

GREEN CITIES

FROM URBAN GARDENING TO AQUAPONICS

By 2050, two-thirds of humanity will live in urban areas. Our quality of life depends on how liveable our cities are. Gardens have multiple functions: they produce a surprising amount of food, help prevent floods, cool the air – and are a pleasant place to relax away from the city bustle.

Public parks, gardens and tree-lined streets are not only a welcome splash of green, but are vital lungs for the city and its inhabitants. Healthy urban soils, unsealed and aerated, can quickly absorb large amounts of rainwater, preventing flooding. They also provide open spaces where people can relax.

Green spaces in and around cities are surprisingly important for food production. Up to 80 percent of the poorest residents in some countries are involved with some type of “urban agriculture”; they grow vegetables and fruit, raise chickens and goats. This provides them with fresh, healthy food they otherwise could not afford. However, urban farmers must cope with lack of space, degraded soils, unreliable supplies of water, and urban encroachment.

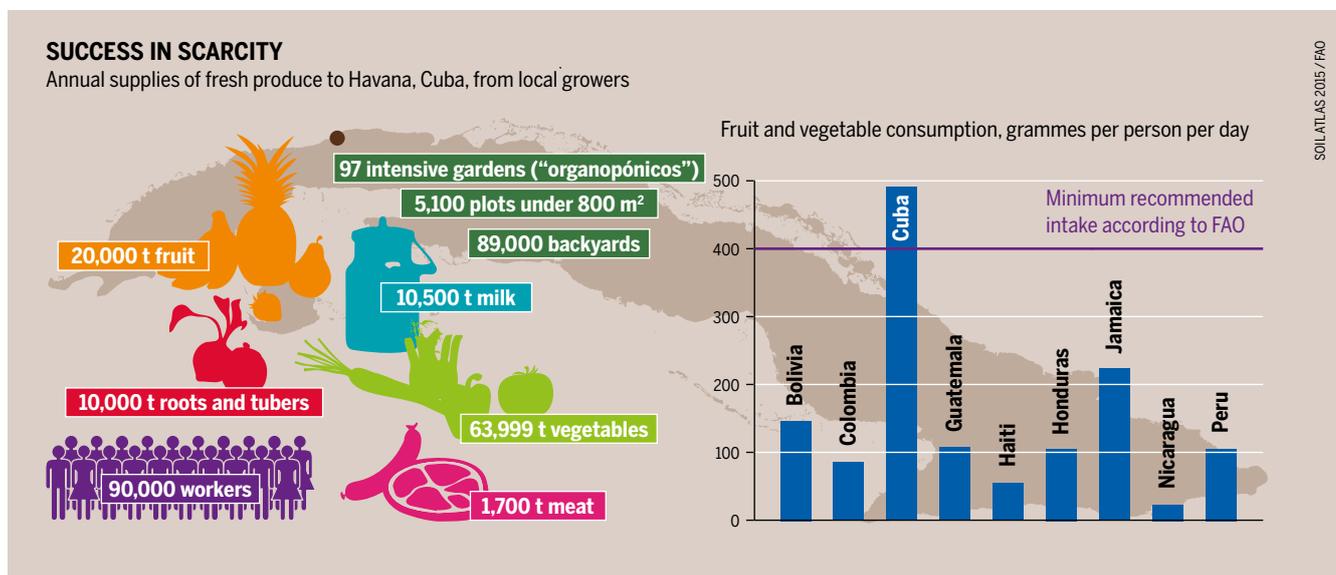
Nevertheless, cities still produce a substantial amount of food. In sub-Saharan Africa, 40 percent of the households have gardens. In Nepal, it is 57 percent; in Nicaragua, 68 percent; and in Vietnam, 69 percent. Gardens do not have to be large; people often grow plants in pots on balconies and rooftops. But rapid urbanization puts pressure on available open space, converting allotments into apartments, gardens into garages. Designating certain areas as agricultural

zones would protect food supplies and preserve flood-control zones. Teaching people the skills of organic farming, helping them get high quality seeds, and supporting markets would increase the amount of food grown.

Urban and peri-urban agriculture is well-established in Latin America where most of the population lives in cities. As a result, farming is often included in national policy, and in research and education programmes – and in some places even in local land-use plans. Farmers’ markets are increasingly common, and their output is impressive: 15,000 tonnes of vegetables per year are grown on 22,800 hectares in Mexico City. On the edges of water-scarce Lima, food for city markets is produced on 5,000 hectares of irrigated land. Poor areas in cities like Detroit, in the United States, are food deserts. Local convenience stores do not sell fresh produce; the grocery stores that do are far away; public transport is almost non-existent. But there is no shortage of brownfields, where community gardening projects can easily be organized. Detroit has 1,200 gardens, including a two-acre site downtown.

Cities are islands of heat; because building and paved surfaces absorb solar radiation, they are between 1 and 4 degrees Celsius hotter than the surrounding areas during the day, and up to 10 to 15 degrees Celsius at night. Vehicles, and air conditioners contribute additional heat. Vegetation cools the air through evapotranspiration and provides shade. Even small areas of urban green can cool their neigh-

Local production is very important for Havana, the capital of Cuba – and is welcomed by both consumers and nutritionists

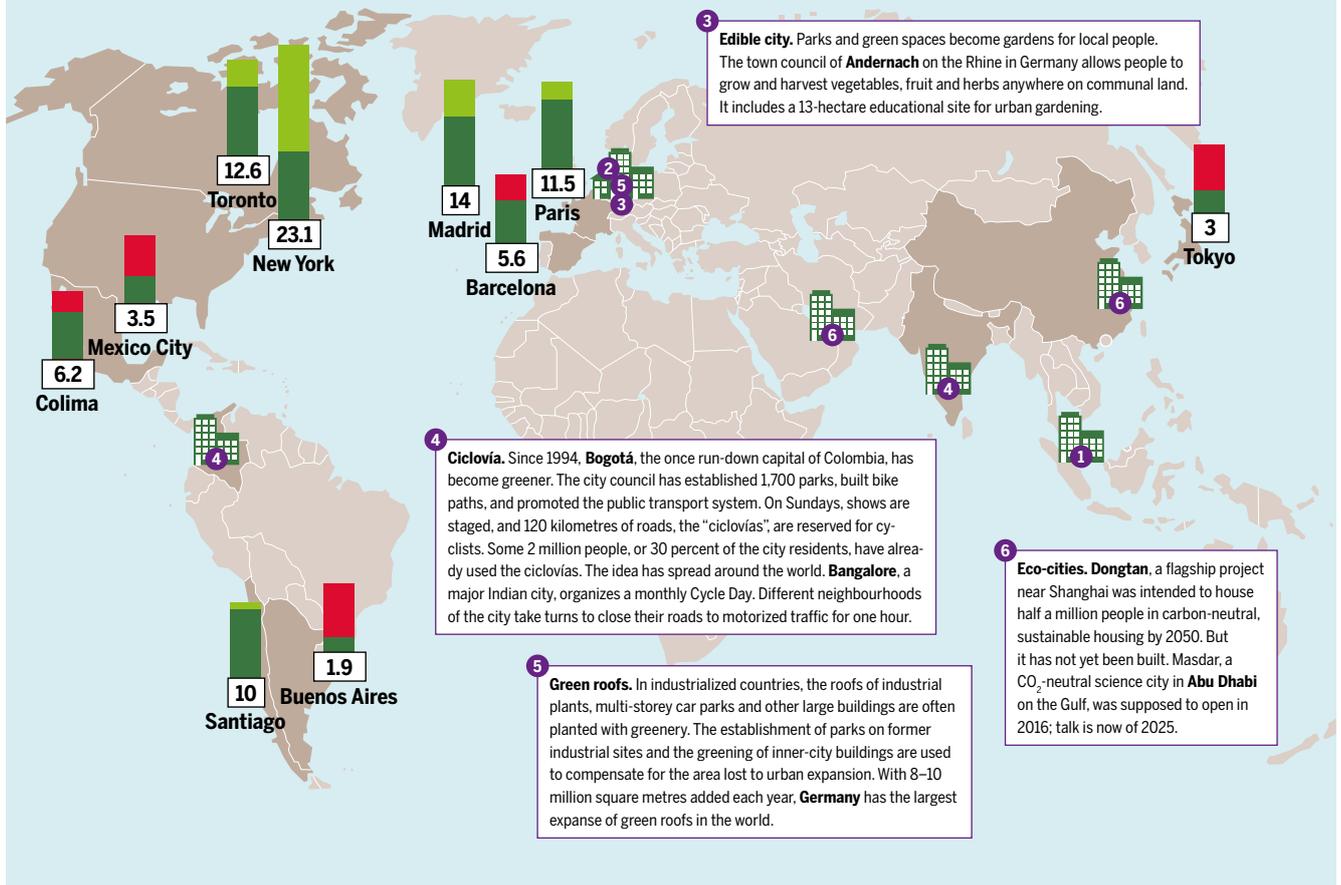


A LONG WAY TO THE GREEN CITY

Current land use, ideas for the future

Green space per person in selected cities, in m²

- 9 m² minimum area per person according to World Health Organization
- Area above minimum
- Area below minimum



1 Vertical farming. This will save space, allow recycling and produce healthy food in the centre of the city. Vertical farming means growing crops on multiple storeys. It is being tested in many cities, but the costs of construction and operation are huge. Only **Singapore** has commercial facilities, and its towers are only 9 metres high.

2 Aquaponics. The city farm "Uit je eigen stad" ("From your own town") opened in 2012 on 2 hectares of former industrial land in the port of **Rotterdam**. It produces vegetables and flowers. Since 2014 it has used aquaponics: fish farming in combination with growing hydroponic crops.

3 Edible city. Parks and green spaces become gardens for local people. The town council of **Andernach** on the Rhine in Germany allows people to grow and harvest vegetables, fruit and herbs anywhere on communal land. It includes a 13-hectare educational site for urban gardening.

4 Ciclovía. Since 1994, **Bogotá**, the once run-down capital of Colombia, has become greener. The city council has established 1,700 parks, built bike paths, and promoted the public transport system. On Sundays, shows are staged, and 120 kilometres of roads, the "ciclovías", are reserved for cyclists. Some 2 million people, or 30 percent of the city residents, have already used the ciclovías. The idea has spread around the world. **Bangalore**, a major Indian city, organizes a monthly Cycle Day. Different neighbourhoods of the city take turns to close their roads to motorized traffic for one hour.

5 Green roofs. In industrialized countries, the roofs of industrial plants, multi-storey car parks and other large buildings are often planted with greenery. The establishment of parks on former industrial sites and the greening of inner-city buildings are used to compensate for the area lost to urban expansion. With 8–10 million square metres added each year, **Germany** has the largest expanse of green roofs in the world.

6 Eco-cities. **Dongtan**, a flagship project near Shanghai was intended to house half a million people in carbon-neutral, sustainable housing by 2050. But it has not yet been built. **Masdar**, a CO₂-neutral science city in **Abu Dhabi** on the Gulf, was supposed to open in 2016; talk is now of 2025.

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bourhoods dramatically. Urban green also improves air quality, cleaning the air by replacing carbon dioxide with oxygen, and by filtering dust. A belt of trees and bushes 50–100 metres wide improves air quality up to 300 metres away.

As a city's population grows, the pressure on green areas increases. These open spaces are either paved, built upon, or regarded as a luxury, even though investments in urban green pay off through savings in health, energy and drainage. In 2008, São Paulo, Brazil, invested about \$180 million in urban green, saving an estimated \$980 million in costs.

Not only are cities hotter; they are also wetter than the surroundings, because smoke and other particles in the air causes more rain to fall. Extreme, unpredictable weather is becoming more common due to climate change. Heavy rain can result in flooding, traffic chaos and sewage overflows. In Berlin, this type of overflow occurs on average 35 times a year. Soils that can absorb the extra water are important to avoid such problems.

Parks and green spaces also provide essential, non-commercial, spiritual, and public health functions. Urban open space is a gathering space and thus a place of democracy.

Many small projects are often more successful than a few large ones. Some futuristic projects founder from the very start

Wealthier people have private gardens; public parks and playgrounds are especially important for marginalized groups such as the elderly, children, and the poor.

Urban design is a question of priorities. In the United States, single family homes, massive highway construction projects, and cheap gasoline were in effect subsidized over decades. This has resulted in car-centered urban sprawl and city centres with vast areas dedicated to parking. Houston, Texas, has 30 parking spaces per person. A reorganisation of the transportation system would reduce the need for parking, making possible a change from grey to green.

But not everything that is green is golden. Unmaintained green spaces are often dangerous and considered an eyesore. Lawns guzzle water and fertilizer. Green strips trapped between multi-lane roads cannot offer a haven for relaxation. Urban design providing for accessible green city spaces is a key to livable, pleasant and thus people-oriented cities. ●