

Linking Theory + Practice

Incorporating Nature into the Built Environment

Healthier Workplaces, Happier Employees

By Bill Browning

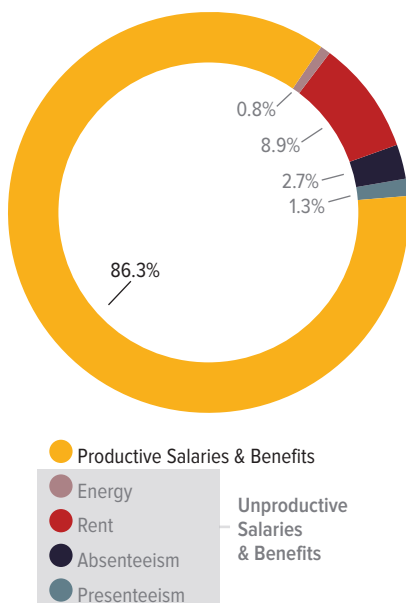
Biophilia—the innate human attraction to nature—is a concept that has been recognized for several decades by the scientific and design communities, and intuitively for hundreds of years by the population at large. Biophilic design, design that brings nature into the built environment, has often been regarded as a luxury for employers that want the best possible workplace for their employees, or that want to showcase their efforts to be more environmentally responsible.

Green building efforts traditionally focus on costs of energy, water, and healthy materials—all important topics. Yet, human costs are 112 times greater than energy costs in the workplace (Browning, et al., 2012). Incorporating nature into the built environment is not a luxury, but a sound economic investment in health and productivity. Biophilic design has been shown to improve employee well-being, increase



Lan Su Chinese Garden

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Sources: US Department of Labor 2010, BLS 2011, BOMA 2010

productivity, and boost the bottom line.

What is Biophilia?

Humans have evolved in the larger context of the natural environment, and we have developed to respond to these natural surroundings. As a result, we innately favor specific sensory interactions with nature and spatial properties of various natural landscapes (Wilson, 1984). The term biophilia, stemming from the words *bio* (“life”) and the Greek word *philía* (“friendship, affinity”) means “love of life,” and it implies that humans hold a biological need for connection with nature on physical, mental, and social levels, and that this connection affects our personal well-being, productivity, and societal relationships.

Whether one is engaging with nature by walking through a park, interacting with animals, or simply taking in a view

of greenery from one’s place of work, biophilia has many applications that help transform mundane settings into stimulating environments.

The Growing Evidence

Recent advancement in our understanding of natural systems, coupled with a growing understanding of the subtle neurological and physiological functions associated with contact with nature, has allowed us to identify biophilic design strategies that can increase economic gains, improve productivity, and strengthen the social fabric of communities. For example, neuroscience studies have demonstrated that experiencing nature improves cognitive focus (Lee, et. al, 2015). Monitoring cortisol levels indicate prolonged drops in stress hormones after experiences of nature (Park, et. al. 2009). Optical sci-

entists also note that looking at distant pleasing views causes all the muscles in the eyes to relax (Lewis, 2012). This is an expanding field of research that is underscoring the value of biophilic design in the workplace.

Studies conducted by neuroscientists, psychologists, and endocrinologists have indicated the positive impact of nature interactions on productivity. For instance, neuroscientists have found that viewing complex, dynamic natural scenes is a pleasurable experience, whereas viewing scenes with less visual richness, such as a blank wall or a treeless street, trigger less pleasurable mental reactions (Biederman & Vessel, 2006).

Studies in Japan (Park, et.al. 2010) found that walking through forest atmospheres decreases stress hormone levels, blood pressure, and heart rate compared to walking through urban areas. These studies support Attention Restoration Theory (ART): that nature serves as a positive restorative environment for humans and is an effective platform for stress management, health promotion, and disease deterrence (Kaplan and Kaplan, 1989).

An experiment at the University of Melbourne demonstrated that this can occur with just a 40-second view to nature. (Lee, et. al, 2015), indicating how easy it is to create impactful

biophilic interventions. Biophilic office environments can also deeply affect our cognition and health.

Researchers at the University of Oregon (Elzeyadi, 2011) found that 10

tion saved three times the cost of its installation. The call center is located on an upper floor with large windows and trees just outside the windows. The building achieved a LEED Gold

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percent of employee absences could be attributed to architectural elements that did not connect with nature, and that the quality of a person's view was the primary predictor of absenteeism. These studies, along with others, demonstrate how biophilic environments can decrease illness and absenteeism, increase staff retention, and improve job performance through the reduction and prevention of mental stress and fatigue. In other words, biophilic design strategies not only create healthier workplaces and happier employees, but have a positive effect on the bottom line as well.

How Cost-Effective Is Biophilic Design?

An experiment undertaken in a call center for the Sacramento Municipal Utility District (SMUD) office building found that a simple biophilic interven-

tion saved three times the cost of its installation. The call center is located on an upper floor with large windows and trees just outside the windows. The building achieved a LEED Gold certification, with great daylighting, raised floors with vents that can be controlled at each workstation, good thermal performance, and high indoor air quality. The workstations were situated perpendicular to the windows, and since the workers needed to focus on their computer monitors, seeing the view out the windows required them to turn their bodies.

By rotating the workstations a few degrees toward the windows, any movement in the trees outside became perceptible in the occupants' peripheral vision. This caused the occupants to occasionally glance out the windows, which relaxed their eyes by changing visual focus and gave them brief mental pauses that restored cognitive focus. Moving the workstations cost about \$1,000 per occupant. The call handling capabilities of the staff increased by more than 6 percent, resulting in savings of approximately \$3,000 per occupant. (Hechong 2003, Loftness 2008)

Bringing Biophilia into the Workplace

Transforming an existing or new workspace into a biophilic environment must be strategic. Certain biophilic strategies have specific cognitive or physiological outcomes. Business leaders and designers must select interventions that will have the specific effects their workplace and workforce require for the type of work performed there. Terrapin Bright Green's paper "14 Patterns of Biophilic Design" (Browning, et al., 2014) identifies patterns found in nature with proven health benefits to help guide designers in creating effective biophilic spaces.

Biophilic design strategies fall under three general categories:

- Nature in the space



Irish Cafe in North Carolina Museum of Art, sculpture by Patrick Dougherty

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- Natural analogues
 - Nature of the space.
- Nature in the space** addresses the

direct, physical, and ephemeral presence of nature in a space or place. For workplaces this can include plant life,

water, and animals, as well as breezes, sounds, scents, and other natural elements. Common examples include potted plants, flower beds, bird feeders, butterfly gardens, water features, fountains, aquariums, courtyard gardens, and green walls or vegetated roofs.

Natural analogues address organic, non-living, and indirect evocations of nature. Such interventions can include objects, materials, colors, shapes, sequences, and patterns found in nature and manifest as artwork, ornamentation, furniture, décor, and textiles in the built environment. Mimicry of shells and leaves, furniture with organic shapes, and natural materials like wood planks and granite tabletops are all examples of natural analogue design interventions.

Nature of the space addresses spatial configurations in nature. For office spaces in particular, a designer can incorporate refuge conditions for solitary work and places of prospect for surveying the space.

Several leading employers already use biophilic design to improve their office spaces. The Bank of America Tower at One Bryant Park in New York City is designed so that more than 80 percent of the occupants have a view to the outside, many of them with a view to Bryant Park. This visual connection to nature is enhanced by the use of natural materials like stone on the core walls with highly visible fossils, bamboo ceilings in the lobby, and perceivable wood grain on the handles of the entry doors.

In Shanghai, Glumac Engineering's new office is located in a renovated historic building. The design uses patterns abstracted from nature, a living green wall, and dynamic lighting design to help connect their engineers to nature.

Clif Bar & Company's new industrial bakery in Idaho will have large projections of pictures of their customers in the outdoors to bring nature into spaces that are otherwise windowless and sterile by necessity. In the non-food production spaces, a more direct connection to nature will be established by water features, stone walls, and views to



The Rockery by Frank Lloyd Wright.

Credit: Salil Wadhavkar/Flickr



Harvey Nash office space by K2 Space

Credit: K2 Space/Flickr

the surrounding landscape.

Google has metrics for the incorporation of biophilic elements into the design of their offices and campuses. As noted in the *New York Times*, Google officials, "... cited studies of 'biophilia,' or love of nature and its effects on easing stress levels. 'We are after the holy grail for the knowledge industry—how to measure productivity,' he said. 'That isn't just how quickly you can type words, or how well you made a line of code. It's about how you felt about it, and whether you had enough energy to play with your kids when you got home.'" (Hardy, 2014).

However, this is not a new concept. Frank Lloyd Wright's 1936 design for the S.C. Johnson Wax building is reminiscent of a savanna forest, with spreading shade tree columns and diffuse daylight overhead, a surrounding balcony that provides refuge, and a beautiful prospect view through the space. The design provides much of the same biophilic feeling that a real savanna would provide. The skillful use of nature in the space makes this building's design particularly resonant, so much so that one employee when first moving into the building reported that, "Everyone he knew was very happy with the building" (Lipman, 2003).

The space today has remained largely unchanged for the past 79 years and is still loved by the occupants. How many workplaces can you think of that have continued to make employees happy and content for close to eight decades? ■■

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SC Johnson Administration Building, Great Workroom

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