

The Benefits of Habitat to a Homeowner and a Community: Ways to Measure Nature's Impact

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We all expect clean air, plentiful and clean water, natural beauty and dry basements without understanding where they come from and what they are worth. We are living in an age of amazing innovation. The fact that we have learned to utilize the forces of nature so effectively without any real understanding of them and their relation to man himself, should make us pause and consider the ever-widening gap between our increasing knowledge and our very limited understanding of nature.

Beyond its intrinsic value, nature provides productive assets that account for billions of dollars each year in savings, earnings, avoided costs, and tax dollars. Open space and healthy natural systems positively affect everything including economic development, health, recreation, stormwater management, flood control, water supply, water, air pollution control, pollination and habitat, free of charge. They also positively impact property value and energy savings.

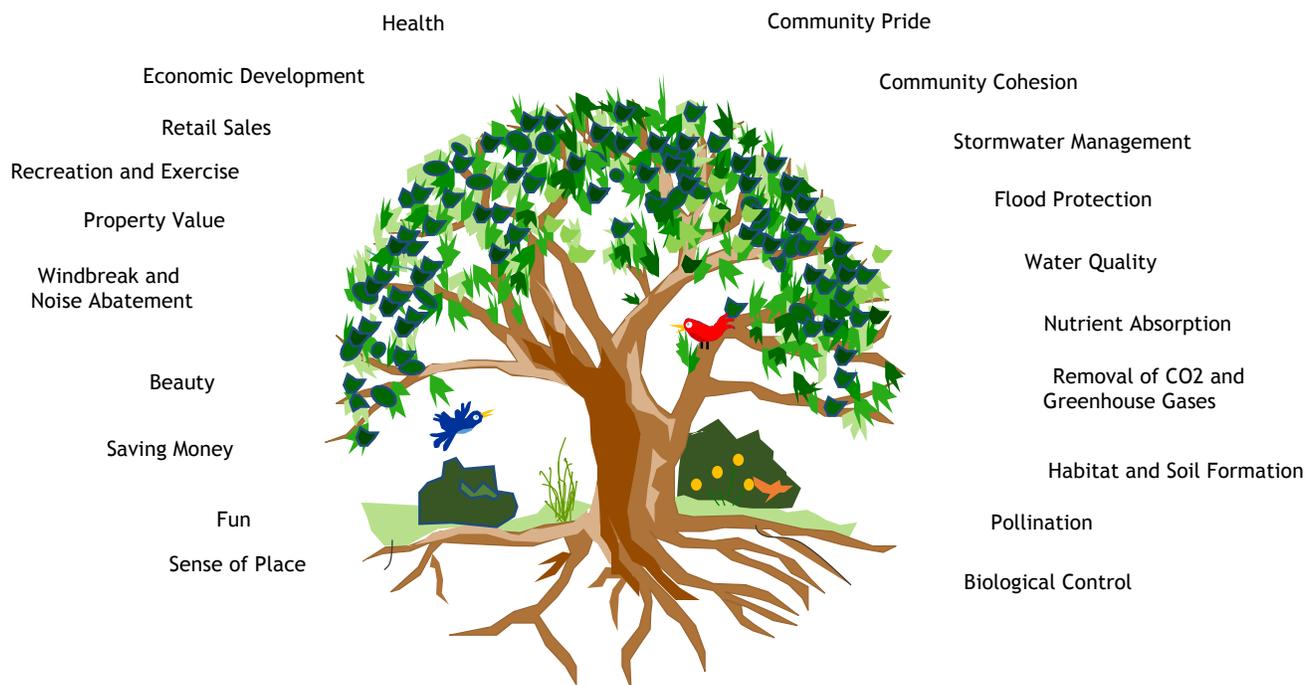
Too often, nature is undervalued in policy debates and investment decisions and in everyday choices of homeowners. Natural areas are sometimes viewed as an impediment to growth rather than a treasured ally. Nevertheless, nature is serious business and policymakers, land use and economic development planners, businesses and homeowners can play a critical role in ensuring that everyone gets the highest financial return on the environment.

Richard Louv, the author of *The Nature Principle*, states that “The future will belong to the nature-smart—those individuals, families, businesses, and political leaders who develop a deeper understanding of the transformative power of the natural world and who balance the virtual with the real. The more high-tech we become, the more nature we need.”

Recent studies show that we are still sprawling despite our knowledge of the heavy price we pay. While the rate of sprawl seems to have slowed down, it's probably due to economic and demographic changes, rather than our culture of stewardship.

Backyard Conservation Design is a low-impact approach to creating beautiful landscapes using native plants that will enhance your stewardship of the natural environment. Backyard Conservation Design can significantly improve habitat and beauty, reduce runoff and stormwater and reduce air pollution. Good design will help cool your home and neighborhood and break the cold winds to lower your heating costs. This will add value to your home. By reducing the size of your lawn and creating attractive habitat you will help natural systems function more efficiently. The following benefits show just how important habitat is to a homeowner and a community. Many of these benefits are measurable.

Benefits of Habitat and Backyard Conservation Design



Habitat

We live in Penn's Woods (Pennsylvania) and woodlands help create and enhance sustainable animal and plant habitats for many bird and wildlife species. Birds and wildlife provide enjoyment to residents of all ages and, like canaries on coalminers' helmets, can serve as indicators of local environmental health.

The first rule of ecology is that everything is connected to everything else in ecosystems. The economy is a system, as well. Therefore habitat is related to everything, including the economy. The higher the habitat quality, the better natural system services function. Green corridors of habitat along streams and around natural areas and parks not only increase sustainable habitat, they are also the areas that contribute most to the local economy. Enhancing habitat in these areas saves money by expanding natural system services like stormwater and flood control, native pollination, and water quality protection, among others. (1) The better the natural system services, the better the economy.

Habitat value is created by the percent of native plants and the percent of vegetation structure created by layers of canopy, understory, trees, shrubs, grasses and perennial flowers and ferns. The relationship between percent canopy cover and percent native plants determines habitat

quality. A home with 60% canopy cover and 60% native plants is a high quality habitat. (2) Doug Tallamy, author of "Bringing Nature Home," says the value of native plants in supporting beneficial insects is 29 times that of non-native plants. (3) Every house that includes a high percentage of native plants not only attracts bird and butterflies, but helps the entire community's biological health. Larger habitat areas create more sustainable natural system services and wildlife than smaller habitat areas.

Habitat Measures

- Percent reduction in size of lawn
- Percent canopy and flower bed cover
- Percent native plants

Beauty and Sense of Place

As the poem says, some days "you think that you will never see, a thing as lovely as a tree." The same can be said about shrubs, flowers, birds and bees. The colors of spring tree blossoms and groundcover tell us nature is reawakening. In summer, trees add cool shade while summer flowers attract butterflies, birds and bees. Many tall trees and shrubs in fall ignite the landscape with rich vibrant colors. In winter, trees and evergreen shrubs provide shelter for birds, and offer artistic silhouettes to the landscape. Peeling bark, red berries and grasses jutting through the snow add texture to an otherwise monotonous outdoor scene.

What makes a community a desirable place to live? What draws people to stake their future in it? Are communities with more attached residents better off? Gallop and the John S. and James L. Knight Foundation launched the *Knight Soul of the Community* project in 2008 with these questions in mind. Interestingly, after interviewing almost 43,000 people in 26 communities over three years, the study found that three main qualities attach people to place.

- Social Offerings - Places for people to meet each other and a strong feeling that the community cares about its residents.
- Openness - How welcoming the community is to different types of people, including families with children, minorities and talented college graduates.
- Aesthetics - The physical beauty of the community, including the availability of parks and green spaces.

The main drivers of attachment show little difference across communities. In addition, the same drivers rose to the top in every year of the study. Open spaces with scenic views, tree lined streets, parks, trails and other recreation opportunities create a sense of place and attachment for people to a town or region. Attachment to place is an important metric for communities, since it links to key outcomes like local economic growth (GDP). (4) It's difficult to have a strong economy without a healthy environment and plenty of open space providing quality habitat.

Beauty and Sense of Place Measures

- People in contact with nature

Healthy Life Style

In one study, residents of areas with the highest levels of greenery were three times as likely to be physically active and 40% less likely to be overweight or obese than residents living in the least green settings. (5) Neighborhood parks promote exercise, especially to people living within a mile of a park. In another study, three-quarters of park users lived a mile or less from the park. (6) Children and youth living in greener neighborhoods have lower body mass index. (7) People who exercise 30 minutes a day reduce their risk of degenerative diseases and attendant health care costs by \$485 per year. (8)

Older adults who have more exposure to green common spaces report a stronger sense of unity among residents within their local neighborhood, and experience a stronger sense of belonging. (9) We are beginning to understand that trees play a role in enhancing the strength of communities. Residents who live buildings surrounded by trees, report significantly better relations and cohesion with their neighbors. They have more of an attachment to where they live and they feel safer than residents who have few trees around them. (10) Surveys show that trees improve communities by making people feel calmer, and improving quality of life. (11)

Contact with nature not only decreases elementary school children's stress, but higher amounts of exposure to natural environments decreases their levels of stress. (12) Park users report lower levels of anxiety and sadness after visiting parks. The longer park users stay in park settings, the less stress they report. (13) Mental wellbeing improves from exercising outdoors compared to exercising indoors. Exercising in natural environments is associated with greater feelings of revitalization and positive engagement, decreases in tension, confusion, anger, depression, and increased energy. (14) Visual exposure to settings with trees helps recovery from stress within five minutes, as indicated by changes in blood pressure and muscle tension. (15)

The cost of medicine is a major social concern that impacts patients and health care professionals. Nurses can not only help patients save money by physical exercise it is their responsibility to ensure efficient health care delivery. A recent study of over 20,000 people found that the average medical claims for middle aged least fit men (\$5,134) were about 36 percent higher than the average (\$3,227) a year for the more fit men. This means the average active male saves \$2,907 in medical costs per year. The average medical claims for the least fit women (\$4,565) were 40 per cent higher than the most fit (\$2,755). This means that the average fit female saves \$1,810 in medical costs per year. ([Ellin Holohan](#), 2012)

Ellin Holohan, 2012. Fitness lowers medical costs *HealthDay Reporter*

Healthy Lifestyle Measure

Dollar savings in potential medical costs due to active healthy life style

Dollar Value of air quality benefit

Water

Southeastern Pennsylvania receives between 42-44 inches of rain each year. (1) In a forest, almost all the water is infiltrated into the ground. Approximately 56% is evapo-transpired by trees. Another 22% provides base flow to streams at a temperature suitable for aquatic organisms to thrive. The remaining 22% recharges ground water. Lawns, driveways and rooftops create runoff. In a heavy rainstorm, grass can act like cement. A single front yard tree can intercept 760 gallons of rainwater in its crown, reducing runoff and flooding on a property. (16) Habitat can reduce annual stormwater and a mature tree can store 50 to 100 gallons of water during large storms. (17) By having natural landscapes, far less sediment and chemicals flow into streams. Trees and shrubs and strategically-placed flower beds and rain gardens prevent water from leaving a property by infiltrating 28 gallons of water per square foot each year. (1) This also prevents 10 pounds of nitrogen per 5,000 square feet from polluting streams each year. (1)

For every 10 percent increase in forest cover across a watershed, (up to about 60 percent forest cover), water treatment and chemical costs decrease by about 20%. (18) The average tree provides an estimated \$85 in savings per year in a yard and \$113 on public land. (19) The stormwater management value of Philadelphia's parkland and trees is \$5.9 million annually. (20)

Water Measures

- *Gallons of water infiltrated*
- *Gallons of water to stream base flow*
- *Gallons of water to ground water*
- *Estimated benefits of trees and green infrastructure*

Air Quality

The increased incidence of childhood asthma is increasing at a rate of 1% every seven years and is directly correlated with the increase in CO₂ over the last 20 years. (22) Trees filter airborne pollutants and reduce conditions that cause asthma and other respiratory problems. (23) Researchers from Columbia University found childhood asthma rates were highest in parts of New York City where tree density was lowest. The rate of asthma fell by 25% for every extra 340 trees per square kilometer (250 acres), a pattern that held true even after taking into account different sources of pollution, levels of affluence and population density. (24) Community trees help reduce asthma and respiratory diseases.

Planting trees is one of the least expensive, most effective means of drawing excess carbon dioxide from the atmosphere. The average healthy mature tree produces roughly 260 pounds of net oxygen annually and the average person consumes 386 lbs. of oxygen per year. (27) Each person requires about 1.5 trees to meet their oxygen needs.

Carbon dioxide is removed from the air by the process of photosynthesis. "Sequestering" simply refers to the inherent removal of carbon dioxide from the atmosphere as trees or other plants grow, absorbing carbon in the plant material. How much carbon can be sequestered in trees? A single mature tree can absorb 48 pounds of carbon dioxide a year, releasing enough oxygen back into the atmosphere to support 2 human beings. Approximately 320 trees (1-1.5 acres) will offset the average carbon dioxide emissions from an average home's electrical use. Tree leaves also absorb and filter out harmful particulates from car exhaust and other pollutants. A single tree can absorb 10 pounds of air pollution per year. This can be valued at \$45 per year for decreased medical costs. (26)

Air Quality Measures

- *Number of people supported with oxygen*
- *Pounds of CO2 absorbed*
- *Pounds of particulate absorbed*

Energy Savings

Trees and shrubs provide shade and windbreaks which help save money on both heating and air conditioning. If you plant a tree today on the west side of your home, in 5 years your energy bills should be 3% less. In 15 years the savings will be nearly 12%. (28)

Evergreens serve as windbreaks and in the winter provide savings of 10-50% on heating costs. (29) A 20 percent tree canopy over a house results in annual cooling savings of 8 to 18% and annual heating savings of 2 to 8%. (30) Properly placed trees can reduce cooling costs by 30 percent. Shading an air conditioning unit can increase its efficiency by 10 percent. (31)

A 25-foot tree reduces annual heating and cooling costs of a typical residence by 8 to 12%. (32)

Energy Savings Measure:

- *Dollars saved on heating and air conditioning*

Property Value

Towering trees and colorful shrubs on your property provide more than habitat and beauty -- they elicit pride and increase the value of your home. Trees and shrubs provide the ultimate "curb appeal" by impressing buyers before they even walk into your house. Here is one example: A value of 9% (\$15,000) was determined in a U.S. Tax Court case for the loss of a large black oak on a property valued at \$164,500. (32)

Several nationwide surveys show that mature trees in a well-landscaped yard can increase the value of a house by 7 to 19 percent. A lush lawn with flower gardens may be pretty to some, but didn't add to the value of a house, the surveys showed. (33)

Well-landscaped yards with mature trees and bushes that provide privacy, not only fetch higher prices, they sell more quickly than houses with little or no landscaping. A Clemson University study found that homeowners get a 100 percent or more return on the money they invest in landscaping. (34)

In one study, 83% of realtors said that mature trees have a "strong or moderate impact" on the salability of homes listed for under \$150,000; on homes over \$250,000, this perception increases to 98% of realtors. *Arbor National Mortgage & American Forests (35)*

Philadelphia's water management plan includes improved and built green areas to capture stormwater, which will increase nearby property values by \$390 million. (36) New tree plantings increased surrounding housing values by approximately 10%, in the Philadelphia neighborhood of New Kensington, which translates to a \$4 million gain in property value through tree plantings. (48)

There are 60 million street trees in the United States. Each tree has an average value of \$525 according to the *Management Information Services*. (38)

Property Value Measures:

- ***Increased property value from well landscaped yards (7-15% of property value)***
- ***Increased property value from trees (\$525 per tree in front yard).***

Designing With Natives Homeowner and Community Savings

Individual Financial Savings

\$3,460	Dollar savings in potential medical costs due to active healthy lifestyle
\$990	Dollar value of air quality benefit
\$600	Dollars saved on heating and air conditioning

\$5,050

Property Value

\$9,000,000	Home value
\$90,000.0	Increased property value from well landscaped yards
\$11,550	Increased property value from trees and shrubs in front yard

Stormwater, Flood Protection and Water Supply

\$1,870	Value of annual green infrastructure financial impact
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Designing With Natives Homeowner and Community Dashboard

Habitat value	
3,588	<i>Square feet of lawn reduced (25% Of uncovered lawn area)</i>
3 out of 10	<i>Habitat Quality (% canopy and % native plants)</i>
3.5875	<i>Added trees needed to reduce the size of the lawn's impact on stormwater</i>
Beauty and Sense of place	
4	<i>People in contact with nature</i>
Healthy life style	
\$1,940	<i>Dollar savings potential medical costs due to active healthy life style</i>
\$990	<i>Dollar Value of air quality benefit</i>
Water	
146,000	<i>Gallons of water used</i>
658,000	<i>Gallons of water infiltrated?</i>
144,760	<i>Gallons of water to stream base flow</i>
144,760	<i>Gallons of water to ground water</i>
450	<i>Size of Rain garden (square feet)</i>
Air Quality	
14.82	<i>Number of people supported with oxygen from trees</i>
1056	<i>Pounds of CO2 absorbed</i>
385,440	<i>Pounds of particulate absorbed</i>
Water Quality	
\$1,870	<i>Value annual green infrastructure financial impact</i>
46	<i>Pounds of nutrients prevented from entering streams</i>
Energy savings	
\$600.0	<i>Dollars saved on heating and air conditioning</i>
Property value	
\$90,000.0	<i>Increased property value from well landscaped yards</i>
\$11,550	<i>Increased property value from trees and shrubs in front yard</i>

Measurable Natural Benefits

Habitat Value

Acres of lawn reduced (25% of uncovered lawn area)
Habitat quality (% canopy and % native plants)

Beauty and Sense of Place

People in contact with nature

Healthy Lifestyle

Dollar savings in potential medical costs due to active healthy lifestyle (\$485 per person)
Dollar value of air quality benefit (\$45 per tree)

Water

Gallons of water used (100 gallons per person per day)
Gallons of water infiltrated (28 gallons per square foot equals total infiltration (TI))
Gallons of water to stream base flow (22% of TI)
Gallons of water to ground water (22% of TI)
Size of rain garden (15% of area of roof and driveway)

Air Quality

Number of people supported with oxygen (260 lbs of oxygen created per tree each year and 386 pounds required per person each year)
Pounds of CO2 absorbed
Pounds of particulate absorbed

Energy Costs

20% of electrical bill

Water Quality

Value of each tree in green infrastructure (\$85 per tree)
Pounds of nutrients prevented from entering streams (16 lbs. /5,000 square feet, 4 times a year)
For every 10% increase in tree cover, water treatment costs are reduced by 20%

Energy savings

Dollars saved on heating and air conditioning (20% of annual costs for heating and air-conditioning)

Property value

Increased property value from well landscaped yards (7-15% of property value)
Increased property value from trees and shrubs in front yards (\$525 per tree)

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