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RESEARCH REPORT

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Trees and Nearby Nature for Health: What is the Economic Value?

by Kathleen Wolf, PhD

A balanced diet and regular exercise are some of the basics for good health, and a daily dose of nature may be equally important! But if people even think about the health benefits of nature, it is usually in terms of personal choice or individual benefits, such as consuming organic food or drinking bottled water. What's missing is the awareness of the community-level health benefits that everyday experiences of nature provide.[1]

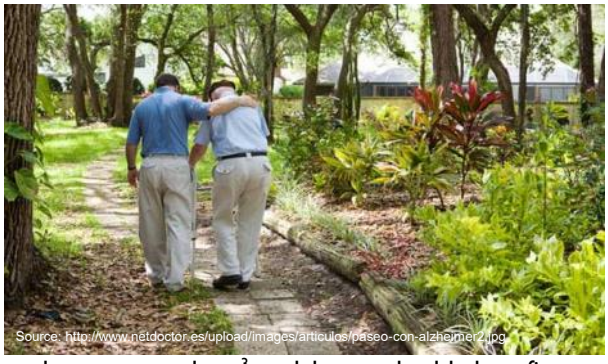
Evidence of Health Benefits

The Green Cities: Good Health web site (GCGH) summarizes nearly 40 years of evidence about nature and human health in cities. Literally thousands of studies, from all around the world, show that "metro nature"— the various landscapes and vegetation of urban places, such as parks, gardens, green infrastructure and the urban forest —provides positive and measurable health benefits that improve quality of life.

Other opportunities have come along while constructing the GCGH science review. For instance, collaborating with The Nature Conservancy, we've produced several research outreach products:

- *Outside Our Doors: The Benefits of Cities Where People and Nature Thrive* (pdf link)
- *Cascading Benefits: Designing Green Stormwater Infrastructure for Human Wellness* (pdf link)
- The Power of Trees (video link)

Economics – The Need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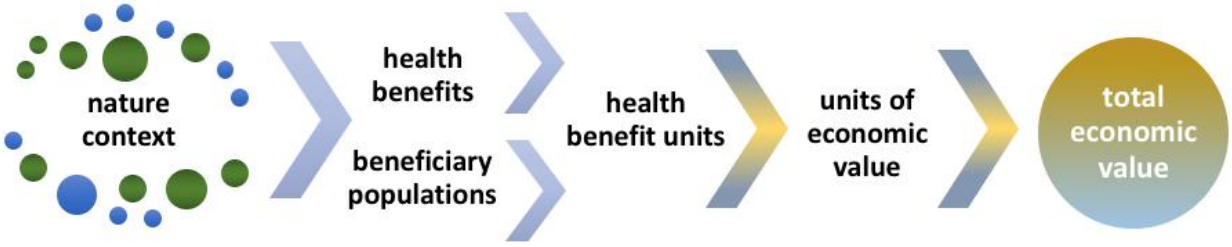
As my team worked on GCGH we realized there was a crucial missing component – understanding the economic value. Various tools, such as i-Tree, estimate the environmental services of trees, and provide economic values for some of those benefits. I felt that human health would also show substantial economic benefit. Any margin of saved costs is important, as U.S. annual health services costs are more than $3.3 trillion, about 18% of the GDP.[2]

Urban foresters, park managers, and environmental planners are often asked to justify the expenses of providing trees, parks and nature in the face of many civic needs. Cities and firms can readily tally the costs of planting and maintenance, but the economic returns are less apparent. Translating environmental services, increased property values,[3] and human health benefits to monetary terms helps urban natural resources professionals make the case for metro nature. Economics can't capture all the values that people hold for nature, but it earns you a place at the table in budget and policy discussions.

Health Benefits Valuation

Our team was made up of myself and several economists. Dr. Alicia Robbins, then a post-doctorate at the University of Washington, helped construct a value framework.[4] Dr. Stephen Grado, professor of forestry, and Marcus Measells, an extension associate, both with Mississippi State University's Department of Forestry, lead the work on the valuation strategies. Project funding was provided by the U.S.D.A. Forest Service, State and Private Forestry, on recommendation of the National Urban and Community Forestry Advisory Council.

The figure below shows the valuation process. First, we reviewed studies that documented the health effects across different city nature contexts, such as street trees or parks. We selected six social and public health outcomes: increased infant birth weight; reduced attention-deficit hyperactivity disorder (ADHD) symptoms in children; better school performance; and decreased crime, cardiovascular disease, and Alzheimer's disease. Using publicly available economic data our team then estimated the potential health care cost savings, as benefits units and as total economic values. *(continued on back)*



Behind the Research: Meet Dr. Kathleen Wolf

How did you get interested in your field of work?
I was immersed in wilderness at a young age; my father was a landscape contractor and avid outdoorsman. I majored in Biology, and worked as an urban forester in Key West. Landscape architects often called me to specify plants for designs, and I found myself drawn to the connection between people and plants, leading to a master's in Landscape Architecture. "Environmental Psychology," what I define as the patterns of response of humans to nature is the essence of my passion. This area combines nature, culture, design, and science.

Your current research focuses on nature and human health. What is your ultimate goal with this line of study?
Research confirms that humans need nature. So we need to make sure that we all have access to "nearby nature" on a regular basis. We need to provide nature programming for people, because people have different comfort levels and different abilities to engage with nature. Programs like "Walk with a Doc" or Yoga in the Park can help. Finally, we want to make the availability of nature part of city policy and integrate it with housing policy, transportation policy, etc. so it becomes part of standard city infrastructure.

What trends do you see in this area of research?
While the research is expanding, the bigger change is social change. There is now greater public awareness and public health official awareness of the benefits of nature to human health. Also, there's been a shift from environmental health focused on regulations, like removing toxins from the air and water. Now they're looking at nature as an additive benefit and a source of preventative medicine.

Read more of our interview with Dr. Wolf in the Recent Updates section of our website.

Research Update

Dr. Wolf updates us on her "Urban forests for human health: a focused economic valuation" project supported by a 2017 Hyland Johns Grant:

The economic valuation is dependent on scientific evidence of positive health outcomes associated with trees. The grant award does not provide enough funding to actually do benefits research, so the first step is to scan existing studies for health effects, followed by the process to monetize them. I am in the midst of the health effects screening, and am doing this in collaboration with Health Canada and Natural Resources Canada. The work has been accepted for presentation at the International Urban Forestry Congress (IUFC) to be held in Vancouver, British Columbia, Canada from September 30 – October 3, 2018. The presentation will cover our benefits screening process and early results. We found that the study set addressed a wide variety of topics, including asthma, noise attenuation, birth weight effects, metabolic outcomes, mental health, etc.

Trees and Nearby Nature for Health: What is the Economic Value? *(continued from front)*

What did we learn? Our set of benefits, based on having nature readily available to all people, could provide annual savings in the United States of up to $6.8 billion. For instance, prescription costs for ADHD and Alzheimer's disease could be reduced by nearly $3.4 billion. Green campuses have been found to be related to increased graduation rates, which results in increased lifetime annual income.[5]

Again, we partnered with The Nature Conservancy to create a booklet that shares the results - *Nature's Riches: The Health and Financial Benefits of Nearby Nature* (pdf link)

Next Projects
We can determine market value for products that we extract from forests such as timber or paper pulp. These things can be bought and sold to establish price. However, health benefits from nature are not readily exchanged on markets, so we had to find proxies, such as less time in the hospital, fewer medications, or less time with therapists.

This project has set up a process we are using to explore other benefits values. We've only scratched the surface. The team has calculated nature-based health economics for older adults. The Tree Fund has provided funding for a study focusing on health benefits provided by city trees, woodlands, and the general urban forest.

These are all preliminary numbers, with room to build in more precision. There are also many other health outcomes that could be valued. Yet this research sets the stage for important discussions. The presence of trees and metro nature has economic consequences, an important finding for policy and planning in cities.

Dr. Kathleen Wolf is a Research Social Scientist with the College of the Environment at the University of Washington (Seattle), and is also a research associate with the Pacific Northwest Research Station, USDA Forest Service. Her research focus is the human dimensions of urban forestry and urban ecosystems, particularly human health. Another interest the translation of scientific evidence for use in local government policy and planning. You can view an overview of her research at www.naturewithin.info.

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[1]Lindland, E., M. Fond, A Haydon, N. Kendall-Taylor. 2015. Nature Doesn't Pay My Bills: Mapping the Gaps Between Expert and Public Understandings of Urban Nature and Health A Frameworks Research Report on Behalf of the TKF Foundation: Washington D.C.
[2]http://depts.washington.edu/hhwb/Thm_Economics.html
[3]U.S. Centers for Disease and Medicaid Services, 2016 estimates: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html
[4]Wolf, K. L., A. S. T. Robbins. 2015. Metro nature, environmental health, and economic value. Environmental Health Perspectives 123, 5, 390-98. https://www.fs.usda.gov/treesearch/pubs/49509
[5]Wolf, K. L., M. K. Measells, S. C. Grado, A. S. Robbins. 2015. Economic values of metro nature health benefits: A life course approach. Urban Forestry & Urban Greening 14, 694-701. https://www.fs.usda.gov/treesearch/pubs/49803