THE ECONOMIC BENEFITS OF NATURAL RESOURCE PROPERTIES MANAGED BY LINN COUNTY CONSERVATION BOARD

Linn County, Iowa

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The Linn County Conservation Board currently manages 8,344 acres of land in the form of parks, preserves, natural areas and trails, which is 1.5% of total land in Linn County. These public areas not only provide natural resource benefits but provide opportunities for conservation education and outdoor recreation. Popular activities include hiking, biking, camping, fishing, boating, birding, picnicking, geocaching, hunting and many more. Numerous studies have shown that parks and open spaces have a positive impact on the health and well-being of the population. Linn County's conservation system is a significant attraction for people to live in, and visit Linn County.

Many methods have been used throughout the country to determine the economic value of public open spaces to communities. Measuring such resources has proven to be challenging as not every aspect of a park and natural area system can be quantified. For example, the mental health benefit of a walk in the woods or sitting on the edge of a wetland listening to the sounds of nature is difficult to assign a dollar value to. Factors such as property value increases for homes located near parks, profits from tourism dollars and visitor spending, health cost savings and many other aspects that bring dollars to the local economy, are often analyzed. While some of these economic benefits can be calculated, it is not feasible to determine all benefits due to time constraints or benefits that cannot be measured.

Since determining the economic value of parks and natural areas is complex and varied throughout different regions of the country, this report was compiled using data from numerous studies. This report will primarily focus on the economic benefit of the Linn County Conservation system's natural resources with a very conservative estimate. A per acre value has been assigned to the resources based on review of multiple studies conducted all over the country by many different agencies. The lowest dollar value per acre from the studies was used when multiple values were given for the same benefit in determining the value for Linn County. Using the lowest value eliminates the variation from geographical location and population base of various studies. It also represents the lowest possible value of the resources and, if anything, under estimates the total economic value of Linn County Conservation's natural resources system.

The tables below show the economic benefits and the associated values of the resources in the Linn County Conservation system. If something has "value," it is beneficial, desirable or worthwhile. We contend that natural ecosystems have intrinsic value in and of themselves. This type of value is not based on economic benefit and is not included in this analysis. The value of the resources lies in the benefits that it provides to the environment or people, something that is not easily measured. Wetlands, prairies, and woodlands can have ecological, social, and/or economic values. True natural resource value, however, goes beyond money. How much value does one place on the beauty of natural resources? All values are not absolute and are difficult to evaluate based on monetary calculations.

Benefits or function of these systems are defined as the processes that improve or contribute economic value. Examples include improving air quality by producing oxygen and consuming carbon dioxide, water quality benefits, flood control, carbon sequestration, and increasing biodiversity. For example, water quality, flood control and water infiltration measures the ability of this habitat type to cleanse water by removing nitrates, phosphates, sediment and other contaminants. It also involves the ability of this vegetation type to infiltrate and hold water slowing excessive runoff and reducing flooding. Biodiversity refers to the number and variety of plant and animal species found on the area. These areas add value through direct recreational benefits of birding, fishing, hunting, nature appreciation, and nature photography.

The estimated economic impact per year of three major categories of natural areas managed by the Linn County Conservation Board is illustrated below. Tables 1-3 show the value for prairie, woodland, and wetlands. These three types of natural areas combined total approximately 6,276 acres of the land managed by Linn County Conservation. Table 4 shows another category of natural area that is a transition zone between the three categories listed above, and consists of undeveloped permanent cover. This could be cool season grass and shrub areas, open water resources such as ponds, streams, and river area. The land is idle, not cropped, and consists of an additional 1,387 acres of land managed by Linn County Conservation. No consistent data for these transition zones or areas of permanent cover could be found. However, these areas of lower ecological quality still contribute a significant amount of benefit when compared to developed landscapes. One could then assume that they have at least half the value of the quality natural areas. Table 4 values are the average value of prairie and woodland combined and reduced by 50%. In total of the 8,344 acres of land managed by Linn County Conservation, 7,663 acres are undeveloped natural open spaces. This is roughly 95% of the land managed by Linn County Conservation.

Table 1. Economic Benefits of Prairie

Prairie Benefits	Annual Value Per Acre	Total Acres	Total Value
Water Quality, Flood, Control, & Water Infiltration	$142		
Air Quality	$94		
Carbon Sequestration	$819		
Biodiversity & Wildlife	*dollars included in recreation benefits		
	$1,055/Total Value Per Acre	**1,227**	**$1,294,485**

Orlan Love Prairie, Squaw Creek Park

An acre of prairie can infiltrate as much as 12 inches of rain per hour. This is due to its thick, deep root systems, which creates open spaces and allows water to permeate the soil. Thereby reducing runoff, soil loss, and floodwater retention. An acre of row crop can only infiltrate ½ to 1 ½ inches of rain per hour.

Table 2. Economic Benefits of Trees/Forest

Tree/Forest Benefits	Annual Value Per Acre	Total Acres	Total Value
Water Quality, Flood, Control, & Water Infiltration	$142		
Air Quality	$94		
Carbon Sequestration	$727		
Biodiversity & Wildlife	*dollars included in recreation benefits		
	$963/Total Value Per Acre	**4,628**	**$4,456,764**

Wickiup Hill Natural Area

Trees and forests work to restore a more natural hydrology, which leads to better water quality and more stable quantity. Upland forest canopies intercept a portion of rainfall and prevent it from rushing into streams. Roots increase the infiltration capacity of the soil, reducing overland flow and associated erosion. Floodplain forests provide resistance against out-of-bank flows, reducing floodplain scour and lessening downstream flood damage.

Table 3. Economic Benefits of Wetlands

Wetland Benefits	Annual Value Per Acre	Total Acres	Total Value
Water Quality & Water Infiltration	$822	421	$2,245,614
Air Quality & Carbon Sequestration	$360		
Biodiversity	$529		
Flood Control	$1,146		
Wildlife & Recreation	$2,477		
	$5,334/Total Value Per Acre		

Morgan Creek Park

A one-acre wetland typically holds 3 acre feet of water that is equivalent to 1 million gallons of water stored. That same wetland can remove up 68% of the nitrogen and 43% of the phosphorus from run of water.

Table 4. Economic Benefits of Permanent Cover

Permanent Cover Benefits	Annual Value Per Acre	Total Acres	Total Value
Water Quality, Flood, Control, & Water Infiltration	$71		
Air Quality	$47		
Carbon Sequestration	$386		
Biodiversity & Wildlife	*dollars included in recreation benefits		
	$504/Total Value Per Acre	**1,387**	**$699,048**

Buffalo Creek Natural Area

Permanent cover of cool-season grasses and shrubs left undeveloped reduce water runoff, provide soil protection, and increase water infiltration.

The benefits of open spaces and quality natural resources, such as beautiful woodlands wetlands and prairies, are well known among outdoor enthusiasts, and we are better positioned to quantify the value of what our conservation system brings to Linn County. The total economic benefits of Linn County Conservation Boards Parks and Natural Areas open spaces annually is calculated at $8,695,911. This value is for environmental services of natural areas only and does not include direct recreational and health benefits of these areas.

A 2007 study *The Economic Value of Iowa's Natural Resources by Daniel Otto, Dan Monchuk, Kanlaya Jintanakul, and Catherine Kling of Iowa State University*, examined the direct economic benefits of spending related to natural area use based on estimated park visits and expenditures for those visits. Examples include gas, goods, user fees, licenses, and special equipment. The estimated economic impact for Linn County Conservation's park system was $18,034,563 in 2007. If you add the average inflation rate of 1.79% since 2007 and the increase in estimated visits over time, that number increases to $25,680,000.

Table 5. Linn County – Park Holdings

Acres	Estimated Visits	Estimated Expenditures
6,881 (2007)	714,665	**$18,034,563**
8,334 (2020)	1,000,000	**$25,680,000**

Source: *The Economic Value of Iowa's Natural Resources*

When combining natural resources, environmental services and visitor expenditures, the Linn County Conservation Board system contributes over $34.5 million annually in economic benefits to Linn County. This calculation does not completely account for mental and physical health impacts.

Considering an overall general fund operating budget of $4.7 million annually, the Linn County Conservation Board produces an incredible return on investment for Linn County when combined with physical and mental health benefits produced by the natural resource beauty and outdoor recreation opportunities. The Linn County Conservation system of parks, trails, and natural areas are an important foundation to the overall health and quality of life for Linn County residents.

Economic Benefits References/Resources

Conservation Fund, Houston-Galveston, Green Infrastructure and Ecosystem Services Assessment, 2013, last visited April 14, 2015 here: http://www.conservationfund.org/images/projects/files/Houston_Galveston_Report.pdf

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Coder, Dr. Kim D., "Identified Benefits of Community Trees and Forests", University of Georgia, October, 1996. (One hectare forest equals $136/day value of air pollution control. Converted to acre/year)

Air Pollutant Uptake by Sacramento's Urban Forest. Klaus Scott & E. Gregory McPherson & James Simpson. 1998. (Total monetary value of pollutant removal estimated at $1,500/ha tree cover per year)

Quantifying Urban Forest Structure, Function, and Value: the Chicago Urban Forest Climate Project. 1997. (50.8M trees provided $9.2M air pollution benefit in 1991 = 0.18 cents/tree, or 0.29 by 2011)

Houston's Regional Forest. USDA Forest Service & Texas Forest Service study, Oct. 2005. Converted to per tree and 2011 values.

A Benefit-Cost Analysis of Ten Street Tree Species in Modesto, CA. E. Gregory McPherson, Journal of Arboriculture 29(1): January 2003. ($2-53 per tree depending on species. $14.27 was the average)

USDA Forest Service. Estimates over 50-year lifetime, a tree generates $31,250 worth of oxygen, $62,000 worth of air pollution control, recycles $37,500 worth of water, and controls $31,250 worth of soil erosion. Air pollution value converted to tree/year.

https://www.card.iastate.edu/research/resource-and-environmental/items/DNR-Amenity.pdf