

Wilderness Makes Cents!

***How Much Are People Willing
To Pay for Wilderness?***



Meet the Scientists



▲ **Dr. Bowker:** One of the great joys I receive from being a scientist has been seeing both of my children pursue science degrees in college. This is a photograph of me with my daughter Rosalina.



▲ **Dr. Bergstrom:** When I was a senior in high school, we took a biology field trip to a salt water marsh on the coast of Virginia. As part of this trip, we walked through the marsh in mud up to our knees—but this was really cool because we got to see up close all of the plants and animals that lived there, like little crabs that rushed around in front of us like kids running around here and there on a playground. This was one of the first times I realized that all of nature (including mud!) has interesting and fun things in it that are important to all of us. Now I spend a lot of time in all kinds of natural places and continue to be amazed by the beauty and wonder of our natural world!



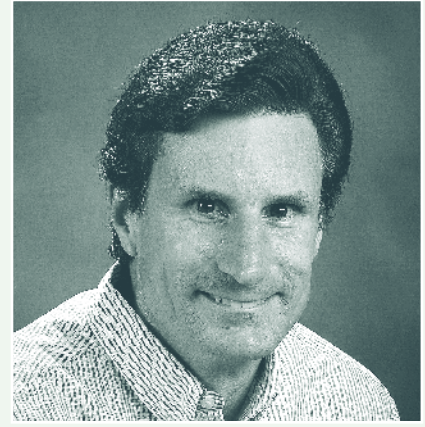
▲ **Dr. Harvard:** My favorite science experience was visiting and doing research in Iceland. You can see me here floating on a small iceberg in front of part of the Myrdalsjokull glacier in Iceland. Iceland has a variety of geological, geographical, and biological mysteries to experience and study. These include glaciers, volcanoes, geysers, waterfalls, hot springs, tectonic plates and earthquakes, Viking ruins, wild blueberries, Icelandic horses, and Icelandic sheep.



▲ **Dr. Cordell:** One of my favorite science experiences is visiting wilderness areas to examine and photograph where and how people are recreating. In this photograph, I am canoeing in the Okefenokee Wilderness, located in southern Georgia. The Okefenokee Wilderness is unique because it is a large freshwater swamp, accessible only by boat, and it is one of the largest undeveloped natural areas in the Eastern United States.



▲ **Dr. English:** My favorite science experience was working with my son Peter to compare flight times and distances of five different paper airplane designs. We made 3 planes of each design and flew each plane 10 times. We averaged the distance covered and time in the air for the 30 flights for each design. The results showed which design flew "best." What a fun experiment!



▲ **Dr. Loomis:** My favorite science experience is getting the results of a survey back and finding the *monetary* values that people have for protection of a *natural resource*. It is usually higher than I would have expected.

Glossary:



monetary (mon uh tair ə): Having to do with money.

natural resource (na cha rôl rē sôrs): A supply of something in nature that takes care of a human need, such as oil.

representation (rep rē zen tə shun): A likeness, picture, image, etc.

legally (lē guh lē): Based on law.

unique (ū nek): Being the only one. Unusual.

social scientist (so shul sjē nist): A scientist who studies individual humans, groups, and their actions or relationships.

passive (pas iv): Not active, but acted upon.

economic (ē kō nom ik): Having to do with the management of money in a home, business, or government.

average (av rij): The usual kind or amount. The number gotten by dividing the sum of two or

more quantities by the number of quantities added.

questionnaire (kwes chen nair): A list of questions used to gather information from people.

Pronunciation Guide

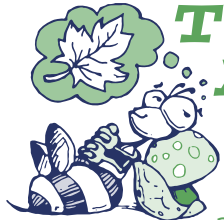
<u>a</u>	as in ape	ô	as in for
ä	as in car	<u>u</u>	as in use
e	as in me	ü	as in fur
i	as in ice	<u>oo</u>	as in tool
o	as in go	ng	as in sing

Accented syllables are in bold.

Thinking About Science



To discover new information, scientists must have one of two things. They either need new data, or they need a new way to examine existing data. Data are *representations* of the things that scientists want to understand. Most of the time, we think of data as numbers that represent measurements or counts of the things being studied. Data can also be words or pictures that represent the objects being studied. In this study, the scientists were interested in some of the benefits that people receive from wilderness. To understand those benefits, the scientists examined existing data in new ways. The data they used were numbers, and those numbers came from research that had been done by other scientists.



Thinking About the Environment

Wildernesses are places that are *legally* protected from human development. As areas that are not developed, people enjoy *unique* benefits from them. One type of benefit that people receive from wilderness is the chance to do things like hike, camp, and canoe in a totally natural area, away from things like roads, electricity, and buildings. This type of benefit is called a recreation use benefit by social scientists.

Another type of wilderness benefit identified by *social scientists* is called a *passive* use benefit. There are three types of passive use benefits. One of these is appreciation felt because of having the option to visit a wilderness in the future.

A second type of passive use benefit is appreciation of being able to pass along to their children the opportunity to use wilderness in the future. A third type of passive use benefit is just knowing that wilderness exists, even if the person never plans to visit them. In this study, the scientists considered both the recreation and the passive use benefits of wilderness.

Introduction

One of the ways that social scientists determine how much benefit people receive from something is to find out how much they would be willing to pay for it. For example, pretend that you are buying a new shirt. You are considering a number of shirts that cost between \$15 and \$35. The more money you spend on a shirt, the less you will have to spend on other things. If you are willing to spend more money, social scientists would say that you are indicating that the more expensive shirt will provide greater benefit than the one that you would spend less on. All of them will keep you covered, but the benefit might include being in style. If being covered is all that you care about, you might spend as little money as possible.

In this study, the scientists wanted to know how much money people would be willing to spend to receive recreation use benefits from wilderness. They also wanted to know how much money people would be willing to spend to receive passive use benefits from wilderness. If you need to refresh your memory on these types of benefits, reread “Thinking About the Environment.” The scientists wanted to estimate how much, across the entire United States, these benefits are worth to the American public.

Reflection Section



- ✦ Reread the first paragraph under “Introduction.” What are some of the benefits you might receive from buying one shirt instead of another?
- ✦ Restate what the scientists wanted to discover by doing this research.



Figure 1. Net economic value is what someone is willing to pay for something over what they actually paid. If the man on the right paid \$50 to go on this recreation trip while in Alaska, what is the net economic value of the trip for him?

Method

The scientists decided to use the results of earlier research to determine the worth of wilderness benefits. You do the same thing when you search the Internet or use the library to gather information for a school project. The scientists were interested in finding information about something called *net economic value*. Net economic value is the amount that a person would be willing to pay for something beyond what they are required to pay for it (**figure 1**). For example, the net economic value of a stylish shirt would be the amount a person would be willing to pay for it above what they actually paid for it.

For recreation use benefits, net economic value is the amount a person would pay to participate in an activity beyond what they have to pay. For example, let's say that a person has to pay for gas and food, and then they have to pay a fee to use an area for recreation (**figure 2**). They pay \$20 a day for these expenses. If they would be willing to pay \$30 a day, the net economic value of their trip would be \$10 ($\$30 - \$20 = \10). The same thing is true of passive use benefits. Let's say that a person pays \$25 every year to help protect a wilderness by joining a group that helps to protect the area. If they would be willing to pay \$50 a year to join the organization, what would be the net



Figure 2. People are required to purchase a special permit to use wilderness for recreation.

economic value of protecting the area for that one person? (Hint: Subtract the amount they pay from the amount that they would be willing to pay to join the organization.)

After looking at previous research, the scientists calculated an average net economic value. This average net economic value came from the different amounts that the scientists found in different studies. **Figure 3** shows the average net economic values for wilderness recreation trips and for passive use benefits.

Recreation Use Benefits (Average per person)	Passive Use Benefits (Average per person)
\$68 per trip	\$67 per year

Figure 3. Average net economic value of a wilderness trip taken by one person and average net economic value of passive use benefits for one person over a year’s time.

Now that the scientists had estimated an average value for individuals, the next step was to estimate a value for the entire American public. This is how they determined the value of recreation use benefits: The scientists multiplied the average net economic value of a wilderness trip for one person by the number of wilderness recreation trips taken each year by everyone visiting wilderness. To find the number of trips taken each year, they examined earlier research.

Estimating the value of passive use benefits across the entire United States population was more difficult. Not every person places a passive use value on wilderness. If the scientists multiplied the average net economic value of passive use benefits by the total

United States population, their number would not be accurate.

Number Crunches

If the scientists multiplied the average net economic value of passive use benefits for one person by the total United States population, would their number be too large or too small?

The scientists decided to use a number that represents a percentage of the number of households in the United States. The percentage they used was 50 percent. That was the percentage of households from which people agreed to answer questions about the benefits of wilderness. For example, if scientists had asked people in 1,000 households to answer a questionnaire, only 500 people, or 50 percent, agreed to answer. Although people have many reasons for not answering a questionnaire, one of the reasons might have been that the person did not feel any benefit from wilderness. In the United States, there are 110 million households. Therefore, the scientists multiplied the average passive use benefit (from figure 3) by 55 million.

The scientists then divided the two benefit totals by the total number of acres in wildernesses in the United States, which is 106.5 million acres. The resulting two figures represent the dollar amount of benefit per acre for the two types of benefits.

Reflection Section



- Look at figure 3. Explain in your own words what each of the dollar values represents.
- Reread the last sentence in the “Methods” section. What might be one advantage of knowing the dollar amount of benefit per acre for each of the two types of benefits?

Findings

The results of the scientists' calculations are shown in **figures 4 and 5**.

Recreation Use Benefits	Passive Use Benefits
\$465 million	\$3.7 billion

Figure 4. Net economic value of wilderness recreation use benefits and passive use benefits for the entire United States.

Recreation Use Benefits	Passive Use Benefits
\$4.39 per acre	\$34.50 per acre

Figure 5. Net economic value of wilderness recreation use benefits and passive use benefits for each acre of wilderness land in the United States.

Discussion

People do not always agree that wilderness provides benefits. Because wildernesses are owned by the public, it is important to understand whether the public receives benefits from wilderness. Many of the benefits that people receive from wilderness are hard to identify. It is harder still to place a value on those benefits. This study indicates that Americans benefit from using wilderness for recreation use. Even greater than this, Americans feel that they receive a benefit from wildernesses even if they do not use them for recreation. They also want to have wilderness available for future generations.

Reflection Section

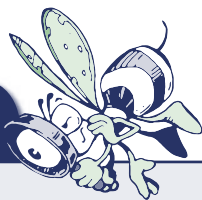
Recreation use benefits and passive use benefits are not the only benefits of having wilderness. Name at least one other benefit of having wilderness.

Reflection Section

- Look at figures 4 and 5. Compare the amounts in each column. Would you say that recreation use benefits or passive use benefits have greater value to the American public? Why?
- Think about what the numbers in figures 4 and 5 represent. If you need to refresh your memory, reread "Thinking About the Environment" at the beginning of this article. What would you conclude about the benefits people receive from wilderness?

From Harvard III, J. E., Bowker, J. M., Bergstrom, J. C., Cordell, H. K., English, D. B. K., and Loomis, J. B. (2005). The net economic value of wilderness. In: Cordell, H. Ken, Bergstrom, John C., & Bowker, J.M. (2005). *The Multiple Values of Wilderness*. State College, PA: Venture Publishing.

FACTivity



In this FACTivity, your class will determine the average net economic value of five different music CDs. You can also do this activity by determining the average net economic value of a single music download, of DVDs, or of any product or service that most of you are likely to purchase. If most of your classmates do not purchase their own CDs, select a product or service that must be paid for out of allowance money.

Create a list of CDs and then write each CD name on a separate small piece of paper. Fold each piece of paper and place the pieces into a container. Your teacher will have one of your classmates select five pieces of paper from the container. These will be the names of the five CDs with which you will work.

Once you have selected five CDs, agree as a class on the price of each CD. This is the price that was paid to purchase the CD.

Create your own chart with six rows and four columns based on the following example. Add column headings identified in the example chart. Write the names of the CDs and the artists in column 1, the price paid to purchase the CDs in column 2, and what you would be willing to pay to purchase each CD in column 3. This can be any price but it should represent the maximum you would be willing to pay to purchase the CD. Calculate the net economic value for each CD by subtracting column 2 from column 3 and record in column 4.

Report your values for column 4 to your class. (*Note: if column 4 values are negative, the CD has zero net economic value.*)

Example chart for music CDs

Name of CD and of artist	Price paid to purchase	Maximum amount willing to pay to purchase	Net economic value (Subtract column 2 from column 3)

Now you will calculate the average net economic value for each of the five CDs. One student should write each classmate's values for the first CD in a list on the board. Add the values in the list and divide the total by the number of values in the list. This is the average net economic value of that CD. Do this

for each CD and write the average net economic values on the board.

Discuss the results of your calculations with your classmates. Are the average net economic values about equal for the five CDs? If there are differences between some of the CDs, why do you think this is so?

FACTivity Extension

Overnight, have each of your classmates ask their parents or guardians the same question regarding each of the five CDs. That question is “What is the maximum amount you would be willing to pay to purchase this CD for your own enjoyment?” Calculate again the average net economic value

of each CD from the viewpoint of your parents or guardians. Compare those values with the values you calculated from the classroom activity. Is the average net economic value of the CDs different for your parents or guardians than for your classmates? If so, why do you think that is?



If you are a Project Learning Tree-trained educator, you may use PLT Activity #50, “400 Acre Wood,” as an additional activity resource.

Wondering About Wilderness

Take a moment to think about the difference between natural lands and more developed areas in and around cities and towns. You probably have seen some natural lands being developed for shopping centers, roads, houses, and other buildings. What was once a forest becomes something quite different. Did you know that some natural lands are legally protected from development? These lands are called wilderness. They are mostly found in the Western United States, but many wildernesses are found in the East as well. This article describes some of the benefits American citizens receive from wilderness, even if

they never visit a wilderness. For more information about wildernesses, read page 5 in this journal or visit <http://www.wilderness.net>.

