



Nature on the Threshold

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Tony Cenicola/The New York Times

Eric Garfinkel and his wife, Donna, right, turned the main living space in their 1888 town house on the Upper West Side of Manhattan into a "garden room" that flows into a landscaped courtyard in an effort to reap the benefits of "biophilic" design.

By VIRGINIA SOLE-SMITH Published: September 7, 2006

WHEN Alan Darlington began studying the use of plants to improve indoor air quality, he and his research team were focused on sustaining life in outer space. "If you send astronauts up to Mars, what's the best way to keep them alive — that sort of thing," he said. But even then, in the early 1990's, Dr. Darlington, an adjunct professor of environmental biology at the University of Guelph in Ontario, was more interested in the earthly applications of his work.

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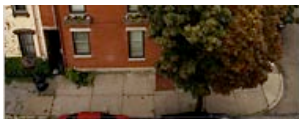
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In 2001 he started a company, Air Quality Solutions, that produces "living walls" of plants like ficus, hibiscus and orchids, which he claims remove up to 90 percent of formaldehyde and other toxic substances from indoor air in lab tests. Now, after building dozens of the walls in universities, condominiums and offices for \$10,000 to \$20,000 each, he said he is being flooded with inquiries from homeowners and is planning to expand into the residential market.

"Typically speaking, the air quality in homes is much

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Jeff Swensen for The New York Times

Biophilic theory informed the design of a greenhouse atop a Pittsburgh row house and a detached porch in Bethesda, Md.

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Stephanie Diani for The New York Times

Biophilic designers say that natural elements, real or simulated, can reduce stress such as Jordan Cahn's Beverly Hills home with a SkyCeiling.

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Tony Centicola/The New York Times

This bluestone pool in Manhattan may help reduce stress by using natural elements.

worse than in commercial buildings,” he said, and “indoor air quality has really become an important issue to consumers.”

Whether it is important enough to put up with what Dr. Darlington calls “certain issues” inherent in the walls — the hordes of bugs, for example, that must be exterminated organically since “pesticides go against the crux of what we’re doing” — remains to be seen. But in the expanding universe of “biophilic” home design, there seem to be few inconveniences too great to bear.

“We heard about one person who installed tiered ponds in their living room and it brought the humidity levels up so much there was mold everywhere,” said Monica Marsicek, the publisher of the quarterly magazine *EcoLogical Home Ideas*.

Biophilic design — the term is derived from biophilia, coined in 1984 by a [Harvard](#) biologist, Edward O. Wilson, to describe what he considered the innate human attraction to nature — incorporates real or simulated natural elements in an effort to promote well-being. It is a quirky, lesser-known cousin of green design, and is concerned more with “speaking to our emotions, our ancient genetic predilections, probably fundamental, for interaction with a natural world” than with the protection of the earth’s material resources, according to Grant Hildebrand, an emeritus professor of architecture at the [University of Washington](#) in Seattle and the author of “Origins of Architectural Pleasure.”

But as interest has grown in green design — creating a market that the U.S. Green Building Council estimates at \$7 billion a year, up 37 percent since 2004 — biophilic design has become more prominent, too, and more in demand. This fall, the country’s first biophilia-focused master’s program will be introduced at [Yale](#), a collaboration between the schools of architecture and of forestry and ecology studies.

“We lived in natural habitats for most of our evolutionary period, so knowing how to respond to light, weather, terrain, plants and animals was absolutely critical to our survival as a species,” said Stephen R. Kellert, a professor of social ecology at Yale, who joined Dr. Wilson in editing “The Biophilia Hypothesis” (1993) and wrote “Building for Life: Designing and Understanding the Human-Nature Connection,” published last year.

According to biophilic theory, Dr. Kellert said, instinctive responses to those natural elements “became genetically encoded, so that part of our emotional, intellectual, and physical well-being depends on having access to nature.”

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For true believers, even seemingly negligible details can have profound effects. “We know that patients in hospital rooms with morning sunshine need pain medication about 23 percent less than patients in rooms that only get drab, shadowy afternoon light,” said Roger Ulrich, a professor of architecture and landscape architecture at [Texas A&M University](#). “Nature is powerfully relaxing.”

As Dr. Ulrich sees it, “We evolved to recognize the kind of natural setting where we could let our guard down because there was water available, sunlight and views to help us spot predators, and refuge to protect us. So when we recognize those elements today, even if we’re highly stressed or sick, our blood pressure lowers, our immune system functions better and we feel less stressed.”

Beyond such psychosomatic effects, there is some debate about the benefits of bringing nature indoors. Jeffrey Siegal, an engineering professor at the University of Texas at Austin and an expert on indoor air quality, for example, argues that “plants are just not effective at getting rid of stuff in the air,” and that, given the health risks of things like mold and moisture, “it’s best to keep plants outdoors.”

But some biophilic designers say that stress reduction requires only the suggestion of nature. Jordan Cahn, 39, an equities trader in Beverly Hills, Calif., is renovating her house to include a “SkyCeiling” measuring 6 by 16 feet in her master bedroom, along with five virtual clerestory windows, at a cost of \$50,000. Zoning laws prohibit skylights larger than two feet square, so Ms. Cahn called on the Sky Factory, a four-year-old company in Fairfield, Iowa, that makes ceiling panels that simulate the sky.

“We’re concerned with not just creating something pretty but with the psychological benefits,” said Bill Witherspoon, the company’s founder, who began doing residential work this year. His ceilings are designed to replicate full-spectrum daylight, he added, “so the mind reads it as real, and you experience the same sense of freedom and physical relaxation you would have when you’re lying under a tree looking up.”

The light in Ms. Cahn’s ceiling will be computer programmed to change throughout the day, mimicking sunrise, high noon and sunset.

Many homeowners prefer more direct contact with nature. Eric Garfinkel, 47, and his wife, Donna, 50, spent two years transforming their 1888 town house on the Upper West Side of Manhattan from a warren of narrow, low rooms into a roomy three-bedroom dwelling with a rustic open-plan kitchen and living area that feels of a piece with the terraced yard. Mr. Garfinkel calls this space their garden room, “because when you’re in here, you feel like you’re still sitting outside.”

The garden, formerly a concrete yard, is dominated by a reflecting pool built from slabs of bluestone and surrounded by river rocks and shade plants. The garden and the house, which has exposed beams and stone walls, were created by Clodagh Design, a New York firm that does biophilic design.

“I didn’t love this room when we first moved in” in 2003, Mr. Garfinkel, 47, a psychologist, said of the garden room. “Now I love it because the garden makes it alive every day.”

Ernie Sota, a contractor specializing in green design, first started applying biophilic principles in the 1970’s, before they were ever defined that way, when he built a greenhouse on the roof of the 19th-century row house he owns with his wife, Jan, a teacher and musician, in Pittsburgh. More than a shed for winter gardening, the greenhouse was aimed at transforming their experience of living in the city, Mr. Sota said.

“It was a reaction to growing up here in the 50’s and 60’s,” he said, “when the steel mills were putting out a lot of smoke and the air was as black as could be.”

The Sotas lived in the row house until 1982, renting it out after that. Two years ago they rebuilt the greenhouse, which had become somewhat dilapidated, adding a new roof deck, with the help of Gerard Damiani of Studio D’Arc, an architectural firm in Pittsburgh. Then, Mr. Sota said, “I advertised for tenants who were interested in growing things” to live in the upstairs apartment.

Greg Boulos, 30, also a green builder, and Jen Montgomery, 29, an urban farmer, moved in in April and now grow tomatoes, lettuce, beets and other vegetables there. “It’s nice to go up and pick a salad for dinner every evening,” said Mr. Boulos, who takes his laptop to the greenhouse when he is working from home.

The greenhouse has an energy-recovering ventilator that uses the warm air to heat and ventilate the house in winter, with the benefit of spreading a sense of nature throughout. “The whole building smells like our orange blossoms,” said Mr. Sota’s son, Benjamin, 25, who lives in an apartment downstairs.

The biophilic goal of bringing the outdoors in is not always as straightforward as simply opening a home to the elements. Last year Elisa Rapaport, 42, and her husband, Michael Schoenbaum, 40, hired Inscape Studio, a Washington architectural firm, to build a screened porch for their family’s house in Bethesda, Md. They envisioned the porch as attached to their kitchen, both for convenience — to let them eat meals outside, mosquito-free — and because the kitchen offered the best views of their yard.

But their architects, Rick Harlan Schneider and Petros N. Zouzoulas, realized the structure would block the kitchen’s views and natural light — a major flaw in biophilic design. So they decided to move the porch away from the house.

“We said, Let’s have the deck between the house and the porch so you keep the light in the kitchen, and get out into the yard more with the porch,” Mr. Schneider said. They set the porch on concrete piers, arranged to avoid damaging the roots of a large tulip poplar, and built in cedar slats that screen the family from their neighbors but frame views of the trees and garden.

Judith Heerwagen, an environmental psychologist in Seattle who is editing a book with Dr. Kellert on the sensory aspects of environment, said that correctly framing views and integrating the designs of landscape and house are key biophilic principles but “are not well understood” by many builders.

“Most landscapes are designed to look good from the curb,” she said, “but what you really want to do is create good views from inside.”

Ms. Rapaport and Mr. Schoenbaum were initially ambivalent about the architects’ proposal. But “we loved the design, and we didn’t have a better solution,” Mr. Schoenbaum said.

Ultimately, they said, they were very happy with the porch. Still, they admit that the benefits of biophilic design have a price. Given Maryland’s substantial mosquito population, “we have to tell everyone to shut the door, shut the door, shut the door,” Ms. Rapaport said. “In that respect, we’re living with nature in a way we’d rather not be.”

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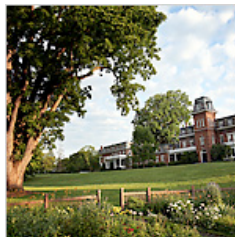
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