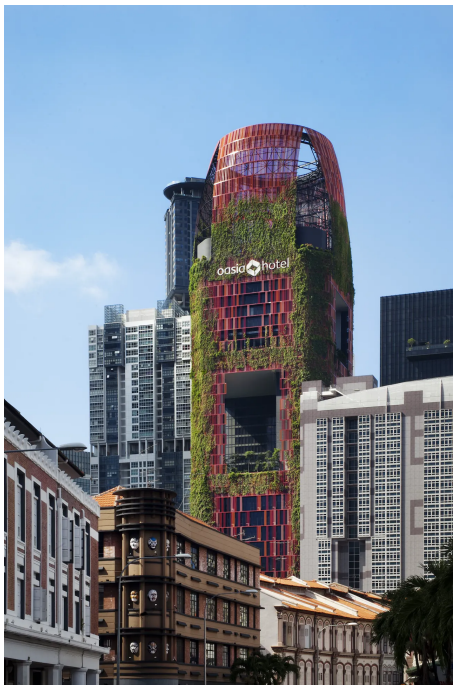
How can buildings act like rainforests?

The greenery performs many valuable ecosystem services, which refer to the benefits that humans derive from ecosystems, including provisioning services such as food, water, and raw materials, regulating services such as climate regulation and disease control, supporting services such as nutrient cycling and soil formation, and cultural services such as recreation and aesthetic enjoyment.

In the case of Oasia Hotel Downtown, an ecosystem service evaluation by biomimicry design firm bioSEA showed that despite being a compact development, the direct shading offered by the planted facade significantly reduced the amount of heat trapped within the development. In fact, the surface temperature of the building is more than 20 degrees Celsius cooler than other buildings in the district and due to the greenery provision being ten times that of its footprint, the building performed up to 68% as well as a pristine rainforest would, in terms of ecosystem service provision.

As cities become more dense, how can we also make them more sustainable?

> The greenery performs many valuable ecosystem services, including the provision of food and water; climate regulation; nutrient cycling; and recreation.



The surface temperature of Oasia Hotel Downtown is more than 20 degrees Celsius cooler than other buildings in the district and the greenery provision is ten times that of its footprint. Because of this, the building performed up to 68% as well as a rainforest would, in terms of ecosystem service provision.

Table 1 - Key ecosystem services of OASIA. The % performance reflects how the vegetation at OASIA performs in comparison with a pristine habitat (undisturbed tropical rainforest at Singapore's geography and climate) that is equivalent of OASIA's plot area (2,310 m2). The vegetation types include fringe plantings on the ground around the building, sky gardens and façade climbers.

Parameters reported as % performance

Pristine forest

OASIA

Air Filtration

100%

54%

Air Nitrogen Removal

100%

28%

Air Particulate Removal

100%

68%

Carbon Uptake

100%

25%

Evaporation

100%

38%

A working diagram of pristine forest vs. OASIA Hotel Downtown for the same plot area

Table 2 Ecosystem services' parameters explained

Inputs

Location & climate data

Latitude, temperature, humidity, precipitation (annual, expected in 24 hours for a 2-year and 25-year storm event), solar radiation, wind power class, incidental solar radiation

Vegetation types & site conditions

Vegetation type and height, density, percentage coverage of standing live/dead stems, trunks, aerial cover, soil type/composition etc. were estimated from landscape drawings and planting list

Outputs

Carbon stored

The amount/percentage of carbon sequestered by the vegetation directly contributing to combat climate change.

Air NOx Removal

The amount/percentage of airborne nitrogen-oxygen compounds sequestered through interaction with vegetation. NOx is an irritant which causes inflammation of airways in humans at high concentrations. Vehicles are the biggest emitters of NOx in cities.

Air PM Removal

The amount/percentage of airborne particulate matter in the PM10 range sequestered through interaction with vegetation. Fine particles in air can get deep into lungs and some into the bloodstream causing lung and heart problems.