



Wood and Woodlands: From the forest to the hardwood floor

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Perhaps the greatest gift from the natural world to human society is wood, and its role in the drive to sustainability cannot be overstated. Forests are carbon sinks, and they sustain essential ecosystems. Wood as a heat source sustained our ancestors, and as a material for everything from building construction to paper for the written word, it has served as a foundation for our civilization. And now, with the stakes higher than ever, it is the role of humanity to protect, sustain and cherish this invaluable resource.

When it comes to sustainable flooring, two of the hottest topics are materiality and carbon neutrality. What's the product made of? How much energy went into its creation? How much is it adding to global greenhouse gas emissions? The answer varies hugely depending on the product type, and it usually comes with charts and graphs and a lot of math. Wood flooring, however, has a more straightforward profile.

Interface, in its Mission Climate Take Back initiative, talks about factories that operate like forests as a model for sustainable (and restorative) industry. Such factories, if achievable, would leave no environmental footprint, sustain existing eco-systems and ultimately contribute to the development of a greener, healthier world. And that's of course exactly what a forest does.

A tree is fundamentally carbon neutral, in that the carbon that it takes from the atmosphere as it grows is equal to what it releases, be it through combustion or natural rot and decay. This is true of all photosynthesizing plants, which use sunlight to power a process that breaks down carbon dioxide, extracting carbon as a building block and releasing oxygen back into the atmosphere. So the carbon dioxide released at the end of its life (biogenic CO₂) equals what it took from the air, in contrast to anthropogenic CO₂, emanating from fossil fuels sequestered in the lithosphere for millions of years, which add directly to the atmospheric load. And fossil fuels are the raw material for most of the flooring currently produced-including carpet, vinyl flooring and synthetic rubber.

For hardwood, the factory for its raw materials is literally the forest. And, as if that wasn't enough, hardwood flooring is more than just carbon neutral, because it holds onto its carbon instead of returning it back to where it came from (the atmosphere). Every consumer who buys a volume of hardwood flooring owns a material caught mid-cycle, having already removed carbon (and added oxygen) to the atmosphere, but prevented from returning it back. So it's essentially a carbon negative product, assuming no huge losses in manufacturing, shipping, installation and maintenance. And assuming the consumer's house doesn't burn down any time soon.

The state of the forests

Sustainable hardwood also relies on sustainable forest management. It's hard to make a case for environmental sustainability if the lumber comes from clear cutting and destroying ecosystems. Fortunately, American hardwood forests are, by and large, extremely well managed. According to

the American Hardwood Export Council, between 1953 and 2012, “the volume of hardwood growing stock increased from 5.2 billion m³ to 12.0 billion m³.” Also, from 2007 to 2012, the volume of standing hardwood, after taking into account harvesting and natural death, increased at a rate of 124 million m³ per year, or 4 m³ per second. In 2012, natural forests accounted for 97% of the area of hardwood and mixed hardwood-softwood woodlands in the U.S., with the balance in plantations.

European forests are also growing, but in many other parts of the world, the trend is moving in the opposite direction. The latest State of the World’s Forests report by The Food and Agriculture Organization of the United Nations found that between 1990 and 2015 the world’s forests decreased from 31.6% of global land to 30.6%. The biggest losses were in Latin America and Sub-Saharan Africa. And Global Forest Watch reports that 3.6 million hectares of primary forest was lost last year, an area about the size of Belgium, led by Brazil with losses of 1.35 million hectares.

Brazil is worth watching, because its new president, Jair Bolsonaro, believes that Amazon protections are an obstacle to growth and is already working to open them up for commercial exploitation. According to a New York Times report on July 28, “Under Brazil’s Far-Right Leader, Amazon Protections Slashed and Forests Fall,” since Bolsonaro took office at the beginning of this year, over 1,330 square miles of Brazilian Amazon forest cover have been lost. In June alone, 80% more forest cover was lost compared to June 2018. And enforcement measures have been sharply reduced. The article reports that Bolsonaro recently told a journalist, “The Amazon is ours, not yours.”

According to the Intergovernmental Panel on Climate Change, Amazon rainforests absorb a quarter of the carbon dioxide that is released each year from the global combustion of fossil fuels.

However, there are hopeful developments in other critical regions. In Indonesia, for instance, primary forest loss was 40% lower in 2018 than the average annual loss from 2002 to 2016, driven by government policies.

Threats to hardwood

When people talk about the pressing existential need for environmental sustainability, it’s worth noting that the threats don’t all come from climate change. Many ecosystems were already badly damaged before the warming from greenhouse gases started to impact the environment. One of the most profound threats relates to invasive species (both flora and fauna).

No living thing evolved on this earth in a vacuum. They all evolved together, finding equilibrium in their various ecosystems. That’s how the entire natural world has operated, with a niche for every species. Humans changed that when they started colonizing the planet, dragging plants and animals into new environments. It didn’t have much of an impact for the first few millennia, because humans didn’t move far and they didn’t move fast. That started to change very dramatically about 500 years ago with the European discovery of the Americas. Included in the upside is that, among other things, it introduced the rest of the world to hitherto unknown foods: tomatoes, potatoes and every type of sweet and hot pepper. (Also, sugarcane and tobacco.) And on the downside, Europeans carried microbes that wiped out 75% of the Native Americans in New England.

Most Southerners are familiar with kudzu, which has blanketed huge tracts of forest. It’s a Japanese vine, so it evolved in a different ecosystem, and the ecosystem in North America had no defenses

against it. It was introduced to the U.S. in 1876, and today it covers an estimated 7.4 million acres in the Southeast.

Bugs-from insects to microbes-have always been a big problem, particularly for trees. One example is Dutch elm disease, a fungus likely carried from Asia on the backs of bark beetles. It hit Europe and North America in the early 20th century, decimating European elms and killing more than 75% of North American elms.

More recently, there's the Asian longhorned beetle, which is native to China and Korea and was first identified on U.S. soil in 1996. The beetles bore through hardwoods like maple, ash and birch, and the only way to control them is to cut down all the susceptible trees in the infested area. The strategy has been successfully deployed a few times, including in Chicago. There are currently five active infestations in the U.S., in Ohio, Massachusetts and New York.

Many of these invasive insects tend to stay close to the urban areas where they landed-starting off at ports and rail yards-and their flying abilities are limited. So the damage hasn't extended much to forests and plantations. Unfortunately, one of the most recent arrivals, the emerald ash borer, first identified in Michigan in 2002, can fly for miles. And it does. Between its own flying abilities and unsuspecting campers moving beetle-contaminate firewood, new populations can easily start many miles away from existing infested areas, and currently there are so many infestations-across at least 35 states, as far west as Colorado-that the USDA is considering lifting the quarantine and focusing all its resources on developing biological controls.

The insect has already killed at least 100 million ash trees and is threatening the entire 8.7 billion North American ash population. And five of the six ash species have been placed on the Critically Endangered list.

Softwood production has been heavily impacted by insect infestations. In British Columbia, a wave of sawmill closures due to the pine mountain beetle epidemic has impacted local communities. The pine mountain beetle is actually indigenous to North America, but according to scientists at the Canadian Forest Service, the current epidemic, which started in the early 1990s, has been enhanced by milder winters and warmer summers. The outbreak has so far impacted 18 million hectares of forest, or nearly 70,000 square miles.

Other threats to trees include the goldspotted oak borer in forests in southern California, and Sudden Oak Death, a pathogen that has killed millions of trees in California and Oregon. And just in the last few weeks, scientists at the United States Forest Service announced the discovery of a new non-native jewel beetle, of the same genus as the emerald ash borer, in Brooklyn. It is currently being studied to determine the threat it poses.

Climate change and pests

Global warming impacts invasive species in several ways, including adding more stress to the health of trees and bringing warmer nights, which expands the range of infestations. According to Leigh Greenwood, a wildlife biologist who is the forest health program director, North America region, for the Nature Conservancy, trees under drought or heat stress are more susceptible to infestations of both native and non-native pests because their natural defenses become compromised. Greenwood adds, "It is much like how a person's immune system works-if we are stressed, we are more prone to getting colds."

Also, many pests are limited by their northern borders, since they have evolved to operate within certain temperature ranges. So the coldest winter nights form a barrier of sorts. And when those nights are not quite as cold, it allows them to slowly move northward into new territories. This has already occurred with some native pests, like the mountain pine beetle and the southern pine beetle. And the emerald ash borer may soon follow suit.

Can wood save the world?

The answer is yes, but it will take a lot of wood. According to a recent report by Eric Hamilton, a science writer for the University of Wisconsin-Madison referencing a recent study at the school, wood products currently mitigate less than 1% of global carbon emissions through carbon sequestration. The study was conducted by two professors from the school, Craig Johnston and Volker Radeloff, who set out to determine whether humans can “continue to consume wood products and have climate change benefits associated with that consumption.”

Among other things, the study revealed that, from a global perspective, any gains are easily reversed if there’s a slowdown, because current production is responsible for offsetting carbon emissions from furniture or lumber produced 50 to 75 years ago. For instance, in the early years of the Great Recession (2008 and 2009), America’s wood products went from a net sink for carbon to a net emitter, because total carbon sequestration fell below total historical emissions.

A strategy that would really move the needle, according to Swiss scientists in a report published by the journal *Science*, would be to plant a trillion or so trees. According to the team, it would require 3.5 million square miles, an area about the size of the U.S., and it could be done without impinging on existing cities and farmland.

According to Thomas Crowther, a study co-author, “This is by far-by thousands of times-the cheapest climate change solution.” And the nations with the most room for such a venture are the U.S., Canada, Russia, Australia, Brazil and China. There are currently three trillion trees on Earth.

Crowther warns that it’s not a substitute for weaning off of fossil fuels, adding that none of this works without emissions cuts. However, Crowther warns that it is not easy or realistic to think that the world “will suddenly go on a tree-planting binge.”

He adds, “It’s certainly a monumental challenge, which is exactly the scale of the problem of climate change.”

The essential role of wood puts humanity in an interesting situation. As Kip Howlett, president of the Decorative Hardwoods Association, points out, we all ought to be using more hardwood products, because it makes forests more valuable, creating incentives for forest protection and driving the planting of more trees.

To take it one step further, one could argue that consumers, when purchasing any given item, should seek out wood options instead of, say, products made from fossil fuels. After all, sequestering carbon has never been more important and the stakes have never been higher. But, again, it’s a strategy that’s only effective when sourcing from responsibly managed forests.

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