



Immerse Yourself in a Forest for Better Health

Most of us sense that taking a walk in a forest is good for us. We take a break from the rush of our daily lives. We enjoy the beauty and peace of being in a natural setting. Now, research is showing that visiting a forest has real, quantifiable health benefits, both mental and physical. Even five minutes around trees or in green spaces may improve health. Think of it as a prescription with no negative side effects that's also free.

Health Benefits From Forests

[The reference list at the bottom of this page has links to specific studies on these benefits.](#)

Exposure to forests and trees:

- boosts the immune system
- lowers blood pressure
- reduces stress
- improves mood
- increases ability to focus, even in children with ADHD
- accelerates recovery from surgery or illness
- increases energy level
- improves sleep



*Spending time in forests makes us healthier.
Photo: Jennifer Miller*

How Do Forests Make Us Healthier?

Numerous studies in the U.S. and around the world are exploring the health benefits of spending time outside in nature, green spaces, and, specifically, forests. Recognizing those benefits, in 1982, the Japanese Ministry of Agriculture, Forestry and Fisheries even coined a term for it: shinrin-yoku. It means taking in the forest atmosphere or "forest bathing," and the ministry encourages people to visit forests to relieve stress and improve health.

Research is casting light on how spending time outdoors and in forests makes us healthier:

Exposure to forests boosts our immune system. While we breathe in the fresh air, we breathe in phytoncides, airborne chemicals that plants give off to protect themselves from insects. Phytoncides have antibacterial and antifungal qualities which help plants fight disease. When people breathe in these chemicals, our bodies respond by increasing the number and activity of a type of white blood cell called natural killer cells or NK. These cells kill tumor- and virus-infected cells in our bodies. In one study, increased NK activity from a 3-day, 2-night forest bathing trip lasted for more than 30 days. Japanese researchers are currently exploring whether exposure to forests can help prevent certain kinds of cancer.

Spending time around trees and looking at trees reduces stress, lowers blood pressure and improves mood. Numerous studies show that both exercising in forests and simply sitting looking at trees reduce blood pressure as well as the stress-related hormones cortisol and adrenaline. Looking at pictures of trees has a similar, but less dramatic, effect. Studies examining the same activities in urban, unplanted areas showed no reduction of stress-related effects. Using the Profile of Mood States test, researchers found that forest bathing trips significantly decreased the scores for anxiety, depression, anger, confusion and fatigue. And because stress inhibits the immune system, the stress-reduction benefits of forests are further magnified.

Green spaces in urban areas are just as important as rural forests. About 85% of the US population lives in suburban and urban areas and may not have access to traditional rural forests. That's O.K. Gardens, parks and street trees make up what is called an urban and community forest. These pockets of greenspace are vitally important because they are the sources of our daily access to trees.

Spending time in nature helps you focus. Our lives are busier than ever with jobs, school, and family life. Trying to focus on many activities or even a single thing for long periods of time can mentally drain us, a phenomenon called Directed Attention Fatigue. Spending time in nature, looking at plants, water, birds and other aspects of nature gives the cognitive portion of our brain a break, allowing us to focus better and renew our ability to be patient.

In children, attention fatigue causes an inability to pay attention and control impulses. The part of the brain affected by attention fatigue (right prefrontal cortex) is also involved in Attention-Deficit/Hyperactivity Disorder (ADHD). Studies show that children who spend time in natural outdoor environments have a reduction in attention fatigue and children diagnosed with ADHD show a reduction in related symptoms. Researchers are investigating the use of natural outdoor environments to supplement current approaches to managing ADHD. Such an approach has the advantages of being widely accessible, inexpensive and free of side effects.

Patients recover from surgery faster and better when they have a "green" view. Hospital patients may be stressed from a variety of factors, including pain, fear, and disruption of normal routine. Research found that patients with "green" views had shorter postoperative stays, took fewer painkillers, and had slightly fewer postsurgical complications compared to those who had no view or a view of a cement wall.

What happens if we lose trees?



The invasion of the emerald ash borer, or EAB, (*Agrilus planipennis*) since 2002 has provided an unfortunate opportunity to look at the effect of tree-loss on human health. EAB is a non-native, wood-boring beetle that kills all species of ash (*Fraxinus*) trees within three years after infestation. In some communities, entire streets lined with ash were left barren after the beetle arrived in their neighborhood. A study looked at human deaths related to heart and lung disease in areas affected by EAB infestations. It found that across 15 states, EAB was associated with an additional 6,113 deaths related to lung disease and 15,080 heart-disease-related deaths.

More Research is Needed

While the research in Japan is groundbreaking, we need more research on trees growing in the Northeastern US. We share some of the same genera with Japan, like pine, birch and oak, which all give off different phytoncides, but we have different species. The more we know about our local trees, the more applicable the science will be.

References

Please note: the following links leave the DEC website.

Akers, A., Barton, J., Cossey, R., Gainsford, P., Griffin, M., Mikleright, D. (2012). **Visual Color Perception in Green Exercise: Positive Effects on Mood and Perceived Exertion.** *Environmental Science and Technology*. 46(16):8661-8666. <http://www.ncbi.nlm.nih.gov/pubmed/22857379>.

Aspinall, P., Mavros, P., Coyne, R., Roe, J. (2012). **The urban brain: analyzing outdoor physical activity with mobile EEG.** *British Journal of Sports Medicine*. <http://www.ncbi.nlm.nih.gov/pubmed/23467965>.

Barton, J., Pretty, J. (2010). **What is the Best Dose of Nature and Green Exercise for Improving Mental Health? A Multi-Study Analysis.** *Environmental Science and Technology*. 44: 3947-3955. <http://www.ncbi.nlm.nih.gov/pubmed/20337470>.

Berman, M. G., Jonides, J., Kaplan, Stephen. (2008). **The Cognitive Benefits of Interacting With Nature.** *Psychological Science*. 19: 1207-1212. <http://libra.msra.cn/Publication/6994981/the-cognitive-benefits-of-interacting-with-nature>.

Children and Nature Network. (2012). **Health Benefits to Children from contact with the Outdoor & Nature.** 46 pages. <http://www.childrenandnature.org/downloads/CNNHealthBenefits2012.pdf>. <http://www.childrenandnature.org/>.

Donovan, G. Butry, D. Michael, Y., Prestemon, J., Liebhold, A., Gatzliolis, D., Mao, M. (2013). **The Relationship Between Trees and Human Health: Evidence from the Spread of the EAB.** *American Journal of Preventive Medicine*. 44(2):139-45. <http://californiareleaf.org/trees-in-the-news/the-relationship-between-trees-human-health>.

Gies, E. (2006). *The Health Benefits of Parks*. The Trust for Public Land. <http://www.tpl.org/publications/books-reports/park-benefits/the-health-benefits-of-parks.html>.

Hanson, P., Matt, F., Bowyer, J., Bratkovich, S., Fernholz, K., owe, J., Groot, H., Pepke, E. (2016) **The Human Health and Social Benefits of Urban Forests.** *Dovetail Partners Inc.* (1 MB PDF, 12 pages)

Kaplan, R., Kaplan, S. (1989) *The experience of nature: A psychological perspective*. New York: Cambridge University Press.

Kuo, F. E., Taylor, A. F. (2004) **A Potential Natural Treatment for Attention-Deficit /Hyperactivity Disorder: Evidence From a National Study.** *American Journal of Public Health*. 94(9): 1580-1586. <http://www.ncbi.nlm.nih.gov/pmc/articles/pmc1448497/>.

Lee, J., Park, B.-J., Tsunetsugu, Y., Kagawa, T., Miyazaki, Y. (2009). **Restorative effects of viewing real forest landscapes, based on a comparison with urban landscapes.** *Scandinavian Journal of Forest Research*. 24(3): 227-234. <http://www.tandfonline.com/doi/abs/10.1080/02827580902903341#preview>.

Lee, J., Park, B.-J., Tsunetsugu, Y., Ohra, T., Kagawa, T., Miyazaki, Y. (2011). **Effect of forest bathing on physiological and psychological responses in young Japanese male subjects.** *Public Health*. 125(2): 93-100. <http://www.sciencedirect.com/science/article/pii/S0033350610003203>.

Li, Q. (2010). **Effect of forest bathing trips on human immune function.** *Environmental Health and Preventative Medicine*. 15(1): 9-17. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2793341/>.

Li, Q., Kawada, T. (undated but probably 2010). **Healthy forest parks make healthy people: Forest environments enhance human immune function.** Department of Hygiene and Public Health, Nippon Medical School, Tokyo, Japan. <http://www.hphcentral.com/wp-content/uploads/2010/09/5000-paper-by-Qing-Li2-2.pdf>.

Li, Q., Kobayashi, M., Kawada, T. (2008). **Relationships Between Percentage of Forest Coverage and Standardized Mortality Ratios (SMR) of Cancers in all Prefectures in Japan.** *The Open Public Health Journal*. 1: 1-7. <http://www.benthamscience.com/open/tophj/articles/V001/1TOPHJ.pdf>.

Li Q, Kobayashi M, Wakayama Y, Inagaki H, Katsumata M, Hirata Y, Hirata K, Shimizu T, Kawada T, Park BJ, Ohira T, Kagawa T, Miyazaki Y. (2009). **Effect of phytoncide from trees on human natural killer cell function.** *International Journal of Immunopathology and Pharmacology*. 22(4):951-959. <http://europepmc.org/abstract/MED/20074458/reload=0;jsessionid=BnlPLmTxArJ6VpF0s4MU.6>.

Li, Q., Morimoto, K., Nakadai, A., Inagaki, H., Katsumata, M., Shimizu, T., Hirata, Y., Hirata, K., Suzuki, H., Miyazaki, Y., Kagawa, T., Koyama, Y., Ohira, T., Takayama, N., Krensky, A.M., Kawada, T., (2007). **Forest bathing enhances human natural killer activity and expression of anti-cancer proteins.** *International Journal of Immunopathology and Pharmacology*. 20(2 Suppl 2):3-8. <http://www.ncbi.nlm.nih.gov/pubmed/17903349>.

Li, Q., Nakadai, A., Matsushima, H., Miyazaki, Y., Krensky, A., Kawada, T., Morimoto, K. (2006) **Phytoncides (Wood Essential Oils) Induce Human Natural Killer Cell Activity.** *Immunopharmacology and Immunotoxicology*, 28:319-333. <http://www.ncbi.nlm.nih.gov/pubmed/16873099>.

Maas, J., Verheij, R., Groenewegen, P., de Vries, S., Spreeuwenberg, P. (2006). **Greenspace, urbanity, and health: how strong is the relation?** *Journal of Epidemiology and Community Health*. 60(7): 587-592. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2566234/>.

- Maller, C., Henderson-Wilson, C., Pryor, A., Prosser, L., Moore, M. (2008) **Healthy parks, healthy people: The health benefits of contact with nature in a park context.** A review of relevant literature. 2nd edition. Parks Victoria. <http://parkweb.vic.gov.au/about-us/healthy-parks-healthy-people/the-research>. (Scroll to the bottom of the page for the document.)
- Mao G.X., Cao, Y.B., Lan, X.G., He, Z.H., Chen, Z.M., Wang, Y.Z., Hu, X.L., Lv, Y.D., Wang, G.F., Yan, J. (2012). **Therapeutic effect of forest bathing on human hypertension in the elderly.** *Journal of Cardiology*. 60:495-502. <http://www.sciencedirect.com/science/article/pii/S0914508712001852>.
- Ohtsuka, Y., Yabunaka, N., Takayama, S. (1998). **Shinrin-yoku (forest-air bathing and walking) effectively decreases blood glucose levels in diabetic patients.** *International Journal of Biometeorology*. 41(3):125-7. <http://www.ncbi.nlm.nih.gov/pubmed/9531856>.
- Park, B.-J., Furuya, K., Kasetani, T., Takayama, N., Kagawa, T., Miyazaki, Y. (2011). **Relationship between psychological responses and physical environments in forest settings.** *Landscape and Urban Planning*. 102(1): 24-32. <http://www.sciencedirect.com/science/article/pii/S0169204611001368>.
- Park, B.-J., Tsunetsugu, Y., Kasetani, T., Kagawa, T., Miyazaki, Y. (2010). **The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan.** *Environmental Health and Preventative Medicine*. 15(1):18-26. <http://www.ncbi.nlm.nih.gov/pubmed/19568835>.
- Taylor, A. F., Kuo, F. E. (2009). **Children with attention deficits concentrate better after a walk in the park.** *Journal of Attention Disorders*. 12(5): 402-409. <http://jad.sagepub.com/content/12/5/402>.
- Thompson, C. W., Roe, J., Aspinnall, P., Mitchell, R., Clow, A., Miller, D. (2012) **More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patterns.** *Landscape and Urban Planning*. 105(3): 221-229. <http://www.sciencedirect.com/science/article/pii/S0169204611003665>.
- Townsend, M. (2008). **Healthy parks, healthy people: The health benefits of contact with nature in a park context. A review of relevant literature.** Deakin University, Burwood, Melbourne, Australia. http://parkweb.vic.gov.au/__data/assets/pdf_file/0018/313821/HPHP-deakin-literature-review.pdf.
- Tsunetsugu, Y., Lee, L., Park, B.-J., Tyrväinen, L., Kagawa, T., Miyazaki, Y. (2013) **Physiological and psychological effects of viewing urban forest landscapes assessed by multiple measurements.** *Landscape and Urban Planning*. 113: 90-93. <http://www.sciencedirect.com/science/article/pii/S0169204613000212>.
- Tsunetsugu, Y., Park, B., Miyazaki, Y. (2010). **Trends in research related to "Shinrin-yoku" (taking in the forest atmosphere or forest bathing) in Japan.** *Environmental Health and Preventative Medicine*. 15(1): 27-37. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2793347/>.
- Ulrich, R. S. (1984). **View through a window may influence recovery from surgery.** *Science*. 224:420-422.
- Ulrich, R. S. (1999). **Effects of gardens on health outcomes: Theory and research.** In C. Cooper-Marcus & M. Barnes (Eds.), *Healing Gardens: Therapeutic Benefits and Design Recommendations*. New York: John Wiley, pp. 27-86. <http://www.majorfoundation.org/pdfs/Effects%20of%20Gardens%20on%20Health%20Outcomes.pdf>.
- Society for Forest Medicine within the Japanese Society for Hygiene, <http://forest-medicine.com/page11.html>.
- University of Washington. **Urban Forestry and Human Benefits.** <http://www.naturewithin.info/urban.html>.
- University of Illinois at Urbana-Champaign, **Landscape and Human Health Laboratory**, <http://lhl.illinois.edu/adhd.htm>.