

# Ecosystem Valuation



## Methods, Section 1

# Market Price Method

*Estimates economic values for ecosystem products or services that are bought and sold in commercial markets.*

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## Overview

The market price method estimates the economic value of ecosystem products or services that are bought and sold in commercial markets. The market price method can be used to value changes in either the quantity or quality of a good or service. It uses standard economic techniques for measuring the economic benefits from marketed goods, based on the quantity people purchase at different prices, and the quantity supplied at different prices.

The standard method for measuring the use value of resources traded in the marketplace is the estimation of [consumer surplus](#) and [producer surplus](#) using market price and quantity data. The total net economic benefit, or economic surplus, is the sum of consumer surplus and producer surplus. (see [Essentials, Section 1, Basic Concepts of Economic Value](#), for a more complete explanation).

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This section continues with an example application of the market price method, followed by a more complete technical description of the method and its advantages and limitations.

**Hypothetical Situation:**

Water pollution has caused the closure of a commercial fishing area, and agency staff want to evaluate the benefits of cleanup.

**Why Use the Market Price Method?**

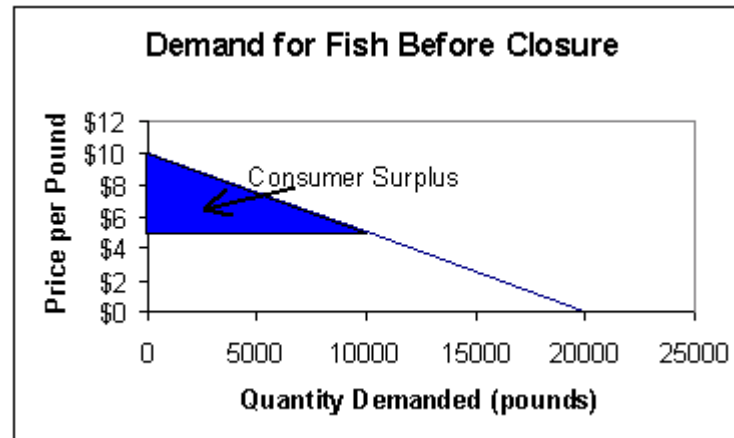
The market price method was selected in this case, because the primary resource affected is fish that are commercially harvested, and thus market data are available.

**Application of the Market Price Method:**

The objective is to measure total economic surplus for the increased fish harvest that would occur if the pollution is cleaned up. This is the sum of consumer surplus plus producer surplus. Remember that consumer surplus is measured by the maximum amount that people are willing to pay for a good, minus what they actually pay. Similarly, producer surplus is measured by the difference between the total revenues earned from a good, and the total variable costs of producing it. Thus, the researcher must estimate the difference between economic surplus before the closure and economic surplus after the closure.

**Step 1:**

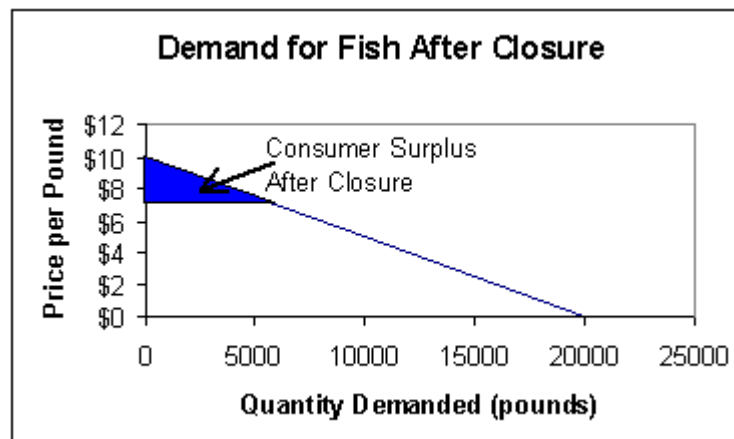
The first step is to use market data to estimate the market [demand function](#) and consumer surplus for the fish before the closure. To simplify the example, assume a linear demand function, where the initial market price is \$5 per pound, and the maximum willingness to pay is \$10 per pound. The figure shows the area that the researcher wants to estimate ? the consumer surplus, or economic benefit to consumers, before the area was closed.



At \$5 per pound, consumers purchased 10,000 pounds of fish per year. Thus, consumers spent a total of \$50,000 on fish per year. However, some consumers were willing to pay more than \$5.00 per pound and thus received a net economic benefit from purchasing the fish. This is shown by the shaded area on the graph, the consumer surplus. This area is calculated as  $(\$10 - \$5) \times 10,000 / 2 = \$25,000$ . This is the total consumer surplus received from the fish before the closure.

### Step 2:

The second step is to estimate the market demand function and consumer surplus for the fish after the closure. After the closure, the market price of fish rose from \$5 to \$7 per pound, and the total quantity demanded decreased to 6,000 pounds per year.



Thus, the economic benefit has decreased, as shown in the figure. The new consumer surplus is calculated as  $(\$10-\$7)*6,000/2 = \$9,000$ .

### Step 3:

The third step is to estimate the loss in economic benefits to consumers, by subtracting benefits after the closure, \$9,000, from benefits before the closure, \$25,000. Thus, the loss in benefits to consumers is \$16,000.

### Step 4:

Because this is a marketed good, the researcher must also consider the losses to producers, in this case the commercial fishermen. This is measured by the loss in producer surplus. As with consumer surplus, the researcher must measure the producer surplus before and after the closure and calculate the difference. Thus, the next step is to estimate the producer surplus before the closure.

Producer surplus is measured by the difference between the total revenues earned from a good, and the total variable costs of producing it. Before the closure, 10,000 pounds of fish were caught per year. Fishermen were paid \$1 per pound, so their total revenues were \$10,000 per year. The variable cost to harvest the fish was \$.50 per pound, so total variable cost was \$5,000 per year. Thus, the producer surplus before the closure was  $\$10,000 - \$5,000 = \$5,000$ .

### Step 5:

Next, the researcher would measure the producer surplus after the closure. After the closure, 6,000 pounds were harvested per year. If the wholesale price remained at \$1, the total revenues after the closure would be \$6,000 per year. If the variable cost increased to \$.60, because boats had to travel farther to fish, the total variable cost after the closure was \$3,600. Thus, the producer surplus after the closure is  $\$6,000 - \$3,600 = \$2,400$ .

### Step 6:

The next step is to calculate the loss in producer surplus due to the closure. This is equal to  $\$5,000 - \$2,400 = \$2,600$ . Note that this example is based on assumptions that greatly simplify the analysis, for the sake of clarity. Certain factors might make the analysis more complicated. For example, some fishermen might switch to another fishery after the closure, and thus losses would be lower.

### Step 7:

The final step is to calculate the total economic losses due to the closure?the sum of

lost consumer surplus and lost producer surplus. The total loss is  $\$16,000 + \$2,600 = \$18,600$ . Thus, the benefits of cleaning up pollution in order to reopen the area are equal to  $\$18,600$ .

### **How Can the Results be Used?**

The results of the analysis can be used to compare the benefits of actions that would allow the area to be reopened, to the costs of such actions.

### **Summary of the Market Price Method**

The market price method estimates the economic value of ecosystem products or services that are bought and sold in markets. The market price method can be used to value changes in either the quantity or quality of a good or service. It uses standard economic techniques for measuring the economic benefits from marketed goods, based on the quantity people purchase at different prices, and the quantity supplied at different prices.

For those resources for which markets exist, economists determine individuals' values by observing their preferences and willingness to pay for the goods and services at the prices offered in the market. The standard method for measuring the use value of resources traded in the marketplace is the estimation of consumer surplus and producer surplus using market price and quantity data. The total net economic benefit, or economic surplus, is the sum of [consumer surplus](#) and [producer surplus](#). (see [Essentials, Section 1, Basic Concepts of Economic Value](#), for a more complete explanation).

### **Applying the Market Price Method**

The market price method uses prevailing prices for goods and services traded in markets, such as timber or fish sold commercially. Market price represents the value of an additional unit of that good or service, assuming the good is sold through a perfectly competitive market (that is, a market where there is full information, identical products being sold and no taxes or subsidies).

Application of the market price method requires data to estimate consumer surplus and producer surplus. To estimate consumer surplus, the demand function must be estimated. This requires time series data on the quantity demanded at different prices, plus data on other factors that might affect demand, such as income or other demographic data. To estimate producer surplus, data on variable costs of production and revenues received from the good are required.

## Advantages of the Market Price Method

- The market price method reflects an individual's willingness to pay for costs and benefits of goods that are bought and sold in markets, such as fish, timber, or fuel wood. Thus, people's values are likely to be well-defined.
- Price, quantity and cost data are relatively easy to obtain for established markets.
- The method uses observed data of actual consumer preferences.
- The method uses standard, accepted economic techniques.

## Issues and Limitations of the Market Price Method

- Market data may only be available for a limited number of goods and services provided by an ecological resource and may not reflect the value of all productive uses of a resource.
- The true economic value of goods or services may not be fully reflected in market transactions, due to market imperfections and/or policy failures.
- Seasonal variations and other effects on price must be considered.
- The method cannot be easily used to measure the value of larger scale changes that are likely to affect the supply of or demand for a good or service.
- Usually, the market price method does not deduct the market value of other resources used to bring ecosystem products to market, and thus may overstate benefits.



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