



# The Economic Benefits of Protecting Healthy Watersheds

April 2012

## Did You Know?

Maintaining the integrity of natural biological and physical systems provides economic benefits through ecosystem service provision.

Degradation of riparian ecosystems can cause negative economic impacts far from the altered site.

Protecting healthy watersheds reduces capital costs to supply clean drinking water and to treat waste water.

## Healthy Watersheds support healthy economies!

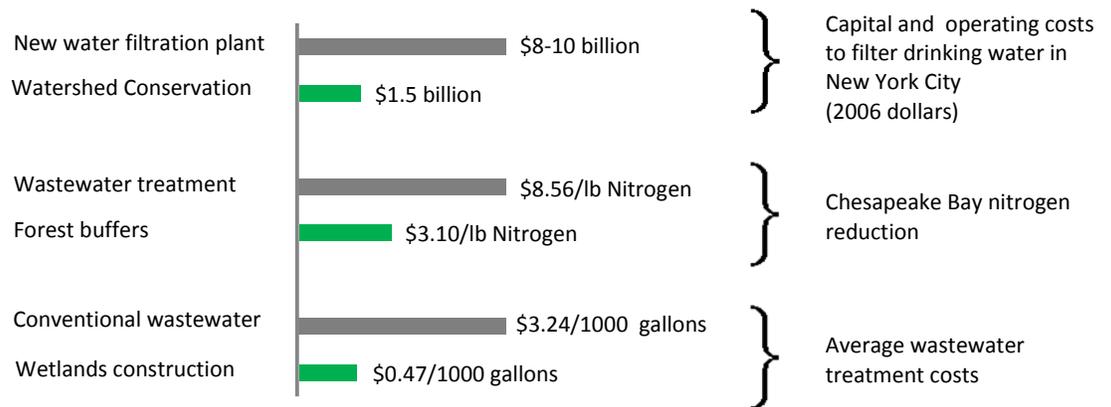
## Protecting Healthy Watersheds...

- Lowers drinking water treatment costs
- Avoids expensive restoration activities
- Sustains revenue-generating recreational and tourism opportunities
- Minimizes vulnerability and damage from natural disasters
- Provides critical ecosystem services at a fraction of the cost for engineered services
- Increases property value premiums
- Supports millions of jobs nationwide
- Ensures we leave a foundation for a vibrant economy for generations to come

## Protecting our nation's healthy watersheds makes economic sense

Healthy intact watersheds provide many ecosystem services that are necessary for our social and economic well-being. These services include water filtration and storage, air filtration, carbon storage, nutrient cycling, soil formation, recreation, food and timber. Many of these services have not been monetized and therefore the economic contributions of healthy intact ecosystems are often under-valued when making land use decisions. Ecosystem services provided by healthy watersheds are difficult to replace and most often very expensive to engineer (see chart). An engineered ecosystem service replacement may only provide a fraction of the services provided by highly functioning natural systems.

Preventing impairments in healthy watersheds protects valuable ecosystem services that provide economic benefits to society and prevent expensive replacement and restoration costs. Maintaining riparian connectivity and natural processes in the landscape provide a supporting network for ecological integrity, ensuring the sustainable and cost effective provision of clean water over time.



Watershed protection is less expensive than building new "grey" infrastructure  
*Hanson, Craig et al. 2011. Forests for water: exploring payments for watershed services in the US south. World Resources Institute Issue Brief, Issue 2, Pp15.*

## How is monetary value assigned to an ecosystem service?

Environmentalists and economists frequently suggest that there would be a greater incentive for environmental stewardship if ecosystem services were valued in a manner that reflects the large contribution they have to our economy and society. Assigning a monetary value to a particular service can be very complicated due to issues of scale and the complexity of ecological interactions that make isolating the economic effects of one service difficult. Although challenging, valuation is seen as essential for encouraging conservation. Economists have developed innovative methods that attempt to quantify ecosystem services and the economic benefits of conservation.

Instead of developing values for individual landscape features, such as a wetland, a healthy stream reach or headwaters, many economists have found that holistic valuation techniques that monetize a range of services provided by a landscape to be a more effective communication tool. At times, value is measured indirectly through payment for ecosystem services (PES) programs that compensate landowners for conserving land so that others may benefit from the multitude of ecosystem services the land supplies. Value can also be estimated by citizen's willingness to pay (WTP) to use or protect a land area or ecosystem service.

Another common indirect valuation method is the estimation of avoided costs to society due to protection activities. Cost avoidance scenarios are used to communicate the costs associated with losing ecosystem services and replacing them. These scenarios are commonly used to show costs saved from the prevention of flood damage or impairments that would occur if a floodplain was not intact.

**Protecting healthy watersheds avoids future costs and benefits communities**

Investing in the maintenance of healthy watersheds can significantly lower costs associated with water treatment and flooding. In a study of 27 US water suppliers, researchers found that protecting forested watersheds used for drinking water sources can reduce capital, operational and maintenance costs for drinking water treatment. They found that watersheds with greater percentages of protected forest correlate to fewer water treatment expenditures (see table).

Retaining high quality natural green infrastructure minimizes property damage and clean-up costs from flood damage and storm surges. Forested cover prevents runoff from moving rapidly across the landscape and allows it to slowly infiltrate into the soil, reducing erosion and high flows. Intact wetlands store and capture excess water. For example, wetlands surrounding the Boston area have been estimated to prevent \$42,111 of flood damage per acre of intact wetland. A healthy watershed will reduce the area and impact of a flood, minimize the economic burden on public infrastructure, reduce erosion and water treatment costs and can restore natural groundwater recharge.

**Floods cause an average of \$8 billion in damage every year in the United States**

Healthy watersheds that maintain protected riparian corridors are expected to be more resilient to the anticipated effects of climate change. Expenses associated with recovery from extreme weather impacts increased by a factor of six between 1997 and 2007. This rising trend is expected to continue. Floods now cause an average of \$8 billion in damage every year in the U.S. The most efficient way to avoid excessive future costs is to increase the flexibility of ecosystems now so that they may function and retain resiliency under a wider range of climatic conditions. Riparian areas

Share of forested watershed	Treatment costs per 3,000 m <sup>3</sup>	Average annual treatment costs	Cost increase over 60% forest cover
60%	\$29	\$297,110	
50%	\$36	\$369,380	24%
40%	\$46	\$465,740	57%
30%	\$58	\$586,190	97%
20%	\$74	\$746,790	151%
10%	\$91	\$923,450	211%

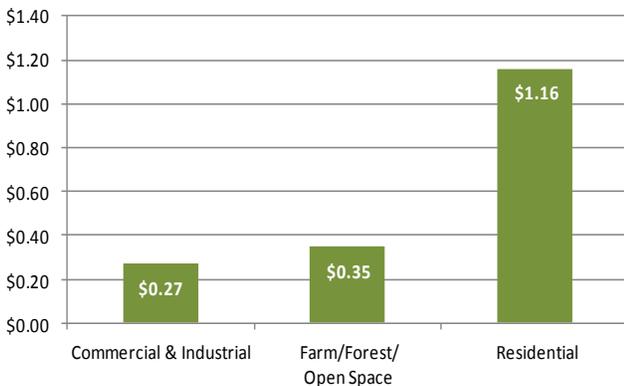
that are hydrologically connected to their landscape can maintain their functionality, are more adaptable to change, and better equipped to handle large storm events.

Future costs associated with the loss of natural intact systems and the services they provide may include constructing new infrastructure to manage and treat more stormwater and drinking water and greater clean-up costs from natural disasters. Comparing future adaptation costs to current short-term profits from land conversion can accurately reflect the ecological and economic consequences of land use decisions.

Percent forest cover and predicted water treatment costs based on 27 US water supply system, based on treatment of 22 million gallons per day, the average daily production of water suppliers surveyed.

For more information, see *Postel, Sandra L. and Barton H. Thompson. 2005. Watershed protection: capturing the benefits of nature's water supply services. Natural Resources Forum. Issue 29, Pp 98-108.*

**Economic and ecological benefits of conservation development**



Conservation development preserves open space and maintains landscape connectivity, while clustering development to the least environmentally sensitive areas. Traditional development requires intensive and costly additions of grey infrastructure to connect new neighborhoods to road and utility networks. In a review of 98 communities across 21 states, researchers found that for every dollar received from residential development revenues, an average of \$1.16 was spent on providing services to the new community by the local government (see figure). Conservation development provides economic benefits to communities because it consumes less land, needs fewer roads, resources and utility infrastructure. Additionally, many studies have shown that people are willing to pay a premium to live in conservation developments; these premiums provide greater revenues to local communities.

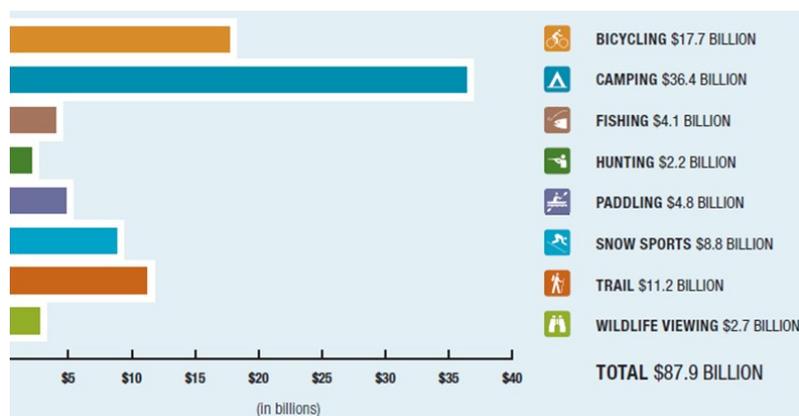
The median cost to provide public services to different land uses per dollar of revenue raised (n=98 communities)

*Reprinted with permission from Crompton, John L. 2007. "The impact of parks and open spaces on property taxes." The Economic Benefits of Land Conservation. Ed. Constance T.F. de Brun. The Trust for Public Land. Pp1-12.*

### Recreation and tourism

Recreation and tourism are billion-dollar industries in the United States. According to the American Sportfishing Association, there are over 30 million anglers in the U.S., generating over one million jobs and over \$45 billion in retail sales annually. Healthy intact ecosystems are essential to the viability of both commercial and recreational fishing. More people in the U.S. fish (30 million) than play golf (24.2 million) or play tennis (10.2 million).

In a 2003 study, the Outdoor Industry Foundation found that the outdoor recreation economy contributed \$730 billion annually to the economy, supported 6.5 million jobs and generated \$88 billion in state and federal tax revenues. Wildlife watchers in The Chesapeake Bay region spend about \$3 billion annually on trip-related expenses and equipment; this estimate does not include job creation and multiplier effects from these activities. Rural areas near forest land and other types of open space often depend on tourist spending to help support their local economies. Outdoor recreation and eco-tourism are large economic forces whose foundation rely on the maintenance of healthy watersheds and the protection of open space.

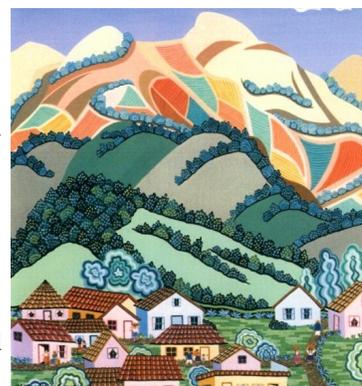


Federal and state tax revenues generated by recreational activity  
*Outdoor Industry Foundation 2003*

**More people in the United States fish (30 million) than play golf (24.2 million) or play tennis (10.2 million)**

### Property value premiums

People value living near healthy clean water. Studies from Maine and Minnesota show that home values declined by tens of thousands of dollars with declines in water quality. The aggregate effect of an increase in property values attributed to good water quality on a single lake equates to millions of dollars per lake in these areas. Further, recent studies around the country (e.g., in Colorado, Pennsylvania, Oregon, Maryland, Ohio and Virginia) have shown increased property values and tax revenues from properties near open space, green space, walking/biking trails, or riparian areas. Even in tight economic times, a relatively higher premium is placed on properties with access to nature. For example, a current study of five counties in southeastern Pennsylvania shows that open space is attributed with adding \$16.3 billion to the regional housing stock value. Clean and healthy waterfronts boost property values and revenues for adjacent retail and commercial businesses, too. Waterfront business properties are attractive to customers and have greater property value premiums when they are near clean waters. Preserving healthy watersheds and protecting open space while providing access to people has the potential to boost local revenues while providing attractive amenities.



**Forests outside of urban areas significantly contribute to human health in urban areas... reducing health expenditures**

### Quality of life and health benefits

The EPA and other public health organizations have long acknowledged the link between water and air quality to human health. When people think of human health and the environment, they often think of the negative health effects from an impacted environment, rather than the positive impacts that a healthy environment can have on human well-being.

There are social and health benefits related to the proximity of people to nature, parks, walking trails and biking trails—both in the form of physical exercise and mental stress relief. Forests outside of urban areas significantly contribute to human health in urban areas. These health benefits have the potential to provide significant cost savings in health expenditures. People who exercise regularly and seek stress relief are generally healthier, have fewer insurance claims and spend less time in hospitals, thus their societal health care costs are lower.

## About Healthy Watersheds

EPA's Healthy Watersheds Initiative (HWI) was developed to protect the nation's remaining healthy watersheds, prevent them from becoming impaired, and accelerate our restoration successes.

The HWI complements existing EPA program efforts by focusing on protection of high quality watersheds. These healthy areas are identified through holistic aquatic ecosystem assessments. Protection and restoration priorities are developed through these assessments to strategically implement protective actions that are both economically and ecologically beneficial.

## We can't afford not to protect our nation's remaining healthy watersheds!

If you would like to receive a copy of a white paper on the economic benefits of protecting healthy watersheds or learn more about Healthy Watersheds at EPA,

Contact Laura Gabanski:  
[Gabanski.Laura@epa.gov](mailto:Gabanski.Laura@epa.gov)  
 or

Visit our website  
[www.epa.gov/healthywatersheds](http://www.epa.gov/healthywatersheds)

## People support protecting our nation's environment—it's good for the economy

Citizens across the United States have overwhelmingly voiced their support of environmental protection: between 1994 and 2004 over 75% of conservation referenda on ballots were passed and a 2011 Gallup poll shows that nearly 80% of people worry about pollution of lakes, rivers, streams and drinking water.

The United States has spent on average \$1 billion per year on stream restoration since 1990. These numbers are expected to rise as communities work to mitigate environmental problems. Restoration efforts are less successful without a supporting ecological network of healthy watersheds. Protecting highly functioning aquatic ecosystems is a cost-effective way to sustainably provide the multitude of services required to meet society's needs. Studies show that the total economic value of intact systems exceeds that of lands converted for intensive economic uses over time.

Understanding the contribution that healthy watersheds provide to local economies is an important tool for land stewardship. Strengthening protection of high quality waters or diverting new development from these sensitive areas can have a positive economic and social impact and maintain these benefits for generations to come.

## Selected Publications and Resources

### Ecosystem services provided by conserving forest land

**Forests, water and people: Drinking water supply and forest lands in the Northeast and Midwest United States**

[http://na.fs.fed.us/watershed/fwp\\_preview.shtm](http://na.fs.fed.us/watershed/fwp_preview.shtm)

This analysis by the US Forest Service highlights the connection between forests and the protection of surface drinking water quality.

### Investing in protecting healthy watersheds avoids future costs

**Forests for water: Exploring payments for watershed services in the U.S. South**

<http://www.wri.org/publication/forests-for-water>

This World Resources Institute study from 2011 explores the use of landowner compensation to protect natural resources and for avoided costs.

### Green infrastructure: Smart conservation for the 21st century

Mark A. Benedict and Edward T. McMahon

[http://www.greeninfrastructure.net/sites/greeninfrastructure.net/files/GI\\_RR.pdf](http://www.greeninfrastructure.net/sites/greeninfrastructure.net/files/GI_RR.pdf)

This 2002 publication lays out the natural green infrastructure concept of protecting ecological hubs and corridors and discusses how protecting these areas avoids future costs.

### Revenues generated in recreation and tourism sectors from healthy watersheds

**American Sportfishing Association**

<http://www.asafishing.org/>

This organization provides links to several studies that explore the economic impact of the hunting and fishing industries, which rely on healthy fish and wildlife habitats.

### Outdoor Industry Association

<http://www.outdoorindustry.org/national-economic-impact-reports.php>

This website provides links to comprehensive economic reports on the impact that outdoor recreational activity has on the economy.

### Valuing ecosystem services

**The World Conservation Union (IUCN) Value: Counting ecosystem services as infrastructure**

<http://www.iucn.org/what/tpas/greeneconomy/resources/documents/?1136/Value-counting-ecosystems-as-water-infrastructure>

This 2004 IUCN publication is a comprehensive look at how ecosystems provide valuable services and the critical need for investment in protecting natural systems.

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