Bamboo Flooring

Environmental Silver Bullet or Faux Savior?

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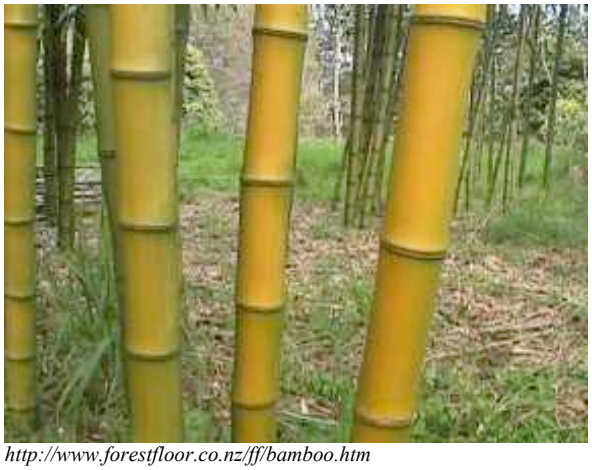
Introduction



http://www.forestfloor.co.nz/ff/bamboo.htm

Bamboo flooring has become something of a phenomenon among U.S. homeowners in recent years, a development that is widely touted as good for the environment. Based largely on the high growth rate of the bamboo plant, bamboo is today promoted as a "green" building material. A website dedicated to green resources notes that oak takes 120 years to grow to maturity and that bamboo can be harvested in 3 to 7 year cycles, commenting that because bamboo is a rapidly renewable resource it "has environmental advantages over finite raw materials and long-cycle renewable resource extraction." This theme also appears in the website of the California Integrated Waste Management Board in a section focused on sustainable building. The reputation of bamboo as an environmentally preferable option to wood appears to have its roots in a November 1997 article in the well-respected newsletter *Environmental Building News*. Included in that article is the statement: "Environmentally, it's hard to argue with a wood substitute that matures in three years, regenerates without need for replanting, and requires minimal fertilization or pesticides." Today, bamboo flooring is recognized as a green building material by the U.S. Green Building Council's LEED program, with the result that builders can receive credit toward green building certification for incorporating bamboo into a structure.

In an era in which the environmental attributes of materials are increasingly questioned, and production details increasingly available, it is remarkable that a product such as bamboo flooring has been so firmly embraced by the green movement without vigorous attempts to determine what impacts result from its production and use. Investigation reveals many environmental concerns associated with growing, harvesting, and converting bamboo to useful products. Clearly, the green status currently accorded bamboo products needs serious re-evaluation.

Bamboo – the "Poor Man's Timber"

Distribution

Bamboo is a rapid growing tree-like grass that occurs naturally in many regions of the world. Over 1,200 species of bamboo are known to exist worldwide, with an estimated 54 million acres (22 million hectares) distributed throughout the forests of Asia, Africa,

and South and Central America. Some 80 percent of world bamboo stocks occur within China, India, and Myanmar. China is said to have 17.8 million acres (7.2 million ha.) of bamboo, including 10 million acres (4 million ha.) of plantations and 7.5 million acres (3 million ha.) of natural stands of sparsely distributed bamboo scattered through mixed forests. Bamboo also occurs on over 26 million acres of the subcontinent of India, mostly within natural forests. In Vietnam, where vast areas of tropical forests were killed through use of defoliating chemicals during the war years, the population turned to bamboo as a means of reforesting the landscape and stabilizing erosion-susceptible slopes. Today, bamboo covers much of the countryside of Vietnam. Whereas only one species of bamboo grows naturally within the continental United States, some 300 species of temperate climate bamboos are reportedly growing throughout Europe.

A Long History of Use

Reflecting the utility and wide availability of the plant, bamboo has other names in regions where it is common. In India, bamboo is known as the "wood of the poor," in China "friend of the people", and in Vietnam as simply "brother" (Anon, 2000). Long time bamboo researcher and author Oscar Hidalgo refers to bamboo as a "gift of the gods," using that term in a title of a recent book. Historically, bamboo has been used for construction of houses and other structures, in making vehicles and boats, as a fuel, and as a principal raw material in the manufacture of over 1,500 products, including furniture, utensils, musical instruments, handicrafts, and paper. Bamboo shoots have also long been an important source of food. Such uses continue today. The Bamboo Thematic Network (BTN) reports that hundreds of millions of people live today in bamboo houses. This figure grows to more than one billion when dwellings are counted that have bamboo as the key structural element, cladding material, or roofing element.

Bamboo Forest
http://www.sustainableflooring.com

Fast Growth, Rapid Renewal

Bamboo reproduces by sending out shoots from rhizomes – below ground stems that send out roots from the lower side and shoots and leaves from the upper side. It is reportedly adaptable to a wide range of soils, from organically poor to mineral rich and from wet to dry, making these plants quite useful for rehabilitation of degraded sites. A number of species typically grow in clumps, whereas others tend to send up more widely spaced shoots.

Bamboo propagates mainly through the sprouting of new stems from rhizomes. Plantations are established by gathering young stems with attached rhizomes and

replanting in desired locations. Once the young plants are established, they grow to full height within one year, but require 4 to 7 years (and in some cases 10 years) to reach the size and quality required for use as construction material or as a raw material for production of products such as flooring. After harvest of from 30 to 50 percent of mature culms, new shoots emerge within the following year.

Bamboo is remarkable not only for its adaptability to a variety of sites, but also for its rapid growth rate. Culm production (dry weight) has been reported to range from 2 to 14 metric tons/hectare/year (0.9 to 6.2 short tons per acre per year), with production on some sites as high as 37 mt/ha/yr. Long-term average values across the countries of China and Japan are in the 2 to 3.5 mt/ha/yr range. In China's Hunan province, reportedly the source of most bamboo flooring sold in the U.S., average bamboo culm yields of 5-8 mt/ha/yr are reported. In comparison, documented production of wood by the most commonly planted eucalyptus species ranges from 7.9 to 35 mt/ha/yr (dry weight).

Height growth of bamboo is as rapid as one foot per day to a height of as much as 130 feet, in as short a period as four months. In one documented instance in Japan, 1.2 meters (3.9 feet) of height growth was recorded in a single 24-hour period!

A Source of Income for Many

The world market for bamboo is large and growing. Recent estimates place the global market for bamboo at about $12 billion; market growth to $20 billion or more is foreseen by the year 2015. Figures for China's bamboo sector in 1999 showed market value almost evenly divided between bamboo shoots (for use as food), and culms and the products made from them.

A Bamboo Future
By Carol Steinfeld

Super-strong and durable, bamboo is being used for flooring, paneling, furniture, fencing, engineered lumber and even structural elements

The super-material of the future may in fact be the largest variety of grass — bamboo — a traditional construction element in the Pacific that's been used almost solely for decor in the United States.

Now, bamboo is making its way into American homes as flooring, paneling, stair treads, moulding, furniture, fencing, laminates, particle board, oriented strand board, engineered lumber and even structural elements.

http://www.edcmag.com/CDA/ArticleInformation/features/BNP__Features__Item/0,4120,19442,00.html

BTN estimates that local and international markets for bamboo generate income for over 600 million people worldwide. In several of China's provinces, including Zhejiang (directly south of Shanghai) and Hunan (300-400 miles northwest of Hong Kong), where much of the bamboo flooring in world markets is produced, development of bamboo plantations and associated industries is the basis for economic renewal, providing jobs and supplemental income for millions. In 1999 an estimated 5.6 million people worked full or part-time in China's bamboo sector, of whom 4.5 million were farmers. About 1.1 million were employed in the bamboo processing industry. In India, where commercial development of bamboo resources is less advanced than in China, most bamboo is harvested from natural forests. Here, initiatives are underway that are designed to mimic China's success in bamboo-based economic development, and the Indian government has

announced an aggressive program to create employment opportunities through an expanding bamboo industry. Several firms are already producing bamboo flooring for the export market.

Environmental Issues Associated with Bamboo Production and Harvest

Some environmental aspects of bamboo production are clearly positive. Wide distribution, rapid growth and renewability, a source of useful products and income for millions of traditionally low income people – all of these factors point to the environmentally and socially desirable material described in promotional materials for bamboo products. These factors also appear to apply to the primary producing regions for bamboo flooring. But is this the whole story? Unfortunately: no.

A host of environmental problems associated with bamboo harvest and plantation establishment are readily apparent when examining the scientific literature. For instance, a recent assessment of bamboo production in China that involved scientists from the Center for International Forestry Research (CIFOR), the Chinese Academy of Forestry, and the University of Madrid (Ruiz-Pérez et al. 2001) included the following observations:

- "Recently, bamboo expansion has come at the expense of natural forests, shrubs, and low-yield mixed plantations . . . It is common practice to cut down existing trees and replace them with bamboo."

- "As forestlands tend to be in hilly and mountainous areas with steep slopes, clear-cutting has resulted in an increase in erosion until the bamboo becomes fully established . . ."

- "Natural forests in the vicinity of bamboo plantations have sometimes given way to bamboo as a result of deliberate efforts to replace them or because of the vigorous natural expansion of bamboo in logged over forests. This process has also had a negative impact on biodiversity."

- "The intensive management practices employed involve manual or chemical weeding and periodic tilling of the land to keep the soil clear of undergrowth. These practices increase erosion and result in single-species plantations over large areas."

- "The intensive use of chemicals (pesticides, weed killers and fertilizers) [associated with growing bamboo] also affects the environment . . ."

Statements of a number of other researchers from the mid-1990s to the present underscore these observations.

From Dr. J.T. Williams, Science Advisor to the International Network for Bamboo and Rattan:

- "Although ecosystems modification or ecosystem conversion has over time resulted in short-term economic gains, these gains have often been obtained at the risk of long-lasting damage."

- "bamboo resources are harvested in a non-sustainable manner."

From Dr. R.L. Banik, Bangladesh Forest Research Institute and Co-Chair, INBAR Working Group on Biodiversity:

- "In the past, bamboo was a perpetual resource because of its vigorous vegetative regeneration. But at present, over-exploitation associated with growing human populations, destruction of tropical forests, and new demands for industrial uses (especially by the pulp and paper industry) have resulted in wide-scale reduction of bamboo stocks."

From Dr. R. Rao, Principal Scientist at INBAR:

- " . . . serious constraints exist in the supply of bamboo and rattan. This is true in most countries where bamboo and/or rattan have been traditionally utilized. Since production is largely from natural forests, demand has outstripped the annual incremental production capacity of the forests."

From Dr. F. Maoyi, Chinese Academy of Forestry:

- "Many of the natural stands of bamboo in China are no longer truly natural regenerates since management has caused ecosystem conversion toward plantations."

From M. Monyrak, Department of Nature Conservation and Protection, Cambodia:

- "Since commercially valuable bamboo resources are threatened by over exploitation, their availability in the natural forest is being reduced."

Unique and endangered species

A study, produced by INBAR (International Network for Bamboo and Rattan) and UNEP-WCMC (United Nations Environment Programme World Conservation Monitoring Centre), identifies unique and endangered species, whose fates are intimately linked with those of bamboos, in every region where bamboos occur.

In Asia these include the red panda and Himalayan black bear, and perhaps best known, the giant panda.

In Africa, mountain gorillas depend on bamboos for up to 90% of their diet in some seasons. The survival in the wild of the mountain bongo depends on conservation of the bamboo thickets to which it migrates during the dry season.

In Madagascar, the critically endangered greater and golden bamboo lemurs depend on bamboo for much of their diet, and the rarest tortoise in the world, the ploughshare tortoise, is also intimately connected with bamboos.

In South America, the spectacled bear, the mountain tapir and many endangered bird species are connected with bamboo in the Andes, Amazon and Atlantic forests.

http://www.naturalworldtours.co.uk/articles2004/may/may2804l.htm

It is interesting to note that promotional statements made about the production and harvesting of bamboo by commercial interests as well as by several environmental organizations are at wide variance with observations of research scientists working with bamboo. For instance, statements that bamboo regenerates without the need for replanting are true, but ignore the reality that forests are being cleared to make way for bamboo plantations and that such plantations are often composed of only one or two species. Similarly, claims that bamboo requires minimal fertilization or pesticides, though true, overlook the fact that substantial use of both fertilizers and pesticides occurs in practice in order to obtain the kinds of yields often cited in promotional literature.

Bamboo Flooring
http://www.avalanchefloorcoverings.com

In view of the fact that environmental concerns associated with bamboo production are remarkably similar to those associated with growing and harvesting wood, it is a curiosity that proponents of bamboo are not pursuing certification of bamboo, including development of criteria and indicators for sustainable harvesting and chain of custody monitoring. It is especially curious that the U.S. Green Building Council, which requires that wood be FSC Certified in order to garner points as a green building material, has no similar requirement for bamboo.

The Bottom Line

Bamboo has many positive attributes, including a rapid growth rate. However, much of the current production of bamboo clearly does not fit common definitions of an environmentally responsible material. This means that "green" bamboo flooring may be, in reality, anything but green. It is certainly *not* an environmental "silver bullet." For programs such as LEED to maintain credibility and achieve their goal of environmental leadership, more rigor is needed in identifying green building products. Bamboo flooring provides an excellent case in point, and bamboo should be subjected to the same level of scrutiny as wood.

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