

# How Nature-Based Solutions Can Improve Indoor Air Quality

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Apr 07, 2025, 07:01am EDT

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The Building Biospheres project investigates how the natural intelligence of plants can be used to ... [More](#)  
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When people talk about indoor air quality, invariably the discussion soon turns to traditional heating ventilation systems and activated carbon filters.

However, more and more nature-based systems are now being developed which offer a greener and healthier alternative.

[Green walls](#) and moss-based filters are already on the market, but another possible interesting solution will be launched next month (May) at the Belgian pavilion at the Venice Biennale in Italy.

The [Building Biospheres project](#) aims to harness the natural intelligence of plants to actively manage the pavilion's indoor climate.

The installation consists of more than 200 plants and occupies the pavilion's central area beneath the skylight.

The Belgian pavilion has been initiated by the Flemish government and commissioned by the Flanders Architecture Institute, presented by curator and landscape architect Bas Smets in collaboration with neurobiologist Stefano Mancuso.

Smets said he has been discussing with Mancuso how to use the natural intelligence of plants to manage an indoor climate for the last 10 years in an interview.

Smets said if you can understand what specific plants need to thrive in those environments to clean and regulate the temperature of the air, then they can become an “active agent” to create an indoor climate. In a natural way these plants can help to create the artificial climates found in most of today’s buildings.

“What we are proposing is not just to bring plants into a building, but to rethink the purpose of architecture,” he told me.

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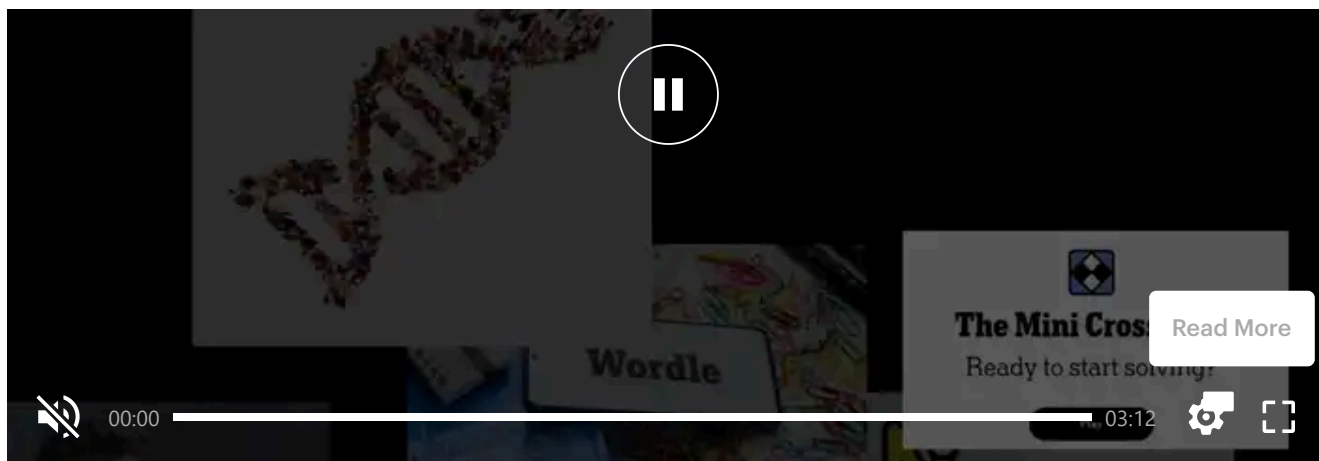
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“In the beginning, architecture was about survival, sheltering us from the rain, wind and sun. And now again in this climate crisis, architecture should be about survival, but not just about the survival of us humans, but also of plants. We need to create a new symbiosis between us, the plants and the architecture.”

Smets said Building Biospheres will be in place for six months in Venice and they have chosen trees from the sub-tropical regions, Asia, Africa and America for their biosphere as they are particularly sturdy and suitable for an indoor environment, while offering the ideal climate for humans.

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Mancuso said sap flow sensors and dendrometers are used to monitor the health of the trees and plants. These have been installed in collaboration with the University of Ghent.

The harvested data is used to activate irrigation, lighting and ventilation to create a self-regulating microclimate.

In the run up to the Venice Biennale, a greenhouse at Ghent University hosted a prototype of the installation for the pavilion made with the same trees.

“The idea is to give the plants the ability to adjust all the parameters of ventilation, lighting and irrigation according to their need, and so far, it seems to be working,” Mancuso told me.

Smets added when people think of indoor plants, they still have a “19<sup>th</sup> century” idea of their role.

“We put a beautiful plant in a corner, give it a bit of water, and we see it as a decoration, not as an active agent of air quality,” said Smets.

“It’s almost an inversion of the Victorian greenhouses, where they built a warmer environment to import plants from tropical climates. Now, we are using those plants indoors to make spaces cooler in a warming outside climate.”

Another nature-based air quality solution is being developed by the Swedish startup Adsorbi, which in January announced it had raised €1M to build pilot plant for its air purification material made from Nordic wood.

The material itself is derived from Nordic tree cellulose and designed for targeted pollutant capture, including key nitrogen oxides like nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>).

According to Adsorbi, the material can be used in air filters, products that remove bad odours, and museums to protect works of art.

Adsorbi chief executive Hanna Johansson said it is ready to offer a commercial solution which does not require the use of fossil-based materials in a statement.

And Ingeborg Mägi, head of impact forestry at carbon removal developer Arbonics said afforestation and improved forest management also brings many co-benefits, including better air quality in an email.

Mägi added trees naturally filter pollutants and particulate matter from the air and protecting mature forests helps preserve these natural air cleaners.

"In addition to this, some of our afforestation sites are located near roads and towns with higher concentrations of air pollution, where the benefits are most immediate and impactful," she added.

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