

Unearthing home-grown solutions to urban greening

In a rapidly warming and increasingly urbanized world, green spaces can provide a much-needed oasis for city dwellers. Urban greening not only boosts biodiversity and lowers air temperatures in cities, it also reminds us of the importance of our natural environment

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From the impeccable Zen gardens of Kyoto to the sacred forests surrounding shrines such as Meiji Jingu in Tokyo, Japan is admired for its traditional gardens that often provide a welcome respite from the concrete jungles that surround them.

However, rapid urbanization over the past half century — 91% of people nationwide currently live in urban areas compared to around 75% in 1975 — has gone hand in hand with a reduction of urban green spaces.

“If farmland and woodland is taken into account, the total area of green spaces in Tokyo has decreased by around 219,000 hectares — approximately 22% — from 1965 to 2005,” says Yoshinori Akiyama, senior deputy director of the environment office at the land ministry.

Even though Tokyo’s urban parks have increased by 16,000 hectares over the same period, the city still has a remarkably low percentage of park space — 6.2% — compared to dedicated spaces found in capitals such as Stockholm (29.4%), Paris (24.3%) and London (11.2%).

The loss of such green spaces has tangible consequences on the wellbeing of citizens and the environment. Analysts say that it is important to re-imagine how cities are designed and built so that planners can respond to the challenges posed by increasing urbanization and climate change.

If properly designed, urban green spaces — even small ones — can lower surrounding air temperatures, boost biodiversity, and provide a whole range of health and social benefits.

The ‘urban heat island’

The loss of green spaces in Japan’s cities has been occurring against a backdrop of rising global temperatures, a warming effect that is even more pronounced in urban areas.

In the 20th century, the average temperature in six large cities in Japan, including Tokyo and Nagoya, increased by 2-3 degrees Celsius, compared to a global average of 0.6 degrees.

“This temperature pattern — whereby temperatures remain higher in central areas compared to suburban metropolitan areas — is known as the ‘urban heat island,’” says Takehiko Mikami, emeritus professor at Tokyo Metropolitan University, who has conducted extensive research on urban climatology and the impact of green spaces on city temperatures.

The urban heat island effect is caused



by two main factors: heat emissions connected to human activities (such as engine emissions and air conditioning) and the heat retention of artificial surfaces, such as cement or asphalt, compared to natural ones typically found in forests or fields. Cement and asphalt have a low albedo, which means that solar energy is absorbed during the day, resulting in an accumulation of heat that is then released gradually, causing higher temperatures (especially at night).

In contrast, green areas create a cooling effect through evapotranspiration during the daytime and heat loss from the ground surface (radiation cooling) at night. The cold breeze felt when walking through a city park on a hot summer’s night is an example of radiation cooling in action.

The urban heat island effect poses a significant health threat to city dwellers, leading to an increase in cases of heat stroke and heat stress, particularly during the night, Mikami says.

Studies even indicate a direct correlation between death rates and the number of days in which maximum temperatures are above 30 degrees Celsius and nights in which minimum temperatures remain above 25 degrees.

“It is important to preserve or even increase green areas in big cities because cool air seeps out into the surrounding neighborhood, even when the areas are small,” says Mikami, whose research on Japanese cities demonstrates that surface and air temperatures in city parks are a lot lower than the built-up areas around them. “We call this the ‘cool island effect.’”

The ‘Miyawaki method’

Planners, developers and city dwellers are increasingly concerned with how to include natural elements in urban settings where lack of space is often an issue. Encouragingly, research shows that the benefits of urban greening can even be achieved with relatively small green spaces, particularly if connected to one another by corridors of trees.

One approach whose popularity is growing rapidly was pioneered by a renowned Japanese botanist, professor Akira Miyawaki. The “Miyawaki method” involves planting potted saplings of native tree and plant species to create dense forests on small plots of land.

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Social aspects such as engaging local citizens in the creation and management of the forests are also integral to the method, which has inspired the planting of almost 40 million trees worldwide.

“Heavy industrialization in the 1960s was destroying nature and Miyawaki wanted to restore natural forests in the urban deserts that had been created since 1971,” says Kazue Fujiwara, professor emerita at Yokohama National University, who learnt the method directly from its creator.

Fujiwara has been involved in the planting of Miyawaki forests since she was a research student at Yokohama National University, where she contributed to parts of the dense on-campus forest that has grown to be a symbol of the university.

The Yokohama National University

campus is a green oasis in one of the largest and most densely populated metropolitan areas in the world. Although small, the forest is a great example of the benefits of using native species, Fujiwara says. In fact, she emphasises that it’s not just a few trees and lawns that we need, but a specific type of planned urban greening.

“Professor Miyawaki taught us that natural forests have regulated themselves for hundreds of thousands of years and they’ll continue to do so until the next ice age, that’s why we must plant native species,” Fujiwara says.

The technique has been shown to be effective worldwide, irrespective of soil and climatic conditions, says Daan Bleichrodt, founder of Tiny Forests, a Netherlands-based initiative that has been developing Miyawaki forests in urban settings since 2015.

Miyawaki forests are self-sustaining, biodiverse and resilient. They require very little maintenance and, after a mere three years, they can be left to grow naturally without the need for human intervention.

Furthermore, research conducted on Tiny Forests’ projects reveals their exceptional cooling capacity, whereby the forest surfaces were cooler than nearby paved surfaces by up to 21 degrees Celsius on a hot summer’s day.

“It is difficult to find land, especially in urban settings, where you can plant trees, but what is good about the Miyawaki method is that it is very well adapted to





small areas where you want quick results,” says biologist and naturalist Nicolas de Brabandere, who founded Urban Forests in 2016 and has already planted more than 30 urban forests in Europe, some of which are as small as a tennis court.

According to de Brabandere, the biodiversity benefits of the Miyawaki method are even more pronounced when compared to regular city gardening schemes involving the planting of lawns, shrubs or flowers, which can be 20 to 100 times less biodiverse.

Building a community

Urban green spaces also have the potential to help people rediscover their connection to the natural world. This is the philosophy underpinning India-based Afforestt, founded by Shubhendhu Sharma, which has been planting Miyawaki forests and sharing knowledge on the method for more than 10 years.

Forestscaping is Afforestt’s latest project, a seamless integration of art, design and nature.

“The mainstream approach to urban greening around the world is about creating grass lawns,” says Sharma. “This is a shame because the way nature grows is totally different, forests are tremendously more beautiful than manicured lawns and gardens.”

By creating native forests that encourage human interaction — for example, by including benches, observation decks and even sculptures — Sharma wants people

to enjoy Miyawaki forests in the same way as they would traditional parks.

Through Forestscaping, Sharma has added a new element to Miyawaki forests, while also following the same principles that have made them so effective in the first place.

“Human intervention should not always be looked upon as a negative influence on the forest,” he says. “We’re creative beings and can add value to natural ecosystems because we’re a part of nature.”

Historically, green areas such as parks have always been a point of welcome respite for urban dwellers. They have been linked to a positive impact on the real estate value of surrounding neighborhoods, lower crime rates, enhanced creativity and the promotion of social interaction.

The desire to use natural elements to bring people together was one of the guiding principles behind the hugely successful Namba Green Parks project developed by California-based architectural partner Jerde.

The redevelopment project has transformed an old industrial area in Osaka’s chaotic and highly urbanized Namba district into a green commercial hub, which includes office spaces and a shopping mall. Nature is incorporated into the very structure of the building’s multi-layered outdoor terraces and roof gardens, joining natural elements with man-made ones.

“Upon visiting the site, we immediately realized it needed nature,” says Phil Kim,

Jerde’s Asia-Pacific managing director. “Our objective was to create a place where people could meet and get a sense of greenery.”

Jeri Oka, the project’s senior designer, describes visiting Namba Parks as being in a park rather than on a roof garden. There are more than 300 species of vegetation that people can read about as they walk around.

“We wanted to create an educational aspect but in an experiential way,” she says.

Green benefits

Shinrin-yoku (literally, “forest bathing”) is a Japanese concept that refers to the practice of immersing oneself in forests as a form of therapy or healing.

Understanding how to bring the benefits reaped from being in nature to urban environments, that are characterized by vast expanses of concrete and tight living spaces, is becoming a priority for urban planners.

“We need urban forests for biodiversity conservation, education and enhancing our creativity, and a range of other health benefits,” says Cecil Konijnendijk, a professor of urban forestry at the University of British Columbia and director of the Nature Based Solutions Institute.

Research demonstrates that people are mentally, physically and socially healthier when they live in greener environments, Konijnendijk says. “The current COVID-19 pandemic has once again shown how important our local green spaces are as a way to relax and escape stress.”

As an expert in urban forestry who has advised national and local governments in 30 or so countries, Konijnendijk believes successful urban greening projects are often dependent on government policies that determine the planning and management of public spaces.

In April 2001, the Tokyo Metropolitan Government established greenery standards for the rooftops and areas surrounding the construction or renovation of building sites that are larger than 1,000

Clockwise from above, far left: An aerial view of Yokohama National University’s campus; at 94 years old, Akira Miyawaki continues to inspire younger generations with his Creating Native Forests for Life project; Miyawaki plants foliage in an urban area with students from the University of Nairobi in Kenya; an example of a Miyawaki forest in Belgium COURTESY OF YOKOHAMA NATIONAL UNIVERSITY, KAZUE FUJIWARA AND URBAN FORESTS

square meters (250 square meters for public facilities). This means that developers now have to complete and submit a greenery plan as part of the planning permission process.

“We’re developing a green plan on the premise that greenery has multiple functions, such as improving the urban environment, mitigating the heat island effect, providing habitats for living things, as well as facilitating disaster prevention,” says Kazuhiko Aoyama, director for greenery policy planning and coordination at the Natural Environment Division of the Tokyo Metropolitan Government.

On a national scale, the Environment Ministry has also recognized the need for urban greening and approved a 2018 climate change adaptation plan that includes measures such as promoting urban green spaces to tackle the heat island effect, says Toshio Torii, director-general of the Nature Conservation Bureau.

Furthermore, Torii believes that Prime Minister Yoshihide Suga’s recent commitment to carbon neutrality by 2050 will bring a shift in environmental policy and help raise awareness about the need for urban green spaces as part of broader measures to lower emissions by absorbing carbon dioxide.

“Urban green spaces have a variety of important functions such as providing a comfortable living environment, children’s emotional education, evacuation sites in the event of a disaster, biodiversity conservation and the mitigation of the heat island effect,” Torii says.

Aside from their tangible benefits, urban forests can be transformative, stimulating people to reflect on the value of nature even in the heart of a city.

“Once we create a new perspective of how our habitat should be and how our cities can become,” Afforestt’s Sharma says, “a lot of change will start to happen.”



From far left: Visitors stroll through Osaka’s Namba Green Parks development project; natural canopies are incorporated into the underlying structure of the project

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