



# Trees and Your Health

TREE CITY USA®  
BULLETIN

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**T**he relationship between nature — especially trees — and public health has long been suspected. Frederick Law Olmstead, our nation's pioneer landscape architect, promoted his idea for Central Park on the concept that city folks need a bit of the countryside in their midst in order to maintain mental health. Likewise, J. Sterling Morton, founder of Arbor Day, believed that around the farms of his day, “Children reared among trees and flowers growing up with them will be better in mind and in heart than children reared among hogs and cattle.”

Today, there are more than 400 correlational studies that show improved health benefits related to time spent in nature. These relationships, in which trees play an important role, add another dimension to the importance of urban forestry. They provide even more evidence that community trees are far more than ornaments or the source of pleasant summer shade. They are an essential component of a sustainable, healthy environment for the men, women, and children who live in American cities of all sizes.

John Muir saw a walk in a wooded setting as “the clearest way into the universe.” He said, “Nature’s

Although not all the cause-and-effect relationships between trees and public health are yet understood, there is mounting evidence that trees do significantly contribute to public health.

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peace will flow into you as sunshine flows into trees.” Scientists today bear this out in less philosophical ways. In Japan, for example, a whole body of literature has grown up around what is called *Shinrin-yoku* or “taking in the forest atmosphere” or “forest bathing.” Benefits being cited range from improved moods and deepened friendships to strengthened immune systems and better sleep at night. Although daily access to forests and woodlands may be beyond the reach of most urban residents, natural areas in city parks and even well-treed streets can provide many of the same benefits.

A few examples of how trees affect human health are summarized in this issue of Tree City USA Bulletin. Not all the relationships are clearly understood and research on this fascinating subject continues and deserves to be supported. But the message is clear and needs to be taken to a wider audience in order to gain the broader public appreciation for trees that is necessary for continuous, systematic stewardship.



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# How Does it Work?

*The Druids and other ancients attributed the healing power of trees and other plants to magic. At first glance, one may conclude they were right. But now science is looking more closely not only at the relationship between nature and health, but the cause(s) behind the consequences.*

Some writers have argued that human affinity for trees — and resulting benefits — stems from our genetic base. This is difficult to test and affirm or deny. The spiritual aspect of trees is equally murky. The theory has been suggested that trees help us become more aware of our connection with something larger than ourselves. In her book, *Between Earth and Sky: Our Intimate Connections to Trees*, Dr. Nalini Nadkarni adds that trees put us in a state of “mindfulness,” or “the need to be aware of and compassionate towards one’s surroundings.”

For those who want more concrete evidence of the healing power of trees, there is a growing body of knowledge. Brain chemistry is certainly involved. Perhaps it is as simple as greenery stimulating a dopamine pulse, the neurotransmitter that sends signals to other nerve cells, including the so-called pleasure centers of the brain. But it is probably more than that. Research has focused on a number of physical effects of being around trees, gardens, and other green or natural surroundings. For example, environmental psychologist Terry Hartig did an experiment using 112 young adults. They were assigned a variety of stressful tasks and then some were placed in a windowless room and some were exposed to tree views and walked through a nature preserve. He then measured blood pressure and found that the latter group showed blood pressure declining and better feelings commencing sooner than in the control group.

Japanese people enjoying the “forest baths” mentioned on page 1 were found to benefit from lower pulse rates, lower blood pressure, and lower concentrations of cortisol, a chemical that, among other unhealthy things, suppresses the immune system.

## THE KEY

The bottom line that explains the healing power of trees points to stress reduction. Stress is our nervous system giving our body the so-called fight-or-flight response to various stressors. While this was useful to cave dwellers — and still is in many circumstances — it is not so good as a reaction to unavoidable circumstances of modern life. Stress triggers higher heart rates, muscle tension, a weakened immune system, sweating, and other unhealthy physical responses.

According to Dr. Marc Berman, as reported in *The Wall Street Journal*, trees and other components of nature engage our attention as something interesting and pleasant. They do not require intense focus, instead giving our minds and bodies time to restore themselves. In an experiment, Dr. Berman found that his subjects performed 20 percent better on memory and attention tests after they paused for a walk through an arboretum. Subjects who strolled down a busy street showed no cognitive boost on the tests.

## A SUMMARY OF BENEFITS

Dr. Kathleen Wolf sums up the benefits of exposure to nature in cities saying that the urban forest “can help us to calm and cope, to recharge our ability to carry on.” The healing — and preventive — effects of trees and green space on human health include:

- **ENVIRONMENTAL ACTION** or the eco-benefits that come from filtering air and water pollutants and reducing heat.
- **PHYSICAL ACTIVITY** by providing settings that encourage people to engage in walking, jogging, and other outdoor exercises.
- **SOCIAL SUPPORT** by providing inviting places that promote social interaction and a sense of inclusion and can lead to reducing social annoyances and preventing crimes.
- **RESTORATION**, the result of reducing stress and helping people restore their cognitive functions and ability to cope with the demands of life.



# Real Life Impact — A Few Examples

## HOSPITAL RECOVERY

Studies by Dr. Roger Ulrich gained worldwide attention and made a huge impact on the idea that the healing power of nature is real. Dr. Ulrich tracked the recovery rates of 46 hospital patients who had gall bladder operations. Half were assigned to recovery rooms facing a brick wall. The other half could see a small stand of trees outside their windows. He found that patients who could see trees spent 8.5 percent fewer post-operative days in the hospital and needed fewer pain-killing medicines than patients viewing the brick wall. The study has been replicated many places and with similar results.



At Sacred Heart Medical Center at RiverBend in Springfield, Oregon, doctors as well as patients and their families find peace and restoration in the wooded grounds behind and beside the hospital. Urban foresters and tree boards have an opportunity to encourage and assist with institutional landscaping that provides emotional/psychological benefits as well as ecoservices.

## THE WORKPLACE

Stephen and Rachel Kaplan were also modern pioneers who looked at human-nature relationships, including office workers and their surroundings. As with many studies that have followed theirs, they found that workers with windows looking out at green elements were more satisfied at work and had more patience, less frustration, increased enthusiasm for work, and fewer health problems than their colleagues in windowless offices. Similar relationships have been shown to reduce absenteeism and increase efficiency.

## INNER CITY GIRLS

Work by Drs. Ming (Frances) Kuo and William Sullivan have uncovered a trove of amazing relationships. One famous study showed the positive social effects of landscape around public housing projects. Another focused on young girls living in Chicago apartments. They found that girls in apartments with greener, more natural views scored better on tests of self-discipline than a matched group of girls with more barren views. The young ladies fortunate to have green views showed better concentration and less impulsive behavior and were better able to postpone immediate gratification. This



means they can better handle things like peer pressure, sexual pressure, and can generally do better in school and prepare more responsibly for later life.

# Real Life Impact Examples Continued



## CHILDREN

The Dimensions Educational Research Foundation is the repository for scores of studies that show the positive influence of unstructured outdoor play. Trees, of course, are a large part of the spaces that make this possible. The studies of these benefits point out that, in addition to physical benefits, outdoor play opportunities help make children “smarter, better able to get along with others, healthier, and happier.” With more than 2 million children in the U.S. diagnosed with attention deficit hyperactivity disorder, considerable attention has been focused on how natural settings might be of help. These studies have come to the same conclusion: Children with ADHD show reduced symptom severity when they live in more natural settings or have “green time” during the day.

## ASH TREES AND HEALTH

In a study by scientists at Drexel University, the National Institute of Standards and Technology, and the U.S. Forest Service, it was found that people living in areas infested by the emerald ash borer (and the resulting tree loss) had health problems to a greater degree than residents in other areas. Through analysis of data from nearly 1,300 counties in 15 states, the researchers found that residents in the ash borer zones suffered from an additional 15,000 deaths from cardiovascular disease and 6,000 more deaths from lower respiratory disease when compared to uninfected areas.

As reported in the Society of American Forester's *The Forestry Source*, Dr. Geoffrey Donovan of the Forest Service said, “There's a natural tendency to see our findings and conclude that, surely, the higher mortality rates are because of some confounding variable, like income or education, and not the loss of trees. But we saw the same pattern repeated over and over in counties with very different demographic makeups.”



## SENIOR CITIZENS

In a Dutch study that controlled for income and other factors, the proximity of nature was found to affect the health of the elderly. In a greener environment, people reported fewer poor health symptoms and perceived better health in general. The researchers concluded that “10 percent more green space in the living environment leads to a decrease in the number of symptoms that is comparable with a decrease in age by 5 years.”



## PREGNANCY AND NEWBORNS

Another careful study was conducted in Portland, Oregon, by Dr. Donovan and his colleagues at the U.S. Forest Service Pacific Northwest Research Station. The researchers found a relationship between healthy babies and trees within 50 meters (164 feet) of their homes. For each 10 percent increase in tree canopy in this zone around a house, the rate of undersized newborns decreased by 1.42 per 1,000 births. By applying this finding to the improvement of public health and the reduction of medical costs, we can see that if the city were to increase tree cover by 33 percent, there would be three fewer undersized newborns per 1,000 births. That, of course, is not even mentioning the other benefits described in this bulletin.

The research question is: What is the exact role of trees in producing healthier babies? Other research suggests that exposure to nature can reduce stress levels. Stress in pregnant women is known to be harmful to the developing fetus and can increase the probability of underweight birth. Perhaps that is the cause of the beneficial effect. Or is it that women of a certain background are more drawn to living in an area with trees? Perhaps that same kind of woman is more likely to take better care of herself?

“In our model we tried to account for about 100 variables,” Dr. Donovan said. “This isn’t the final word.”

The conclusion is that there is definitely an important link identified by the research. Whatever the explanation, the bottom line is that trees are involved. It is one more piece of evidence that trees are important to public health.

## THERAPY AND HEALING – SOME DIFFERENCES

**THERAPY** is the treatment of disease or disorders, as by some remedial, rehabilitating, or curative process.

**HORTICULTURAL THERAPY** is the engagement of a person in gardening and plant-based activities, facilitated by a trained therapist, to achieve specific therapeutic treatment goals.

**HEALING GARDEN** or therapeutic garden is a space in which a person can build on or find inner strength. This is a space anyone can create or use and, by extension of the meaning, can include special places with trees. It is designed to meet the physical, psychological, social, and spiritual needs of the people using the garden as well as their caregivers, family, and friends. These spaces are typically found around hospitals, nursing homes, assisted living residences, and retirement communities.

**HORTICULTURAL HEALING GARDEN** is a space professionals use to encourage active involvement of clients or patients. The therapist matches plants and chores with the needs of individuals who are challenged physically, emotionally, or socially.



# What it Can Mean to Urban Forestry

*The human health benefits resulting from trees and green spaces are significant. They have even been called the green vitamin, or Vitamin G. And this powerful medicine rests in the hands of urban foresters, park managers, tree boards, and other stewards of trees and green spaces in our cities and towns.*

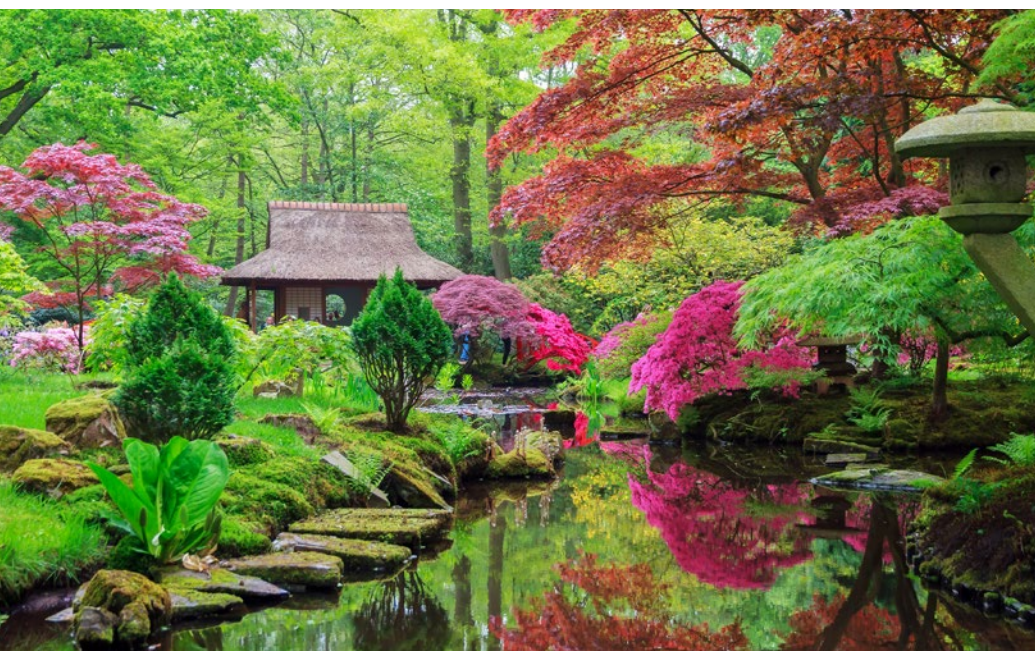
## HOW TO USE THIS INFORMATION

- ✓ **PLANT TREES!** With 80 percent of our nation living in stressful urban situations, residents in all neighborhoods need the healing power of trees.
- ✓ **GAIN SUPPORT** The data developed by research can be a powerful tool in gaining the support for urban forestry by city councils, potential donors, and grant organizations.
- ✓ **BROADEN YOUR AUDIENCE** Expand beyond traditional partners by showing health care providers and insurance companies the benefit of trees. For example, based on the Portland study of tree canopy density and healthy babies mentioned on page 5, the findings suggest that by increasing tree cover by 33 percent, there would be three fewer undersized newborns per 1,000 births. More trees would lower the costs of health care in this and many other ways.
- ✓ **CREATE HEALING GARDENS AND TREE STANDS** Spaces designed for this purpose will gain public attention and appreciation. Parks and other public land can be dedicated as healing spaces. Guidance for the creation and maintenance of these places can be provided to hospitals, care centers, and similar institutions.



- ✓ **CELEBRATE ARBOR DAY** Arbor Day celebrations remain one of the best ways to gain local media attention. As part of your celebration, you can:

- Emphasize public health benefits by modifying the sample Arbor Day Proclamation found at [arborday.org/celebrate](http://arborday.org/celebrate).



- Create a media package or news release that highlights the relationship between trees and human health.
- In one or more of the Arbor Day presentations, have someone discuss the public health benefits that are described in this bulletin.
- Include the health benefits of trees in presentations to children.
- Have children create a poem or skit that informs others about the health benefits of trees.

✔ **CREATE MEMORIAL TREES AND GROVES** Trees provide the psychological benefits described throughout this bulletin as well as ecoservices such as cleaner, cooler air and stormwater retention. But they also offer one additional opportunity. When death occurs in a family or tragedy strikes on a larger scale, loved ones are often at a loss as to how to memorialize or properly celebrate the life of the deceased. Planting memorial trees can help in two ways. First, it truly continues the contributions of an individual beyond his or her lifetime, and at the same time it provides an uplifting avenue of action for the bereaved.

A community program that enables donations for memorial trees usually takes one of several forms:

- A special tree is planted somewhere in town or on an institution's grounds where it is needed, paid for with donations, and identified with a plaque or marker. The latter is sometimes flat on the ground or surrounded by mulch to address maintenance issues.
- Same as above but in a place designated for memorial trees such as along bike paths or in greenways, cemeteries, or arboreta.
- In both cases, the addition of individual trees is ongoing as the need arises and should be publicized with specific costs, rules, and opportunities clearly spelled out in a brochure. Distribution of the brochure should include all funeral directors and churches in the area.
- A memorial grove might be created for the commemoration of a person or event. This usually entails the dedication of a piece of land for the purpose and the addition of infrastructure such as walks, lighting, and appropriate signage.



✔ **SHADE YOUR PLAYGROUNDS** The Arkansas Forestry Commission has taken seriously a message from the American Cancer Society that children exposed to too much sun risk skin cancer later in life. Shade can counter the threat. A study by Purdue University determined that with 90 percent tree canopy cover, the ultraviolet protection factors are 10 times greater than with none, giving the same Sun Protection Factor as found in 10-rated sunscreen lotion.

Under the leadership of former Patti S. Erwin, Arkansas urban forestry coordinator, the Shade Trees on Playgrounds program (STOP) was initiated to plant trees in schoolyards. Funded by grant money and volunteer labor, large-maturing hardwood trees have been planted at participating schools. To get extra educational value from the project, school representatives attended a workshop, and a curriculum was designed that incorporated math, science, history, and a variety of activities. Children not only learned more about the benefits of trees and participated in the planting — complete with a ceremony — they also became responsible for the ongoing watering and care of the trees.

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The Grove of Remembrance, a program of the New Jersey Tree Foundation, is a 11-acre tract where over 750 trees were planted in remembrance of 9/11. The memorial grove is located in Liberty State Park.



# The Doctor is In — and Prescribes Nature



Activities to initiate or expand the use of trees to take advantage of their healing power may qualify for points needed to earn the Tree City USA Growth Award. For more information, visit [arborday.org/growthawards](http://arborday.org/growthawards).

Many doctors understand the close relationship of the outdoors and good health. One pediatrician takes this so seriously that in 2017 he founded an unusual nonprofit organization, Park Rx America. Dr. Robert Zarr, says his mission is to decrease the burden of chronic disease while increasing health and happiness. At the same time, his organization's mission is to foster environmental stewardship. The key: routinely prescribing visits to nearby parks. On his organization's website, Dr. Zarr says, "It is rare for doctors to find such an accessible and inexpensive intervention that positively impacts a wide breadth of chronic disease, ranging from diabetics to high blood pressure to obesity to depression and many ... serious mental illnesses found in all ages. It is also quite satisfying and reassuring to find an intervention with few side effects."

According to *Time* magazine, Dr. Zarr writes up to 10 park prescriptions per day, not just as places to recreate, but literally as places to improve his patients' health. In addition, Park Rx America encourages more doctors to do likewise, and maintains an online directory of cooperating parks. Although many are currently concentrated in the Washington, D.C., area, the organization's website provides a means for other communities to add parks. Parks and other green spaces are searchable by zip code with results filterable by park attributes and pertinent features. Visitors can also download a free poster-size infographic that illustrates the positive health benefits of time spent in nature.

If a greener environment can play a role in managing ADHD (Attention Deficit Hyperactivity Disorder), few, if any, studies have explicitly examined whether the converse is also true: that ADHD may be a set of symptoms initiated or aggravated by lack of exposure to nature ...

If that's the real ailment, a walk in the woods would be the ideal treatment: It's not stigmatizing, has no serious side effects, and it's free. But such reliance on greenery would underscore the need to scale back industrialism, redesign cities, and expand access to nature — which can't be encapsulated in a pill, but could be equally powerful medicine.

— Richard Louv, Author of *The Last Child in the Woods*



## FOR MORE INFORMATION

For more information about Park RX America and links to studies about trees and public health, please visit [arborday.org/bulletins](http://arborday.org/bulletins).

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