BAMBOO

by Owen Elfine

The construction sector is responsible for high global resource and energy consumption, as well as waste and emmision production → Building solutions have to become more sustainable

Concrete and steel are obviously not affordable for low-income groups

Timber : sustainable growth mechanisms is still being developed. Depletion of stocks occurs.

In tropical regions, the application of round bamboo as load bearing members for housing can be an affordable local alternative to timber, concrete, and steel.

Bamboo is a rapidly renewable raw material, which can be found between 50° North and 47° South latitude around the world.

Matureness of bamboo for structural application reached in only 3 to 5 years

Sustainable supply chains without depletion of existing stocks are good.

Type of bamboo

Bamboo is a grass plant like rice and corn. Despite being in the same plant group, bamboo is a bit different to those, as the part of its tissues after some years become a structure that is as hard as wood, but more flexible and lighter than woods.

Bamboos, in their wild form, grow on all the continents except Europe.

The majority of species are found in warm zones with humidity levels over 80%, in tropical cloud forests, and in clayey and humid soils.

There are tropical and subtropical bamboos that thrive in different ecological situations.
A few grow in dry climates too, for example in China and Japan there are species that can survive in temperatures below zero degree.

Approximately 1200 species exist, of which there are 750 in Asia and 450 in America and Latin.

Positive Environmental Effects

Biomass Production

Bamboo is a rapid-growth natural resource.

Reduction of Soil Erosion

Bamboo has dense network of roots that anchors earth and helps to lessen erosion due to rain and flooding.

Temperature reduction

Thanks to their leaves, bamboo forests reduce air temperature through water evaporation.

Absorption of CO^2

Plants absorb CO^2 for photosynthesis, make it an important contribution to the global climate.
Because its rapid growth, bamboo can take in more CO^2 than a tree.
Though this is only valid if the bamboo plant is transformed into products with lifelong spans, but
Being a plant that self-regenerates, it could be understood that bamboo forests has a permanent CO^2 absorption.
Bamboo forest is planted only once and with good management converts into a permanent plantation.

Primary Energy

According to Janssen (1981), the production of bamboo uses 300 MJ/m^3 compared with 600 MJ/m^3 for wood.

Different uses

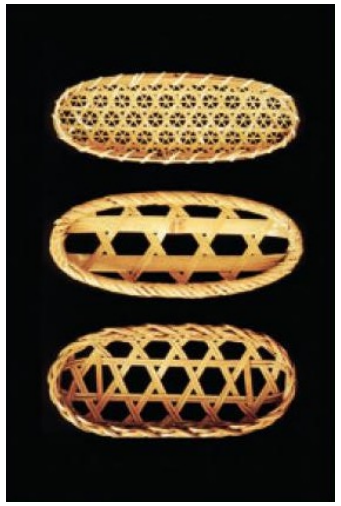
Bamboo is a construction material with many applications.
It has great flexibility, rapid growth, low weight, and low cost.
It is estimated that one billion people live in houses constructed from bamboo,
for example, in Bangladesh over 70%, in Ecuador, south America, 50% of the population uses it in construction.

In humid tropical zones, bamboo is used in construction since it is a local, cheap and easily handled material,
furthermore in these areas it allows walls with low thermic mass.
[Low density, lightweight materials that require little heat to increase in temperature but lose heat rapidly]

The ideal uses of bamboos depends on their age.
In their first days, bamboo hearts are used as human food
Between 6-12 months, strips extracted from the cane are ideal for making fabrics
At 2 years the canes are better for making plank boards
Normally between 3-5years the stalks are ideal for use in construction.




Recently bamboo is used for crafts, everyday objects, musical instruments, and furniture.



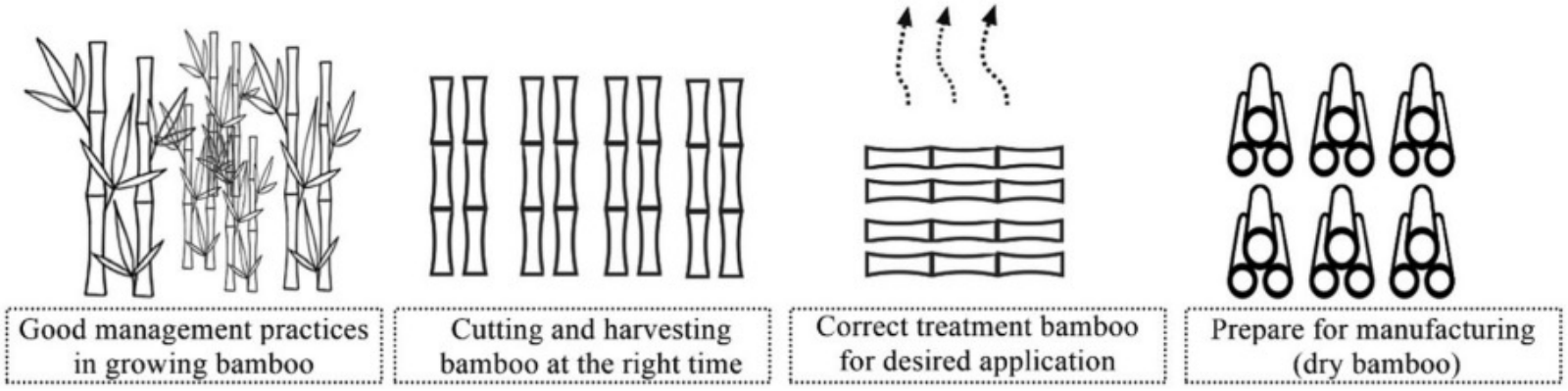
Most traditional houses in the rural zones of warm humid climates where bamboo grows, are constructed this material.

Indonesia

India

The Plant

The colour of bamboo canes is generally green, after becoming woody they change colour to between yellow and brown.



Cutting, Drying, Treatment and Storage

Bamboo contains a large quantity of starch, which attracts insects. Also, the presence of humidity can cause the appearance of fungus and lichens.
To guarantee durability in bamboo construction elements, it is important to take into account the good procedures for cutting, drying and treatment.

Cutting : it is advisable to make the cut during the dry season when the stems have minimum humidity. And the optimum age at which to cut for structural use is between 3-5years.

Drying : the simplest method to dry the bamboo is to arrange them in a form similar to a tripod, exposing them to the sun and wind.

Treatment : cleaning the surface. An effective, inexpensive and healthy option is to use a hydro wash with a stream of high-pressure water.

Storing : in order to store (preservation) bamboo poles, it has to be immunized with liquid that functions as insecticide and fungicide.

Since ancient time, bamboo has been a construction material used to build basic habitats to complex structures.

Until now, there are more architecture by woods than bamboo.
It may be one of the factor why architecture industry is one of the reason of global warming.
Deforestation for construction materials makes forest decreasing rapidly throughout the world.
It takes minimal of 30 years for a reforestation, and some type of wooden tree even need hundreds.

In contrary of that, bamboo regrowth take only about 6 years.
Even though bamboo was also used a lot in the world where it is available, wood is a more widely used and standardized material than bamboo.

Bamboo as Roofing Material in Indonesia

PENGLIPURAN VILLAGE, BALI



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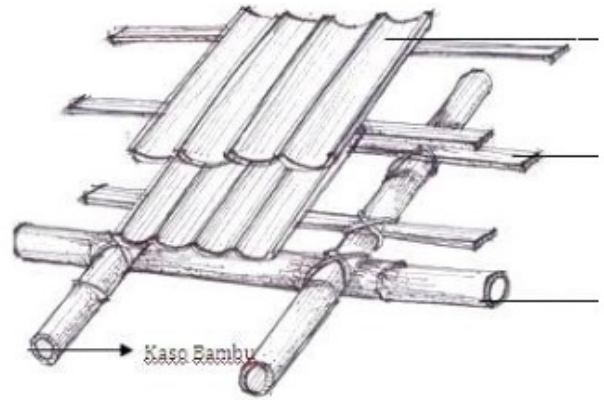

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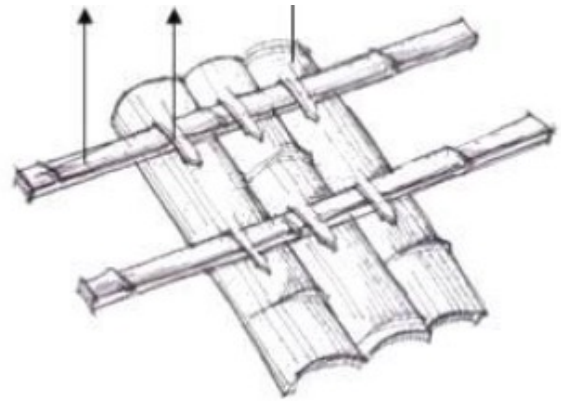

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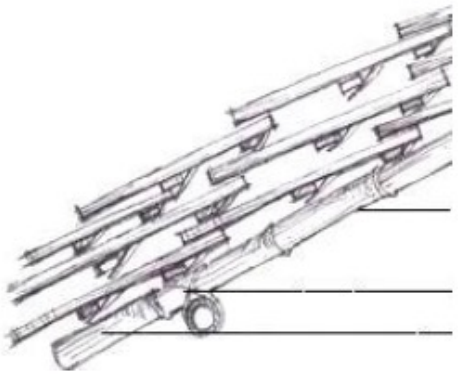
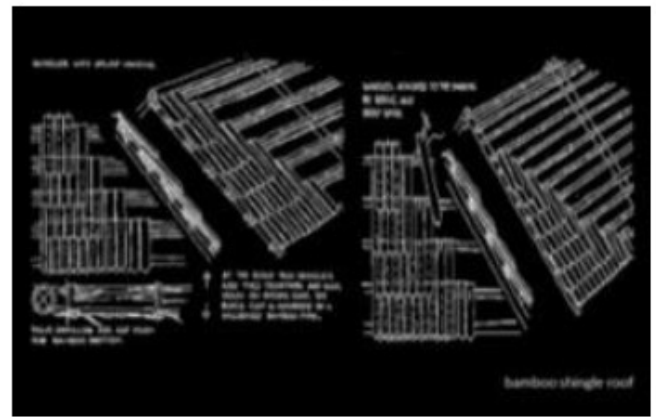
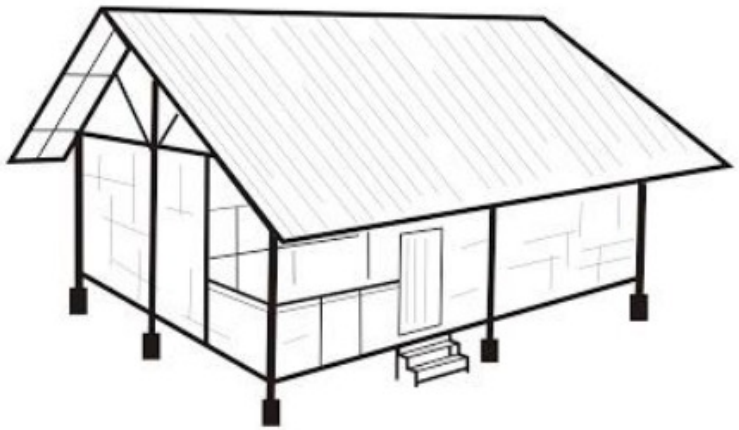
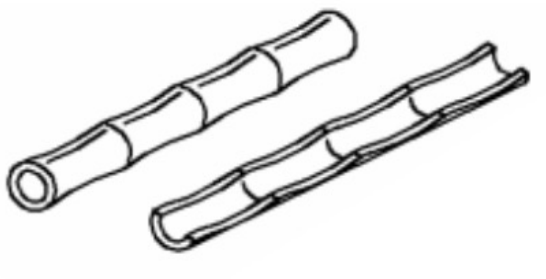




CIKONDANG, WEST JAVA

Bamboo roof is what differ this traditional house with other in the same region.





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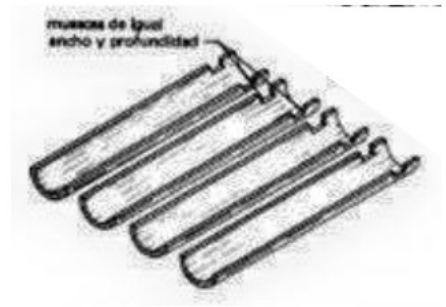

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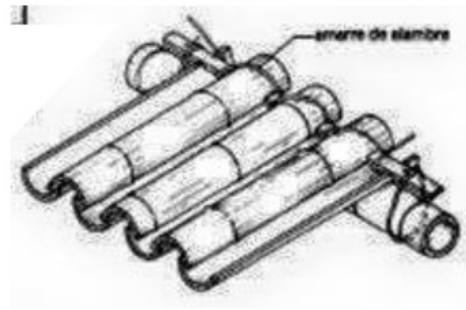

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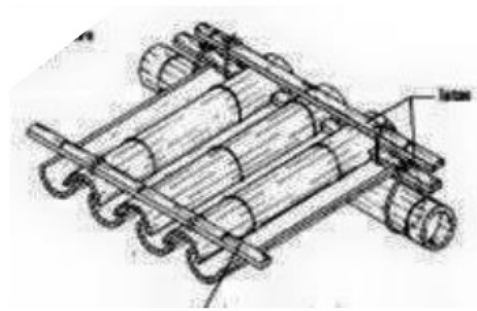

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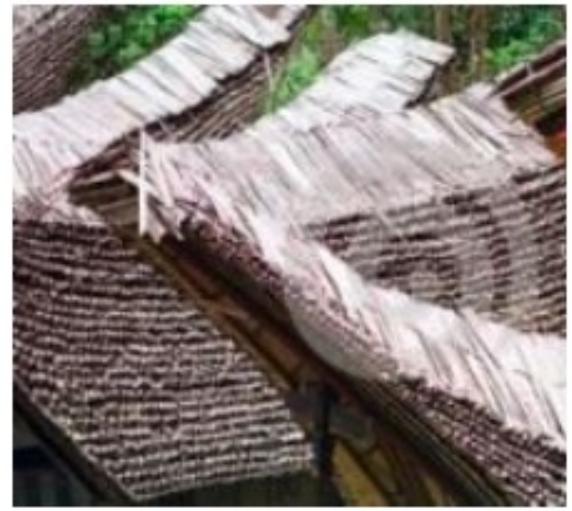
TONGKONAN, TORAJA, SOUTH SULAWESI

The curved shape of the roof which resembles a boat along with the use of vernacular materials such as bamboo makes this house stand out as a national emblem of Indonesia.





Thank you