

## Natural System Services:

*Helping to maintain a low cost of living while saving money at home*



We all expect clean air, plentiful, clean water, natural beauty and dry basements without understanding where they come from and what they are worth. Beyond their intrinsic value, nature provides productive assets that account for billions of dollars each year in savings, earnings, avoided costs, and tax dollars. These benefits impact the foundation of our economic, social and natural resource. A triple bottom line as it were. Expanding and restoring natural areas can help keep the cost of living and taxes low while maintaining our quality of life, health and a good economy.



Our trees, shrubs and flowers provide natural system services free of charge. Whether in an urban, suburban or rural area, you receive natural system services benefits that are consistently supplied by forests, wetlands, headwaters, riparian buffers and streams. These benefits cover economic, social and environmental services.

- Reducing stress
- Beauty
- Cleaning the air and reducing asthma
- Filtering and cooling water for people and aquatic organisms in streams, lakes and ponds
- Water supply and groundwater recharge
- Stormwater management
- Storm and flood damage
- Storing and cycling nutrients
- Habitat for pollinators
- Regulating climate
- Reducing stream bank erosion
- Maintaining habitat and biological diversity and biological controls
- Lower energy and water bills
- Soil formation
- Property value

Mother Nature doesn't provide receipts for these service. As a consequence, nature is often undervalued in policy debates and investment decisions because nature is a complex system with many benefits that are not part of a market economy. Natural areas are also often seen as an impediment to growth rather than a treasured ally. Whether a community recognizes the

values natural system services provide or not, these services operate 24 hours a day, seven days a week, 365 days a year and they have been doing so for over 14,000 years—since the last Ice

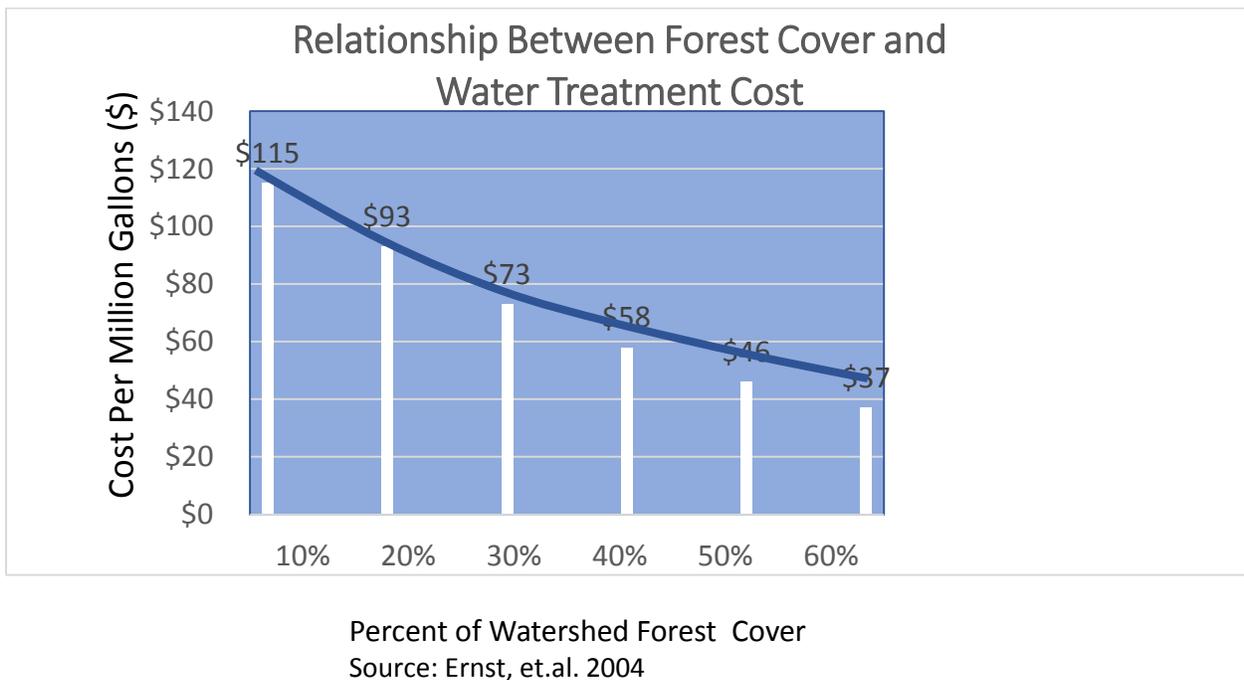


*Nature is serious business and policymakers, land use and economic development planners, businesses and homeowners play a critical role in ensuring that everyone gets the highest financial return on the environment.*

Age. Many are more reliable than engineered solutions.<sup>1</sup> In this way, natural systems provide a form of risk management or insurance to maintain a lower cost of living.

For example, an acre of mature trees (86 mature trees at 20 inch dbh) will offset the carbon footprint of an average home.<sup>2</sup>

A survey of water suppliers conducted by the Trust for Public Land and the American Water Works Association showed that treatment costs for drinking water goes up when forested area in a watershed goes down.



<sup>1</sup> U.S. Environmental Protection Agency, (2012). *The Economic Benefits of Protecting Healthy Watersheds*.

<sup>2</sup> The Conservation Fund, 2006. *The State of Chesapeake Forests*.

For every 10 percent increase in forest cover in a watershed, the cost of water treatment goes down 20%. Treatment costs level off at 60% forest cover.<sup>3</sup>

One acre of woodland supplies clean, filtered water to approximately 5.4 homes each year. It also supplies clean water to streams at the temperature aquatic organisms need to thrive. It significantly reduces flooding, stormwater, erosion, and increases habitat and pollination.

Once lost, natural services are difficult if not impossible to replace. Unlike a stock portfolio where changing circumstances influence how stocks go up and down, once natural system services are lost, they are very expensive to replace. Even though these services are inherently renewable, they require that natural system productivity and diversity remain intact. A natural system service cannot be reestablished at the same level for many years. While residential, commercial and industrial areas require public investment for services, natural areas require little more than protection. That's why natural resource protection is very often an excellent business strategy.

The Chief Executive Officer for any organization would always protect the company's revenue stream, avoid any unnecessary costs and maintain the company brand. So should every county commissioner, township supervisor, politician, and homeowner. As an example, Schuylkill Township benefits from \$20,000,000 each year in natural system services.<sup>4</sup> The value of these services is rarely considered in private or public decision making or land use decisions, open space referendums or as part of an economic development investment strategy, but they should be.

The first step in land use and economic development decisions should be to assess nature's portfolio of financial services before entertaining any changes to land use or resource management. This ensures that a wide range of reliable services are not lost without knowing and are maintained at the lowest possible cost.

The natural system services provided by one acre of quality habitat are shown below. A quality habitat has native canopy, understory trees, shrubs, ferns, grasses and wildflowers.

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<sup>3</sup> 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.

<sup>4</sup> *Designing With Natives*, 2015, Schuylkill Township Case Study.

### Natural System Services Provided by Quality Habitat to Residents and Communities

Natural system service	Annual Value Per Acre of Quality Habitat	Source
Air Pollution Removal	\$405	American Forests, 2002 <sup>5</sup>
Biological Diversity	\$305-\$772	Maryland <sup>6</sup>
Carbon sequestration and storage	\$238	Schuylkill Township, PA <sup>7</sup>
Flood protection	\$768	Robert Costanza, et.al (2006) <sup>8</sup>
Pollination	\$56-\$265	Robert Costanza, et.al (2006) <sup>9</sup>
Water quality	\$44-\$309	Robert Costanza, et.al (2006) <sup>10</sup>
Water supply	\$1,102-\$3,839	Robert Costanza, et.al. (2006) <sup>11</sup>
Recreation	\$131	U.S. Fish and Wildlife Service, 2011 <sup>12</sup>
Energy savings	\$231	USDA Forest Service, UFORE (2004) <sup>13</sup>
<b>Total</b>	<b>\$3,280- \$6338</b>	

### Natural System Services Provided by Quality Habitat

Natural System Service	One-time savings or gain	Source
Stormwater management control	\$3,527	American Forests (2002)
Real estate value (Premium for living in or near)	\$10,000- \$16,500	DVRPC (2010) <sup>14</sup> and LVPC, (2014) <sup>15</sup>

Greenery encourages exercise and provides a more restorative environment than indoor settings, with a greater positive effect on mental health.<sup>16</sup> A recent study of over 20,000 people

<sup>5</sup> 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.

<sup>6</sup> Conservation Fund, 2006. *The State of Chesapeake Forests*.

<sup>7</sup> *Designing With Natives*, 2015, Schuylkill Township Case Study.

<sup>8</sup> Costanza, Robert; Wilson, Matthew; Troy, Austin; Voinov, Alexey; Liu, Shuang; and D'Agostino, John. 2006. *The Value of New Jersey's Ecosystem Services and Natural Capital*.

<sup>9</sup> IBID

<sup>10</sup> IBID

<sup>11</sup> IBID

<sup>12</sup> Richard Birdseye, et. al. *Chesapeake Bay Watershed-Forest Carbon Budget and Management Opportunities*, USDA Forest Service, Northern Area Research, 2005.

<sup>13</sup> USDA/UFORE. 2004.

<sup>14</sup> Delaware Valley Regional Planning Commission, *Return on Environment Study*, 2011.

<sup>15</sup> Lehigh Valley Planning Commission, 2014. *Lehigh Valley Return on the Environment Study*.

found that the average medical claims for middle-aged, least-fit men were about 36 percent higher (\$5,134) than the average spent a year for most-fit men (\$3,227). The most-fit males saved \$1,857 in medical costs per year. The average medical claims for least-fit women were 40 per cent higher (\$4,565) than the most-fit women (\$2,755). The most-fit females saved \$1,810 in medical costs per year.<sup>17</sup>

### Medical Benefits Savings Related to Increased Exercise<sup>18</sup>

	<i>Annual medical claims savings per year</i>
Male	\$1,857
Female)	\$1,810

The Chesapeake Bay Watershed is losing 100 acres of woodland a day to development. That is the equivalent of the CO2 offset for 100 homes and the water supply for 4.5 households each day.<sup>19</sup>

<sup>16</sup> van Praag, H., B.R. Christie, T.J. Sejnowski and F.H. Gage. 1999. Running Enhances Neurogenesis, Learning, and Long-Term Potentiation in Mice. *Proceedings of the National Academy of Sciences of the U.S.A.* 96, 23: 13427-13431.

<sup>17</sup> Holohan, E. 2012. Fitness in middle age lowers medical costs later: study. *HealthDay News*. <http://consumer.healthday.com/fitness-information-14/gum-health-news-253/fitness-in-middle-age-lowers-medical-costs-later-study-664646>

<sup>18</sup> IBID

<sup>19</sup> Rogers, John, 2015. Nature is Serious Business. DWTN.net

The following indicators can be used to track natural system services.

- The percentage of canopy covering the site. 60% canopy cover is the goal.
- The vegetation layers present on the site are in place (canopy, understory, shrubs, grasses and wildflowers). Having all 5 layers is the goal.
- The percentage of the site cover by native species is over 60%.
- The number of different native plant species present on the property. Having more than 25 species is the goal.
- Pollinator gardens in place.
- Turf grass only used to cover play areas and walking paths.
- Vegetable and cutting gardens.
- Water features.
- Rain gardens.
- Riparian buffers.