Section 6: Appendices

Appendix 1: Cooling the Urban Heat Island

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Background

Climate change is expected to increase the frequency and severity of extreme weather events. In large urban areas, heat waves are weather events of particular concern because of their impact on vulnerable populations (the very young, elderly, or infirm, outdoor athletes, etc.) and resulting increases in acute hospitalizations and mortality events.

Notable heat waves have contributed to a high number of fatalities over the last several years. During the summer of 1995, a short but intense heat wave was responsible for the death of over 1,000 people in the Midwestern United States, with more than 500 of these mortalities occurring in the City of Chicago (Changnon et al. 1996, Palecki et al., 2001). In 2003, an estimated 14,800 deaths were attributed to a heat wave that occurred in France (Kovats and Ebi, 2006).

A phenomenon known as the “urban heat island effect,” is largely to blame for the exacerbated harm of heat waves in urban and suburban environments. The heat island effect describes the results of developed landscapes, with large buildings and concrete structures, absorbing and retaining more heat from the sun than natural, undeveloped lands. Heat islands are observed in areas primarily comprised of buildings, asphalt, bare soil, or short grasses. During summer months areas with these surfaces may be up to 10°F warmer than nearby woodlands (Kim, 1992). The following figure represents this temperature disparity clearly.
The Benefits of Natural Areas in Urban Settings

The presence of vegetation and undeveloped open spaces can help to alleviate the burden of the heat island effect in developed suburban or urban environments. Leaves and branches from trees and shrubs provide shade and help to reduce the amount of solar radiation that comes in contact with the built environment. When trees are in leaf during the summer, only 10 to 30 percent of the sun’s energy reaches the area below the canopy (Bell et al., 2008). Additionally, evapotranspiration of water from leaf respiration significantly cools the air around vegetation. Suburban areas with mature trees can be 2 to 3°F cooler than suburban environments without trees, while air temperature within tree groves can be 5°F cooler than in open fields (Bell et al., 2008).

In addition to reducing the heat island effect, planting trees, increasing vegetation and protecting open spaces within developed areas can have the notable impact of reducing air pollution, an effect with significant human health implications. Vegetation may remove pollutants from the environment through the uptake of gaseous pollutants and through dry deposition (Bell et al., 2008). Additionally, vegetation can reduce energy consumption from devices like air conditioners, and decrease power plant peak emissions (EPA, 2002). A recent study calculated that in one year urban trees in the United States removed 784,000 tons of air pollution from the environment, a service with a value of $3.8 billion (Bell et al., 2008).
Chicago Trees Initiative

Since its devastating heat wave in 1995, the City of Chicago has been a leader in climate change adaptation. Partnering with a very large group of community organizations, state and federal agencies, and developers, The Chicago Trees Initiative hopes to achieve a citywide average tree canopy cover of 20% by 2020 to create a “greener and healthier city.” This program’s emphasis on health speaks to the close relationship between both the environment and residents’ wellness.

For more information see: http://www.chicagotrees.net/

There is then a distinct opportunity for land trusts and public health practitioners to form partnerships in the urban arena to work together to reduce heat and air pollution impacts on public health. Substantial health, economic, cultural and aesthetic benefits make a strong case for this type of initiative.

Possible Questions for Discussion

· Can lessons and achievements from small-scale urban tree planting initiatives be applied to the conservation of larger tracts or corridors of open space within cities?

· How might conservation organizations and public health professionals work together to increase vegetation within urban environments? Do their mandates overlap sufficiently to target the neediest communities?

· Can public health networks be tapped to assist in the stewardship of existing natural spaces in urban neighborhoods, which necessarily experience greater daily stress than their rural counterparts?

· How can the extensive co-benefits of urban vegetation be better communicated to policymakers and the public?

Some of the Organizations Doing Interesting Work on this Topic

· Alliance for Community Trees (ACT) is a national organization with member groups, ACT focus on the environmental and community benefits of urban tree planting. See: http://actrees.org/

· TreeVitalize is a large public-private partnership within Pennsylvania, this organization seeks to build urban forestry capacity by promoting the numerous benefits of trees and vegetation within cities. See: http://www.treevitalize.net/

· Urban Resources Initiative is a nonprofit-university partnership, U.R.I. works to improve and develop urban forests, teach green skills and develop community in New Haven, Connecticut. See: http://environment.yale.edu/uri/
Useful Readings/Works Cited


Appendix 2: Obesity, Exercise, and the Outdoors

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“The link between lack of physical activity and obesity has now been documented and provides a compelling case, during the ongoing debate on health care reform, for promoting greater outdoor activity as a cost-effective, preventive approach to better health.”

- Outdoor Review Board 2009

A Growing Epidemic

More than 35 percent of American adults are obese (CDC, 2012). In addition to direct impacts on quality of life, obesity predisposes individuals to heart disease, stroke, liver disease, sleep apnea, hypertension, osteoarthritis, multiple types of cancer and Type II diabetes. Currently, one in nine Americans have diabetes, but the number of people with “prediabetes” (higher than normal blood sugar) is far greater. At current rates, forty years from now nearly one third of the American population could have diabetes (CDC 2012). This suite of debilitating illnesses holds tremendous costs both for those who are ill and for society at large. Avoidable deaths, high health care costs and years of lost productivity follow these trends. In 2000, obesity-related diseases were the second leading cause of preventable death in the U.S. (Baxter 2011).

The US spends nearly $147 billion every year on the direct and indirect costs of obesity (Kuo, 2010). In 2006, medical spending for obese people was $1,429 greater than for people of normal weight (CDC, 2012). Healthcare costs related to obesity are projected to rise precipitously over the next decade, even if obesity rates remain constant (Baxter, 2011). In this environment, it is critical to focus on preventive care that will improve long-term health outcomes while simultaneously reducing costs.


Source: Thorpe, 2009
It is well-known that physical activity reduces the risk of a plethora of health problems, obesity and many of the diseases mentioned above, including colon cancer, osteoporosis, Type II diabetes, depression, cardiovascular disease and hypertension. However, a whopping 40% of adults in the U.S. report that they participate in no leisure physical activity whatsoever (McCurdy et. al., 2010).

**Snapshot: Troubling Health Trends**

- 35.7% of US adults are obese
- One in nine US adults have diabetes
- One in three children in the US are overweight
- 17% of US children are obese
- $147 billion is spent every year in the US on the costs of obesity.

Source: [http://www.cdc.gov/obesity/data/adult.html](http://www.cdc.gov/obesity/data/adult.html)

These dire numbers are unfortunately characteristic of a human population that now spends most of its time inside, sitting at desks and staring at screens, rather than outside, doing physical labor. Our work environments are stressful, highly-structured, and sometimes sterile. At the same time, the domestication and development of formerly wild, open spaces in cities means that even in our leisure time, it is harder and less pleasant to be outside. We are becoming creatures of the urban environment. The cities most Americans now live in were designed with the automobile in mind, not the pedestrian. Neighborhoods with reasonable walking distances between services and accessible green spaces seem to be less common than ever.

Only seven percent of the trips that Americans make in urban areas are conducted on foot or bike. Compare that to 46 percent in The Netherlands (Baxter 2011). The probability of obesity is directly correlated with the number of minutes spent in a car every day, and America is a nation of drivers (Frank, Andresen, and Schmid, 2004). Changes in diet, including increased consumption of fats, sugars, and highly processed food have exacerbated these health risks.

Meanwhile, it is not just adults who are suffering: a 1997 study showed that having obese parents more than doubled the risk that children would become obese adults. Parental habits become family routine and, if that routine is largely inactive, it is likely that children will suffer the consequences (McCurdy et.al., 2010). Rising numbers of children and young adults with health issues like asthma, Type II diabetes, obesity, ADHD and Vitamin D deficiency are attributable in large part to the sedentary, indoors lifestyles that so many of today’s youth lead (McCurdy et. al., 2010). One in three children in the United States
today is overweight, and 17 percent are considered clinically obese. The current generation of children in the U.S. is the first whose lives may be shorter than those of their parents.

The Potential Role of Access to Natural Areas

Outdoor physical activity is a powerful, low cost health treatment and preventative healthcare tool, one that can be enjoyable and sustainable in the long term. Helping Americans get out and enjoy nature has long been, and should continue to be, a goal of many land trusts (some of which have been detailed in these reports).

Some new studies have found outdoor exercise to be particularly useful for supporting the health of children and adults. One study in Indiana found that on average, children living in greener neighborhoods weighed less (controlling for age, sex, neighborhood income, neighborhood density, and family income status) and were less likely to show weight gain over a two-year period than children living in less green neighborhoods (Bell, Wilson, and Liu, 2008 in Kuo, 2010).

A recent study from Australia found obesity indicators in young children decrease in relation to time spent outdoors, while vigorous physical activity increased (Cleland et.al., 2009). Other research has found that participants in outdoor exercise may enjoy it more, and thus be more likely to exercise frequently, than participants in indoor exercise. Exercise also walk faster, train harder and find exercise less “demanding” when they recreate outdoors (Gladwell et. al., 2013).

An additional component to this is worth mentioning here: in general, minority populations and communities of color have some of the highest rates of diabetes and obesity in the country. Often, minority or otherwise disadvantaged communities in inner cities are the ones with the least access to green park space or wild land. Increasing outdoor recreation and improving access to green space for lower income neighborhoods could be an opportunity to even the gap and help ameliorate some of the other health problems these communities may be faced with (McCurdy et.al., 2010).

Solutions and Innovations

A number of institutions are pioneering new tools and approaches to managing obesity and public health through increasing activity and environmental engagement in select communities. Some examples of these efforts are detailed below.

Monitoring Public Health through the Environment

Natural Health England is a group that promotes public health and engagement with the outdoors. Information from its publication Monitor of Engagement with the Natural Environment (MENE) is being used by local health councils to assess and understand the health of residents, especially as it relates to how they use their outdoor space. http://www.naturalengland.org.uk/ourwork/research/meneandhealthfeature.aspx

Prevention through Design

The City of New York has published a set of what it calls “active design guidelines,” to create healthier, more sustainable neighborhoods and citizens. These guidelines formalize ev-
idence-based strategies in architecture and urban design that can promote physical activity and healthier eating. They are a manual of best practices for architects and city planners to layout better streets, buildings, and public spaces. For example, the placement and design of walking paths, bike trails and green space is likely to affect how many people actually use them. Sustainable design strategies, such as LEED certification are also considered in how they might interact with active design (NYC.gov, 2013)

**Health Insurance Companies for Healthy Environments**

Kaiser Permanente, the largest private health insurance company in California, has started to take an active role in communities where it works to decrease obesity and promote healthy environments.

In Northern California, Kaiser partners with other organizations to investigate recreational and health needs in communities, increase and enhance outdoors spaces for recreation, and advocate for land use planning that will provide better access to green space. They have helped build bike paths and community gardens, and promote a number of other initiatives, including access to local food, safe walking routes to school, greater use of parks, trails, and other active public spaces, and joint use agreements (joint funding and use of open space like parks between park and local school).

From 2005 to 2011, Kaiser Permanente gave more than $6 million in grants related to open space, including efforts focused on underserved communities, active living, and other creative partnerships. For more information see: [http://info.kaiserpermanente.org/communitybenefit/html/index.html](http://info.kaiserpermanente.org/communitybenefit/html/index.html)

**The Trails Challenge**

Last year, 10,000 participants took part in the Trails Challenge, a self-guided hiking program that gives participants incentives to get out and hike in East Bay Park, promoting fitness and enjoyable outdoor recreation. A partnership between Kaiser Permanente of Northern California and the Regional Parks Foundation has offered free registration to residents of two counties. Registrants are given information about trails and parks, and challenged to log hikes on at least 5 trails, or 26.2 miles, before sending in their log for a pin. For more information see: [http://www.regionalpharksfoundation.org/page.aspx?pid=582](http://www.regionalpharksfoundation.org/page.aspx?pid=582)

**Joint Use for Recreation**

Kaiser Permanente has also been promoting the use of Joint Use Agreements. These legal agreements can open up school facilities, including outdoor play space, to communities during after school hours to promote increased physical activity. Other versions of these agreements, which help defuse liability and property damage issues, allow outside groups to use school recreation facilities, while agreements between school districts and municipal government can open recreational facilities up to use by each other or by other parties.
Parks for Health
The Trust for Public Land (TPL) has worked across the U.S. to improve park systems and facilities. It has also spearheaded multiple health-focused initiatives such as building outdoor “Fitness Zones” with exercise equipment accessible to the public and improved programming to draw in participants to parks. With a focus on mixed-use, beauty, usability, connectedness and access, their parks have changed the landscape in neighborhoods that formerly had little open space. TPL also pursues innovative partnerships with city health departments and hospitals to improve the health of local communities.

Further Opportunities
CDC’s Division of Nutrition, Physical Activity, and Obesity, currently funds state initiatives that address obesity and chronic disease by improving the environments in which Americans live, work, and play. Among the recommendations that CDC makes are taking active transport to school or work (such as biking or walking), improving school-based physical education, enhancing urban design to promote physical activity and developing better local food systems and access to farm-grown produce. The most explicit mention of nature it makes is in strategy 16 in its recommendations for communities – “Communities should improve access to outdoor recreation facilities” (CDC, 2012).

Any of these efforts to encourage active lifestyles represent potential opportunities for land trust community engagement. From the public health end, organizations like the CDC could take an active role in partnering with land trusts to expand outreach about the benefits of outdoor exercise and encourage the development of a national culture that facilitates people’s outdoor recreation.

Possible Questions for Discussion
- How can we design open space that balances the use for recreation and exercise with conservation/habitat uses?
- How much infrastructure is needed for exercise on conserved land?
- Can health care institutions or insurers help contribute to the costs of maintaining access and infrastructure improvements on conserved land used by their clients?

Some of the Organizations Doing Interesting Work on these Topics
- Change Lab Solutions is a law and policy think tank focused on innovative solutions to tackle problems like childhood obesity. See: http://changelabsolutions.org/publications/model-JUAs-national
- The Obesity Society is a major clearinghouse website for research, education, and action on obesity. See: http://www.obesity.org/
- Let’s Move Outside is a national government campaign to provide information and resources for kids and families to get active and have better access to outdoor recreation opportunities. See: http://www.letsmove.gov/lets-move-outside
Useful Readings/Works Cited


