

Valuation Methods and Sources

In order to complete the daunting task of placing a value on the Cleveland Metroparks system, value of individual reservations were into three distinctive values. These include economic value, social value, and environmental value. Each measurement of value is then summarized in a spreadsheet that will calculate each individually using inputs that reflect current conditions of specific reservations.

Economic Benefit Valuation

Economic value is calculated solely on the value of each Cleveland Metropark reservation to the surrounding community/communities through property value which translates into increased property taxes. The model is based upon Lutzenhiser and Netusil's (2001) hedonic analysis of the effect of open spaces on housing prices. Using their conclusions, value is added to the county base housing price by proximity to a reservation. These "buffers" are measured in feet and rely upon the count of single family homes within each zone. These values are then inflated to 2009 values and normalized. Normalization is necessary since Lutzenhiser and Netusil's study is based on property values in Portland, Oregon in the 1990s. Houses in Cleveland cost, on average, 5% less than those in Portland in 1990. This effect on housing value is then translated into public value using the local tax rate(s).

The product of this analysis is a spreadsheet in which counts of single family homes can be input by distance from the Cleveland Metropark reservation as well as the municipal property tax rate(s). The spreadsheet then calculates a single dollar amount that reflects the money that the surrounding area receives through assumed increased property taxes. This figure only reflects a conservative value created for single family homes since Lutzenhiser and Netusil's

(2001) findings are based on natural areas much smaller than those found in Cleveland, Ohio.

Also, other park factor—that are not considered—affect housing values in specific circumstances (such as viewsheds created by the Rocky River Reservation).

Environmental Benefit Valuation

Parks and preserved natural areas have value beyond the obvious aesthetic, social, and cultural benefits of these spaces. Depending upon the type of vegetative cover and geographic location of them, parks can provide ecosystem benefits from flood protection to soil creation and carbon storage. A study in Mecklenburg County, North Carolina, found that the combined environmental, economic, and health benefits of a park can provide at least a five-to-one return on investment in these spaces (Kirshman). Where preserved wetlands exist, many of these benefits are magnified through water quality and cleaning services provided by these spaces (US EPA, 2006).

A study conducted by the New Jersey Department of Environmental Protection attempted to assign monetary value to the services offered by the state's forests. The results were quite impressive: the total economic value of the forests' services, from hydrologic services to air quality maintenance, were on average \$1,003 per acre per year. When wildlife habitat and refuge services are included in this total, the value is increased to \$2,084 per acre per year. Additionally, the report notes that this is a conservative estimate due to large gaps in ecosystem valuation literature (Mates & Reyes, 2006).

The level of ecosystem services provided by a given ecosystem depends on local climatic, biological, geological and economic circumstances, as well as on the management regime. Given

the limitations on knowledge, time and resources, analyzing the variation over a geographic area is generally estimated using a simplified approach:

Value of Ecoservice = Acres of ecosystem providing a given ecoservice x Value per acre.

In this study, the per-acre values were obtained using a method known as “value Transfer”

The Value Transfer Method

Value transfer is the adaptation of existing valuation information to new geographic ecosystem.

The transfer method involves two steps:

- obtaining one or more estimates for the value of a given ecoservice from one or more prior studies carried out in a different geographic area.
- applying those values from the original study site to a new site, in this case Cleveland Metroparks.

Valuation of Specific Ecosystem Services

Preservation of parks and forests can yield substantial economic benefits in the form of ecosystem services. In fact ecoservices such as watershed protection and carbon storage can be more valuable than forest products such as pulp and timber.

Hydrological Services

Water related benefits provided by forest ecosystems include improvement of water quality, regulation of flow, and provision of water supply. Except for highly polluted areas, water quality is likely to be higher in forested water sheds due to the natural water holding and filtration capacities of forest ecosystems.

Base on multiple previous studies, we have obtained estimates of \$22, \$47, and \$126 per acre per year for the types of hydrological or watershed services provided by forests. The average of \$65 /ac/yr is the most appropriate basis for the middle estimates in 2004 dollars. The value in 2009 dollars would be \$73.

Carbon Storage

Functioning as carbon storage and sequestration, forests can help positively climate change. In the process of photosynthesis, trees absorb carbon dioxide and convert to biomass collecting carbon in their leaves, stems, branches, boles, and roots; the biomass of a tree is about 50% carbon by weight (NSFA 2002).

The amount of carbon in forests is conventionally measured in metric tonnes per hectare (MT/ha); one MT/ha equals about 0.446 US or “short” tons per acre (ST/ac).

The amount of carbon stored or sequestered depends on many factors, including the mix of tree species, the average tree age, and the species specific growth rates under prevailing climate conditions. If all this components are included, closed primary forests can store 250 MT/ha (112 ST/ac) or more (Nasi et al. 2002).

The weighted pricing of carbon credits is about \$54 per short ton of carbon. The value in 2009 dollars would be \$64.

Air quality Maintenance

Forests are well-recognized to improve air quality by removing various air pollutants creating an economic benefit by improving human health and life expectancy.

The value of the air quality services provided by forests depends on three things: the physical amount of each air pollutant removed annually by a given amount of forested land, the dollar value per unit and the number of acres of land providing this ecosystem service.

A study by American Forests found that an acre of forest removes between 76 and 85 pounds of air pollutants annually. Estimated the (2003) value of the air quality service at about \$2.29/lb which would equal \$2.66/lb in 2009 dollars.

Stormwater Control

Forested land slows storm runoff by reducing peak stream flows and amount of stormwater storage capacity needed. The amount of stormwater temporarily stored by forested land depends on several factors like tree canopy, slope of the land, and others.

American Forests (2003) estimated that an acre of forest could store between 2.66 and 3.01 cubic feet, with a midpoint value of 2.84 cu ft/ac.

The value to society of this stormwater storage capacity estimated by quantifying the cost that society would need to incur if forested lands didn't exist was estimated (2003) at \$2 per cu ft of storage or \$2.33 in 2009 dollars.

Limitations of Ecoservice Valuation

- Gaps between ecoservice valuation literature.
- Valuation of ecosystem services is an new evolving field of study.
- The addition of new studies of previously uncovered or under-covered services.
- Disparities reflect in large part the preferences of funding agencies.

Intangible Social Benefits Valuation

There are several different values which already exist in the Cleveland Metro Park system, such as recreational and educational value. Most recreation program in the Cleveland metro park system are free to people so the value of this part is comparing to the price of recreation service outside park in Cuyahoga area. For educational value is comparing by similar programs ran by similar programs run by different organizations.

There are five nature centers in the metro park system which provide free education programs for visitors. Some include attractions such as animal galleries and small animal shows making each center similar to a small natural history museum.

Besides programming, the natural parks also bring huge benefit to the earth such as sustaining the variety of life and storing carbon. The social value of the park will be like underpinning tourism industry and bringing people together. The cultural value can be considered by inspiring people's hearts and souls.

Tangible Social Benefits Valuation

It is difficult to establish a complete view of the economic value of the social benefits of parks. For example, how do we put a price on an hour of sitting in peaceful solitude? This question is complicated by the fact that each individual values that experience differently.

Other researchers have attempted to approach this issue by analyzing travel distance and salaries of park visitors. Admittedly this method has flaws. It does not address the issue of salaried people who do not experience a true opportunity cost. They are not giving up an hour of pay in order to enjoy an hour at the park. Travel times are also problematic. It begs the question

whether a park is truly more valuable to a person who travels a great distance than it is to a person who lives nearby.

This team, instead, approached this valuation from the perspective of more tangible assets, such as educational programs and recreational facilities; acknowledging that the intangible benefits were not captured. The question that was asked was: what if the Metroparks ceased to offer their facilities and programs? How much would an individual need to pay for similar opportunities outside of the park system?

Other organizations offer comparable services. For example, school districts provide educational programming, gyms offer fitness facilities and reception halls offer rentals for social gatherings. However, the Cleveland Metroparks offer their facility and services for free or for a heavily subsidized fee. Therefore, the park visitor is receiving benefits for a price lower than what they would be willing to pay. This economic concept is called consumer surplus. This is the difference between how much a person pays for an item and how much that person would be willing to pay.

The attached spreadsheet applies the consumer surplus concept. The fees and usage levels of various services provided by the parks have been calculated. These services include educational programming provided to specific groups, as well as those provided to the general public; unstructured physical fitness usage; green fees for golf; and facility rental for events. The above services are then compared to the market rate for comparable services outside of the park system. The difference between these two values is the consumer surplus, or the monetary benefit received by park consumers.

In order to calculate the market rate for educational programming offered to the general public, the average hourly cost to educate a Cuyahoga County public school student was used.

Whereas, in calculating the educational programming offered to school and other groups, the average teacher salary per instruction hour was used (Cuyahoga County public school teachers). The rationale for this distinction was that school groups were still expending funds for their own teachers to chaperone the groups, for transportation and for other overhead. Therefore, the added financial benefit is merely the addition of an instructor. The school districts do not absorb those expenses when the programming is offered to the general public.

For unstructured physical fitness, it could be argued that an individual who uses the park for exercise at least once per week would receive comparable benefit from a YMCA membership. In the golf category, Metropark green fees were compared to the average green fee for public golf courses within Northeast Ohio. Cart rentals and similar services were not compared because the rates for the Metropark courses were similar to those of other public courses. Facility rentals were compared to the average fee paid (nationwide) for facility rental for wedding receptions. Finally, boarding for horses was excluded because the stables at the Rocky River reservation were no less expensive than other boarding facilities. Furthermore, horseback riding lessons and trail rides are provided by private organizations not affiliated with the Metroparks.

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