish a formal water marketing system, property rights must be clearly defined. Without a clear definition of property rights, the sale and purchase of water rights cannot legally occur and the likelihood of spillover problems (for example, water pollution) is great. *Water as a Public Good: Property Rights* (G3698-3) discusses both the nature of water as a public good and the issue of property rights.

Finally, there are many values associated with water which do not have observable market prices. Although water markets may offer the solution to determining a precise value for water, the market is usually unable to assess all of the values society places on water. For example, markets are typically unable to provide a value for water used by recreationists (such as canoeists, water skiers or swimmers) because none of these uses has an observable market price.



Wisconsin Department of Tourism

The market is often unable to assess the value of water when it is used by recreationists such as this water skier in Wausau.

³ In the western United States, water is bought and sold just like any other commodity. Formal water markets have been created in states such as Wyoming, New Mexico and California. In many of these states, private citizens, private industry as well as local, state and federal government can buy and sell water rights. For example, farmers may purchase other landowners' water rights to irrigate their own crops. A contract would thereby be entered into which would guarantee the farmer a specified quantity and quality of water each year. Given the traditional resource rights established in Wisconsin, formal water markets have not been established.

Other than the cost for purchasing a boating license, we do not pay to canoe down a river or take a boat out on a lake. The market cannot address the values associated with these uses. It is also not able to place a price on non-use values such as existence, option and bequest values.⁴

Increasing awareness of water's value

The goal of the discussion presented in this publication is to illustrate the complexity of placing a value on water resources. Another goal is to promote an increased awareness of the different values Wisconsin residents place on water and other natural resources. The discussion also provides a framework to assess societal benefits from maintaining and improving the state's water resources.

Our continuing challenge is to increase our knowledge of how society values water and use these values as one basis upon which to make future water resource management decisions.



Wisconsin Department of Tourism

Economists can estimate the economic value of aesthetics, thus creating a broader awareness of different values society places on its water resources.

⁴ For a discussion of these concepts, see *Water Issues In Wisconsin—The Economic Value of Water* (G3698-1).



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