BIOPHILIC URBANISM: INVITING NATURE BACK TO OUR COMMUNITIES AND INTO OUR LIVES

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For several years now, I have administered an interesting slide-based survey to my new graduate students. I call it the "what is this" survey. The survey largely consists of images of flora and fauna native to the eastern United States. Interspersed are other political and corporate images. I ask students to tell me everything they can about the images I present. The results, though funny, are usually rather discouraging and sad because few students are able to name the common species of birds, plants, or trees. One image I present, for instance, is of a Silver-Spotted Skipper, a very common species of butterfly.[1] Many students identify it as a moth (not unreasonable), a Monarch butterfly (although it looks nothing like a Monarch), or even a hummingbird. Only one student in several hundred has been able to identify the species correctly. The results confirm that nature is fairly abstract and a general concept for most young adults. This is not surprising given the fact that they have grown up in an age of computer games, indoor living, and diminished free time. While it is probably not surprising that common species of native flora and fauna are not immediately recognizable, it is still an alarming indicator of our disconnect with nature.

Journalist Rich Louv has ignited new concern and debate about this nature disconnect in his wildly popular book *Last Child in the Woods*.[2] He argues that today's children suffer from "nature deficit disorder."[3] Factors Louv recognizes as contributing to "nature deficit disorder" are too much time spent inside, too much time in front of the television and

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[1] Butterflies and Moths of North America, Species Detail: Silver-Spotted Skipper, http://www.butterfliesandmoths.org/species?l=1905 (last visited Nov. 9, 2009) (The Silver-Spotted Skipper can be found in "extreme southern Canada and most of the continental United States except for the Great Basin and west Texas . . . [It is] demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.").

[2] RICHARD LOUV, LAST CHILD IN THE WOODS: SAVING OUR CHILDREN FROM NATURE DEFICIT DISORDER (2008).

[3] *See id*. at 36. Louv defines nature deficit disorder as describing "the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illness." *Id.*

computer,[4] too little freedom to explore nature (and too little access to nature in new forms of development),[5] and parental concerns about safety, or as some refer to it, the "boogeyman syndrome."[6] These concerns certainly dovetail with health concerns about weight problems and sedentary children and their lifestyles.[7] For me, however, they represent an even more dire prospect of future generations of adults who don't viscerally or passionately care about nature, are little interested in its protection or restoration, and who will miss out on the deeper life experiences that such natural experiences and connections can provide.

I. THE POWER OF NATURE

Edward O. Wilson, a Harvard myrmecologist and conservationist, in popularizing the term "biophilia," suggested that we need daily contact with nature to be healthy, productive individuals, partly because we have co-evolved with nature.[8] Specifically, Wilson describes biophilia as "the innately emotional affiliation of human beings to other living organisms. Innate means hereditary, and hence, part of ultimate human nature."[9] To Wilson, biophilia is a "complex of learning rules" developed over thousands of years of evolution and human-environment interaction:

> For more than 99 percent of human history people have lived in hunter-gatherer bands totally and intimately involved with other organisms. During this period of deep history, and still farther back . . . they depended on an exact learned knowledge of crucial aspects of natural history . . . In short, the brain evolved in a biocentric world, not a machine-regulated world. It would be therefore quite extraordinary to find that all learning rules related to that world have been erased in a few thousand years, even in

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[4] *See id.* at 64–67 (discussing the negative effects a reliance on technology has on children).
[5] *See id.* at 116–17 (discussing a lack in outdoor park space in metropolitan areas and an increase in demand for limited park space caused by organized sports). *See also infra* note 38.
[6] *See generally id.* at 123–32 (discussing the safety concerns of parents that lead Louv to conclude that nature is "the new Boogeyman").
[7] *See* LOUV, *supra* note 2, at 47 (discussing CDC data showing a thirty-six percent increase in the population of overweight children between ages two and five from 1989 to 1999).
[8] *See* Edward O. Wilson, *Biophilia and the Conservation Ethic, in* THE BIOPHILIA HYPOTHESIS 31, 31–41 (Stephen R. Kellert & Edward O. Wilson eds., 1993). Wilson proposed the term "biophilia" two decades ago to describe the extent to which humans are hard-wired to need connection with nature and other forms of life. *Id.*
[9] *Id.* at 31.

> the tiny minority of peoples who have existed for more than one or two generations in wholly urban environments.[10]

The empirical evidence of biophilia, and of social, psychological, pedagogical, and other benefits from direct and indirect exposure to nature, is mounting and impressive. Research has shown that a connection with nature has the ability to reduce stress,[11] aid recovery from illness,[12] enhance cognitive skills and academic performance,[13] and aid in moderating the effects of ADHD, autism and other child illnesses.[14] A recent study by MIND, a British mental health charity, compared the effects on mood of a walk in nature with a walk in a shopping mall.[15] The differences in the effects of these two walks are remarkable, though not unexpected. The study concluded that "green exercise has particular benefits for people experiencing mental distress. It directly benefits mental health (lowering stress and boosting self-esteem), improves physical health (lowering blood pressure and helping to tackle obesity), provides a source of meaning and purpose, and helps to develop skills and form social connections."[16] The results showed marked improvements in self-esteem following the outdoor nature walk (ninety percent improved),[17] compared to much smaller improvements for those walking in the shopping center (seventeen percent improved).[18] Indeed, a large percentage of the indoor walkers actually reported a *decline* in self-esteem (forty-four percent declined).[19] Similarly, the green outdoor walk resulted in significant improvements in mood.[20] The different mood effects are especially great with respect to tension. Seventy-one percent of participants reported

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[10] *Id.* at 32.
[11] *See, e.g.*, Robert S. Ulrich, *Health Benefits of Gardens in Hospitals*, Conference Paper for Plants for People International Exhibition Floriade (2002), *available at* http://www.greenplantsforgreenbuildings.org/pdf/HealthSettingsUlrich_copy.pdf.
[12] *See, e.g.*, Stephen Mitrione, *Therapeutic Responses to Natural Environments: Using Gardens to Improve Health Care*, MINN. MED., Mar. 2008, http://www.minnesotamedicine.com/PastIssues/March2008/ClinicalMitrioneMarch2008/tabid/2488/Default.aspx.
[13] *See* LOUV, *supra* note 2, at 206–08 (discussing improved test scores at schools utilizing environment-based learning programs).
[14] *See id.* at 100–02.
[15] *See* MIND, ECOTHERAPY: THE GREEN AGENDA FOR MENTAL HEALTH (2007), http://www.mind.org.uk/assets/0000/2138/ecotherapy_report.pdf.
[16] *Id.* at 28.
[17] *Id.* at 21.
[18] *Id.* at 22.
[19] *Id.*
[20] *Id.* ("Six mood factors were measured . . . : depression, anger, tension, confusion, fatigue and vigor.").

a reduction in tension, with no participants reporting an increase following the green walk.[21] Meanwhile, fifty percent of the participants actually reported an *increase* in tension after the indoor walk.[22]

Hartig and his colleagues have undertaken a series of studies and experiments that bolster the findings, suggesting that views of nature and walks in natural settings can reduce mental fatigue, improve test performance, and improve mood more than in urban settings without.[23]

> Views from indoors onto nature can support micro-restorative experiences that interrupt stress arousal or the depletion of attentional capacity. Similarly, when moving through the environment from one place to another, passage through a natural setting may provide a respite that, although brief, nonetheless interrupts a process of resource depletion. Frequent, brief restorative experiences may, over the long run, offer cumulative benefits.[24]

This is good news because the nature present in dense, compact cities (such as a rooftop garden, an empty corner lot, a planted medium), though smaller in doses and more discontinuous than in non-urban locations, can have restorative benefits.[25] Biophilic urbanism, thus, must also strive for more intensive and protracted exposure to nature, keeping in mind that even the small green features we incorporate into cities will have a positive effect.[26] Few elixirs have the power and punch to heal, restore, and rejuvenate the way that nature can. The power of biophilia

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[21] MIND, *supra* note 15, at 22.
[22] *Id.*
[23] See Terry Hartig, Marlis Mang & Gary W. Evans, *Restorative Effects of Natural Environmental Experience*, 33 ENV'T AND BEHAV. 3, 21–22 (1991); Terry Hartig & Henk Staats, *The Need for Psychological Restoration as a Determinant of Environmental Preferences*, 26 J. ENVTL. PSYCHOL. 215, 221, 222 (2006).
[24] Agnes E. Van den Berg, Terry Hartig & Henk Staats, *Preference for Nature in Urbanized Societies: Stress, Restoration, and the Pursuit of Sustainability*, 63 J. OF SOC. ISSUES 79, 87–89 (2007).
[25] *See* LOUV, *supra* note 2, at 257–60 (discussing numerous examples of successful green development in urban areas, including Portland, Oregon's trail system circling the city, the Adam Joseph Lewis Center for Environmental Studies at Oberlin College in Ohio, and Chicago's ambitious steps toward becoming the "greenest city in the United States").
[26] *See* Roger S. Ulrich, *Biophilia, Biophobia, and Natural Landscapes*, *in* THE BIOPHILIA HYPOTHESIS 73, 94–96 (Stephen R. Kellert & Edward O. Wilson eds., 1993) (reviewing several studies demonstrating the preference of a large number of people for natural landscape scenes versus urban scenes devoid of natural content).

suggests that everything that we design and build should incorporate natural elements to a far greater extent, both indoors and outdoors (and indeed the need to overcome these overly artificial distinctions), green neighborhoods, integrated parks and wild areas, and all around us.[27]

Existing research suggests that the presence of green neighborhoods has broader and more pervasive impacts on health than we sometimes appreciate. In a national study involving more than ten thousand people in the Netherlands, researchers found significant and sizable relationships between green elements in living environments and self-reported health.[28] Controlling for socioeconomic and demographic variables, the researchers found significantly higher levels of self-reported physical and mental health for respondents with green living conditions.[29] The authors concluded that "[i]n a greener environment people report fewer symptoms and have better perceived general health. Also, people's mental health appears to be better."[30] Lastly, the magnitude of the effects of "greenness" appear to be fairly significant. The authors report that "10% more greenspace in the living environment leads to a decrease in the number of symptoms that is comparable with a decrease in age by 5 years."[31]

I would argue, however, that the benefits of biophilia are much deeper and even more profound than suggested by de Vries. Nature should not be an afterthought or only viewed in terms of the considerable functional benefits typically provided, such as the benefits of trees,[32] for mediating air and water pollutants,[33] green rooftops,[34] wetlands for managing

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[27] *See* LOUV, *supra* note 2, at 276

> The green urbanism of Western Europe and parts of the United States helps to point the way, by showing that the improbable is possible. We are no longer talking about retreating to rural communes, but, rather, about building technologically and ethically sophisticated human-scale population centers that, by their very design, reconnect both children and adults to nature.

[28] *See* Sjerp de Vries, Robert A. Verheij, Peter P. Groenewegen & Peter Spreeuwenberg, *Natural Environments—Healthy Environments? An Exploratory Analysis of the Relationship between Greenspace and Health*, 35 ENV'T. & PLANNING A 1717, 1726–27 (2003).

[29] *Id.* at 1726.

[30] *Id.*

[31] *Id.*

[32] *See* LOUV, *supra* note 2, at 269 ("Recently, American Forests, the nation's oldest nonprofit citizens' conservation organization, estimated that San Diego's urban forest removes 4.3 million pounds of pollutants from the air each year, 'a benefit worth $10.8 million annually.'").

[33] *See id.*

[34] *Id.* at 258 (discussing the benefits of rooftop gardens in the context of Chicago's City Hall, including insulating the building, absorbing excess storm water, preventing sewer flooding, and purifying the air).

storm water,[35] or for addressing urban heat island effects.[36] Nature can provide wonder and awe to our lives. It can amaze, stimulate and propel us forward to want to understand our world more fully. Nature provides an unparalleled wonder value to our lives. The qualities of wonder and fascination, the ability to nurture deep personal connection and involvement, and visceral engagement in something larger than ourselves offers the potential for deeper meaning in life.

Much of the current biophilia debate has focused on the increasingly de-natured world that children are raised in today.[37] Though obvious, research confirms the importance of outdoor play, and the natural concomitant interaction with nature, to a child's development.[38] Some contemporary authors, discussing issues relating to children's access to nature, bemoan the decline in the freedom children once had to independently explore and investigate, to climb trees, and to build forts and tree houses.[39] The freedom to flip rocks over while looking for bugs, or to dip one's feet in local streams, is integral to understanding and personally experiencing nature. Robert Pyle writes of the resulting "extinction of experience" because many natural areas no longer exist or are accessible.[40] Declining "home ranges" for kids

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[35] Kane Co., IL: Stormwater Management, http://www.co.kane.il.us/kcstorm/adid/benefits.htm (last visited Nov. 9, 2009).

> Wetlands . . . are critical to the control of flooding. They store vast quantities of runoff water during floods and release it slowly to rivers and streams as the flood recedes. The storage and slow release of runoff water by wetlands helps to prevent erosion in downstream channels, and stabilizes the baseflow in streams and rivers.

[36] LOUV, *supra* note 2, at 258 (quoting Nancy Seegar's report on the rooftop garden of Chicago's City Hall and stating, "During an August heat wave, surface temperatures in areas of the garden were between 86 and 125 degrees Fahrenheit, 40 to 70 degrees less than the temperatures of the black-tar roof of the adjoining Cook County building.").

[37] *See, e.g.*, LOUV, *supra* note 2.

[38] For a thorough review of the general importance of play, see Kenneth R. Ginsberg, *The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds*, 119 AM. ACAD. OF PEDIATRICS 182, 183 (2007).

[39] *See, e.g.*, LOUV, *supra* note 2, at 28–29 (discussing the sometimes "draconian" approaches taken by homeowners associations toward tree houses and forts, as well as local government officials occasionally classifying tree houses and forts as violating zoning ordinances and ordering their demolition).

[40] *See* ROBERT MICHAEL PYLE, THE THUNDER TREE: LESSONS FROM AN URBAN WILDLAND 140–52 (1993) (discussing the need to protect ourselves against "extinction of experiences" by saving the wilderness and vacant lots, ditches and canyonlands).

leads to the loss of important and formative experiences.[41] Pyle argues that a lack of personal contact with nature breeds alienation from it, which transforms into apathetic feelings about future protection and conservation of nature in a self-perpetuating downward spiral, or "cycle of disaffection."[42]

II. BIOPHILIC URBANISM: NATURE AT THE CORE OF URBAN DESIGN AND PLANNING

Natural and biophilic elements need to be incorporated into everything we design and build. Currently, there are a number of different green and biophilic design ideas, features, initiatives and projects—far more than existed just a decade or two ago.[43] With these biophilic initiatives comes serious challenges for planners, designers, and lawyers, who are charged with integrating nature into our daily urban lives while ensuring they comply with ordinances and laws.[44] Although the challenges to propelling adults and children outside remain serious, there is sufficient precedent and a stock of test ideas and techniques with which to rise to the challenge.[45]

Ideally, biophilic urbanism requires action on multiple geographic scales in a "rooftop to region" or "room to region" approach. Access to nature can occur in many different ways and through access to a range and variety of natural features.[46] The type and extent of these features will vary in part depending on the scale of attention.[47] Ideally, multi-scalar attention results in a nested set of natural features that move from building and site to region and bioregion, creating the conditions for biophilic living. This, in turn, results in an extensive biophilic design palette. This article provides a detailed discussion of these natural

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[41] LOUV, *supra* note 2, at 124.

> In terms of child development, the shrinking home range is no small issue. An indoor (or backseat) childhood does reduce some dangers to children; but other risks are heightened, including risks to physical and psychological health, risk to the child's concept and perception of community, risk to self-confidence and the ability to discern true danger— and beauty.

Id.

[42] PYLE, *supra* note 40, at 146–47.

[43] For a discussion of new projects incorporating these elements, see *infra* Parts A–C.

[44] For a discussion on the obstacles to biophilic urbanism, see *infra* Part III.

[45] *See generally* STEPHEN R. KELLERT, BUILDING FOR LIFE: DESIGNING AND UNDERSTANDING THE HUMAN-NATURE CONNECTION (2005); *see also infra* Parts A–C.

[46] *See infra* Parts A–C (discussing biophilic homes, neighborhoods and cities).

[47] *Id.*

features and compelling examples of its application on different scalar levels. Three scalar levels of biophilic urbanism are particularly useful in framing the discussion here: biophilic buildings and homes; biophilic neighborhoods; and biophilic cities and metropolitan areas.

A. Biophilic Buildings and Homes

Last summer I had the pleasure of touring the new Dell Children's Medical Center of Central Texas in Austin, Texas, a building providing remarkable insight into the design of a biophilic building. The biophilic design qualities of the hospital are plentiful. For instance, no room or space except the surgery room is more than thirty-two feet from a window, thus allowing natural daylight to flood into virtually all spaces of the building.[48] Additionally, there are five interior open-air courtyards and two healing gardens.[49] The open-air courtyards provide natural light and opportunities for outside activity. Additionally, both the courtyards and the gardens highlight the native plants and natural landscapes of the seven primary ecosystems in the Medical Center's forty-six-county service area.[50] Lastly, one central courtyard contains a multi-level waterfall, a natural feature which integrates the sights and sounds of water into the daily regime of the healing facility.[51] The building seemed to embrace the groundbreaking conclusions of environmental and medical experts that hospital patients recover more quickly in rooms with views of nature.[52]

Green features in office buildings and work environments can result in economic gains by dramatically improving working conditions that

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[48] *Austin Texas' 'Green' Hospital Goes Platinum with Help from VT Doors*, DOOR PRESS (VT Indus., Holstein, Iowa), Spring 2009, at 1, *available at* http://www.vtindustries.com/images/news/107.pdf [hereinafter *Austin Texas' 'Green' Hospital*]..

[49] *See* Dell Children's Medical Center, About Our "Green" Building, http://www.dellchildrens.net/about_us/about_our_green_building/ (last visited Nov. 9, 2009); *see also* Rob Patterson, *Green Building Has High Hopes*, March 2006, http://texas.construction.com/features/archive/0603_feature3.asp.

[50] Dell Children's Medical Center, The Healing Power of Art and Nature, http://www.dellchildrens.net/about_us/healing_power_of_art_and_nature/ (last visited Nov. 9, 2009).

[51] *See Austin Texas' 'Green' Hospital*, *supra* note 48, at 1.

[52] *See* Mary Fouts & Diane Gobay, *Healing Through Evidence-Based Design*, ONCOLOGY ISSUES, May–June 2008, at 32; Marc Schweitzer, Laura Gilpin & Susan Frampton, *Healing Spaces: Elements of Environmental Design That Make an Impact on Health*, 10 J. OF ALTERNATIVE & COMPLEMENTARY MED. S71, S71–S76 (2004); *see also* Roger S. Ulrich, *Health Benefits of Gardens in Hospitals*, PEOPLE INT'L EXHIBITION FLORIADE (2002), *available at* http://www.planterra.com/SymposiumUlrich.pdf.

increase productivity.[53] One recent example is the 2006 opening of the Council House 2, the new municipal offices for the City of Melbourne, Australia.[54] The building incorporates a number of creative, high-tech green design elements, including wind turbines at the top of the structure to pull air through the building, shower towers that provide evaporative cooling, and a wastewater harvesting system.[55] But perhaps the most impressive features of the building are the most basic natural elements of the structure: fresh, non re-circulated outside air and lots of daylight and plants.[56] It was originally estimated that the incorporation of these green, natural elements would result in a five percent increase in worker productivity, ultimately paying for the cost of the green features in about ten years.[57] A recent study, however, shows that following the first full year of occupancy, the building's worker productivity increased by ten percent, and the payback period will be seven years or less.[58] Other studies that have researched the effects of biophilic elements on worker productivity and economic yield have shown similar results.[59] These collective findings further demonstrate the value and need for incorporating green elements in every structure.

Another biophilic building initiative can be found under the leadership of Chicago's Mayor Richard Daley, who pushed to retrofit Chicago's City Hall with a green roof.[60] The project is now perhaps the most famous of such projects in the United States and has inspired the construction of some four hundred and fifty green rooftops in the city of Chicago.[61] Green rooftops, as with many urban greening techniques and strategies, accomplish many things at once. The benefits of these rooftops include

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[53] *See* Ulrich, *supra* note 52, at 6; *see also* Fouts & Gobay, *supra* note 52, at 32.
[54] City of Melbourne, Council House 2 Facts and Figures, http://www.melbourne.vic.gov.au/info.cfm?top=171&pa=4112&pg=4090 (last visited Nov. 9, 2009).
[55] CITY OF MELBOURNE, CH2—HOW IT WORKS 2, 5, http://www.melbourne.vic.gov.au/rsrc/PDFs/CH2/CH2_HowItWorks.pdf (last visited Nov. 9 2009).
[56] *See id.* at 2, 6–10.
[57] See TIMOTHY BEATLEY, GREEN URBANISM DOWN UNDER: LEARNING FROM SUSTAINABLE COMMUNITIES IN AUSTRALIA 44 (2008).
[58] *Id.*
[59] *See generally* Rachel Kaplan, *The Role of Nature in the Context of the Workplace*, 26 LAND & URBAN PLAN. 193, 196–200 (1993) (discussing the benefits in productivity when employees have windows in their offices); F. Stephen Mayer, Emma Bruehlman-Senecal & Kyffin Dolliver, *Why is Nature Beneficial?: The Role of Connectedness to Nature*, ENV'T & BEHAV., Sept. 5, 2008 at 13–15, 22, 28 (discussing three studies where the authors find that people with exposure to nature reflect better than people without it).
[60] Sustainable Cities, Chicago: Green Roofs Cut Energy Bills, http://sustainablecities.dk/en/city-projects/cases/chicago-green-roofs-cut-energy-bills (last visited Nov. 9, 2009).
[61] *Id.*

the following: storm water management that can retain up to seventy-five percent of the water that falls on it; urban heat island cooling; sequestration of carbon; creation of new habitats for bird and invertebrate species; and greater longevity for the roof as it is shielded from weather and ultraviolet rays.[62] While these beneficial green rooftops are more common in Europe than in North America,[63] a number of cities in the United States are currently incorporating this concept.[64] For instance, the new Minneapolis Central Library includes "an 18,560-square foot 'extensive' green roof" with plant species native to Minnesota.[65]

Efforts to insert nature in and around cities are increasing in terrific and creative new ways. The new Ballard Branch of the Seattle Public Library, for example, demonstrates how building-integrated green features can help enhance the green surroundings of a neighborhood.[66] While the building incorporates a number of ecological features, including extensive use of skylights, daylighting, recycled materials, and photovoltaics, its most prominent feature is its extensive green rooftop.[67] The dramatic sloping roof of the library is home to more than eighteen thousand native plants and is composed of some fourteen different native grass species,[68] including Woolly yarrow, long-stoloned sedge, red creeping fescue, and Fool's onion.[69] These grass species give the roof the look of a native prairie, visible from all sidewalks and spaces around the building.

Rethinking the many vertical spaces in cities, such as with green rooftops, could help infuse nature into the city. This could ultimately result in the sequestering of carbon, reduction of energy consumption, retention

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[62] Capital Regional District, Green Roofs, http://www.crd.bc.ca/watersheds/lid/roofs.htm (last visited Nov. 9, 2009).
[63] *Id.*
[64] *See* Ketzel Levine, *'Green' Roofs Sprout Up All Over: Growing Plants on Buildings Said to Offer Environmental Benefits*, NAT'L PUB. RADIO, June 23, 2004, http://www.npr.org/templates/story/story.php?storyId=1970286.
[65] MINNEAPOLIS PUB. LIBR. & CITY OF MINNEAPOLIS, GREEN ROOF 1–2 (2006).
[66] *See* Fred Moody, *Ship Shape: In a New Maritime-Inspired Branch Library, a Seattle Neighborhood has Gotten a Design that Perfectly Fits its Values*, METROPOLIS MAG., Feb. 20, 2006, http://www.metropolismag.com/story/20060220/ship-shape.
[67] *See id.*
[68] *See id.*
[69] Heidi Wachter & Kurt Marx, A Study of Green Roof Hydrological Performance to Support Policy Development for the Use of Green Roofs as Par of Seattle Public Utilities' Stormwater Management Strategy, http://www.co.pierce.wa.us/xml/services/home/environ/water/general/conferences/lid101207/presentations/04-Taylor-L211StormCon0-SPUGreenRoofsPuyallupConf.pdf (last visited Nov. 9, 2009).

of stormwater, and the tackling of the urban heat island phenomenon.[70] Patrick Blanc, a botanist employed at the French National Center for Scientific Research, is one of the most creative designers of green walls for interior and exterior spaces.[71] Blanc's exterior vertical gardens, or *Le Mur Végétal* (plant wall) as he prefers, are beautiful, lush, and add an incredible degree of greenness to buildings in the urban districts where they are built.[72] Created by a metal exterior frame, with plastic and felt layers through which plants are rooted, garden walls, like the visually dramatic one he designed for the Musée du Quai Branly in Paris, are a kind of vertical hydroponics.[73] Blanc utilized some one hundred and seventy different species for the Musée du Quai Branly wall.[74] Each of his projects uses a different botanic mix, depending on site and climate conditions.[75]

Recently, I traveled to Paris to see and film several of Patrick Blanc's most notable green walls. Perhaps the most famous is the wall at the Musée du Quai Branly. Although I had seen many impressive photos of this wall, I was not prepared for the real thing. In fact, there were two specific aspects of the wall that I was completely unprepared for. The first was the texture and structure of the green wall itself. While it is a vertical wall, it is remarkable how horizontal it actually is. There are rather large bushes and various other green vegetation extending outward from the wall for several feet. I had a difficult time seeing the sky when standing close to the wall and looking up. Although it is simply a vertical green wall, it is functionally quite complex because it enables plants to grow and extend their reach in every direction.

The second remarkable thing about the wall is its seemingly magical impact on every passerby. The wall faces a major road and sidewalk that serves as a major pedestrian corridor for tourists. There is a steady flow of pedestrian traffic moving en route to the Eiffel tower a mere block or so away. As they walk by, it seems impossible for pedestrians to pass the wall without interacting with it in some way. They stop to touch it, to gaze up at it, to pose with it and their loved ones, and to take pictures of

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[70] *See supra* note 62.
[71] *See* Patrick Blanc Vertical Garden, http://www.verticalgardenpatrickblanc.com (last visited Nov. 9, 2009).
[72] *See id.* (follow "Walls" hyperlink; then follow "Short Presentation" hyperlink).
[73] *See id.* (follow "Walls" hyperlink; then follow "Detailed Presentation" hyperlink).
[74] *Green Walls: The Growing Success of 'Vegitecture'*, CNN, June 29, 2009, http://www.cnn.com/2009/TECH/science/06/28/green.walls/index.html.
[75] *See* Patrick Blanc Vertical Garden, http://www.verticalgardenpatrickblanc.com (follow "Walls" hyperlink; then follow "Short Presentation" hyperlink).

it. The reaction to the wall is something akin to viewing a natural wonder, seemingly garnering an equivalent number of pictures taken at the Niagara Falls on any given day. Part of this must surely be the result of surprise. Moreover, because the vegetation extends to the ground, observers are able to interact with the wall's many components.

Blanc has said he "like[s] to reintegrate nature where one least expects it," such as in a metro station, in a hotel lobby, or on the side of a department store building.[76] "'Humanity is living more and more in cities, and at odds with nature,' he [explains]. 'The plant wall has a real future for the well-being of people living in cities. The horizontal is finished—it's for us. But the vertical is still free.'"[77] Using vertical spaces, such as in a metro, thus, are the best ways to integrate natural elements into the city.[78]

Green walls of various kinds are popping up in many cities around the world. There are now hundreds of green walls,[79] which can be found from Canada[80] to Australia.[81] For instance, Mark Paul of the Green Wall Company in Sydney, Australia, has designed and installed green walls in many places, including the Qantas first class lounge at the Sydney International Airport[82] (using epiphyte plants).[83] A dramatic Canadian example can be found at the University of Guelph-Humber in Toronto.[84] Here, a wall designed by Air Quality Solutions Ltd. impressively occupies the main interior atrium of the building, providing students and workers a striking living feature and green backdrop while simultaneously cleansing the air.[85] Another example of a city's use of green walls can be seen in the work of

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[76] Kristen Hohenadel, *All His Rooms Are Living Rooms*, N.Y. TIMES, May 3, 2007, at F1, *available at* http://www.nytimes.com/2007/05/03/garden/03blanc.html.
[77] *Id.*
[78] *See id.*
[79] *See* Linda Stern, *Climbing the Office Walls*, NEWSWEEK, Feb. 25, 2008, at E4, *available at* http://www.newsweek.com/id/111714.
[80] *See, e.g.*, Ginny Smith, *Walls of green: Vertical, Hydroponic Gardens are Good for the Air and for Design*, SEATTLE TIMES, Apr. 11, 2009, *available at* http://seattletimes.nwsource.com/html/homegarden/2009021229_zhom11greenwall.html (discussing Green Walls in Canada).
[81] *See, e.g.*, Mark Paul, *Going Out On a Limb*, http://www.greenwall.com.au/Uploads/Downloads/GoingOutOnALimb.pdf (last visited Nov. 9, 2009) (discussing the Greenwall Company and their work in Australia).
[82] *Id.*
[83] Olivia McDowell, *Marc Newson's Qantas First Lounge*, SPECIFIER, http://www.specifier.com.au/projects/hospitality/30025/Marc-Newson-s-Qantas-First-Lounge.html (last visited Nov. 9, 2009).
[84] Andrew Vowles, *Guelph-Humber Plant Wall a Breath of Fresh Air*, 48 AT GUELPH 17 (2004), *available at* http://www.uoguelph.ca/atguelph/04-11-10/featuresair.shtml.
[85] *See id.* Research indicates this wall is likely to remove half of the benzene in the air and some ninety percent of the formaldehyde.

Korean architect Minsuk Cho and his firm Mass Studies.[86] Specifically, he designed a dramatic green building for Belgian fashion designer Ann Demeulemeester, whose Seoul shop is essentially covered in blankets of moss (Pachysandra terminalis).[87]

There are many other green elements that can and have been integrated into building designs and sites.[88] Some of these elements include green courtyards, skygardens and green atria in a number of green skyscraper designs and rooftop and vertical food production systems.[89]

B. Biophilic Neighborhoods

Every urban neighborhood offers hope and promise for infusing new nature and acknowledging the often considerable nature already found there.[90] This can be achieved by re-envisioning spaces around buildings as natural habitats, by replacing turfgrass with native flowers, or by pulling up pavement, where acceptable.[91] Two recent examples of such green and biophilic neighborhoods include the Greenwich Millennium Village in London and the Western Harbor in Malmö, Sweden.[92] Greenwich Millennium Village is distinctive in its creative combination of high density sustainable housing and impressive access to nature, particularly with its new ecology park.[93] This ecology park is an urban form that allows residents unusual visual and pedestrian access to a restored riparian wetland system through a series of elevated boardwalks, bird blinds, a nature center, and a viewing structure.[94] There, residents routinely watch nesting birds and aquatic life, often from their balconies, and experience the pre-industrial Thames River daily.[95]

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[86] Mass Studies, About Mass Studies, http://www.massstudies.com/about_EN.html (last visited Nov. 9, 2009).
[87] Mass Studies, Ann Demeulemeester Shop, http://www.massstudies.com/projects/ann_txtEN.html (last visited Nov. 9, 2009).
[88] *See* Ji-hyun Rho, Young-soo Kim, & Jin-Ho Park, *Effects and Approaches of Green Design for Communal Spaces in Housing Designs*, http://www.osooya.com/research-1.htm (last visited Nov. 9, 2009).
[89] *See id.*
[90] *See* TIMOTHY BEATLEY, NATIVE TO NOWHERE: SUSTAINING HOME AND COMMUNITY IN A GLOBAL AGE 125–32 (2004).
[91] *See id.* at 126–29, 133.
[92] *Id.* at 133, 136.
[93] *Id.* at 133–34.
[94] *Id.* at 133–34.
[95] *Id.*

The Western Harbor in Malmö is a similar brownfield redevelopment project, and it is a new urban district with some impressive environmental targets.[96] A key priority of this urban district was to be "an internationally leading example of environmental adaptation of a densely built urban environment."[97] In order to fully include nature in the Western Harbor, building contractors must comply with the green space factor by providing green spaces and a system of green points to benefit biodiversity.[98] In the latter case, building contractors committed to achieving at least ten out of thirty-five green points.[99] Although there are deficiencies, the overall result here is impressive.[100] For instance, green courtyards, native vegetation, and a meandering vegetated water channel snake through, creating natural sights and sounds that form the connective tissue of the neighborhood.[101]

These green neighborhoods seek to promote safe spaces for walking and conducting other outdoor activities by minimizing the presence of automobiles.[102] Green neighborhoods utilize methods such as connected streets with sidewalks, car-free or car-limited neighborhood spaces, and trails that connect the neighborhood to larger networks of green space and nature. Vauban, a new car-limited neighborhood in Freiburg, Germany, for instance, discourages car ownership by providing inconvenient parking areas and a high premium for car ownership.[103] This allows the life of the neighborhood to center around beautiful courtyard spaces, where pedestrians can enjoy the "safety and pleasure of car-free living and play environments."[104] Moreover, these close-by neighborhood spaces, in turn, connect to larger green features, such as a nearby stream or a bridge connecting to a regional network of natural areas.[105]

Integral to biophilic urbanism is having sufficient parks and natural space in and around urban neighborhoods. To that end, a number

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[96] *See* BEATLEY, *supra* note 90, at 307–08. One target is to provide one hundred percent of the district's energy from local renewable sources, a goal which they have met.
[97] CITY OF MALMO, THE GREEN CITY OF TOMORROW (2001), http://www.malmo.se/download/18.4a2cec6a10d0ba37c0b800012608/bo01_det_grona_bo01_eng.pdf.
[98] *See id.*
[99] *Id.* Contractors receive points for, inter alia, installing bird nesting boxes or bat boxes, butterfly courtyards.
[100] *See* CITY OF MALMO, GREEN PLAN FOR MALMO: 2003: SUMMARY 4 (2003).
[101] *See id.* at 1–2, 8–12.
[102] See BEATLEY, *supra* note 90, at 244–45.
[103] *Id.* at 252–53.
[104] *Id.*
[105] *See id.*

of cities have set targets or benchmarks for parks, which are sometimes expressed in distance measures or in acres per person.[106] Equally important, however, is deciding what kinds of natural experiences will be used in these parks and urban green spaces. Providing a degree of "wildness" in cities is an important biophilic goal and suggests new thinking about parks, including where the spaces are used for more than just turfgrass, benches and standard play equipment.[107]

Finding space for new parks in already dense cities, and ensuring that it comports with biophilic goals, is a challenge. One of the more unusual locations for a park is found on the top of a disused elevated railway line in Paris.[108] This park, created in the 1990's, is known as *Promenade Plantée,* or "a Promenade full of plants," and is a linear park full of trees, greenery, and benches that float above the city.[109] The elevated portion of the park takes up a significant portion of the park.[110] This elevated portion of the park runs from the Opéra Bastille to Jardin de Reuilly.[111] Just below the elevated portion is the Viaduct des Arts, which houses "arts and crafts workshops, galleries, furniture showrooms, a restaurant and a café" and provides occasional stairway access to and from the street level below.[112] The elevated portion snakes alongside apartment buildings and even through several buildings.[113] One can expect to find dog walkers, strollers, joggers, and residents of nearby flats enjoying the benches and green serenity of this unusual place during any given afternoon.[114]

The Promenade Plantée is so impressive that it is serving as the inspiration to the High Line rail, a similar park and urban green

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[106] *See, e.g.*, CITY OF NEW YORK, PLANYC: A GREENER, GREATER NEW YORK 31 (2008), *available at* http://www.nyc.gov/html/planyc2030/downloads/pdf/full_report.pdf (discussing PlaNYC and its goal of ensuring that New Yorkers live within a ten minute walk of a park).
[107] *See* BEATLEY, *supra* note 90, at 44–52 (discussing the positive impacts nature has on people). One recent example of a different kind of park is seen at the Teardrop Park at the Battery Park neighborhood of New York City. *See* David W. Dunlap, *A Chip Off the Old Park*, N.Y. TIMES, Sept. 30, 2004, *available at* http://www.nytimes.com/2004/09/30/nyregion/30park.html.
[108] Paris-Walking-Tours.com, Promenade Plantee, http://www.paris-walking-tours.com/promenadeplantee.html (last visited Nov. 9, 2009).
[109] *See id.*
[110] *See id.* The elevated portion of the park is about 1.5 kilometers in length; whereas, the entire park measures about 4.5 kilometers in length.
[111] *Id.*
[112] *Id.*
[113] *Id.*
[114] Paris-Walking-Tours.com, *supra* note 108.

project in New York City.[115] The High Line is a park located on an elevated 1930s freight that runs through the Meat Packing District, Chelsea District, and Hell's Kitchen.[116] It has been a multi-year effort to creatively restore this structure as an elevated garden and walking park.[117] When it is completed, the High Line will be an elevated green park that connects every few blocks with the surface streets below.[118] The planting design of the first section of the park is inspired by, and incorporates, many of the native plants that existed during the years the rail line was not in use.[119] It is a special park indeed, with pedestrians experiencing a variety of natural habitats, from grasslands, to fields of wildflowers, to water features.[120] One planned segment, the Woodland Flyover, envisions a metal walkway springing up from the Highline, providing a kind of tree canopy walk: "while an undulating terrain of moss and shade groundcover blankets the Highline bed, the Flyover carries visitors upward into the shady canopy of a stand of sumac trees."[121]

Another means of infusing biophilic concepts in urban and suburban areas is by "daylighting," or "deliberately expos[ing] some or all of the flow of a previously covered river, creek, or stormwater drain."[122] This ultimately improves water quality, recreates aquatic and valuable riparian habitats, provides recreational amenities, and "link[s] urban greenways and paths for pedestrians and bicyclists."[123] A number of cities, from Zurich to Seattle, have undertaken stream daylighting projects.[124] In Seattle, for instance, a portion of Ravenna Creek was brought back to the surface, creating a beautiful and lush natural environment with restored native vegetation, just a few meters from urban

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[115] *See id.*; *see also* High Line, Park Information, www.thehighline.org/about/park-information (last visited Nov. 9, 2009).
[116] Paris-Walking-Tours.com, *supra* note 108; High Line, Park, *supra* note 115.
[117] *See* High Line, Frequently Asked Questions, www.thehighline.org/about/faq (last visited Nov. 9, 2009).
[118] *Id.*
[119] *See* High Line, Planting Design, www.thehighline.org/design/planting-design (last visited Nov. 9, 2009).
[120] *See* High Line, High Line Design, www.thehighline.org/design/high-line-design (last visited Nov. 9, 2009).
[121] *See id.*
[122] RICHARD PINKHAM, DAYLIGHTING: NEW LIFE FOR BURIED STREAMS IV (Rocky Mountain Institute 2000), *available at* http://www.rmi.org/images/other/Water/W00-32_Daylighting.pdf.
[123] *Id.* at IV–V.
[124] *Id.* at IV, 51.

housing.[125] Pushed along by a local non-profit, the Ravenna Creek Alliance, the project resurfaced water that had been diverted underground throughout the early 1900's.[126]

Planting trees and urban forests is another essential step in greening the city. Most cities have some form of an urban forestry program, and recently a number of cities have set ambitious tree planting goals.[127] Both Los Angeles and New York City have set goals of planting one million new trees.[128] Other cities, such as Brisbane, Australia, have been even more ambitious by initiating a campaign to plant two million new trees by 2012.[129]

There are many other important ways in which green and nature can be returned or nurtured in urban neighborhoods. Several cities, such as Chicago, now have initiatives to create green alleys, and many cities have community gardens programs.[130]

Just as important as the urban form and physical design features are the other essential organizational and programmatic strategies for growing a green neighborhood. Gardens, community orchards, and spaces for gathering and exploring are all important, but so are the many things that may be done to challenge residents to more deeply understand their place in the world and to connect more intimately with the people and creatures that co-inhabit that space. I believe every new homeowner should be given an *ecological owners manual* that describes the ecology, the unique environmental conditions, and the history of their neighborhood and watershed. Accompanying it might be a nature journal, in which residents are encouraged to join in the ancient practice of phenology—watching and

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[125] *See id.* at 51; Seattle Parks and Recreation, Ravenna Creek Daylighting Within Ravenna Park Pro Parks Project Information, http://www.seattle.gov/parks/proparks/projects/RavennaCreekatRavenna.htm (last visited Nov. 9, 2009).

[126] PINKHAM, *supra* note 122; Seattle Parks and Recreation, *supra* note 125.

[127] *See, e.g.*, MillionTreesNYC, A Million Ways to Get Involved, http://www.milliontreesnyc.org/html/involved/tree_planting_opps_text.shtml (last visited Nov. 9, 2009); MillionTreesLA, The Initiative: One Million New Trees, http://www.milliontreesla.org/mtabout1.htm (last visited Nov. 9 2009).

[128] MillionTreesNYC, *supra* note 127; MillionTreesLA, *supra* note 127.

[129] *A Breath of Fresh Air for Brisbane*, THE REGENERATOR (Brisbane City Council), Summer 2008, at 7, *available at* http://www.brisbane.qld.gov.au/bccwr/environment/documents/regenerator_summer2008_2009.pdf.

[130] *See* City of Chicago, Green Alleys, http://egov.cityofchicago.org/ (follow "Your Government" hyperlink; then follow "City Departments" hyperlink, then follow "Transportation" hyperlink; then follow "CDOT Programs" hyperlink; then follow "Green Alleys" hyperlink) (last visited Nov. 9, 2009). *See, e.g.*, American Community Gardening Association, Find a Community Garden, http://acga.localharvest.org/ (last visited Nov. 9, 2009).

recording the seasonal changes around them.[131] In this way, individuals connect with the nature around them and perceive native nuances in weather and ecology.

We should also rethink the basic equipment that a neighborhood needs to achieve these goals. My suggested list includes some of the following: a bat detector, an outside collective baking oven, a tree house, a native seed collection and storage facility, and a community apiary. Additionally, people could join organizations that ultimately promote the biophilic agenda, such as the following: a membership in a Community Supported Agriculture ("CSA") group, a type of subscription farming that directly connects consumers with local farmers,[132] and memberships in either the local bird club, native plant society, star gazing party or fungi foray. The creation and organization of such place-strengthening groups should be viewed as an important feature of a healthy neighborhood.

Embracing the natural elements in a given community is a key aspect of biophilic urbanism, which requires the formation of new relationships and new ways of living.[133] Cooking, eating, landscaping, and recreating can be seen as acts of place-strengthening and expressions of place-commitments.[134] Real commitments to strengthening community and place also require creative notions of home or building needs, perhaps a new understanding of the essential "equipment" of place strengthening. In addition to the ecological owners manual and neighborhood biodiversity guide, each new home should come equipped with a telescope for celestial star-gazing, a pair of walking shoes for exploring the neighborhood and meeting one's neighbors, and a bicycle for moving around one's larger "home" at more place-appropriate speeds.

Perhaps each neighborhood should assess its biophilic expertise, and each locality could add something particular to it. What I envision is a network of *neighborhood naturalists* that would help to educate adults and children alike. A resident ornithologist, a mycologist, a botanist, or others could lead the occasional neighborhood walk or workshop, and would be available when something unknown needs

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[131] *See* James L. Olmsted, *Climate Surfing: A Conceptual Guide to Drafting Conservation Easements in the Age of Global Warming*, 23 ST. JOHN'S J. LEGAL COMMENT. 765, 787–88 (2008).
[132] *See* Neil D. Hamilton, *Tending the Seeds: The Emergence of a New Agriculture in the United States*, 1 DRAKE J. AGRIC. L. 7, 16–17 (1996).
[133] *See* BEATLEY, *supra* note 90, at 24.
[134] *See id.* at 13–14.

identification or explanation. Neighborhood gatherings and block parties could provide opportunities to further stimulate interest in the local natural environment. Perhaps a yearly or biennial neighborhood *BioBlitz* could utilize this neighborhood expertise and knowledge, ultimately creating an important celebratory and learning event for the neighborhood.[135]

C. Biophilic Cities

While it is easier to design biophilic buildings and the immediate spaces around them, we should not neglect imagining *biophilic* cities in order to promote a new kind of *biophilic urbanism*. Exactly what is a biophilic city, and what are its key features and qualities? Perhaps the simplest answer is a city that puts nature first in its design, planning, and management. A biophilic city recognizes the many instrumental and economic values provided by nature and natural systems, as well as the essential need for daily contact with nature.[136] For me, biophilic urbanism represents a creative mix of green urban design, a commitment to outdoor life, protection and restoration of green infrastructure from neighborhood to bioregional levels, and much more. The ability to access a park or point of wild nature on foot, by bicycle, or by transit, is essential. It also involves expanding our notion of the experiences offered within parks. Some city parks now encourage family camping or an extended classroom experience.[137]

The larger physical networks of green spaces in cities and metropolitan areas are essential. Increasingly, we recognize the need to integrate and tie together the many individual green features and

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[135] *See* National Geographic, Species Inventory Information & Facts, BioBlitz, http://www.nationalgeographic.com/field/projects/bioblitz.html (last visited Nov. 9, 2009) (describing BioBlitz as "a 24-hour [intense] event in which teams of scientists, volunteers, and community members join forces to find, identify, and learn about as many local plant and animal species as possible.").

[136] *See* BEATLEY, *supra* note 90, at 44.

[137] *See, e.g.*, New York City Department of Parks & Recreation, Family Camping, http://www.nycgovparks.org/sub_about/parks_divisions/urban_park_rangers/pd_ur_family_camping.html (last visited Nov. 9, 2009); Tenn. Dep't of Education, *Tennessee Brings Outdoors in with Environmental Education*, Apr. 14, 2008, http://info.tnanytime.org/tdoe/?p=103; Western Kentucky University News Release, *Teachers Participate in Outdoor Classroom at WKU*, June 30, 2009, *available at* http://www.wku.edu/news/releases08/June/workshop.html.

neighborhood parks that exist in a city into a more holistic, ecological network, which a number of cities have done.[138] Helsinki, Finland, for instance, has one of the most impressive urban green networks that integrates larger natural features, such as its Keskupuisto Central Park.[139] The park runs in an unbroken wedge from an old growth forest on the edge of the city to the center of the city, with smaller features at the neighborhood and street level.[140] A biophilic city, thus, is concerned about the ecological integrity of its network of nature and its accessibility to citizens, thus ensuring that a resident can move from his or her neighborhood to larger green realms.[141]

Many cities have developed regional greenspace plans and visions. American cities include Boulder, with a greenbelt that now consists of over thirty thousand acres of protected land,[142] Portland,[143] and Chicago (e.g., Chicago Wilderness).[144] Impressive European city efforts include Hannover, Germany's eighty kilometer long Green Ring,[145] and Vitoria-Gasteiz, Spain's Green Belt.[146] The latter demonstrates the great value of joining dense and compact urban form with land conservation.[147] In Vitoria-Gasteiz, urban neighborhoods are only a short walk away from large natural areas, including Salburua Park,

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[138] *See, e.g.*, City Of Helsinki Planning Department, Helsinkipuisto– Nature and Culture, http://www.hel.fi/wps/portal/Kaupunkisuunnitteluvirasto_en/Artikkeli_en?WCM_GLOBAL_CONTEXT= /ksv/en/Town+Planning/City+planning+projects/Helsinkipuisto (last visited Nov. 9, 2009); Green Belt of Vitoria-Gasteiz, Physical Configuration, http://www.vitoria-gasteiz.org/anilloWeb/en/html/4/48.shtml (last visited Nov. 9, 2009); Hannover, Conservation of Biological Diversity, http://www.hannover.de/data/download/lhh/umw_bau/energie/download_sustainable_hannover/Conservation_of_biological_diversity.pdf (last visited Nov. 9, 2009).

[139] *See* City of Helsinki, *supra* note 138.

[140] *See id.*

[141] *See* BEATLEY, *supra* note 90, at 278.

[142] *See* City of Boulder, Colorado, Open Space & Mountain Parks, Summary of Land Acquisition, http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=298&Itemid=3643 (last visited Nov. 9, 2009).

[143] *See* Urban Greenspaces Institute, Mission & Motto, http://www.urbangreenspaces.org/mission_motto.htm (last visited Nov. 9, 2009).

[144] *See* Chicago Wilderness, Vision for the Chicago Wilderness Region, http://www.chicagowilderness.org/about.php (last visited Nov. 9, 2009).

[145] *See* Hannover, *supra* note 138.

[146] *See* Spain.info, Vitoria: A Leisurely Way to Explore the City, http://www.spain.info/TourSpain/Reportajes/2/Vitoria%20conocer%20la%20ciudad%20con%20calma.htm?Subsys=Dstntn&language=EN (last visited Nov. 9, 2009).

[147] *See* Natura 2000 Site Management Case-study, Salburua Wetland: ES, http://www.natura.org/natura2000management/es_salburua_wetland.html (last visited Nov. 9, 2009).

a former airport converted into an important wetland for migratory birds.[148] Extensive trails and a city nature center are part of the biophilic infrastructure of this city.[149] The city has placed much importance on the Green Belt and on integrating nature into local life.[150] Building on the Provincial conservation plan, the city is now looking to expand the Green Belt to allow residents access to more distance natural points.[151]

The importance of the Green Belt in Vitoria and the protection of nature and environmental education to this city suggests that integral to a *biophilic* city is the presence of a *biophilic spirit* or sensibility. *Biophilic* spirit suggests a high value on nature, where both residents and public officials recognize the importance and centrality of nature to a rich urban life. In Austin, Texas, residents gather by the thousands every summer evening to watch the emergence of the one and a half million Mexican free-tailed bats that live under the Congress Avenue Bridge.[152] It provides a remarkable story of appreciation of the wonder and wildness and majesty of local natural spectacles and a gradual cultivating of a biophilic sensibility. This is especially impressive because people initially reacted fearfully to the bats, petitioning for their eradication.[153] While every city will not have as large of a spectacle as the bats in Austin, Texas, they should still pay attention to its own natural spectacles and the concomitant beauty, wonder, and caring.[154] It may be the running of the steelhead trout in Niagara River,[155] or the appearance of orcas in Prince William

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[148] *See* Green Belt of Vitoria-Gasteiz, Ecological Importance of Salburua Park, http://www.vitoria-gasteiz.org/anilloWeb/en/html/1/38.shtml (last visited Nov. 9, 2009); *see also* Urbarama Atlas of Architecture, Bioclimatic Towers in the Salburua Fens, http://es.blog.urbarama.com/project/bioclimatic-towers-in-the-salburua-fens (last visited Nov. 9, 2009).

[149] *See* Green Belt of Vitoria-Gasteiz, Farmhouse of Olarizu, http://www.vitoria-gasteiz.org/anilloWeb/en/html/3/57.shtml (last visited Nov. 9, 2009); Green Belt of Vitoria-Gasteiz, Green Belt, http://www.vitoria-gasteiz.org/anilloWeb/en/html/1/1.shtml (last visited Nov. 9, 2009).

[150] *See* Green Belt of Vitoria-Gasteiz, Technical Information: Origin and Objectives, http://www.vitoria-gasteiz.org/anilloWeb/en/html/4/46.shtml (last visited Nov. 9, 2009).

[151] *See* Green Belt of Vitoria-Gasteiz, The Future, http://www.vitoria-gasteiz.org/anilloWeb/en/html/4/50.shtml (last visited Nov. 9, 2009).

[152] Bat Conservation International, Congress Avenue Bridge, http://www.batcon.org/index.php/get-involved/visit-a-bat-location/congress-avenue-bridge/subcategory.html?layout=subcategory (last visited Nov. 9, 2009).

[153] *Id.*

[154] *See* BEATLEY, *supra* note 90, at 10–11.

[155] *See* A. J. Somerset, *Steelhead Fishing: Niagara River, Ontario*, OUTDOOR CANADA, http://articles.outdoorcanada.ca/homepage/default/steelhead-fishing-niagara-river-ontario-n256948p1.html (last visited Nov. 9, 2009).

Sound,[156] or the migratory return of robins along the east coast of the United States.[157] A biophilic city celebrates these natural wonders, connecting and strengthening bonds with nature, ultimately allowing for a better understanding of the cycles of life and seasonality.

With the recent rise of the importance of *green infrastructure*, many cities are increasing efforts to enhance and restore the ecological and hydrologic systems that define those places at a regional and bioregional level.[158] Many have sought to repair and restore rivers in hopes of re-establishing both physical connections and personal associations with those rivers.[159] New efforts are underway, for instance, to restore the natural functions of the Los Angeles River.[160] Currently more a concrete flood channel than a natural system, the Los Angeles River touches virtually every neighborhood in that city, and an ambitious new urban design holds real potential to enhance the living conditions of thousands of residents by offering two hundred and thirty-nine greening projects.[161] The City of Seoul, South Korea, in a very bold move, removed three miles of an elevated freeway to reestablish a connection to the Cheonggyecheon River that lay hidden beneath it.[162] This was a campaign pledge of then-mayor Lee Myung-bak, now president of South Korea, which demonstrates that actions supporting the biophilic agenda can yield political dividends.[163] Even more so, however, this Korean daylighting project yielded environmental, economic, and cultural benefits.[164]

A biophilic city is one that forces us to connect with and enjoy the nature around us. It is a city with an extensive and robust *social capital*.[165]

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[156] *See* Alaska Ocean Observing System, The Eye on Alaska's Coasts and Oceans, http://www.aoos.org (last visited Nov. 9, 2009).
[157] *See* Kathy Reshetiloff, *Air, Land, Sea Exploding with Migrating Wildlife*, CHESAPEAKE BAY J., May 2004, *available at* http://www.bayjournal.com/article.cfm?article=111.
[158] *See* BEATLEY, *supra* note 90, at 121–22, 125–27, 203–04.
[159] *See id.* at 125–27, 203–04.
[160] *See* Troy Anderson, *Waterway Going from Eyesore to City Jewel Transform: Tujunga Wash Project Opening Floodgates to Change*, DAILY NEWS, Dec. 8, 2007, http://www.thefreelibrary.com/waterway+going+from+eyesore+to+city+jewel+transform:+tujunga+wash...-a0172279754.
[161] *See id.*
[162] *See* Andrew C. Revkin, *Peeling Back Pavement to Reveal Watery Havens*, N. Y. TIMES, July 17 2009 at A4, *available at* http://www.nytimes.com/2009/07/17/world/asia/ 17daylight.html.
[163] *See id.*
[164] *See id.*
[165] See ROBERT PUTNAM, BOWLING ALONE: THE COLLAPSE AND REVIVAL OF AMERICAN COMMUNITY 18–20 (2000), for a description of social capital, although this article extends that definition.

There is compelling evidence that, in addition to needing extensive friendships and social contact to be healthy and happy,[166] we need contact with nature.[167] Finding creative ways to combine these needs, thus, becomes an important goal in the biophilic city. I refer to the fusion of the need for social contact and the need for contact with nature as *natural* social capital, which implicitly acknowledges that learning about and experiencing nature can nurture friendships and help to overcome the increasing social isolation felt by some Americans.[168] This *natural* social capital can then become another proxy for the biophilic city.

Biophilic cities work hard to entice residents to spend time outside and to connect with nature. Perhaps this means supporting a network of nature coaches. Some possible models of this include the Urban Park Rangers that exist in a few cities, including New York and Los Angeles.[169] There, a corps of uniformed rangers staff city parks and nature centers.[170] In some cities and countries, there has been an emphasis on training nature guides. In Sweden, for example, there is an interesting program to train and certify nature guides, who give tours of the Swedish countryside and teach tourists about Swedish culture.[171] Supported through a combination of funding from three different organizations, the Swedish Society of Nature Conservation, the Study Promotion Association and the Swedish Ornithological Society, these tours are clever ways to entice residents to experience the natural world around them and provide jobs for the underemployed.[172]

We might judge a biophilic city by the percentage of residents actively involved in some form of ecological community building. There are thousands of small, but extensive, networks of citizen groups across Australian cities, for instance, whose members spend their free time doing

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[166] *See generally id.* at 326–35.
[167] *See id.* at 395.
[168] *See*, Frances E. Kuo, *Social Aspects of Urban Forestry: The Role of Arboriculture in a Healthy Social Ecology*, 29 J. ARBORICULTURE 148, 150 (2003).
[169] New York City Department of Parks & Recreation, Urban Park Rangers, http://www.nycgovparks.org/sub_about/parks_divisions/urban_park_rangers/pd_ur.html (last visited Nov. 9, 2009); City of Los Angeles Department of Recreation and Parks, Park Ranger Division, http://www.laparks.org/dos/ranger/ranger.htm (last visited Nov. 9, 2009).
[170] *See* Urban Park Rangers, *supra* note 169; Park Ranger Division, *supra* note 169.
[171] *See* Närnaturguiderna (Local Nature Guides), Sweden, http://www.norden.org/en/ nordic-council/the-nordic-council-prizes/the-nature-and-environment-prize/nominations-2009/naernaturguiderna-local-nature-guides-sweden (last visited Nov. 9, 2009).
[172] *See id.*

work on public land in urban areas that benefit the environment or the community.[173] This allows members the opportunity to socialize, have fun, build friendships, and deepen community commitments while tangibly reconnecting with the natural environment.[174] One such program is in Brisbane, Australia.[175] Started in 1990, Habitat Brisbane now consists of five Habitat Brisbane Officers and several support staff, one hundred and twenty-four different community groups, and twenty-five hundred volunteers who work to "restore and protect bushland, wetland and waterway habitats."[176] The goals and objectives of this organization are conservation and restoration of biodiversity, education and awareness, and community cohesion.[177] Evidence suggests that involvement in urban bushcare and urban restoration work increases and deepens an individual's sense of community.[178]

Cities must begin to see the value and importance of facilitating connections with nature, perhaps similarly to the Australian Bushcare program. It is interesting and hopeful to see citizens taking direct initiative to form "family nature clubs," such as "Kids in the Valley Adventuring" ("KIVA").[179] KIVA organizes a series of nature events in the Roanoke area of Virginia, including hikes and visits to nature centers.[180] Similar groups are forming in other parts of the country as well.[181] Nature Strollers was formed by two New York mothers who noticed few other parents on their nature walks.[182] They organize weekly walks under the auspices of the

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[173] *See* Land Care Online, Community Care Groups, http://www.landcareonline.com/page.asp?pID=80 (last visited Nov. 9, 2009). One activity that the groups engage in is called Bushcare, in which volunteers work to "rehabilitate and preserve bushland." *Id.*

[174] *See id.*; *see also* Bushcare Program in the Port Phillip & Westernport Region, http://ppwcma.vic.gov.au/downloads/Bushcare_News_ Jan_2002.pdf (last visited Nov. 9, 2009).

[175] CITY OF BRISBANE, HABITAT BRISBANE PROGRAM: 2007–2008 ANNUAL REPORT, *available at* http://www.brisbane.qld.gov.au/bccwr/environment/documents/habitat_brisbane_annual_report_2008.pdf.

[176] *Id.* at 2.

[177] *Id.*

[178] *See* CITY OF BRISBANE, *supra* note 175, at 11 (stating that seventy-nine percent of respondents reported an increase in a sense of community).

[179] Kids in the Valley, Who We Are, http://kidsadventuring.org/blog/?page_id=297 (last visited Nov. 9, 2009). KIVA was formed by local parents, Chip and Ashley Donahue, to help make it easier for families and children to get outside. *See id.*

[180] *See* Kids in the Valley, Newsletter, http://kidsadventuring.org/blog/?page_id=31 (last visited Nov. 9, 2009).

[181] *See* Inland Empire Kids Outdoors, http://iekidsoutdoors.org/ (last visited Nov. 9, 2009); *see also* Denver Kids Outdoors, http://www.meetup.com/Denver-Kids-Outdoors/ (last visited Nov. 9, 2009).

[182] Nature Strollers, http://www.naturestrollers.org/ (last visited Nov. 9, 2009).

Orange County Audubon Society.[183] Their mission is "to support parents and grandparents in their role as primary interpreters of nature for their families; to provide opportunities for families to enjoy unstructured time outdoors; to familiarize families with local trails, refuges, sanctuaries and preserves; and to develop networks among families with a common interest in nature."[184] The weekly walks are usually less than a mile, about an hour long, and with difficulties dependent on the age of the children.[185] Such citizen initiatives and new community organizations help overcome the inertia that often keeps people away from nature.

Creatively involving citizens in conducting science is another way to engage people with the nature around them. Citizens in San Diego have been trained to become "parabotanists" and help collect plant specimens.[186] There are two hundred citizens serving as parabotanists, working to collect plant data for the San Diego County Plant Atlas Project.[187] The project records plants on a three square mile grid.[188] Parabotanists now volunteer to collect data in certain grid squares.[189] They are mailed maps and permits from the San Diego Museum of Natural History once they sign up for a square.[190] The project will eventually result in "an internet-accessible, databased plant atlas based upon vouchered specimens."[191] Citizens, after receiving training, play an important role in the initial steps of the identification of more than fifteen hundred native species of plants in San Diego County, after which a professional botanist verifies the results.[192] The lack of specialization, thus, encourages citizens to

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[183] *Id.*
[184] *Id.*
[185] *Id.* There are "toddler and stroller-friendly" trails, which are the norm. *Id.*
[186] San Diego Natural History Museum, Plant Atlas Project, http://www.sdnhm.org/plantatlas/ (last visited Nov. 9, 2009). This program is based on an earlier citizen scientist program run for the County's Bird Atlas,
[187] Mary Ann Hawke, *Developing a 'Citizen Science' Program*, 11 CALIFORNIA INVASIVE PLANT COUNCIL SYMPOSIUM 46, 47 (2007), *available at* http://www.cal-ipc.org/symposia/archive/pdf/2007/Proceedings_2007.pdf.
[188] *Id.*
[189] *Id.*
[190] *See id.*; James Steinberg, *Botany by the Inch: Volunteers Scour County for Museum's Plant Atlas*, UNION TRIBE, Feb. 23, 2004, http://legacy.signonsandiego.com/uniontrib/20040223/news_1m23plants.html
[191] San Diego Natural History Museum, *supra* note 186.
[192] *See id.*; San Diego Natural History Museum, Plant Atlas Parabotanist Training, http://www.sdplantatlas.org/(S(lv0flsa2tqnegd455ma5zu45))/training.html (last visited Nov. 9, 2009); San Diego County Plant Atlas, How to Get Involved, http://www.sdplantatlas.org/(S(lv0flsa2tqnegd455ma5zu45))/pdffiles/GetInvolved.pdf (last visited Nov. 9, 2009).

explore the natural environment around them. Additionally, the Plant Atlas Project incorporates a social element for volunteers who help aid in the progress of the local natural science agenda.[193] Lastly, Parabotanists also receive certain benefits for volunteering, including discounts at the Museum, the ability to attend Museum events and lectures for free, and access to field trips and other events.[194] There are, thus, many tangible and intangible rewards for experiencing nature.

III. OBSTACLES TO BIOPHILIC URBANISM AND WAYS FORWARD

There are social, cultural, legal and economic impediments and obstacles in the promotion of biophilic cities.

A common explanation for the lack of personal connection with nature is the lack of time people have to spend in nature.[195] Further, people must have "loose, unstructured time . . .[in order] to experience nature" meaningfully.[196] This sort of free range play, however, is not possible because lives are much more programmed and scheduled than just a generation ago.[197] One tactic in remedying the lack of free range play, at least for children, is to eliminate the "criminalization of natural play."[198] Louv points to the common practice exhibited by homeowners associations of banning the building of tree houses, which undoubtedly limits the time for the necessary free range play.[199]

Legal or legal-esque barriers to the enjoyment of nature also exists. The fear of an imposition of legal liability, for instance, might be motivating the curtailing of free range play.[200] Perhaps tort reform is necessary. There are even a variety of green urban and biophilic design elements that are illegal in many cities and states, and efforts should be made to reconsider the virtue of these restrictions.[201] These restrictions apply to

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[193] *See* San Diego Natural History Museum, *supra* note 186; SAN DIEGO NATURAL HISTORY MUSEUM, VOLUNTEER NEWS (Fall 2009), http://www.sdnhm.org/enews/volnews_fall2009.pdf.
[194] *See* San Diego Natural History Museum, Volunteer Opportunities, http://www.sdnhm.org/volunteer/volunteer_faqs.php (last visited Nov. 9, 2009).
[195] *See generally* LOUV, *supra* note 2, at 115–122.
[196] *Id.* at 117.
[197] *See id.* at 115–120.
[198] *See generally id.* at 27–36.
[199] *See id.* at 28–29.
[200] *See id.*
[201] *See, e.g.*, Nicholas Riccardi, *Who Owns Colorado's Rainwater?*, L.A. TIMES, Mar. 18, 2009, http://articles.latimes.com/2009/mar/18/nation/na-contested-rainwater18?pg=1.

everything, from disconnecting home downspouts that permit rain gardens and on-site storm water collection, to the use of native landscaping.[202] Many traditional zoning codes in cities prohibit biophilic activities, such as growing food in one's own yard and raising chickens. There is now a movement in many cities, however, to revise these codes to permit such activities.[203] For instance, Milwaukee is currently considering such a green city code.[204] As new sensibilities and attitudes about urban nature begin to emerge, it is necessary that we reconsider such restrictions.

To a certain degree the obstacles are aesthetic. Many Americans view native landscaping as unkept or untidy.[205] While there are maintenance and mowing strategies that can help to counter this issue, some green features will simply look out of place or unattractive to Americans raised on turfgrass lawns and hard-surface parking facilities.[206]

Historically, plans and planning codes in American cities often fail to mandate or even encourage the integration of nature in neighborhood and urban design. That trend, however, is changing slowly because cities are recognizing the benefits of less conventional or green infrastructures.[207] Some cities now require minimum greenway or open space.[208] And a number of cities, such as Chicago, now mandate minimum, and fairly extensive, landscaping requirements, especially for new commercial development.[209] These types of ordinances are a good start, though more is needed.

Some communities, like Portland, Oregon, have put into place a system of green density bonuses.[210] Under Portland's eco-roof floor

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[202] *See, e.g.*, *id.*; *see also* U.S. Forest Service, Basic Instructions for Restoration and Native Landscaping Projects, http://www.fs.fed.us/wildflowers/nativegardening/instructions.shtml (last visited Nov. 9, 2009).

[203] *See* Mid-Region Council of Governments, Resources for Backyard Growers and Community Gardens, http://www.mrcog-nm.gov/content/view/312/285/ (last visited Nov. 9, 2009).

[204] *See* Dave Steele, *Beyond the Backyard Garden: Urban Agriculture in Milwaukee*, NEXT AM. CITY, June 10, 2008, *available at* http://americancity.org/daily/entry/853/.

[205] *See, e.g.*, Iowa NRCS, Seeding Native Landscapes, ftp://ftp-fc.sc.egov.usda.gov/IA/news/SeedingNativeLandscapes.pdf

[206] *Id.*

[207] *See* Green Infrastructure, Benefits of Green Infrastructure, http://www.greeninfrastructure.net/benefits-green-infrastructure (last visited Nov. 9, 2009).

[208] *See, e.g.*, City of Chicago, Chicago Landscape Ordinance, http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?contentOID=536910072&contenTypeName=COC_EDITORIAL&topChannelName=Dept&channelId=0&entityName=Environment&deptMainCategoryOID=-536887205&blockName=Environment%2FUrban+Heat+Island+Mitigation%2FI+Want+To (last visited Nov. 9, 2009).

[209] *Id.*

[210] *See* CITY OF PORTLAND ENVIRONMENTAL SERVICES, ECOROOF FLOOR AREA RATIO BONUS OPTION (2009).

area bonus option, developers can earn "a larger development footprint or additional floor area than otherwise allowed by zoning codes if their building proposal includes an ecoroof that meets specific requirements."[211] The amount of FAR bonus is decided utilizing a sliding-scale, where the greater the extent of the roof covered, the larger the bonus.[212]

The city of Berlin has pioneered the concept of a Biotope Area Factor ("BAF"), a formula that ultimately "promotes high quality urban development with respect to the ecosystem, protection of biotopes and species, the appearance of the landscape, and recreational use."[213] The Berlin model has been applied in other European cities such as Malmö, Sweden, where they are often called Green Area Factors.[214] Seattle, Washington is the first American city to utilize this tool, calling it the Green Factor.[215] In Seattle, the Green Factor is essentially a requirement that new commercial developments of four thousand square feet or larger must incorporate adequate green or landscape elements.[216] Development must reach a score of .30, the equivalent of thirty percent of the lot, utilizing a "weighted menu of landscape elements."[217] Developers use a Green Factor worksheet that assigns a score for biotention features, such as tree planting, green roofs and vegetated walls, water features, and permeable paving.[218] More than sixty projects have been evaluated since the adoption of the Green Factor standard in January 2007.[219] Recent updates to the system now provide bonuses for food cultivation, native and drought-tolerant plants, and rainwater harvesting.[220] One clear advantage

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[211] *Id.*
[212] *See id.*
[213] *See* Senate Department for Urban Development in Berlin, Biotope Area Factor, http://www.stadtentwicklung.berlin.de/umwelt/landschaftsplanung/bff/index_en.shtml (last visited Nov. 9, 2009). This formula has also been used in the city center. *Id.*
[214] *See* DARA O'BYRNE, THE CITY OF PARKS 5, *available at* http://depts.washington.edu/open2100/Resources/1_OpenSpaceSystems/Open_Space_Systems/Malmo_Case_Study.pdf.
[215] City of Seattle, Seattle Green Factor, http://www.seattle.gov/dpd/permits/greenfactor/Overview/ (last visited Nov. 9, 2009).
[216] Malgorzata Bereziewicz, Green Factor Programs: How Does Seattle Compare with Berlin and Malmo?, NORTHWEST HUB, July 22, 2009, http://www.northwesthub.org/seattlegreenfactor.
[217] DAVE LACLERGUE, DIRECTOR'S REPORT AND RECOMMENDATIONS: COMMERCIAL CODE CLEAN-UP AMENDMENTS 5, March 9, 2009, *available at* http://www.seattle.gov/dpd/cms/groups/pan/@pan/@permits/@greenfactor/documents/web_informational/dpds015952.pdf.
[218] City of Seattle, *supra* note 215.
[219] Bereziewicz, *supra* note 216.
[220] City of Seattle, *supra* note 215.

of the Green Factor system is that it provides developers with a degree of flexibility in determining the specific mix of green features they wish to incorporate.[221]

Establishing minimum biophilic city standards for all new neighborhoods and city projects is one possible strategy. Another possible strategy is the provision of upfront funding, such as grants and loans,[222] to facilitate the installation of green features. Although green urban elements yield clear and demonstrable economic returns to owners, they are often avoided because they involve some additional upfront costs.[223] Chicago's green rooftops program provides an example of the benefits of urban green projects.[224]

A few of state and local initiatives have been undertaken pursuant to the "No Child Left Inside" initiatives, which usually involve funding for a mix of outdoor activities and environmental education.[225] In some states, proclamations and outdoor bills of rights have been adopted to help raise awareness and bring attention to the child-nature disconnect.[226] Chicago Wilderness, a coalition of more than two hundred and forty organizations that promotes regional nature conservation and awareness-raising in Chicago, has similarly issued its own Children's Outdoor Bill of Rights as part of its own "No Child Left Inside" initiative.[227] The Bill of Rights holds that "every child should have the opportunity to: discover wilderness . . . camp under the stars . . . follow a trail . . . catch and release fish, frogs and insects . . . climb a tree . . . [and] explore nature in neighborhoods and cities."[228] The goal of the bill of rights is to "draw attention to the importance of unstructured playtime and other activities and contribute to a culture in which children enjoy and are encouraged to be outside in nature."[229]

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[221] *Id.*

[222] *See, e.g.*, The Metro Council, Nature in Neighborhoods Capital Grants, http://www.oregonmetro.gov/index.cfm/go/by.web/id=18203 (last visited Nov. 9, 2009).

[223] *See* Carbonday, Use Green Buildings, http://carbonday.com/carbonday-take-action/carbonday-take-action-at-workplace/use-green-buildings/ (last visited Nov. 9, 2009).

[224] ICLEI, Local Governments for Sustainability, http://www.iclei.org/index.php?id=2743 (last visited Nov. 9, 2009).

[225] *See* ALLEN COOPER, CHILDREN AND THE OUTDOORS: STATE POLICY SOLUTIONS GUIDE 1–2 (2008).

[226] *See, e.g.*, California Children's Outdoor Bill of Rights, http://www.calroundtable.org/cobor.htm (last visited Nov. 9, 2009).

[227] Karen Zaworski, *Life, Liberty, and the Pursuit of Blue Gills: The Case for Children's Outdoor Bill of Rights*, CHICAGO WILDERNESS MAGAZINE, *available at* http://chicagowildernessmag.org/issues/spring2009/billofrights.html (last visited Nov. 9, 2009).

[228] *Id.*

[229] Kidsoutside.info, Children's Outdoor Bill of Rights, http://www.kidsoutside.info/billofrights/ (last visited Nov. 9, 2009).

Addressing the larger cultural and social obstacles may be significantly harder. Even when marvelous green features and resources exist in urban neighborhoods, there is no guarantee that residents—children and adults alike—will actually utilize them. Limited time, busy schedules, heavily-programmed lives, and the role of technology in our society are obstacles to children and adults enjoying nature. Some of these obstacles might be overcome by cultivating natural social capital and nature coaching. It will likely take a concerted reassessment of priorities and the combined commitment of parents, schools, employers, and others who understand the ultimate life-enhancing value of regular contact with the natural world.

There are many larger cultural changes that would be needed to move American cities in the direction of biophilic urbanism. Rethinking the school day to provide greater time for outside play and learning, reducing the hours in a work week, cultivating a walking culture, and reforming work environments so that nature walks and outside respite become standard features of the American work day are all essential changes needed in order to promote biophilic urbanism in American cities. While these changes are possible, they would not likely be easy or quick to bring about. We must, however, be willing to work and bring about these changes if we wish to fundamentally reconnect ourselves and our children with our natural environment.