Debating Tall

Do Trees Belong on Skyscrapers?

As skyscrapers adorned with greenery, both rendered and real, appear more frequently in design publications, the question must be asked, "Can substantial trees at height make a positive contribution to tall buildings?"

NO

Tim DeChant
PhD, Environmental Science, University of California, USA
Senior Digital Editor, NOVA, PBS-TV, USA
Contributor, Wired, Scientific American

Trees atop buildings have become an architectural crutch, a way to make a tower feel sustainable without necessarily being so. Worse, trees on skyscrapers are little more than a distraction from rampant development and deforestation. They’re trees for the rich, and for no one else. They’re the "soma" in architecture’s "brave new world" of "sustainable" development.

There are plenty of scientific reasons why skyscrapers shouldn’t have trees, at least not to the heights which many architects propose. It’s hot, cold, and windy, the rain lashes, and the snow and sleet pelts at high velocity. City trees already have it hard enough – mortality rates for Philadelphia street trees, for example, are 50% after 10 years.

Blame plant physiology. Wind interrupts the thin layer of air between a leaf and the atmosphere, known as the boundary layer, which controls evapotranspiration, or the loss of gas and water through the tiny pores on a leaf’s underside, known as stomata. If the boundary layer becomes too thin, leaves can quickly dry out.

Extreme heat exacerbates water loss, too. To cool off, plants often “sweat” by opening their stomata to release water vapor. But even that has a limit. At certain temperatures, a leaf’s photosynthetic machinery begins to break down, which could be a real problem on the sunny side of a skyscraper. Leaf temperatures can be many degrees hotter than the air, up to 14˚C in some species.

Then there are logistical concerns. How are these trees going to be watered and fertilized? Pruned? How will they be replaced, and how often? These expenses are on top of initial construction costs, which can be 5% higher, or US$4.25 million in the case of Bosco Verticale, for one vertical hectare of forest. If we use that money to resuscitate natural habitat, we could restore between 860 and 8,600 hectares, or between 860 to 8,600 times more forest.

Let’s focus on preserving and restoring places that already have, or desperately need, trees. I just can’t make a case for tree towers. Plant physiology tells me that the trees, if they do survive, will require constant and costly maintenance. Finance tells me that the money required to afforest a building would be more effectively used for restoration and preservation. And my gut tells me there are more equitable ways to give people trees, not just to those who can afford it.

Evidence-based design studies have indicated that placing landscaping in buildings engenders greater well-being in its occupants, and in nature, through biophilia.

Planting absorbs carbon dioxide, creating healthier micro-climates. Research has shown that certain species absorb VOCs (Volatile Organic Compounds), thereby engendering greater IAQ (Indoor Air Quality). Planting in built forms also reduces the heat island effect of a locality.

There is of course much more to this enterprise than just the facile planting of trees in the building. We also need to create habitats that attract the desired fauna, whether for refuge, breeding, or feeding. In some cases, roof gardens with appropriate plantings have resulted in the return of butterfly species that had been previously thought to be extinct.

When we do place trees on high buildings, we need to make sure that the higher wind speeds occurring at the upper levels do not rip out the planting during heavy wind storms. We need to have “wind breakers” like those we find at the edge of runways at airports, which break down heavy winds into small eddies.

YES

Dr. Ken Yeang
Principal, Hamzah & Yeang (Malaysia);
Principal, Llewelyn Davies Ken Yeang (UK);
Principal, North Hamzah Yeang (China)

The answer is a “yes.”

The benefits are as follows.

Placing vegetation on skyscrapers enhances the biodiversity and ecological resilience of the location. However, we should select hardy, native species, not alien species which may be invasive. In temperate and cold climates, the species selected must be able to survive over the two extreme seasons and over the two pleasant mid-seasons (spring and autumn).

There is much more to this enterprise than just the facile planting of trees in the building. We also need to create habitats that attract the desired fauna, whether for refuge, breeding, or feeding. In some cases, roof gardens with appropriate plantings have resulted in the return of butterfly species that had been previously thought to be extinct.

When we do place trees on high buildings, we need to make sure that the higher wind speeds occurring at the upper levels do not rip out the planting during heavy wind storms. We need to have “wind breakers” like those we find at the edge of runways at airports, which break down heavy winds into small eddies.

Evidence-based design studies have indicated that placing landscaping in buildings engenders greater well-being in its occupants, and in nature, through biophilia.

Planting absorbs carbon dioxide, creating healthier micro-climates. Research has shown that certain species absorb VOCs (Volatile Organic Compounds), thereby engendering greater IAQ (Indoor Air Quality). Planting in built forms also reduces the heat island effect of a locality.

There is of course much more to this enterprise than just the facile planting of trees in the building. We also need to create habitats that attract the desired fauna, whether for refuge, breeding, or feeding. In some cases, roof gardens with appropriate plantings have resulted in the return of butterfly species that had been previously thought to be extinct.

When we do place trees on high buildings, we need to make sure that the higher wind speeds occurring at the upper levels do not rip out the planting during heavy wind storms. We need to have “wind breakers” like those we find at the edge of runways at airports, which break down heavy winds into small eddies.

Evidence-based design studies have indicated that placing landscaping in buildings engenders greater well-being in its occupants, and in nature, through biophilia.

Planting absorbs carbon dioxide, creating healthier micro-climates. Research has shown that certain species absorb VOCs (Volatile Organic Compounds), thereby engendering greater IAQ (Indoor Air Quality). Planting in built forms also reduces the heat island effect of a locality.

There is of course much more to this enterprise than just the facile planting of trees in the building. We also need to create habitats that attract the desired fauna, whether for refuge, breeding, or feeding. In some cases, roof gardens with appropriate plantings have resulted in the return of butterfly species that had been previously thought to be extinct.

When we do place trees on high buildings, we need to make sure that the higher wind speeds occurring at the upper levels do not rip out the planting during heavy wind storms. We need to have “wind breakers” like those we find at the edge of runways at airports, which break down heavy winds into small eddies.