Section 2: Resilience in Adult Mental Health Through Access to Natural Areas

Sarah R. Barbo
Yale School of Forestry & Environmental Studies
Yale School of Management

“In a civilization which requires most lives to be passed amid inordinate dissonance, pressure and intrusion, the chance of retiring now and then to the quietude and privacy of sylvan haunts becomes for some people a psychic necessity. It is only the possibility of convalescing in the wilderness which saves them from being destroyed by the terrible neural tension of modern existence.”

– Bob Marshall, co-founder of The Wilderness Society

Three to four million people hike some portion of the Appalachian Trail each year. Nearly 8,000 people have completed the entire Trail – no small feat for one of America’s longest hikes, one which can take up to seven months to complete (Appalachian Trail Conservancy, 2013). In a world where news events are reported in real time and billable hours can be tracked in 15 minute increments, how can we explain this surprising activity?

Researchers are increasingly discovering what weekend hikers and lunchtime park-walkers intrinsically understand: spending time in nature is restorative and calming, of benefit to both our physical and mental well-being. A study examining the motives of hikers on the AT found the top reasons for hiking were for “self-fulfillment, self-reliance, fun and enjoyment of life” (Goldenberg, Hill, & Freidt, 2008). The benefits of nature, which start with physical exercise and mental restoration and cascade out to financial and societal betterment, are useful for all participants but may hold extra value for particular populations like post-combat veterans, urban youth, ex-offenders, and Alzheimer’s Disease and dementia patients.

2.1 How Does Access to Natural Space Impact Adult Mental Health?

Literature from disciplines as diverse as ecology and psychology brim with evidence of the positive effects of green space on adult health. In particular, researchers have documented notable mental health changes in adults who have spent time in natural space, such as:
· Improved mood, attention, and self-discipline (Berto, 2005).

· Reduced stress, anxiety, and aggression (Thompson et al., 2012).

· Improved recovery times from illness and management of symptoms for patients with dementia or Alzheimer’s Disease (Thompson, et al., 2012) (Mooney and Nicell, 1992).

The range of these observed positive impacts can be organized into two categories of mental health benefits for adults: mental restoration and stress reduction.

**Mental Restoration: Improving Cognitive Function and Overall Wellbeing**

Rachel and Stephen Kaplan, pioneer researchers in the psychology of nature, have argued that the beneficial mental effects of nature can be explained through a process called “Attention Restoration Theory” (ART). According to ART, there are two forms of mental attention, direct and indirect, that each require different degrees of cognitive effort. We use direct attention, an effortful, concerted brain process, when we summon the mental focus required to complete productive tasks, like driving in traffic or holding a conversation.

The constant use of direct attention can lead to “mental fatigue” and feelings of stress (Kaplan, 1995). Indirect attention, meanwhile, represents the passive capture of our attention by “inherently fascinating” subjects, such as those often found in nature, like flowing streams or lapping waves (Berto, 2005). Exposure to fascinating subjects turns down your direct attention system, those neural networks used and perhaps exhausted by direct activity, and turns up the indirect attention system. A break in the use of direct attention allows the direct system to recharge and restore, in time renewing one’s ability to concentrate on more complex and demanding tasks. In this way, the Kaplan’s and their collaborators believe, nature restores human attention and mental health.
“Open a book and enjoy the grass.”

Colleges and universities have often sought to decrease final exam stress through free food, snack and coffee breaks, and even trained comfort dogs. In 2011, students in Cornell University's Design and Environmental Analysis course tried a new method. Inspired by Attention Restoration Theory, the students designed and installed exhibits of real grass inside their school's library, bringing a bit of the outdoors indoor and aiding students' mental restoration as they prepared for finals.

For more information see: http://blog.seattlepi.com/bookpatrol/2012/12/16/stay-on-the-grass-nature-goes-inside-the-library/

Researchers at the University of Michigan recently put ART to the test in two experiments comparing the mental impacts of urban and natural environments. In one study, research subjects were given sequences of numbers to repeat backwards, a direct attention activity designed to produce brain fatigue (Berman, Jonides and Kaplan, 2008). Then the subjects went on a 2.8 mile walk – half the group through a park near campus, the other half through downtown Ann Arbor. After their walk, the study subjects were asked to again complete the number sequence recall.

The researchers found that cognitive performance on the number sequence recall test significantly improved when subjects walked in nature, but not when they walked through city landscapes.
In another experiment, participants were again asked to perform a series of number sequence recalls, requiring their direct attention. Then, instead of taking a walk outside, they were shown a series of pictures of either natural or city settings.

After ten minutes of viewing pictures, subjects repeated the number sequence recall test and, once again, those subjects exposed to nature out-performed those who had not – even if “nature” was just a static image. The authors concluded that those who would “consider the availability of nature as merely an amenity fail[] to recognize the vital importance of nature in [supporting] effective cognitive functioning” (Berman, Jonides and Kaplan, 2008, p.1211).

**Stress Reduction from Nature**

In addition to renewing mental attention systems, natural spaces may reduce stress and anxiety more directly. Self-reported surveys of adult stress levels, find, not surprisingly, that time spent in urban parks significantly reduces self-perceived stress (Grahn and Stigsdotter, 2003). If you measure circulating cortisol – the body’s primary fight or flight stress hormone – you find the same phenomenon (Thompson, Roe, Aspinall, Mitchell, Clow, & Miller, 2012).

Though seemingly trivial when compared to major health issues like cancer and infectious disease, stress represents a huge strain on adult systems – one that can exacerbate other conditions or become a major concern in its own right. Prolonged high levels of stress cause high blood pressure, cardiovascular strain and a decrease in white blood cells, compromising one’s immune system (Web MD 2011). Stress may also encourage unhealthy behaviors like smoking, overeating or undereating and sleep deprivation (Jenkens, Rew, and Sternglanz, 2005).
The stress reduction benefits of time spent outdoors may cascade out to other benefits to society, particularly in reducing macro-scale health care costs and addressing systemic healthcare inequalities.

Annually, work-related stress in the United States costs the economy $300 billion in absenteeism, extended illness and recovery times, and compromised productivity (Smith, 2012). If urban spaces and natural retreats play a role in reducing stress across populations, the savings can be considered immense.

Additionally, costs for mental health and cardiovascular treatments in the United States are high – around $57.5 billion for mental health treatment a year (measured in 2006) and $273 billion for cardiovascular disease, about four and 17 percent of total annual healthcare costs, respectively.
spending respectively (Insel, 2011). While there are myriad causes of mental health and cardiovascular disease, stress often plays a significant part in both (Heidenreich, 2011). As a result, actions that reduce stress should reduce costs in these important sectors.

Calculating Stress-Related Expenses

Stress Directions, a consulting company specializing in stress-knowledge tools, provides a Stress Cost Calculator that will generate annual organizational “stress costs” based on the number of employees. Derived from statistical studies at PricewaterhouseCoopers, the Bureau of Labor Statistics, and a generous consultant assumption that “50% of disability is related to stress,” the calculator provides an insightful, though likely biased, picture of the monetary impacts of stress in the workforce.

Check your stress expenses at: http://www.stressdirections.com/res/costcalc.cgi

Natural spaces can also create macro-scale health benefits by addressing systemic health inequalities. Health inequalities are preventable health problems suffered disproportionately by certain population groups that frequently occupy minority positions by socio-economic, gender and ethnicity status.

A study from the University of Glasgow hypothesized that exposure to nature could reduce the prevalence of health inequalities. The researchers examined mortality records and calculated access to green space by reported living addresses, and compared access to green space to prevalence of specific diseases.

Those with the highest access to green space had significantly lower incidence of circulatory disease, but no difference in lung cancer or intentional self-harm. The study concludes that the more access to green areas, the greater reduction in socioeconomic health inequalities (Mitchell and Popham, 2008).

2.2 Out of the Doctor’s Office and Into the Woods

Support for nature-based “medicine” has been building in recent years. Many doctors have become increasingly frustrated with limited clinical responses to mental and physical maladies that could be solved with physical activity and exposure to the outdoors. They are increasingly turning to “prescriptions” for time spent outside and in nature.

A prominent advocate for natural prescriptions is Dr. Daphne Miller, a San Francisco-based physician whose Washington Post article, “Take a Hike and Call Me in the Morning” helped begin a trend toward physicians advocating natural prescriptions (Miller, 2009). Today, bolstered by both land use and health organizations, programs around the country are promoting “Park Prescriptions.”
Replacing Lipitor with Leaves

Many programs in the US now promote nature-based prescriptions. These programs typically have a mix of partnerships between land trusts and healthcare organizations. Some examples include:

- Park Prescriptions: Organized by the Institute at the Golden Gate, this is an umbrella organization, working to form partnerships between healthcare organizations and managers of public lands.

- Prescription Trails: A partnership in New Mexico between 30 healthcare organizations and several land and park services, designed to give patients more information on how to fill their healthy “prescriptions.”

- Children and Nature Initiative: This organization in Brooklyn, NY provides physicians with local nature information in order to effectively prescribe outdoor activity to children.

- The Medical Mile: In Little Rock, a partnership between the National Park Service and Heart Clinic Arkansas used health related funds to build a one mile trail in downtown Little Rock that promotes recreation and educates the public on the health benefits.

For more information see: http://www.parksconservancy.org/assets/conservation/environmental-sustainability/pdfs/park-prescriptions-2010.pdf

Evidence-Based Design

Before there were nature-based prescriptions, there was evidence-based design, a body of research that has increasingly been used in “Healthcare Architecture” to speed up patient recovery times and decrease staff and patient stress. Dr. Roger Ulrich, of the Center for Health Systems & Design, has published widely on the positive effect of nature on patient recovery times in hospitals.

In one landmark study, Ulrich found that patients with a view of trees out their hospital window recovered faster and took fewer pain medications than those with a view of a brick wall (Ulrich, 1984). These positive benefits were attributed to reduced mental stress effected by the mechanisms discussed earlier in this chapter.

Intensity x Time = A “Dose” of Wilderness

If natural settings are good for the mind, the body and for healthcare prescriptions, how does one determine how much wilderness is enough? In other words, what constitutes an adequate “dose” of green space?

Professors Cole and Hall (2010) sought to answer this question by surveying hikers recreating in wilderness areas in Washington and Oregon. They found that hikers experienced
notable mental rejuvenation and lowered stress regardless of the intensity or duration of their hike (Cole and Hall, 2010).

Access to green space, it seems, may be beneficial in any dose. In fact, the more you “need” nature, the more you may benefit from exposure to it. Researchers in Finland found that the more anxiety a person has, the greater the relief they gained from time in nature. Interestingly, those with the most worry tend to spend the least amount of time in nature (Korpela et al., 2010).

**Pavement to Parks in San Francisco**

Building on the idea that green space, regardless of size, can be beneficial, San Francisco started a “Pavement to Parks” program in 2010. Through the program city officials have worked to create mini “parklets” out of unused road space. These parklets range in size from transformed plazas to a mini green space composed merely of a few chairs, a plant, and a protective barricade. The city is welcoming applications for new parklets that meet a small list of requirements such as the potential to improve pedestrian safety and surrounding uses that can attract people to the space.

For more information see: http://sfavementtoparks.sfplanning.org/

**Shinrin-yoku – the Practice of “Forest Bathing”**

In Japan, spending time in nature has become a common preventive medicine method known as “shinrin-yoku,” or forest bathing. Japan’s Ministry of Agriculture, Forestry, and Fisheries has organized 48 official “Forest Therapy” trails, which provide walks and rest stops for natural relaxation and, interestingly, employ scientists to monitor health benefits. After enjoying the trails, parkgoers have their blood pressure measured by researchers as part of a long-term study on the positive effects of forest bathing. Along with findings of lowered levels of cortisol and stress, researchers are also finding an increase in white blood cells – an implication that could make people more resistant to cancer and infections (Werts, 2013). Recognizing the benefits and cost savings for healthcare, the Japanese government has put $4 million into research studying forest-bathing since 2004 (Williams, 2012).
Forest Bathing Benefits: By the Numbers

Yoshifumi Miyazaki, a Japanese physiological anthropologist and vice director of Chiba University’s Center for Environment, Health, and Field Sciences, has amassed a sample size of more than 600 subjects who have had medical exams following a forest bath. Compared to urban walks, Miyazaki has observed the following after a forest walk:

- A 12.4 percent decrease in the stress hormone cortisol.
- A 7 percent decrease in sympathetic nerve activity (the main regulator of flight or fight stress response in the body).
- A 1.4 percent decrease in blood pressure.
- A 5.8 percent decrease in heart rate.


2.3 Conclusion

This background paper has focused on the foundations of the connection between adult mental health and natural space. Through exposure to nature, we are able to restore our minds and attention and lower stress. These mental effects cascade out to real physiological benefits: lowered blood pressure, improved sleep, faster recovery from trauma, and decreased incidence of heart disease, to name a few. In addition, there are many mental health benefits that accrue at the macro-scale to benefit society through, for example, increased worker productivity and reduced crime. Even more broadly, mental health has positive outcomes for sense of wellbeing and community in populations across urban and rural landscapes.

This paper has covered the basics and mentioned some notable examples – but it should only be the start of the conversation on what mental benefits can be derived from nature and the potential partnerships across land use and healthcare forums that could result from considering these benefits.

2.4 Possible Questions for Discussion

- A major challenge in furthering the mental health implications of outdoor recreation – and bringing the land conservation community into the equation – is answering the question of how we can improve our assessments of the mental health impacts of time spent outdoors. Can we find new ways to measure these slippery concepts? Can we understand nature’s impacts on the healthy as well as the infirm?
• How can land trusts engage with populations that are in need of nature’s benefits, but may, by nature of their need, lack access? Patients recovering from surgery, addictions, or mental health disorders may benefit the most from time spent outdoors, but find it particularly difficult to acquire. What challenges and opportunities does serving this community offer to the land conservation world?

• What risks might land trusts face as a result of such engagement?

• How can land trusts or health organizations address the findings on “Affective Forecasting Errors” – a research finding that the therapeutic value of nature is commonly underestimated by those not normally exposed to it?

• Can land trusts play a more active role in supporting the research linking mental health benefits to natural spaces?

Some of the Organizations Doing Interesting Work on this Topic

Evidence-based research into positive mental effects of nature

• Rachel Kaplan, PhD – Researcher at University of Michigan’s School of Natural Resources and the Environment; co-collaborator on the “Attention Restoration Theory.” See: http://www.snre.umich.edu/profile/rkaplan

• The Nature Therapy Project – Out of Chiba University in Japan and headed by Dr. Yoshifumi Miyazaki, the Project researches the physiological effects of nature. See: http://www.fc.chiba-u.jp/research/miyazaki/index_e.htm

• Nature and Human Security Program – Based from Cornell University and headed by Dr. Keith Tidball, the program studies the interplay between humans, nature, and resilience. See: http://dnr.cornell.edu/people/academic-staff.cfm?netId=kgt2

• Landscape and Human Health Laboratory – At the University of Illinois at Urbana-Champaign and directed by Dr. Ming Kuo, the lab’s mission is to study the connection between greenery and human health. See: http://lhhl.illinois.edu/

• Kalevi Korpela, PhD – Docent of Environmental Psychology at the University of Tampere, Finland, Korpela has published widely on self-regulation and well-being in favorite, unpleasant, and restorative environments. See: http://www.favoriteplace.info/Korpela_Kalevi.htm

Land and Health Organizations United in a Common Cause

• Outdoor Health Forum – Run by Dr. William Bird, the Forum works as a gathering place for all environmental organizations in the UK who are committed to pursuing the connection between nature and health. See: http://cwhbird.typepad.com/

• Therapeutic Landscapes Network – A consortium of designers, health providers, scholars, and gardeners focused on evidence-based design in health-care settings. See: http://www.healinglandscapes.org/
• **Healthy Parks, Healthy People Central** – Online community serving as a resource for global initiatives worldwide seeking to reinforce the connection between healthy environments and people. See: [http://www.hphpcentral.com/](http://www.hphpcentral.com/)

• **United States Healthy Parks, Healthy People Initiative** – Run by the US National Park Service, the Initiative works to promote human health along with environmental and ecological health in public lands. See: [http://www.nps.gov/public_health/hp/hphp.htm](http://www.nps.gov/public_health/hp/hphp.htm)

• **Children and Nature Initiative** – This organization in Brooklyn, NY provides physicians with local nature information in order to effectively prescribe outdoor activity to children. See: [http://www.neefusa.org/health/children_nature.htm](http://www.neefusa.org/health/children_nature.htm)

Outdoor Recreation Programs with a Mental Health Mission

• **R4 Alliance** – New in November 2012, the R4 Alliance unites eight rehabilitation organizations around the country that focus on outdoor recreation. The Alliance’s explicit goal is to further the case for therapeutic outdoor programs by promoting, improving, and advocating evidence-based recreational program best-practices. The R4 Alliance is focused on military veteran mental health, but has broad implications. See: [http://r4alliance.org/](http://r4alliance.org/)


• **Project Healing Waters** – Using fly fishing as a centerpiece, Project Healing Waters takes disabled veterans on fishing trips, building community and augmenting the mental health rebuilding process. See: [http://www.projecthealingwaters.org/](http://www.projecthealingwaters.org/)

• **Casting for Recovery** – Casting for Recovery provides weekend fly fishing retreats in all 50 states, free of charge, for women suffering from breast cancer. See: [http://castingforrecovery.org/wordpress/about-2/](http://castingforrecovery.org/wordpress/about-2/)

Works Cited / Useful Readings


### 2.5 Examples, sources of information and other key points from the discussion

Some of the examples, sources of information and key points from the discussion included the following:

- New research on mental health benefits from time spent in nature is very compelling, as are the efforts being made to connect exposure to nature to more biochemical and physiological benefits. Roger Ulrich, Professor of Architecture at the Center for Healthcare Building Research at Chalmers University of Technology in Sweden, was mentioned as a leader in these efforts. His studies examining how “how nature, gardens, and art can lessen pain, stress, and healthcare costs” deserve wider dissemination and replication. See: http://www.healthdesign.org/chd/about/board-directors/roger-s-ulrich-phd-edac

- Though African American communities are viewed as increasingly disconnected from nature, there are historical precedents and current initiatives connecting African American communities to the outdoors (and the benefits nature brings):
  - **Rooted in the Earth**: Reclaiming the African American Environmental Heritage – the latest book from environmental historian Dianne D. Glave “overturns the stereotype that a meaningful attachment to nature and the outdoors is contrary to the black experience,” according to a review of her book. Glave’s work traces “the history of African Americans’ relationship with the environment, emphasizing the unique preservation-conservation aspect of black environmentalism” and unearthing stories
improving human health by increasing access to natural areas: opportunities and risks


○ The Black/Land Project “gathers and analyzes stories about the relationship between black people, land and place” to “identify and amplify” “critical dialogues” on this issue. See: www.blacklandproject.org

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Harriet Tubman – The “Environmental Moses”

Harriet Tubman has been called the “environmental Moses of her people.” She traveled from her home in Philadelphia to the plantations of the South and back no less than thirteen times to help escaping slaves navigate north, often at night, through difficult wilderness and inclement seasons.

According to a review of Dianne Glave’s book, Rooted in the Earth, Tubman “learned the skills of surviving in the woods and other landscapes” from her father, a timber worker, and was, from her own experience “familiar and comfortable with marshes” and the landscapes of the South. Tubman’s deep connection to and knowledge of nature is chronicled among other stories of African Americans in nature in Rooted in the Earth.


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• Government and city leaders are increasingly recognizing the role healthy environments and access to nature can play in fostering better public mental and physical health:

○ The United Kingdom’s government has initiated many reviews and new programs concerned with natural spaces and human health:

  ▪ Natural England, the government body charged with protecting England’s natural environment, is fostering the idea of a “Natural Health Service” to complement the nation’s more traditional “public health service.” See: http://publications.naturalengland.org.uk/publication/31045

  ▪ The United Kingdom’s government’s National Ecosystem Assessment of 2012 devoted an entire chapter to health and the environment. You can find the UK Faculty of Public Health and Natural England’s joint summary and action report on these connections at http://www.fph.org.uk/uploads/r_great_outdoors.pdf
In 2011, the UK Government published an influential White Paper “Natural Choices: securing the value of nature” which includes details on how public health can use the natural environment to benefit the health of the nation. See: http://www.official-documents.gov.uk/document/cm80/8082/8082.pdf


- In 2010 the New York City Mayor’s office joined with the City’s acting Commissioners to set new guidelines for “active design” to promote “physical activity and health” in the City. Improving access to parks and open spaces is a cornerstone principle of these guidelines. See: http://www.8-80cities.org/Articles/Active%20Design%20Guidelines%20NYC.pdf

### The United Kingdom’s Natural Health Service

The United Kingdom’s department of natural resources, Natural England, recently partnered with the government’s Faculty of Public Health to develop and promote the concept of a “Natural Health Service” to complement the country’s existing institutional Health Service. In a compelling “action report” the two agencies describe how access to nature functions as a shadow health service that does “play a vital role in the health of the nation.” This health service, they note, “may be as effective as prescription drugs” in treating some disorders and has the added benefits of “decreased health inequalities, reduced crime, and increased workplace productivity” in addition to direct health benefits.

In addition to describing the very real health benefits of the UK’s natural spaces, the report identifies policy priorities and collaborative actions that can increase access to nature and improve public health (as well as challenges to be overcome).

For more information see: www.fph.org.uk/uploads/r_great_outdoors.pdf