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URBAN INNOVATOR

How One of the World's Densest Cities Has Gone Green

As Singapore expands rapidly, a novel approach is preserving green space.

Symbol of Singapore, these "Supertrees" belong to a display at the 250-acre Gardens by the Bay. The high-tech structures range from 80 to 160 feet and collect solar energy to power a nightly light show. They have a softer side too: their trunks are vertical gardens, laced with more than 150,000 living plants.
PHOTOGRAPH BY LUCA LOCATELLI, INSTITUTE

By **Amy Kolczak**

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Singapore calls itself the Garden City, and it's making good on that promise.

Singapore's meteoric rise launched a landscape of towering architecture in the compact city-state, and it's now a case study in urban density. But as the metropolis continues to grow, urban planners are weaving nature throughout—and even into its heights. New developments must include plant life, in the form of green roofs, cascading vertical gardens, and verdant walls.

That push to go green extends to construction as well—green building has been mandatory since 2008. (Read about how high-density urban areas can be more energy efficient and pollute less.)

Much of that vision to keep Singapore both sustainable and livable stems from Cheong Koon Hean, the first woman to lead Singapore's urban development agency. The veteran architect and urban planner is credited with reshaping the skyline through landmark projects such as the waterfront residential and entertainment quarter Marina Bay—whose gardens are one of the city's top draws—and the Jurong Lake District, slated to be a second business district and home to a new high-speed rail link to neighboring Malaysia.

Cheong is now CEO of the Housing and Development Board, which builds and manages public housing for most of Singapore's 5.6 million people. Singapore's sleek version of public housing emphasizes community-centric towns (there are 23) and amenities such as "skyrise" gardens and rooftop gyms.

National Geographic spoke to her about Singapore's unique brand of building—and how one day it may even take the city underground.

This is no ordinary park: Kite-fliers gather on the green roof of the pump house at Marina Barrage dam, which formed a new reservoir and guards against flooding. The award-winning structure is part of Marina Bay, a development created from land reclamation to relieve growth pressure on Singapore.
PHOTOGRAPH BY LUCA LOCATELLI, INSTITUTE

What distinguishes Singapore as an urban area?

Singapore is a both a country and a city—an island about half the size of metropolitan London. But compactness has its advantages: One can take a morning dip in the ocean and then hop on a train to work.

Singapore is truly cosmopolitan, and we've managed to preserve our cultural—Chinese, Indian, and Malay—and architectural legacy through a heritage conservation program. It is a merger of old and new, a mix of the East and West. These are the beautiful contradictions that make Singapore a richly diverse city.

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How has Singapore transformed during your 35-year career?

When Singapore became independent in 1965, we were a city filled with slums, choked with congestion, where rivers became open sewers, and we were struggling to find decent jobs for our people. We had limited land and no natural resources. In the short span of 50 years, we have built a clean, modern metropolis with a diversified economy and reliable infrastructure. Our public housing program has transformed us from a nation of squatters to a nation of homeowners: More than 90 percent of our people own their homes, one of the highest home-ownership rates in the world.

Could you describe the initiative to expand the city's green space?

Through an incentive program, we replace greenery lost on the ground from development with high-rise terraces and gardens. This adds another layer of space for recreation and gathering. In Marina Bay, all developments comply with a 100 percent greenery replacement policy. The Pinnacle@Duxton, the tallest public housing development in the world, has seven 50-story buildings connected by "skyway" gardens on the 26th and 50th floors. You can even jog around a track on these levels, which are also equipped with exercise stations.

You're aiming to create a model of "livable density." Can you define that?

Given our land constraints, Singapore has no choice but to adopt high-density development. At its essence, livable density is about creating quality of life despite that density.

It's about opportunity, variety, and convenience: More jobs result from the synergy of having so many talented people come together. We offer proximity to shops, schools, entertainment, healthcare, and the outdoors. Affordable public rail networks reduce traffic congestion. Livable density also means that we prioritize parks and recreation facilities.

Veteran architect and urban planner Cheong Koon Hean oversees Singapore's public housing, where most of its 5.6 million people live. The sustainable, community-oriented residential developments typically include three-generation playgrounds, as they're called, and access to gardens.
PHOTOGRAPH COURTESY OF HOUSING & DEVELOPMENT BOARD

Innovative design can reduce that feeling of density by creating the illusion of space using "green" and "blue" elements. We intersperse parks, rivers, and ponds amid our high-rises. These bodies of water also double as flood-control mechanisms. And we plant lushly—some three million trees cover Singapore, including a stand of virgin rainforest, rich in biodiversity, right in the heart of the island.

For a city extension called Marina Bay, we created one of the largest freshwater city reservoirs in the world and set aside 250 acres of prime real estate for the Gardens by the Bay, a "green lung" in the city.

We are also connecting our many parks into a network. Some hill parks are linked by iconic bridges, another example of how we create the illusion of space. As this park connector expands, Singaporeans will have access to a few hundred kilometers of cycling and walking trails throughout the island—they've already spawned a new cycling culture.

Within our public housing estates, Singaporeans build homes, start families, and form strong bonds with their neighbours. We consciously build community spaces and town plazas to create those gathering places, including "three-generation playgrounds" and fitness areas to encourage interaction between residents of different ages.

Public housing takes on a new definition in Singapore, where the Pinnacle@Duxton features elegant apartments in seven 50-story towers, connected by a 1,600-foot-long recreational "sky garden." The building illustrates high-density development—a model for accommodating growth in the compact city-state.
PHOTOGRAPH BY BRYAN VAN DER BEEK, BLOOMBERG VIA GETTY IMAGES

Singapore's version of public housing is unique. Can you talk about that?

Our founding prime minister had a vision to build a nation of homeowners—to give Singaporeans a tangible stake in our country, financial security, and a critical sense of belonging.

Through the Housing and Development Board (HDB), the government builds flats [apartments] that are sold to citizens with a 99-year lease. Today HDB manages close to one million flats, housing more than 80 percent of the population. Some 95 percent of the units are owned.

Urban planning is more than just good physical design. It's also thoughtful policy design. The flats are priced to be affordable, at about 20 to 25 percent of income. We provide choices for diverse needs and budgets, ranging from one bedroom to multigenerational flats, with four bedrooms. As it appreciates over time, the flat may be a key source of financing retirement needs. Elderly flat owners can sublet; sell off a larger flat for a smaller one; or sell part of their lease back to HDB so that the proceeds can be used to buy an annuity that provides income while they remain in their own home.

For vulnerable families who cannot afford a flat of their own, HDB helps them through its public rental program.

At 150 acres, Bishan Park is one of the largest in Singapore, which is gradually connecting its parks into a vast network. The ultimate goal: 400 miles of walking and cycling paths. "We intersperse parks, rivers, and ponds amid our high-rise developments, providing relief," says Cheong.
PHOTOGRAPH BY LUCA LOCATELLI, INSTITUTE

Looking ahead, what will Singapore be like in 2030?

Buildings will be green—a major target is to have 80 percent achieve an environmental performance rating called Green Mark by 2030, in order to reduce energy use and carbon emissions.

New solutions will support the urban lifestyle: More people will be based in Smart Work Centres—shared work space for employees from different companies—near their homes, reducing the need to travel, improving productivity, and enhancing work-life balance.

People will be empowered in new ways with technology—the elderly can be better looked after in their homes with "tele-medicine."

Technology will also allow us to tap underground and cavern spaces to supplement our limited land. Our urban planners are endeavoring to develop a 3-D masterplan of underground Singapore.

What can other cities learn from Singapore's experience?

Many cities, especially those in Asia, are densely populated. Our experience shows that those cities can be livable. Our focus on equitable access to amenities and a commitment to affordable housing have provided a strong foundation for a stable society. Building up capable public institutions and harnessing public-private partnerships and technology have also been critical.

This interview has been edited for length and clarity.

Urban Innovator *explores the contributions by an individual to creating sustainable cities; the article is part of the* **Urban Expeditions** *series, which is supported by a grant from United Technologies to the National Geographic Society.*

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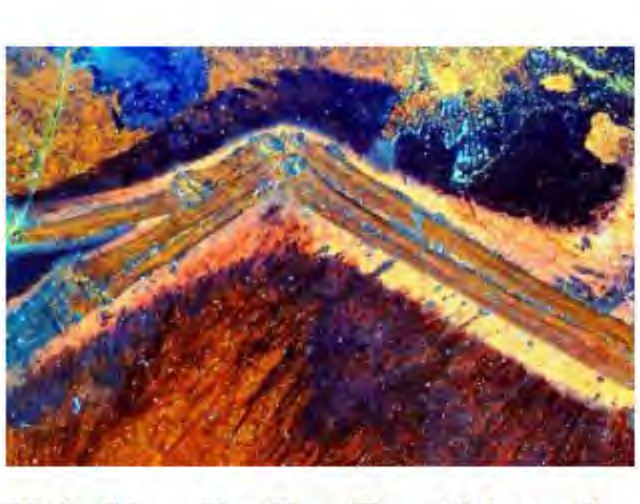

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