DESIGNING WITH WOOD IN ASIA

by **Michael Buckley FIWSc**

Image courtesy of The Wood Awards 1

Designing with wood has been an Asian tradition since time began. From Japan to Jakarta; and from ancient temples of religion to modern temples of high living, wood features as a material of choice. After a rocky passage through the second half of the 20th century, wood has seen a revival in architecture and consumer taste. The question now is whether architects and designers can trust wood to perform in today's projects as a modern, sustainable material?

Michael Buckley is the former European Director of the American Hardwood Export Council with whom he still consults. He is an acknowledged expert on the uses and market applications of hardwoods and has a Masters in US and EU hardwoods. He is a Fellow of the Institute of Wood Science and a Liveryman of the Worshipful Company of Carpenters, an ancient craft guild in the City of London. In recent years he has taken a keen interest in designing with timber, working with leading furniture designers and many architects. He also gives many presentations around the world and publishes articles on international wood issues. Currently, Buckley is Director of Turnstone Singapore Pte Ltd, a public relations agency based in Singapore that specialises in the wood sector and seeks publicity opportunities for wood industry clients.

Japanese and Americans rank among the greatest consumers of wood per capita, but they come at it from different directions. Long-term Japanese craft and desire for light-weight quake-resistant construction contributed a lot with its early use. A total understanding of wood and how to use it led to an almost unparalleled appreciation of the aesthetics of wood in Japan. In North America, it was the sheer availability of vast volumes of both softwood and hardwood which allowed the European settlers to use wood in every conceivable way, for agriculture and then the industrial revolution; and until today almost all low-rise residential construction there is based on timber frames.

Several decades after WWII saw innovation and development in new materials, especially concrete technology, steel specifications and glass options. These were widely adopted throughout Asia and coincided with increasing global concerns about the destruction of local tropical forests. Furthermore wood was not new in this exciting world of modern architecture and suffered accordingly, at least in Asia. But in recent years many of the world's architects have increasingly come to accept the strong environmental credentials of this material and many leading practices have confirmed wood as a modern material for modern architecture when sourced from well managed, sustainable forests.

SUSTAINABILITY OF FORESTS

There are numerous definitions of sustainability, since Brundtland in 1987, "Meeting the needs of the present generation without compromising the ability of future generations to meet their needs." The definition for forests is complex and is well summed up by the criteria of several certifications schemes, including the Forest Stewardship Council (FSC).

The *FSC Principles and Criteria* describe how the forests have to be managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations. They include managerial aspects as well as environmental and social requirements. These 10 principles and 56 criteria (www.fsc.org) form the basis for all FSC forest management standards.

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Based on these, the FSC has developed further rules, called policies or standards, which further define and explain certain requirements stipulated in the 10 principles. Other schemes, such as the Programme for the Endorsement of Forest Certification schemes (PEFC; www.pefc.org) and the Sustainable Forestry Initiative (SFI; www.sfiprogram.org) also take into account the practicalities of local forest industries and seem to include more of the stakeholders. The Malaysian Timber Certification Scheme (MTCS; www.mtcc.com.my) has become the first tropical timber certification scheme in the Asia-Pacific region, and the second in the world after the Gabonese Forest Certification Scheme, to be endorsed by PEFC. Governments around the world are increasingly embracing these schemes as indicators of sustainable forestry, but are also moving more towards the process of due diligence required by users, especially where imports are concerned.

Architects seeking guidance on the availability of certified wood, required to meet the criteria of environmental rating schemes for construction, can turn to timber distributors and importers with confidence these days. There are few now that are not versed in the myriad of information on timber supplied legally and sustainably.

A key issue for many architects is that the wood specified should be sourced from a sustainable forest resource. Here the point has to be made that there are many sustainable resources available that may not necessarily be fully certified yet. In temperate softwoods there is ample product certified under FSC, PEFC and SFI. But in tropical and temperate hardwoods only a very small percentage of forest is certified, leaving specifiers to make judgements based on evidence provided by source countries. In Africa, Ghana has made great strides towards sustainability. In Malaysia, after years of effort, has now obtained acceptance of its own certification scheme by PEFC. In the USA, American hardwoods are hard to find certified, but the facts provided by the 2000 RPA[1] speak for themselves when examining the data of increasing growth against removals over more than 50 years (see Table 1). In addition U.S. hardwood industry has undergone an independent risk assessment on illegal logging by Seneca Creek Associates[2] (the result is available at www.sustainablehardwoods.info).

ADVANTAGES

Wood is a highly efficient insulator, and is much more easily transformed, joined and manipulated than many other materials. It is in fact one of the most diverse materials available to man—the only fully renewable building material we have and very easily recycled or reused as fuel. Wood is not a high polluter in its production or manufacture, nor a high user of energy in its processing as seen in Table 2, nor is it a high maintenance material if properly specified. In Asia one explanation by designers for the excessive use of marble in the past, in such projects as hotels, has been the issue of maintenance. For wood this is solved today with the modern surface treatments available. And when it comes to acoustics, there is no contest!

In some cases wood even outperforms its rivals. The glazed atrium roof, designed by Hopkins and Arup, at Portcullis House in London's Westminster uses laminated American white oak rather than steel because its weight to strength ratio allowed smaller sections thus admitting greater light into the four-sided enclosure. Wood is also used by many architects and designers as a humanising material in conjunction with other materials, as in the warm coloured American cherry at the Esplanade in Singapore.

As architect Antonio Eraso pointed out so well "Not many materials can match its versatility or warmth."

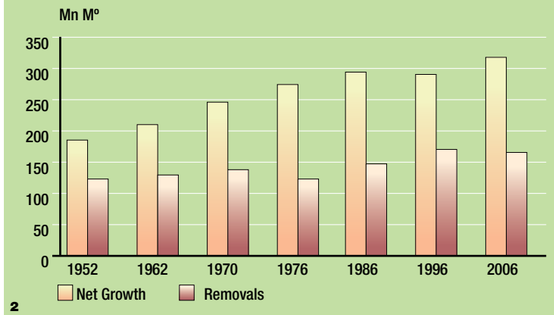
USING WOOD

The use of wood is not always an exact science, although there are adequate data on its performance, added to which working experience can also be important. Architects are often cautious about the use of wood and sometimes appear not sure about where to get reliable information, or seem perhaps to be under pressure from ENGOs to avoid wood altogether. The fallacy of that policy is now well known to result in the conversion of forests for other uses such as agriculture or monoculture plantations such as oil palm.

Singapore-based architect Aamer Taher contends that there is plenty of information available today in good technical books and via the internet. But experience gained working with good builders and attention by junior architects to seniors, perhaps with some improvements in training, is also essential. "The real key," Taher says, "is to specify correctly and get properly dried timber, in order to avoid movement and warping." His view, incidentally, is that there is too much fast cut, insufficiently dried timber shipped too soon to site.

Books are indeed an excellent resource, and their range is deep and wide. Personally I am never without my Lincoln *World Woods in Colour* (ISBN 0854420282). But for architects Ruth

1 Black Walnut joinery and flooring **2** Table 1: US Hardwood Growth & Removals **3** Table 2: The embodied energy of processed wood, whether air dried (AD) or kiln dried (KD), is half that of concrete and many times less than that of other key materials.



2

Material	Embodied energy, Mj/kg
AD sawn hardwood	0.5
KD sawn hardwood	2.0
Concrete	4.0
Mild steal	34.0
Plastics	90.0
Aluminium	170.0

3

In identifying and naming wood species correctly, especially in the architectural and design media, three important guides are provided—Provenance, Price indication and Performance.

Slavid, a former editor at *The Architects' Journal*, has published in 2005 *Wood Architecture* (ISBN 9781856694025) that gives a comprehensive view of wood in architecture. The Malaysian Timber Council (MTC) has just published *Architectural Use of Timber in Malaysia* (ISBN 9789839931488), which is now a must-read for any architect needing technical advice on local species. There are also numerous technical publications from other supply countries and one standard work, aimed at designers and architects, is *Guide to American Hardwoods* published by the American Hardwood Export Council (AHEC) in several Asian languages, available free online (www.ahec-seasia.org). AHEC also regularly sponsors architectural and design seminars on hardwoods throughout Asia and works with many of the region's architectural associations through its Hong Kong office.

Many qualified architects feel they lack sufficient training in wood, compared to their studies in steel, glass and concrete. One local diploma course in Architecture in Southeast Asia offers 2,490 hours of study, 28 percent of which is on materials, including concrete and glass but no mention of wood. This is not entirely an Asian problem, for there is much criticism in Europe about the lack of training in wood as a material for architects. The Architects Council of Europe (ACE) offers information on formal training, but DG Enterprise, Forest Based Industries of the EU says "wood related education is minimal compared to other materials". While many European and Asian institutions offer some general education on wood as a small part of their courses, specialised training in wood is sparse and limited mainly to Scandinavia, Switzerland, France. In the USA there is dedicated timber training at Georgia Tech's College of Architecture (www.awpl@coa.gatech.edu). Nevertheless some of the training gap can be filled by professional advice from world renowned organisations like the Forest Products Laboratory (USDA Forest Service) in Madison, Wisconsin (www.fpl.fs.fed.us) and TRADA (www.trada.co.uk); or with online training from the Institute of Wood Science (www.iwsc.org.uk).

There are examples of wood species that should not be considered. Those on CITES as endangered tree species should be avoided (information is available at www.cites.org) and a useful indicator of species is found at www.unep-wcmc.org/species/tree_study/pdfs/table2.pdf. Some species, such as Makassar ebony, is banned from export by producer governments although stocks may still be available. Other species, such as teak from virgin forests, are regarded as not sustainable and are often illegally cut or traded. It is impossible to give a general rule on suitable species purely on the grounds of environmental issues because first and foremost it must be suitability for use, subject to sustainability. In addition, legality of supply is closely related. There are many 'safe' countries, mainly in the temperate zone where legality is not an issue, whereas some tropical countries are more risky.

One guide to specifying that serves well is to focus on "the three Ps". In identifying and naming wood species correctly, especially in the architectural and design media, three important guides are provided—Provenance, Price indication and Performance. By specifying "hardwood flooring", for example, (so often seen in the professional media) none of this vital information is provided. By specifying hard maple, for example, the Provenance must be North America, a medium to high price/cost is indicated and the Performance, and thus suitability for use such as high traffic, is extremely well known and documented. To return to Taher, in the harsh Asian climate of humidity there is always a need to understand the performance, as in characteristics of stability and movement in wood, for which every commercially available species is tried and tested.

Bamboo has recently received much public acclaim for its environmental credentials as a green material, but wood it is not. This grass has a low impact when used in the round, as in traditional bamboo furniture. But once processed into panels or flooring the embodied energy as well as chemical treatments may obviate all its acclaimed advantages. Recycled timber is another option much heralded these days but the species available are often limited and supplies may be spasmodic, depending on opportunities to buy, rather than reliable options to specify. One of the finest examples of recycled wood is in the reconstructed teak house of Jim Thompson in Bangkok, made from three smaller dwellings. But such opportunities are rarely at the disposal of today's architects unless they have the appropriate connections and also take the time necessary through special interest in such projects.

Finally, there is the task of ensuring that contractors do not substitute inferior and perhaps unsustainable species for the correct species specified, and are up to the mark in fabrication, installation and finishing. This can only come with experience and trust. There are frequent examples of projects in which architects are persuaded, or in some cases not even consulted, to use an alternative or cheaper species 'which does the job' and meets budget targets. But in today's world where sustainability is key, this is a potentially dangerous practice and so specifications need to become tighter not looser.

So in essence, wood provides architects with a great opportunity to specify as sustainably as with any other material, if not more so. Perhaps the real key to this is to ensure the long term sustainability that architects seek, by ensuring performance, is achieved through correct specification. How many sustainable buildings are refurbished wastefully when interior materials fail to perform due to poor specification or wear out, or are simply deemed in need of a make-over?

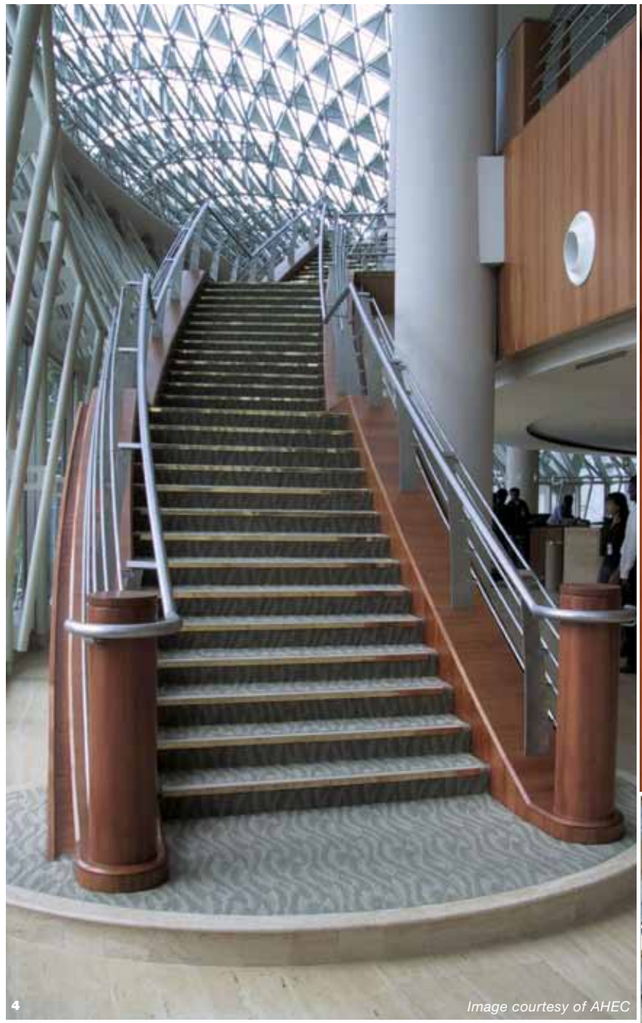
[1] The 2000 RPA Assessment shows that between 1953 and 2007, the volume of U.S. hardwood growing stock more than doubled from 5,210 million m3 to 11,326 million m3. U.S. Forest Service forecasts indicate that further increases of 15 to 20 percent are expected in the hardwood growing stock inventory through 2030. Projections of hardwood growth and removals nationwide indicate that growth will continue to exceed removals through to 2050.

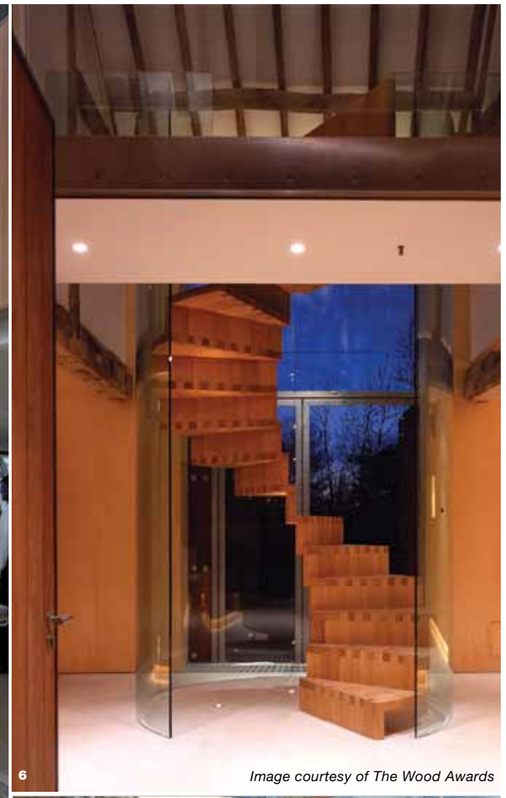
[2] The 2008 Seneca Creek study indicates that hardwood purchased from the U.S. should be considered Low Risk in all five risk categories of the FSC Controlled Wood standard. This means there is Low Risk of any U.S. hardwood being sourced from an illegal source, a GM crop, a forest harvested in violation of traditional and civil rights, a forest where high conservation values are threatened by management activities, or a forest being converted to plantations or non-forest use.

4 American cherry at The Esplanade, Singapore
5 American hard maple acoustic panels by Richard Rogers at Bordeaux law courts **6** Oak staircase by Simon Conder **7** Laminated American white oak at Portcullis House

A CHECKLIST FOR SUSTAINABLE WOOD:

1. Is the wood on CITES or a threatened species?
2. Is the wood from a reliable supplier willing to declare and or prove source?
3. Is the wood from hardwood forests known and accepted as sustainable such as the USA, or from plantations?
4. Is the wood available from a certified source such as FSC, PEFC, SFI or MTCS?
5. If there are species options, check on the more renewable option.
6. Is your specification reasonable, or will it be wasteful?
7. Is your design sustainable, or it will it require regular renovation?


4 Image courtesy of AHEC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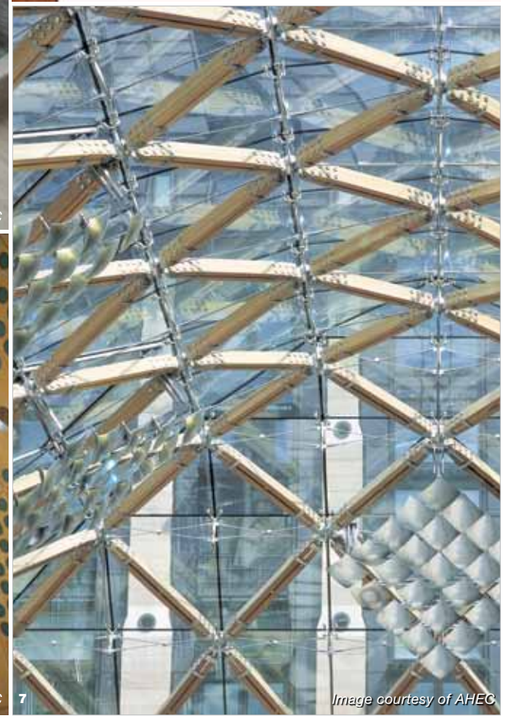
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