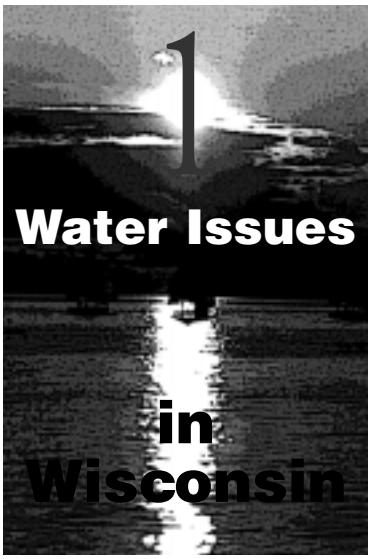
G3698



The Economic Value of Water: An Introduction

Water is one of Wisconsin's most precious assets. It is an essential element of the economic, environmental, aesthetic and social health of the state. The overall quality of life for all of the state's residents—human, plant and animal—is inextricably linked to the quality and quantity of our water resources.

Water's uses are limitless. At home, water is essential to our everyday activities—drinking, cooking, bathing, washing clothes and watering lawns. Farmers use water to irrigate their crops. Beverage, food and paper producers employ water directly in their manufacturing processes. Electric companies create hydroelectric power with water. Other industries transport their products to market via Wisconsin's lakes and rivers.

Water is often the main attraction for recreationists who enjoy outdoor activities such as sightseeing, boating, swimming and fishing. And water serves as a key basis of value for recreational property developments.

As people who value environmental quality and healthy living conditions, we obviously place high value on quality water resources. More and more communities are revitalizing their waterfronts, reestablishing them as centers of urban vitality. Every year, efforts to clean up waterways cost local, regional and state governments millions of dollars.

We can estimate what it costs to maintain the quality of the water resources that currently exist, but it is much more difficult to identify the resulting benefits. And more importantly, it is these perceived benefits that drive policy decisions to allocate scarce public resources to preserve and improve the quality of the water resource base.

This publication and others in the series *Water Issues in Wisconsin* will focus on ways to estimate the benefits of water resources to assist in making sound policy decisions. The series' goal is to provide Extension educators and resource professionals with a better understanding of the fundamentals behind water valuation.

The market is not able to assess all the values associated with water, but valuation exercises do provide a frame of reference for understanding how society's demands affect water and other 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.

Water Issues in Wisconsin is a series of publications designed to focus attention on the economic value of the state's water resouces. 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:

How Does the Market Value Water Resources? (G3698-2)

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)

You can order these publications from your Wisconsin county Extension office or from Extension Publications, Rm. 170, 630 W. Mifflin St., Madison, WI 53706 (608-262-3346).

Wisconsin Department of Tourism

A kayaker at the Wausau Dam. Conflicts over the appropriate use of the state's water resources will increase as Wisconsin's population grows and its industries, particularly tourism, expand.

Water and scarcity issues

Wisconsin is blessed with abundant water resources that include approximately 15,000 inland lakes, 5.3 million acres of wetlands, 43,000 miles of rivers and streams and more than 6.4 million acres of Lake Michigan and Lake Superior that lie within state boundaries. We are also fortunate to have a vast quantity of groundwater. Given this wealth of water resources, it would certainly appear that we have water to spare.

Unfortunately, even though water is plentiful, it is still considered a scarce resource in Wisconsin. This is because there is simply not enough water to allow everyone to use it as they wish. In addition, both the population and industry are growing and user conflicts abound.

Examples of such conflicts are not hard to find. Downstream residents regularly question the quality of upstream sewage treatment facilities. A proposed dam of the Kickapoo River System in southwestern Wisconsin was rejected by those who wanted the river to retain its natural course. Swimmers and anglers regularly confront jet skiers or water skiers.

Modern lifestyles promote the use of water more than in the past, placing tremendous pressure on limited resources. As a result, we are forced to make choices with respect to how water will be used and who will use it.

People value water for different reasons

Because our water resources have become an integral part of our economy, any discussion of policy poses questions about the economic value of the resource base. The difficulty is that these economic values vary by user and can be hard to measure.

Wisconsin Department of Tourism

Beverage manufacturers are one of the numerous industries in the state to use water directly in their production processes.

To choose the use or combination of uses most beneficial to everyone, we must be able to place some sort of value on water resources. Each use of water is supported by different user values. Anglers value a particular body of water based on the number of fish they can catch. Lakeshore property owners value their lake because it adds to the aesthetic and real estate value of their properties. Hydroelectric companies value specific stretches of river based on the amount of electricity they can produce. Barge operators may value a certain body of water because it is the least expensive and most navigable route between two ports. Birdwatchers value wetlands based on the number of waterfowl they can observe. The values placed on water resources are many and varied.

Wisconsin Department of Tourism

A lake trout angler displays his catch at Gills Rock. Water-based recreation such as lake trout fishing is an important part of the state's tourism industry.

An economist's view of water value

Today, there are two commonly used scientific approaches to valuing all natural resources, including water. The first asks individuals directly what they would be willing to pay for a given amount of a resource—in this case, water. The second approach estimates value by identifying the amount an individual is willing to pay for goods or services that require that resource.

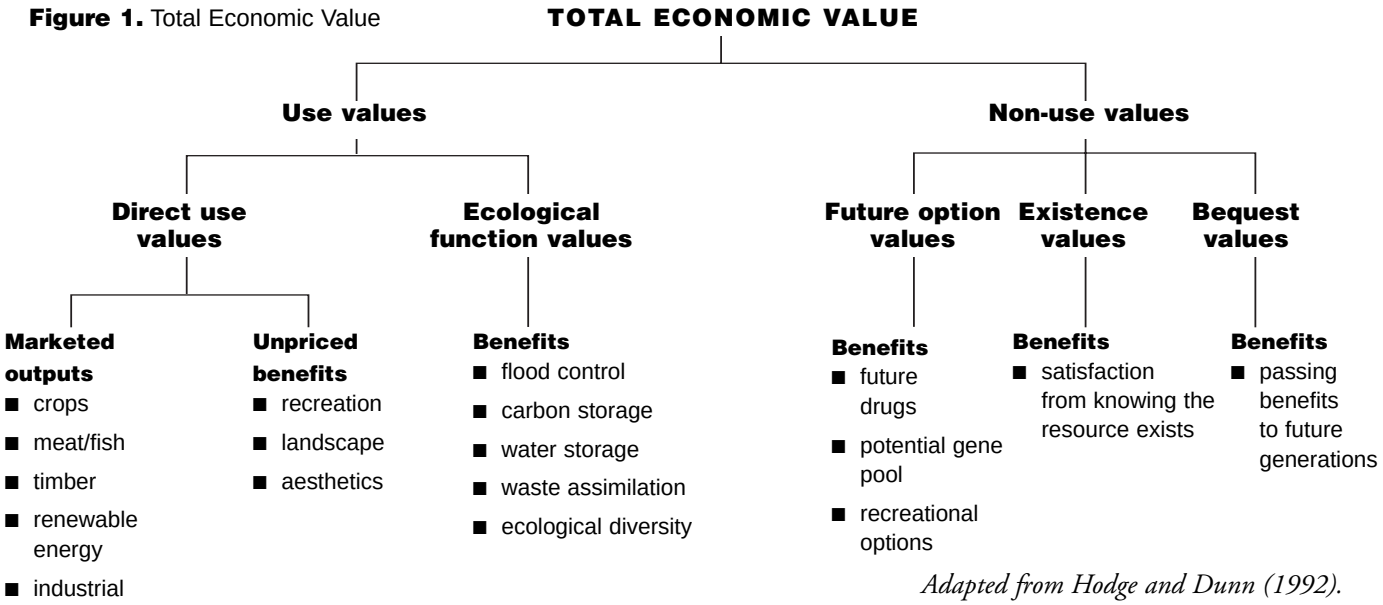
For example, economists have estimated the value of a lake by measuring the difference between the market value of property on the lake and the market value of similar property located elsewhere. The difference between these two market values is attributed to the lake's presence, and serves as an indicator of its economic value.

Use values and non-use values

Determining the value of an individual's or group's use of water is extremely difficult unless we understand the reasons why individuals value water.

The classification of different values begins with the concept of total economic value (or TEV—see figure 1). By determining how people use water, we can determine how they value it. As illustrated in figure 1, the total eco-

Figure 1. Total Economic Value



Adapted from Hodge and Dunn (1992).

nomic value of water is divided into two distinct categories: **use values** and **non-use values**.

Use value refers to the benefit an individual receives from the *direct* or *indirect* use of water. One aspect of water's **use value** comes from its direct use in the production of goods and services and the support of human livelihood. Direct uses of water include drinking, waste disposal and industrial processes. For example, the use value of water to a manufacturer is closely related to the degree to which water is a necessary part of the production of a given commodity. The **use value** of water is particularly important for the beer-making industry because water is vital to the production of beer. There are also businesses that bottle and sell spring water for direct consumption. These are examples of water's direct use value.

The value ascribed to the indirect use of water is also considered use value. Activities considered indirect uses of water relate to recreation and tourism such as sport fishing, sightseeing and boating. Indirect uses are those in which water is not directly used to produce a commodity. The value an indirect use of water receives is characterized by its less tangible benefits[1] to the water user. In other words, a tourist may place value solely on a waterfall's aesthetic quality—not on its industrial production capacity.

The third aspect of **use value** is ecosystem function value. This value recognizes that all forms of life need water to survive and as a result individuals may value water simply because it sustains the environment. Simply stated, people appreciate and value viable, healthy and productive ecosystems. Ecosystem function value attempts to measure this type of benefit.

Non-use value, on the other hand, is not based on the actual use of water. Rather, it is predicated on the notion that people often appreciate water even when they are not actually using it. There are three main **non-use values**:

1. existence value;
2. future option value; and
3. bequest value.

Existence value means that an individual places value on the fact that water, and the functions it supports, exist. The same principle can also apply to other resources.

Existence value does not imply that the individual will ever actually use a particular resource; it simply means that he or she values the fact that it exists. An example of existence value occurs when we consciously preserve land as wilderness, such as the Boundary Waters canoe area in northeastern Minnesota. We set aside land to preserve pristine lakes because we assign a high value to their very existence though we may never use them personally.

Wisconsin Department of Tourism

Canada geese at a wildlife sanctuary near Green Bay. The lakes, rivers, streams and wetlands of Wisconsin are home to diverse plant and animal species. An adequate and clean water supply is required for the health of the state's natural environment.

[1] These less tangible benefits are not traded in any market and are sometimes referred to as "unpriced" benefits.

The second part of non-use value is option value. The concept of option value refers to the value placed on a resource's future use. Because individuals may not know whether they will need to use a particular resource in the future, they are willing to pay to maintain their ability, or option, to use it at some future point.

The preservation of sensitive lakeshore provides an example of a situation in which future option value is taken into account. State and local units of government have made an effort to preserve shoreland because it may be needed in the future to preserve an aquatic ecosystem.Thus, the state retains the option to keep the land in a natural state.

The third part of non-use value is called bequest value. This is the value an individual places on the ability to preserve a resource so that it can be used by future generations.

Bequest value is distinct from option value because it does not preserve an individual's option to use a resource. Rather, bequest value deals with preserving the use of a resource for later generations. For example, we have assigned protected status to various natural areas so the land may be maintained in its natural state for generations to come. Good examples include the Apostle Islands National Lakeshore on Lake Superior and the many miles of wild rivers designated as protected areas in northwestern Wisconsin. Here again, public policy reflects the value Wisconsin residents place on passing a healthy, viable natural resource base on to their children and their children's children.

The total economic value of water is a combination of all five different use and non-use values:

1. direct use;
2. indirect use;
3. existence;
4. future option; and
5. bequest values.

Estimating the economic value of water involves understanding and realizing that individuals value water in different ways. Through this understanding, we try to incorporate these values in Wisconsin's water management policies and make informed decisions regarding the state's water resources.

How the marketplace values resources

Understanding why individuals value water is only half of the issue. To gain a full understanding of the value of water resources we must also observe how these resources are valued in the marketplace. We have begun to realize and understand how water resources contribute to the quality of life in Wisconsin. Effective public policy, which influences our use of resources, requires that we be able to weigh alternative uses.

The next publication in this series, *How Does the Market Value Resources?* (G3698-2) explains how water resources are valued in the marketplace and examines whether or not the high value society places on water is actually reflected in its market value.

Wisconsin Department of Tourism

A waterfall near Osceola. Water is an essential element of the economic, environmental, aesthetic and social health of our state.

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Wisconsin Department of Tourism

Sunrise over Lake Michigan. Preserving our state's water resources ensures that the high quality of life enjoyed by today's Wisconsin residents will also be enjoyed by future generations.

UW Extension

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