

Bali goes green with bamboo buildings

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People visit a building made of bamboo at a school at a village in Sibang, Badung regency on Bali island. Bamboo is so strong and versatile that the Indonesian island of Bali has made it an emblem of sustainable construction, replacing buildings of concrete and steel with far greener alternatives.

Strong, light and cheaper than steel poles, bamboo is ubiquitous across Asia as scaffolding.

So much so that in recognition of the material's versatility, the [Indonesian island](#) of Bali has made it an emblem of sustainable

construction, replacing buildings of concrete and steel with far greener alternatives.

An entire school, luxury villas and even a chocolate factory are the latest structures to rise from [bamboo](#) skeletons as the plant's green credentials and strength are hailed.

The factory, which opened last year and produces organic drinking chocolate and cocoa butter, is the latest in a string of buildings on the island, including homes and businesses, to be built of bamboo.

Erected in the village of Sibang Kaja between the resort island's smoggy capital Denpasar and the forests of Ubud, the factory is the initiative of specialty food firm Big Tree Farms, which claims the 2,550-square-metre (27,500-square-foot) facility is the biggest commercial bamboo building in the world.

"Bamboo is unmatched as a [sustainable building](#) material. What it can do is remarkable," Big Tree Farms co-founder Ben Ripple, 37, told AFP.

"It grows far more quickly than timber and doesn't destroy the land it's grown on," said Ripple, an American from Connecticut. "Our factory can be packed up and moved in days, so if we decided to shut it down one day, we're not going to damage the [rice paddies](#) we sit on."

The 100 hectares (247 acres) of paddies sit inside a so-called "bamboo triangle," with the factory, school and villas standing at each of the three points.



School children stand in front of a building made of bamboo at a school at a village in Sibang, Badung regency on Bali island. The school, which opened in 2008 and was the magnet for other two projects, has 25 bamboo buildings, the main one being a stilt-structure constructed with 2,500 bamboo poles, or culms.

Such ambitious bamboo projects in Bali are mostly driven by eco-conscious foreigners.

With studies showing construction to be one of the world's least sustainable industries -- eating up around half of the globe's non-renewable resources -- sustainable construction is slowly taking root around the world.

It is among the key topics for discussion at the Rio+20 United Nations Conference on Sustainable Development, which opens June 20 in Rio de Janeiro.

In Sibang, the tawny brown bamboo buildings with their grass thatched roofs appear to be rising from the earth.

The three-storey chocolate factory is pieced together using a complex system of scissor trusses and bolts, thanks to clever architecture.

It resembles the traditional longhouses found on Borneo island and was made with more than 18,000 metres (59,000 feet) of bamboo from Bali and Java.

At Sibang's nearby Green School, the 240 students -- most of them children of expatriates -- learn in semi-outdoor classrooms decked with bamboo furniture.



The bamboo interior of a school at a village in Sibang, Badung regency on Bali island. With studies showing construction to be one of the world's least sustainable industries -- eating up around half of the globe's non-renewable resources -- sustainable construction is slowly taking root around the world.

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"In Hong Kong and China, they make new skyscrapers of concrete and glass using bamboo scaffolding. But here, the workmen stood on steel scaffolding to build this bamboo building. That's always seemed funny to me," said Green School admissions head Ben Macrory, from New York.

"In most parts of Asia, bamboo is seen as the poor man's timber."

Not, however, in Sibang, where the bamboo villas that nestle between the palm trees are worth \$350,000 to \$700,000 each.

Like decadent treehouses for adults, they have semi-outdoor areas and include innovative bamboo flooring that resembles smooth timber and jellybean-shaped coffee tables made from thin bamboo slats.

Bamboo -- technically a grass -- has been used in building for centuries because of its impressive strength-to-weight ratio.

Jules Janssen, an authority on bamboo in the Netherlands, says that the weight of a 5,000-kilogram (11,000-pound) elephant can be supported by a short bamboo stub with a surface area of just 10 square centimetres (1.5 square inches).

One reason bamboo is so environmentally-friendly is the speed at which it grows, according to Terry Sunderland, a scientist at the Centre for International Forestry Research in Indonesia.



Visitors walk on a bamboo bridge at a green school at a village in Sibang, Badung regency on Bali island. An entire school, luxury villas and even a chocolate factory are the latest structures to rise from bamboo skeletons as the plant's green credentials and strength are hailed.

"In China, eucalyptus can grow at three to four metres (10-13 feet) a year, which is very impressive for timber. But building-quality bamboo

will grow between six and 10 metres (20-33 feet) in that time," he said.

And unlike trees that rarely grow back once felled, bamboo will continue to produce new shoots even after cutting.

But even bamboo has its drawbacks.

Without intensive treatment, it is prone to rotting after exposure to water. It also catches fire relatively easily, which is why many countries limit bamboo structures to just a few storeys.

Ripple acknowledged that building with bamboo was not foolproof, but expressed optimism that the technology to protect it from the elements will improve.

"A friend we work with here always says bamboo needs a hat, rain jacket and boots," he said. "We're lacking on the rain jacket a bit, but we're looking at non-toxic materials to give it some protection."

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