

Some Persuasive Facts *for protecting biodiversity*

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West Nile Disease

There is a common misconception that wetland habitat protection will lead to increased numbers of mosquitoes and increased threat of contracting West Nile Disease. The principal transmitter of the West Nile Virus is the northern house mosquito (*Culex pipiens*), which breeds in the standing water that collects in rain barrels, clogged gutters, flower pots, catch basins, discarded tires, and other human-made containers. The highly organic nature of this stagnant water, along with a lack of predators, provides optimal conditions for the development of larval mosquitoes. Naturally-occurring, healthy wetlands, on the other hand, have a diversity of predators that eat mosquito larvae; some invertebrate predators include diving beetles, backswimmers, water striders, and dragonfly and damselfly larvae. Certain species of birds, fish, and amphibians also feed on larval and adult mosquitoes. In addition, water levels in healthy wetlands fluctuate regularly, which deters *Culex* mosquito breeding. In Massachusetts, when the Essex County Mosquito Control Project restored a 1,500 acre wetland, the mosquito population dropped by 90 percent! This is a good example of biodiversity providing a human-health service. Maintaining and restoring high quality wetlands may not only help control flooding, preserve water quality, and provide important habitat, it may control mosquito-related problems, as well.

Lyme Disease

In a study conducted at the Institute of Ecosystem Studies in Millbrook, NY, researchers documented that forest tracts smaller than three acres averaged three times as many ticks as did larger forest patches and seven times as many Lyme-infected ticks. The reason has to do with decreased mammalian biodiversity in smaller forested patches – fewer small mammal competitors and fewer mammalian predators to control the populations of white-footed mice, which are the prime carriers of black-legged ticks which carry Lyme. This is a perfect example of how humans have tinkered with the landscape enough to throw off the intricate connections that sustain a healthy environment, and thanks to fragmentation, it is difficult to spend time in the forest without concern over our long-term health. Land-use planners should seek to prevent further fragmentation of deciduous forests into small patches, especially fragments smaller than five acres, where white-footed mice seem to thrive.

Another Economic Perspective

When considering the economic benefits of biodiversity conservation, the discussion often includes costs of water treatment and drinking water supply, flood control, loss of working farms, and possibly, human health concerns. But in addition to these services provided to the human community by biodiversity resources, there are the far less complicated economics of recreation. According to an EPA report, national economic activity directly associated with non-consumptive enjoyment of birds generated 191,000 jobs and more than \$895 million in sales and income tax revenues in 1991. Nature-related recreation is the fastest growing activity of the tourism industry - with an annual increase of about 30% since 1987. Much of this nature-based tourism involves birds, many of which are wetland-dependent. Birding has increased more quickly than other outdoor recreation activities, such as biking, pleasure walking, skiing and golf. And the effect of dollars spent by ecotourists in and around bird watching sites is “multiplied” as tourist dollars generate local wages and consumer income, and so on. Regional examples include Cape May, where 100,000 annual birders provide cumulative impact of nearly \$10 million each year. At Hawk Mountain Sanctuary in Pennsylvania, 50,000 visitors annually contribute over \$4 million to the local economy.

Earthworms and Forest Ecology

When discussing the importance of biodiversity with non-believers, we're often asked if it will really make a difference if we lose a particular species. Not enough is known to answer that question, but many feel it's important to err on the side of safety. The famous Aldo Leopold quote sums it up quite well: "To save every cog and wheel is the first step to intelligent tinkering." Without a particular 'cog' or 'wheel' in our natural systems, we can't predict how well those systems will function. Recent studies, however, have illustrated what can happen when we add a new cog or wheel to the system.

This situation involves the effects of non-native earthworms in forest habitats. The native earthworm populations of the Northeast were wiped out in the last glaciation; earthworms present today were first introduced by European settlers, and since then via unused fishing bait, compost, and other avenues of soil transport. Gardeners know that earthworms are extremely effective at breaking down organic matter in soils, but recent research has documented dramatic changes in native hardwood forest ecosystems when exotic earthworms invade. The problem stems from the worms' rapid decomposition of leaf litter, a process that typically is accomplished at a much slower rate by fungi and bacteria. The resulting impacts have included changes in soil structure, declines in nutrient availability, and loss of native understory plant species and tree seedlings. The associated ripple effects appear to be significant for other components of biodiversity, as well, including small mammal, bird and amphibian populations, and may be facilitating invasions of other exotic species such as common buckthorn and garlic mustard. More research is needed to fully understand the magnitude of the problem on our native hardwood forest habitats, and the cascading ecological and economic impacts.

Web Resources

West Nile Disease:

US Army Corps of Engineers

<http://www.usace.army.mil/inet/functions/cw/cecwo/reg/westnile.htm>

Purdue University Dept. of Forestry and Natural Resources

<http://www.fnr.purdue.edu/inwood/past%20issues/mosquito.htm>

Lyme Disease:

A scanned copy of the manuscript "Effects of Forest Fragmentation on Lyme Disease Risk" published in Conservation Biology, Volume 17, No. 1, February 2003, is available at:

<http://chge.med.harvard.edu/education/course/biodiversity/terrestrial/documents/Allan.pdf>

Economics of Recreation:

Georgia Wildlife Federation's "Bucks from Birds: Economic Values of Bird-related Recreation":

<http://www.gwf.org/birdbucks.htm>

USEPA's Watershed Academy Web, Wetland Functions and Values:

<http://www.epa.gov/watertrain/wetlands/text.html>

Earthworms and Forests:

The Great Lakes Worm Watch

<http://www.nrri.umn.edu/worms/default.htm>