

MOVING ON UP



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Vertical gardens integrated into our cities' high-rise buildings are giving new meaning to the term 'urban jungle'. But to what extent do these projects genuinely improve quality of life and boost environmental performance, or do they only amount to greenwashing? Grace Allen explores the movement with botanist **Patrick Blanc** and architect **Stefano Boeri**.

In Italo Calvino's philosophical novel, *Il barone rampante* [*The Baron in the Trees*], the young Cosimo Piovasco di Rondò climbs into a tree in his family's garden – and never comes back down. His eminently cultivated life is conducted among the branches and trees of Liguria, Italy. Today, the novel is still a paean to sustainable living in the face of urbanisation.

Now, the enlightened ideal of the book – a profoundly human existence that is in harmony with nature, lived high above the earth – is being brought closer as architects and designers embrace a trend to take 'green' to high-rise buildings.

"I've always dreamed of how to combine buildings with living nature," says architect Stefano Boeri, who runs his own firm. He cites the arboreal utopia of Calvino's novel as a formative influence, along with, among others, the work of artist-architect Friedensreich Hundertwasser, who developed the concept of 'tree tenants' – foliage growing and flourishing within buildings, sharing living space with human counterparts.

Nature and architecture

The idea of a building that provides an equally nurturing environment for people and plants, where the latter are present "not simply as ornamental or decorative elements, but a part of its essence", is behind Boeri's development of a manifesto for 'urban forestry'. The first expression of this, the Bosco Verticale in Milan, Italy, is covered with the equivalent of 3ha of forest, where cantilevered balconies provide deep planters for 21,000 creepers, shrubs and trees, which then shade balconies to create a secluded outdoor living space.

This model is being extended to cities across the world, with Boeri describing the Bosco Verticale as an 'experiment' allowing refinement for future projects. In Paris, France, the

54m-high Forêt Blanche will be planted with 1ha of woodland, while a forest city planned for development in Liuzhou, China, will incorporate 40,000 trees and one million plants.

The Bosco Verticale received numerous accolades, winning the International Highrise Award in 2014 and being named 2015's Best Tall Building Worldwide by the Council on Tall Buildings and Urban Habitat (CTBUH) Awards. Its aesthetics, however, have not been beyond criticism. "They say, you are hiding architecture, you use green to hide your building," Boeri states.

While critic contributions are valuable, he nevertheless finds this issue unimportant. On the one hand, the architect sees no great distance between using natural materials – stone, soil and wood – and living nature in architecture; on the other, his ambitions for the project transcend aesthetic appeal. "Urban forestry is not simply planting trees, it's a new approach to the urban condition," he says.

In particular, Boeri sees urban greening as a response to the challenges posed by climate change, and says, "75% of CO₂ is produced by cities, but at the same time, we know that they are the victims of climate change. I think cities should become able to take care of themselves and find a solution that is not only for them, but also for the entire planet. And from that point of view, I think that urban forestry is one of the major contributions to reducing the disadvantages of climate change."

On the rise

The positive results of bringing plant life into the city have been proclaimed. In a 2014 technical guide, the CTBUH Sustainability Working Group credited green walls with a wide range of benefits, including improving energy efficiency in the buildings they cover, improving air quality through the sequestering of carbon and absorption



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of pollutants, and reducing the 'urban heat island' effect.

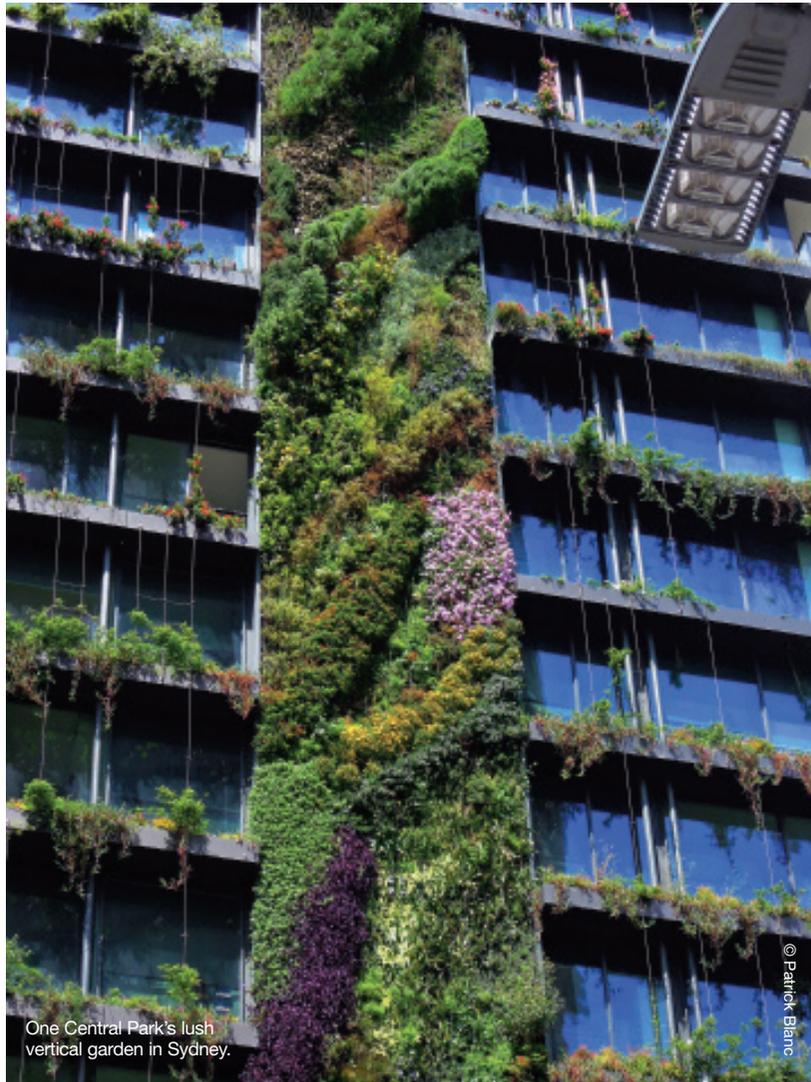
These benefits are also asserted by the botanist Patrick Blanc, a pioneer of hydroponic walls. His 'vertical gardens' are based on a system in which plants grow in a polyamide felt supported by a metal and PVC frame, and are watered by an irrigation system that provides a solution of water and nutrients. They can be found adorning buildings across the world – including French architect Jean Nouvel's 117m-high One Central Park in Sydney, Australia, where shining glass is interspersed with Blanc's living designs.

"In a reduced space, the vertical garden has a very positive effect by



1. In Milan, the Bosco Verticale is the embodiment of Boeri's 'urban forestry'.
2. The Nanjing Vertical Forest in China will be the first of its kind to be built in Asia.

reducing temperature in summer," he says, noting that a narrow canyon street with a living wall can experience temperatures noticeably lower than elsewhere. He also points to the ability of the microorganisms living among the roots of the plants growing on the felt to absorb large organic molecules. >>



One Central Park's lush vertical garden in Sydney.

However, when asked what a living wall brings to a city, Blanc's first response takes an entirely different direction.

He is more focused on the biodiversity a living wall brings to areas completely devoid of plant life, and the positive effect this biodiversity, provided by a living wall populated by over a hundred species of plant, can have on a city's inhabitants.

"When they see ivy growing on the wall they don't think at all about nature," he states. "By seeing vertical gardens with many species, they

can relax, they can think about what they saw when they were travelling for holiday, in the mountains, with waterfalls [and] plants growing close to these or trees."

Blanc likes to make use of local species, although this takes second place to the garden's aesthetic appeal.

"In Paris, for instance, to use plants native from the northern part of France is not very interesting, but when you are working in Sydney, you have so many interesting local species. In Korea, it's the same," he enthuses. Blanc recently returned

from working on a vast living wall for the museum of contemporary art in Busan, South Korea, which features 175 species – 30–35 of which he has found nowhere else in the world.

There is magic in encountering a riot of plant life in the hard planes of the city, and the gardens continue to grow. Working again with Nouvel, Blanc has designed a garden for the 200m Le Nouvel in Kuala Lumpur, Malaysia. Like Boeri, his fascination with plants began at a young age, and the botanists' Parisian home, in which every wall is a mass of foliage, is a testament to a lifetime of passion. "I love the plants, you see," he simply says.

Challenging sustainability

While the benefits may be undeniable, the sustainable advantages of urban greening have been called into question. Vertical gardens often require expensive installation, ongoing maintenance and continual irrigation, which arguably negate their 'green' credentials due to the high consumption of energy, water, labour and money.

The high-rise trees and shrubs on the Bosco Verticale require year-round attention from a team of 'vertical gardeners'. A 2013 research paper on living walls – plants installed in a vertical irrigated system like Blanc's – by the University of Genoa in Italy concluded that the only sustainable form of living wall was direct greening.

But modifications for sustainability can be made. In London, UK, The Athenaeum Hotel's living wall uses felt made from recycled clothes, while One Central Park is irrigated with recycled water. The plants at the top of Blanc's high-rise gardens are also chosen for features that reduce water loss through transpiration. In addition, he points out that vertical gardens can have an advantage over horizontal ones, in that no water is lost through percolation into the soil.

Furthermore, Blanc worries that living walls are being installed by "people

who know absolutely nothing about plants", and see vertical gardening as an opportunity to make money. However, he is optimistic that a natural selection of the best examples will occur. "What will happen year after year is that all of the people who know nothing about the plants or techniques will disappear – only the best ones will persist."

Arboreal utopia

The proliferation of living walls is testament to an ongoing trend that is seeing an increasing number of buildings feature green elements. Despite this, Blanc believes there should be limits. "When you see some projects trying to cover beautiful facades, old facades of the last century, it's crazy," he says. "A city is a city. We are never to forget that."

For Boeri, individual stylistic reservations are tempered by his larger goals for urban greening. "I don't like what I see with buildings that are trying to copy natural shapes, or to transform themselves [into] trunks and branches, but that's a very personal opinion," he says. "It's a positive movement, and a way also to focus on that issue, to make climate change a serious concern for our cities, public administrators and politicians."

His commitment to urban forestry is such that even the sky is not the limit. Boeri's 'Vertical Forest Seeds on Mars 2117' installation explored the concept of a colony forest city, sent from an Earth rendered uninhabitable by climate change.

In the meantime, the forest cities planned in China offer a new metropolitan vision. "We are trying to convince the politicians that when you have to start again, you begin with a new city, so why don't we start with something that is simultaneously a city and a forest," he adds. "And not a city surrounded by forest, not a city with green facades, but a city that is, at the same time, a forest." ●