

# An Excerpt

# Imagining Biophilic Cities

Text and photography by Tim Beatley

This essay is excerpted from Tim Beatley's book,  
*Biophilic Cities: Integrating Nature into Urban Design and Planning*,  
published by Island Press in 2010.

That we need daily contact with nature to be healthy, productive individuals, and indeed have co-evolved with nature, is a critical insight of Harvard myrmecologist and conservationist E.O. Wilson. Wilson popularised the term *biophilia* two decades ago to describe the extent to which humans need connection with nature and other forms of life. More specifically, Wilson describes it this way: "Biophilia...is the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature."<sup>1</sup>

To Wilson, biophilia is really 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 further 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 the tiny minority of peoples who have existed for more than one or two generations in wholly urban environments."<sup>2</sup>

Stephen Kellert of Yale University reminds us that this natural inclination to affiliate with nature and the biological world constitutes a " 'weak' genetic tendency whose full and functional development depends on sufficient experience, learning, and cultural support".<sup>3</sup> Biophilic sensibilities can atrophy and society plays an important role in recognising and nurturing them.

## The Nature of Cities

While we are already designing biophilic *buildings* and the immediate spaces around them, we must increasingly imagine biophilic *cities*,

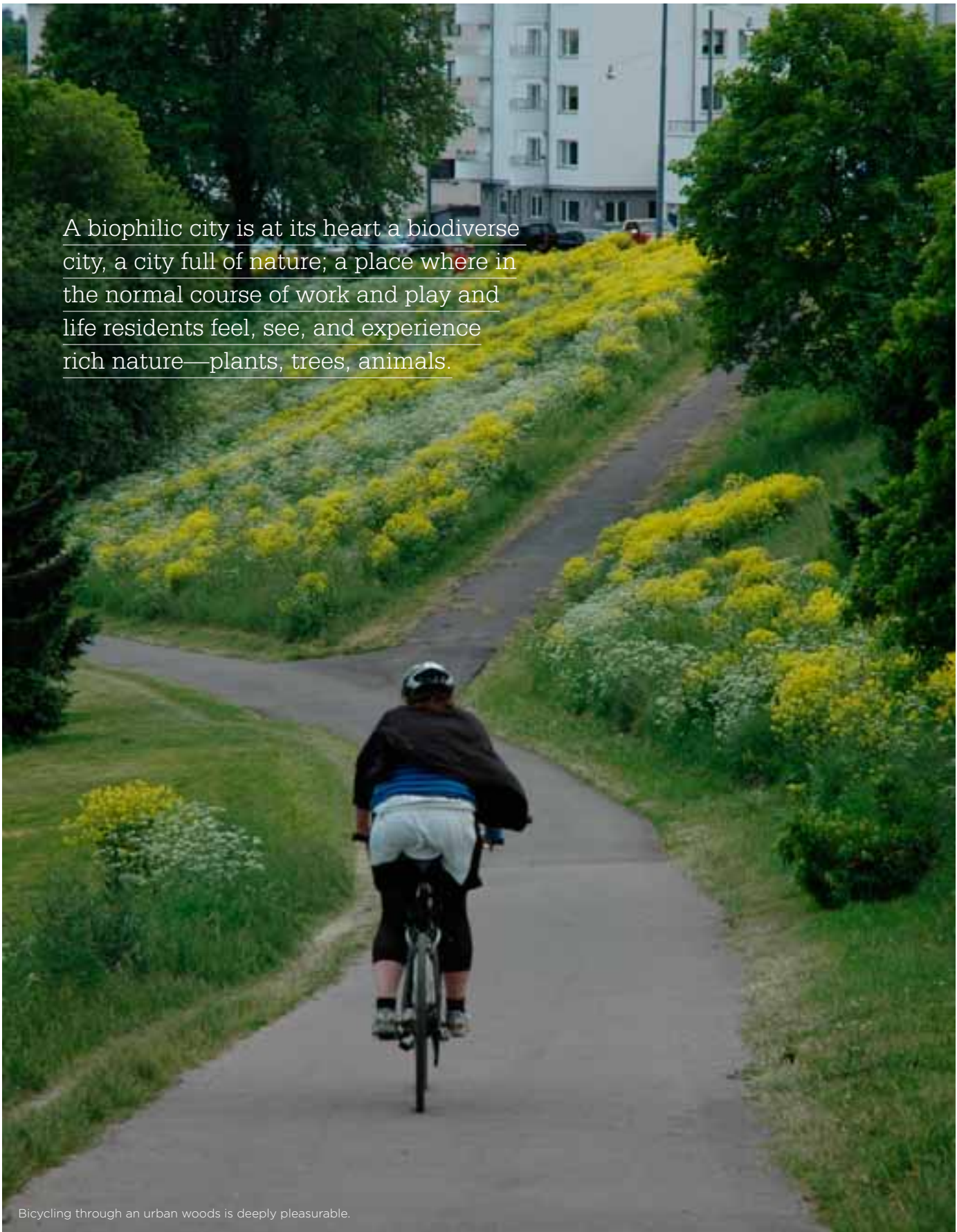
and should support a new kind of biophilic *urbanism*. As the planet barrels rapidly down the path of urbanisation the need for green and *nature-ful* cities is an ever more urgent need.

There is already much nature in cities, of course, more than we realise. It is both big and small, visible and hidden. It is intricate, yet sweeping. It is amazing in its biological functioning, ever-present yet highly dynamic, and vastly underappreciated for its ubiquity in cities. In understanding the nature of cities it is necessary to think beyond our usual approach to visualising or imagining space and place, and to understand that nature is everywhere in cities if we look: it is above us, flying or floating by, it is below our feet in cracks in the pavement, or in the diverse micro-organic life of soil and leaf litter. Nature reaches our senses, well beyond sight, in the sounds, smells, textures, and feelings of wind and sun. Understanding the natural history of a city helps us to see cities as ever-changing, ever-evolving palettes of life.

In the higher reaches of our cities, the rooftops and façades also harbour nature, sometimes by design, and sometimes by accident and natural volunteerism. New forms of nature are being created in cities all over the nation in the form of ecological rooftops and rooftop gardens, hosting grasses and sedum, and increasingly found (over time and with the right design elements) to harbour great diversity in terms of invertebrates, bird and plant life. We know, for instance, that butterfly species will visit rooftops on high-rise structures, and food, for humans and nature alike, can be grown here as well.

This nature in cities is the raw ingredient for a new global urban society organised around wonder. Few have made a more compelling and eloquent plea for the importance of wonder in the natural world than Rachel Carson more than half a century ago. In a 1956 essay entitled "Help Your Child to Wonder", she describes the value and pleasures of exposing her young nephew to the nature found

A biophilic city is at its heart a biodiverse city, a city full of nature; a place where in the normal course of work and play and life residents feel, see, and experience rich nature—plants, trees, animals.



Bicycling through an urban woods is deeply pleasurable.

along the Maine coast: “If I had influence with the good fairy who is supposed to preside over the christening of all children I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things that are artificial, the alienation from the sources of our strength.”<sup>4</sup>

Carson counsels looking at the sky, taking walks and uncovering and experiencing nature, even if (as parents) we are not able ourselves to identify a species or a constellation. It is about cultivating an awareness of the sights, sounds, natural rhythms around us, paying attention and learning to see the mystery and beauty in everything around us.

We need wonder and awe in our lives, and nature has the potential to amaze us, stimulate us, propel us forward to want to learn more about our world. The qualities of wonder and fascination, the ability to nurture deep personal connection and involvement, visceral engagement in something larger than and outside ourselves, offers the potential for meaning in life few other things can provide.

My landscape architecture colleague Beth Meyer argues that with matters of environment and sustainability we need also to emphasise the beauty and pleasure and enjoyment we derive. We often forget about the aesthetics, or try to reduce them to monetary values. At the end of the day, watching that circling hawk or turkey vulture, walking or bicycling through an urban woods, harvesting and eating produce from one’s garden, listening to the sounds of Kadydids and tree frogs on a humid August evening, are deeply pleasurable; they are the building blocks of a life enjoyed. We climb trees as kids because this is a fun and enjoyable thing to do, and as adults unfortunately we often forget these pleasures (and of course rarely climb trees!).

In our recent documentary film *Nature of Cities* we spent a stimulating several days in Austin, Texas, filming the 1.5 million Mexican free-tailed bats that have inhabited the underside of the city’s Congress Avenue bridge during the summer months. People line-up hours before nightfall to get a good look at the wondrous columns of bats emerging from the bridge. Merlin Tuttle, founder of Bat Conservation International (BCI), dutifully recites the many environmental (and economic) benefits provided the city by these bats. And they are considerable, including the millions of mosquitoes they eat each day. But ultimately the sight of thousands of bats flying off, in distinct columns that can be seen for several miles, is an immense and beautiful thing. It is the raw emotion and beauty of the natural world, a primordial spectacle unfolding against a backdrop of high-rise build-

ings and a human-dominated (at least we think) urban environment.

In many American cities the biodiversity is aquatic and sometimes offshore, as in Seattle, which has abundant and wondrous life in the not-far depths of the bay and sound. Much of the biodiversity of King County, in which the City of Seattle lies, is found in the “deep subtidal habitat” of Puget Sound, in some places almost 900 feet below the surface, and including “over 500 benthic and 50 pelagic invertebrates”.<sup>5</sup> And while some are known and recognisable to residents, such as the king crab, many are not. That the Seattle metro region is also home to such unique marine critters as the giant Pacific octopus and giant acorn barnacle suggests a wildness and mystery very close at hand.

And new forms of nature can be fostered in the many leftover spaces of the city. A visit to the Green Roofs Research Center, in Malmö, Sweden, shows the extent of possibilities—here they have planted and monitor hundreds of green roof test plots, testing different plant and soil combinations. Some of these plots are for so-called brown rooftops—places in the urban environments (there are many) where plants can be used to restore and even take up pollutants in highly contaminated and degraded settings (Phytoremediation). And the Malmö centre’s immense research rooftop also shows the potential of different, sometimes surprising delivery methods—their standard green roof, as Trevor Graham who runs many of the centre’s green city efforts explains, is made from recycled polyurethane car seats, and in several places there are small mounted frames, with sedum growing vertically, showing the potential for a kind of natural artwork suitable for hanging in one’s living room!

These new forms of nature are catching on, and are now encouraged and in some places mandated by codes, and we will see more of this happening in every city around the world. And new creative developments in cities—such as *Via Verde* (the green way), a 200-unit complex of affordable housing planned for a 1.5-acre site in the South Bronx of New York—will find many ways to insert and grow nature. In this case, the nature takes the form of a connected multi-functional garden “that begins at street-level as a courtyard and plaza, and spirals upward through a series of programmed, south-facing roof gardens that end in a sky terrace”.<sup>6</sup> Increasingly biophilic cities will understand rooftops, courtyards, and façades as places to cultivate nature.

### What is a Biophilic City?

Exactly what is a biophilic city, and what are its key features and qualities? Perhaps the simplest answer is that it is a city that puts nature first in its design, planning and management: it recognises the essential need for daily human contact with nature as well as the



ABOVE The High Line, New York City's Innovative New Elevated Park.

many environmental and economic values provided by nature and natural systems.

A biophilic city is at its heart a *biodiverse* city, a city full of nature; a place where in the normal course of work and play and life residents feel, see, and experience rich nature—plants, trees, animals. The nature is both large and small—from tree-top lichens, invertebrates, even microorganisms, to larger natural features and ecosystems that define a city and give it its character and feel. Biophilic cities cherish what already exists in and near cities (and there is much, as we have already seen) but also work hard to restore and repair what has been lost or degraded, and to integrate new forms of nature into the design of every new structure or built project. We need contact with nature, and that nature can also take the form of shapes and images, integrated into building designs, as we will see.

A biophilic city ought to be judged by the existence of nature and natural features, but also in some way its biophilic sensibilities or *spirit*; how important is nature and how central to the lives and *modus operandi* of the city, its leaders and its populace? A bit harder to quantify, this *biophilic spirit* or sensibility, suggests a value dimension, the sense that residents and public officials alike recognise the importance and centrality of nature to a rich and sustainable urban

life. This quality could easily fit as both an activity and an approach to governance.

Every city will have its natural spectacles—some large, others more nuanced—but a biophilic city is one that pays attention, a city that sees and conveys this sense of beauty and wonder and caring. It may be the running of the Steelhead trout in Niagara River, or the appearance of Orcas in Prince William Sound, or the migratory return of robins along the east coast of the US. A biophilic city celebrates this wonder and sees in these events the opportunity to connect, to strengthen bonds, to mark the cycles of life and seasonality. This celebrating often involves the direct experience of that biodiversity and nature, such as watching migratory birds, or visiting a park or green area, or it might be a more referential form of biophilic expression.

As the accompanying Table 1 suggests, how actively citizens enjoy the nature around them and actively participate in this nature is also an important measure of a biophilic city. Participation is an interesting word to use here because it implies a level active engagement beyond just passively observing something; it suggests a keen and active interest in the subject. Citizens of a biophilic city, and their leaders, are not removed from the nature around them, but are highly

This enjoyment and engagement can take many different forms, of course, from walking and hiking in natural areas, to bird-watching and plant and tree identification, to organised nature events and activities, from fungi forays to nature festivals.

BELOW Activities of "friends" of the canyons groups in San Diego.



aware of it and present in its midst. A biophilic city is a city in which a large percentage of its population is actively enjoying nature. This enjoyment and engagement can take many different forms, of course, from walking and hiking in natural areas, to bird-watching and plant and tree identification, to organised nature events and activities, from fungi forays to nature festivals.

Biophilic cities help to make it easier to enjoy nature and reflect an understanding that exposure to and enjoyment of nature are key aspects of a pleasurable and meaningful life. There are many potential outlets and venues for our need to connect with nature, and most are also intensely social. Facilitating contact with nature has the great potential to help create new friendships and build social networks, in turn helping to make urbanites healthier and happier. In San Diego, the activities of a number of “friends” of the canyons groups help to conserve and protect the canyon as a neighbourhood and community resource, but also provide opportunities for neighbours to interact and socialise in a way and to an extent that would otherwise not occur. In the Rose Canyon, for instance, residents from different sides of the canyon have places and opportunities to converse and come together, something that would have been difficult without the pull of nearby nature.

Cities must also begin to see the value and importance of facilitating such connections with nature, and perhaps offering help and support in the Australian Bushcare model. Here local groups of citizens and community volunteers organise around a specific urban ecosystem—a patch of green space, a stream, a park—and with the help of a municipal staff person (“bushcare officer” usually), spend weekends and spare hours cleaning up, repairing, and tending over these spaces. The result is not only ecological repair, but also making friends and the rebuilding of community, as well as becoming more embedded in place and environment.

Creatively involving citizens in the conducting of science is another way to intimately engage people with the nature around them. In San Diego, citizens have been trained to become “parabotanists” (like paralegals), helping to collect plant specimens in this highly biodiverse county. There are now 200 citizens serving as parabotanists, working to collect plant data for the San Diego County Plant Atlas Project (begun in 2002). The project records plants on a three-square-mile grid. Parabotanists are now steered to collecting on grid squares where less plant data exists. Once they sign up for a square they are mailed maps and permits from the Museum. A biodiversity “hotspot” and the most floristically biodiverse county in the US, recording and protecting this biodiversity takes on special importance. The Plant Atlas will eventually result in an “internet-accessible, databased plant atlas based upon vouchered specimens”. There are more than 1,500 native species of plants in San Diego County and so there is much to document and record, and citizens here play an important role. Volunteers go through training by San Diego Natural History Museum, and once trained, collect and press the plants and record data about the plant’s location. A museum botanist verifies the plant’s identification.

A biophilic city then is a city with an extensive and robust *social capital*, to extend Robert Putnam’s concept.<sup>7</sup> Evidence is compelling

Table 1: Some Important Dimensions of Biophilic Cities (and Some Possible Indicators Thereof)

#### Biophilic Conditions and Infrastructure

- Percentage of population within a few hundred feet or metres of a park or green space
- Percentage of city land area covered by trees or other vegetation
- Number of green design features (e.g., green rooftops, green walls, rain gardens)
- Extent of natural images, shapes, forms employed in architecture, and seen in the city
- Extent of flora and fauna (e.g., species) found within the city

#### Biophilic Behaviours, Patterns, Practices, Lifestyles

- Average portion of the day spent outside
- Visitation rates for city parks
- Percent of trips made by walking
- Extent of membership and participation in local nature clubs and organisations

#### Biophilic Attitudes and Knowledge

- Percent of residents who express care and concern for nature
- Percent of residents who can identify common species of flora and fauna

#### Biophilic Institutions and Governance

- Priority given to nature conservation by local government; percent of municipal budget dedicated to biophilic programmes
- Existence of design and planning regulations that promote biophilic conditions (e.g., mandatory green rooftop requirement, bird-friendly building design guidelines)
- Presence and importance of institutions, from aquaria to natural history museums, that promote education and awareness of nature
- Number/extent of educational programmes in local schools aimed at teaching about nature
- Number of nature organisations and clubs of various sorts in the city, from advocacy to social groups

(Source: Beatley, 2010)

that we need extensive friendships and social contact to be healthy and happy, as well as our contact with nature, so finding creative ways to combine these needs becomes an important goal in the biophilic city. I have been calling this *natural* social capital, acknowledging that there are many ways that learning about and experiencing nature can also help to nurture friendships and help to overcome the increasing levels of social isolation felt at least by Americans. How many social organisations or clubs, or community events or activities, explicitly focus around the unique nature of cities? The extent of creative social possibilities is almost limitless: weekend fungi forays, wildlife tracking clubs, *bioblitzes* and nature festivals, wildflower and birding clubs, among many others.

Nudging that happens is often a function of the range of organisations, some public, some private, that exist in a city and that can help in supporting the educating and engagement of citizens. One measure of a biophilic city is the extent of the organisational support, the quality and reach of the biophilic organisations that exist in a city that can actively work to nudge us towards nature. Bird watching and nature hikes through the city might be one option, but there should be many: swimming, canoeing, and kayaking in urban waters, visiting parks near and far, experiencing nature on a sidewalk or rooftop or building façade as one walks to work or to the subway, among many others.

Many cities around the world are located on or near water bodies and a measure of their biophilic tendencies is how easy it is for residents to enjoy these aquatic environments. In some cities, such as Boston, non-profit organisations have worked to make it economic and easy to learn how to sail. In that city a junior sailing programme run by the non-profit Community Boating Inc offers kids the chance to learn how to sail for only \$1, for the entire June-August season. Many American cities, moreover, have worked hard to reestablish direct physical contact and connection with rivers, creeks, harbours, though waterfront parks and trails and opportunities to get out on a kayak or canoe.

Biophilic cities are cities that work to expand the opportunities to spend time outside and in close proximity to nature. Partly this means rethinking the ways parks and green spaces are used. New York City has been a leader in creating opportunities for urbanites to camp on weekends in city parks. The programme occurs in the summer months and is quite popular. In 2009, family camping took place in every borough of the city. These camping evenings are especially from the perspective of kids quite enjoyable and exciting. The City's Parks and Recreation department provides the tents and sleeping bags, and there typically barbeques, night hikes, skywatching and even S'mores!

Biophilic cities are to be identified not just by the presence or absence of nature, of green spaces, and green infrastructure, but other forms of investment also that facilitates a biophilic life. A biophilic city invests in a robust network of public (and private) institutions that will educate about, restore and protect, and nudge residents toward enjoying nature. These include traditional environmental education and natural science institutions such as local botanical gardens, zoological parks, and natural history museums, among others. Environmental education centres have been very effective in some cities, in some cases based in urban neighborhoods.

And biophilic cities are also concerned about and work to protect nature beyond their borders. Each city has opportunities to express care about the environment and other life in the world. Large cities exert a tremendous pressure on global biodiversity through their material flows and consumption patterns, and one measure of a biophilic city is the extent to which it seeks to moderate or reduce those impacts.

New York City, for instance, has recently acknowledged that it purchases a large amount of tropical hardwoods, an estimated \$1 million worth each year. The city uses this wood—South American species such as *Ipe* and *Garapa*—for such things as benches,

boardwalks, and ferry landings. The ten-mile long Brooklyn Bridge Promenade is constructed of *Greenheart*, another South American hardwood. In recognition of the destructive impact of such purchases Mayor Bloomberg announced a plan in 2008 to significantly reduce the city's purchasing of such wood—a 20 percent reduction immediately and larger reductions later as the city researches and pilots alternative wood sources and alternative materials that could be used.<sup>8</sup> Describing tropical deforestation as an “ecological calamity”, and noting that it may be responsible for as much as 20 percent greenhouse gas emissions, Mayor Bloomberg has made an eloquent plea for cities to become better stewards of the global environment. “New Yorkers don't live in the rain forest. But we do live in a world that we all share. And we're committed to doing everything we can to protect it for all of our children.”<sup>9</sup> City purchasing policies and decisions is an important opportunity for biophilic values to gain expression.

### Biophilic Cities in Our Future?

What constitutes a biophilic city is still very much a matter of discussion and debate. Less a definitive list or set of principles, the categories described about are meant to identify at least some of the potential building blocks of a biophilic city. It is unlikely that a singular coherent vision of a biophilic city will emerge. Rather, perhaps there are many different *kinds* of biophilic cities, many different expressions of urban biophilia. And they might be expressed by different combinations and emphases of the qualities and conditions described here. At the simplest level, though, a biophilic city is a city that seeks to foster a closeness to nature—it protects and nurtures what it has (understands that abundant wild nature is usually a lot), actively restores and repairs the nature that exists, while at the same time finding new and creative ways to insert and inject nature into the streets, buildings, and urban living environments. And a biophilic city is an outdoor city, a city that makes walking and strolling and daily exposure to the outside elements and weather possible and a priority.


But as the above discussion also indicates, a biophilic city is not just about its physical conditions or natural setting, and it is not just about green design and ecological interventions—it is just as much about a city's underlying biophilic spirit and sensibilities, about its funding priorities, and about the importance placed on support for programmes that entice urbanites to learn more about the nature around them, for instance. A biophilic city might be measured and assessed more by how curious its citizens are about the nature around them, and the extent to which they are engaged in daily activities to enjoy and care for nature, than more the physical qualities or conditions, or for instance the number or acres of parks and green spaces per capita that exist in a city.

There are a variety of important research questions about designing and planning biophilic cities in the future. We still have, for instance, relatively little knowledge of the *cumulative* recuperative and healing powers of urban nature. How do the many smaller green features in a city or urban neighbourhood contribute to our closeness with nature and what are the interactive effects? Is access to a large forest more effective than a neighbourhood full of smaller green features, such as street trees and green rooftops? And what is the actual daily minimum level of nature needed by urbanites, and in what form, to live a healthy life?



ABOVE In the higher reaches of our cities, the façades of BHV.Homme in Paris also harbour nature by design.

There are also a host of research questions that relate to how effective our biophilic strategies in fact are—what are the most effective planning and policies means for getting people outside? What will it take to nudge urban populations to adopt a more outdoor nature-oriented lifestyle? As well, our very understanding of the science and ecology of cities remains quite limited and there is much work to be done here as well. New research is needed to better understand the biology and lifecycles of fauna found in cities and how it changes or is modified in an urban setting (e.g., think of coyotes!), as well as the management implications therein. There are many, almost countless, research questions and opportunities that arise from the agenda of biophilic cities.

Much of task in the future, certainly for those in city planning and urban design, will be in offering an alternative future vision of cities and urban neighborhoods. As Stephen Kellert of Yale University has said: "We need to do more than just avoid all the bad things that we have done in terms of our adverse effects on natural systems. We also have to create the context for thriving, for development, for meaningful exchange with the world around us, and the people around us. And for that we need to restore that sense of relationship with the natural world which has always been the cradle of our creativity."<sup>10</sup> That vision will be of dense, sustainable, walkable cities, and places that are also full of nature, and are profoundly restorative, magical, and wondrous. 

1 Wilson, E.O. 1993. "Biophilia and the Conservation Ethic," in Kellert and Wilson, *The Biophilia Hypothesis*, Washington, DC: Island Press.

2 Wilson, op cit, p.32.

3 Stephen Kellert, *Building for Life: Designing and Understanding the Human-Nature Connection*, Washington, DC: Island Press, 2006, p.4.

4 Rachel Carson, "Help Your Child to Wonder," *Woman's Home Companion*, July, 1956, p.46.

5 King County, Washington, King County Biodiversity Report, 2008, p.57.

6 New Housing, New York Legacy Project, "Phipps-Rose-Dattner-Grimshaw Selected to Develop City-Owned Site in South Bronx," press release, January 17, 2007.

7 Robert Putnam, *Bowling Alone: The Collapse and Revival of American Community*, Simon and Shuster, 2001.

8 See "Mayor Announces Plan to Reduce the Use of Tropical Hardwoods," February 11, 2008, found at [www.NYC.gov](http://www.NYC.gov), accessed on February 17, 2009.

9 Ibid.

10 Stephen Kellert interview, in *The Nature of Cities*, documentary film, 2009.