FRANK MILLER LUMBER
QUARTERSAWN HARDWOODS

AMERICAN HARDWOODS:
AN ECOLOGICAL SUCCESS STORY

Thomas Malthus set the modern day ecological doomsday bell to tolling with his predictions in "An Essay on the Principle of Population" (1798). Since then, the imminent exhaustion of the earth's resources — peak oil, gas, power, etc. — has been confidently forecasted only to be proven spectacularly wrong. The future of American hardwoods has been similarly predicted and ultimately proven false. Due to many factors, (e.g., private land ownership, enlightened government policies and industry management practices), America's hardwood forests are abundant, renewable, sustainable, and preferred as a building material throughout the world.

SAVE THE PLANET — USE MORE AMERICAN HARDWOODS

Upon first reading, this may seem to be a counter-intuitive proposal. In many people's minds, the disastrous impact of deforestation on the rainforests for commercial and agricultural purposes has been extended to all logging and wood products operations. Public assumptions and misconceptions have become hardened to reality. But the facts are stubbornly true and overwhelmingly positive in support of the American hardwoods industry as a sustainable and renewable enterprise:

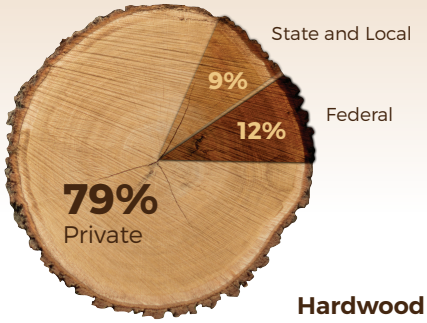
- The volume of U.S. hardwoods has increased by more than 90 percent in the last half-century while forest acreage has increased by 18 percent, largely due to the diligent practice of sustainable forestry.[1]
- Approximately 80 percent of U.S. hardwood forest land is privately owned by about 10.4 million landowners, with an average holding of 25 acres (10 hectares). Approximately 92 percent of hardwood produced in the U.S. is sourced from these private lands. Typically, a harvest occurs only once in the lifetime of the landowner.

Figure 1:

U.S. HARDWOOD TIMBERLAND AND SUPPLY[2]

Source: U.S. Forest Service

Timberland Ownership



Hardwood Supply

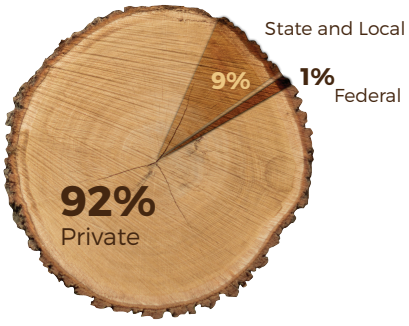


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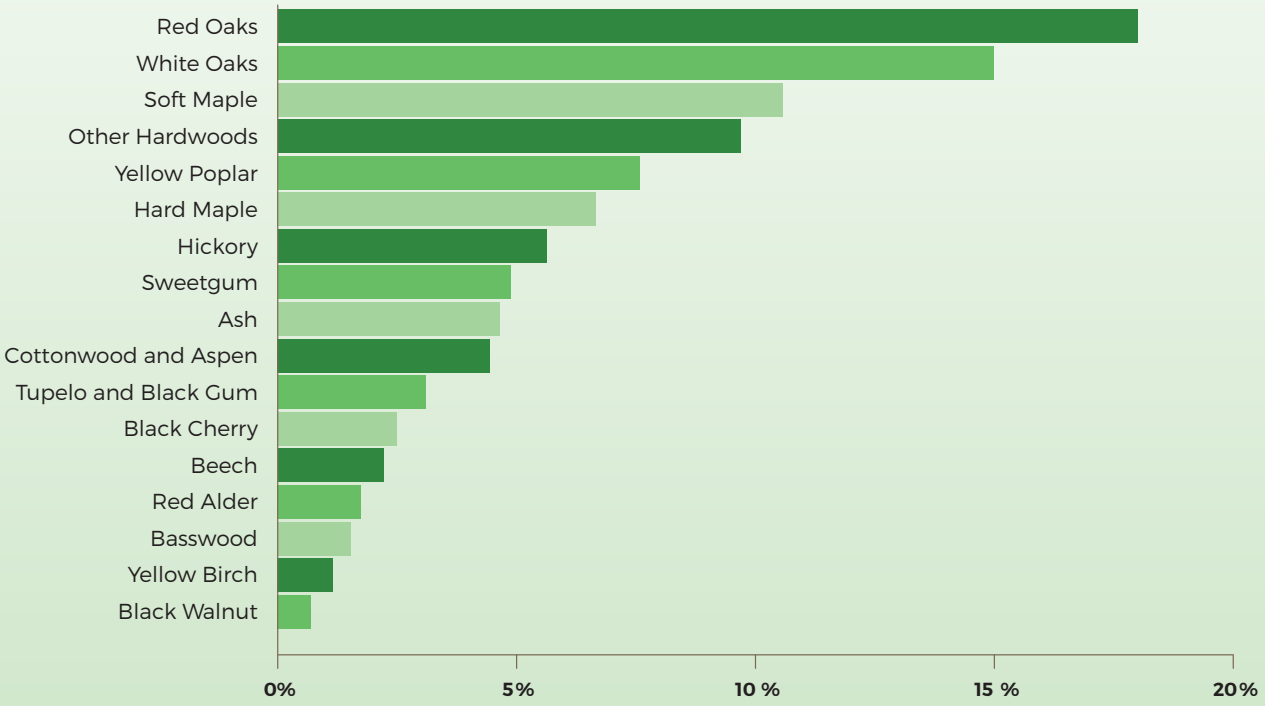
Figure 2:

DISTRIBUTION OF AMERICAN HARDWOOD SPECIES[2]

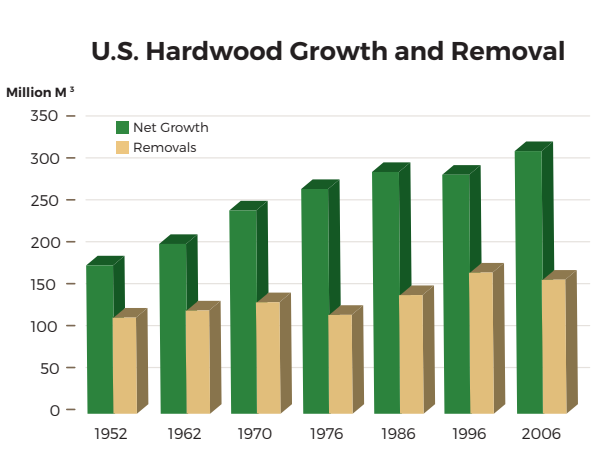
Source: U.S. Forest Service

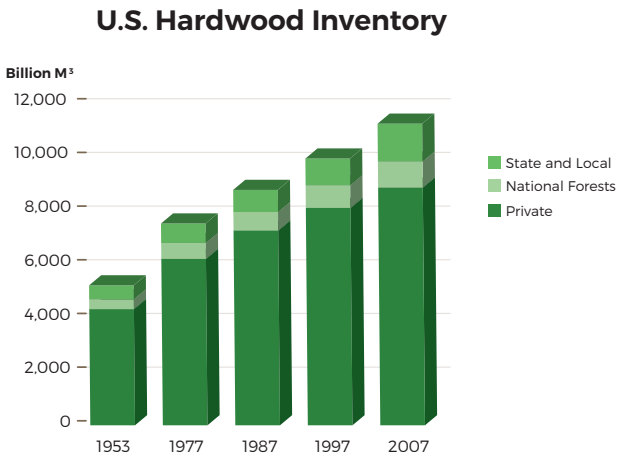


- In 2007, the U.S. hardwood industry (e.g., growing stock) was estimated to comprise 11.4 billion cubic meters (4.8 trillion board feet). In 2006, U.S. hardwood timber removals totaled 160 million cubic meters (67.8 billion board feet). It is easily seen that net annual hardwood growth exceeds removals by a wide margin. In 2006, hardwood growth outpaced removals by a factor of 1.9. In fact, net annual hardwood growth has exceeded hardwood removals continuously since 1952.
- Each year, hardwood volume increases by 1.49 million cubic meters (631.4 million board feet) even after accounting for harvests, fire, insects and disease loss. If hardwood trees stopped growing entirely and harvesting continued at the same rate, supply would last more than 75 years.

Figure 3:

AMERICAN HARDWOOD FOREST SUSTAINABILITY





The facts prove that American hardwood resources are abundant, renewable and sustainable. They have also proven to be the natural choice over concrete, steel, plastics and other processed materials, which have damaging environmental impacts.

In August 2010, the U.S. Senate announced S. Resolution 411, stating, "... United States hardwoods be given full consideration in any program to promote construction of environmentally preferable commercial, public or private buildings. Whereas, hardwood trees grown in the United States are an abundant, sustainable and legal resource, as documented annually by the Forest Inventory and Analysis Program of the Forest Service." The Resolution further noted that U.S. hardwoods had achieved the highest conservation crop rating available under the Department of Agriculture's Environmental Benefits Index, highlighting its role in reducing America's carbon footprint, its renewability and recyclability, and its positive impact in preserving forest acreage from alternative land use options. (Please see Appendix 1.)

In addition, the United Kingdom's Central Point of Expertise (CPET) has approved American hardwood products produced under both Forest Stewardship Council FSC-STD-01-001 (latest version) EN and Sustainable Forestry Initiative (SFI) certification programs as "legal and sustainable." CPET is widely recognized throughout the European Union and other countries as a determining standard.

In July 2012, the American Hardwood Export Council (AHEC) announced publication of its ISO 14014- and ISO 14044-compliant Life Cycle Assessment (LCA) report of rough-sawn, kiln-dried hardwood lumber. Prepared by sustainability experts PE International under an AHEC commission, it covers the environmental life cycle of American hardwood from point of harvest through delivery at the importers' yards in major world markets. This report is an internationally recognized scientific endorsement of the sustainability of U.S. hardwoods and their positive environmental attributes relative to alternative construction materials. (Additional LCA studies regarding this subject may be found at Appendix 2.)

The facts and independent corroboration align for the advocacy of U.S. hardwoods as an environmentally responsible choice in the selection of building materials. A brief discussion of U.S. hardwoods' positive characteristics (e.g., abundance, renewability, sustainability and preferability), follows.

ABUNDANT

In aggregate terms, the U.S. presently has more than 70 percent of the estimated forestland it had in 1600, or about 514 million acres (208 million hectares) versus 745 million acres (301.5 million hectares). In the early 1900s, 20–50 million acres (8.1 million–10.1 million hectares) annually were lost to fire. Today, wildfire losses are between 2–7 million acres (809,000–2.8 million hectares) annually, an 86 percent reduction. Despite a 165 percent growth in population since 1920, U.S. forest acreage has remained stable. Since the 1940s, forest growth has exceeded harvest rates by 47 percent.

More specifically, U.S. hardwood inventory now stands in excess of 10 billion cubic meters (4.2 billion board feet) and is growing at a rate of 40 million cubic meters (16.9 billion board feet) per year after harvesting. Annual hardwood tree growth exceeds removals in each of the 33 hardwood-producing states by a margin of nearly two to one. In fact, since 1953 the amount of hardwood growing stock (i.e., all live trees greater than five inches in diameter) in U.S. forests has grown 97.8 percent, while the amount of hardwood sawtimber (i.e., large trees) has more than doubled.

Hardwoods account for 39 percent of all trees harvested in the U.S. annually. There are approximately 10 million non-industrial private landowners in the U.S. who hold 58 percent, or more than 290 million acres (117.4 million hectares), of the total timberland[4]. The average size of these holdings is approximately 25 acres (10 hectares).

The U.S. forestry industry is purposefully and effectively managing its resources to consistently grow timber volume at a level well above harvesting rates.

RENEWABLE

Forest products companies and private timberland owners plant almost 4.8 million softwood trees each day, or 1.7 billion trees over the course of a year. This 6:1 ratio of live trees planted for every one tree harvested equates to 2.6 million acres (1.05 million hectares) of new plantings annually.

Hardwoods, however, reproduce naturally and prolifically without replanting. This is largely attributable to the management and composition of the tree stands and the method of harvesting. Hardwoods are typically grown in 25-acre (10-hectare) "tree farms," not on plantations. The preferred method of harvesting hardwoods is single-tree selection, as opposed to clear-cutting.

With single-tree selection, a professional harvester evaluates a forest and determines which trees are ready to be harvested. Generally the trees selected for harvest are those closest to maturity, having absorbed as much carbon as they will in their life. A crew then takes only the marked trees with the least possible disruption to the forest floor.

This careful removal of selected trees creates openings in the forest canopy, allowing more precipitation, nutrients and sunlight to reach the forest floor. Seedlings are then free to sprout and grow naturally. Within a few years, the forester returns to evaluate the health of the saplings, removing those that would retard the growth of the heartier stock. This practice ensures the health of the forest, including its water quality and wildlife habitat.

Single-tree selection, however, is just a part of the more complex science of silviculture, or the growing and cultivation of trees. When employed with the principles and criteria for stewardship of the Forest Stewardship Council (FSC), the best management and harvesting practices of professional foresters have allowed the volume of U.S. hardwood forests to more than double over the past 60 years. In a real sense, the natural regeneration of hardwoods enhanced by responsible forest management practices strikes a constructive balance between the needs of the planet and those of its inhabitants, including wildlife.

SUSTAINABLE

According to the U.S. Forest Service, there were 119 percent more hardwood trees in 2007 than in 1953, with a growth-to-removal ratio of two new trees for every one removed. Taking four decades or more to mature, the wood of these new trees will not be needed for another 50 to 100 years.

By definition, “sustainable” means to create and maintain conditions under which humans and nature can exist in productive harmony. More simply, “sustainability” means meeting today’s needs while conserving the resources needed for tomorrow. Since there is twice as much American hardwood growing than is being selectively harvested annually, it is clear the hardwood supply for future generations is sustainable. As a resource, American hardwoods are plentiful and renewable. In March 2011, the U.S. Department of Agriculture (USDA) announced its endorsement strategy “regarding the merits of domestic wood as a preferred green building material.”

Despite development pressure and agricultural requirements, forestland area actually increased by approximately 11.3 million acres between 1987 and 2007. Much of this gain was the result of federal (most notably the U.S. Forest Service) and state incentive programs to convert agricultural land to forest use. Federal efforts in support of sustainable forestry are evidenced through its leadership in the Montreal Process, a multi-lateral group formed in 1994 to develop and implement internationally agreed upon criteria for the conservation and sustainable management of temperate and boreal forests.

The U.S. forestry industry itself has contributed enormously to sustainability. Forest certification in the U.S. has been expanding since first introduced in the 1990s. The three most prevalent third-party audited forest certification systems are the Forest Stewardship Council (FSC), the Sustainable Forest Initiative (SFI) and the American Tree Farm System (ATFS). Certification by these agencies attests landowners are rigorously adhering to best forestry management practices to promote sustainability.

PREFERRED

Conversion of American hardwoods into building products contributes to the long-term sequestration of carbon. Growing trees produce oxygen while removing carbon dioxide, thus reducing greenhouse gases. According to the U.S. Environmental Protection Agency (EPA), it is estimated that each year U.S. forests remove the greenhouse gases emitted by 139 million cars, or about 13 tons of dust and gas per acre. At some point, however, mature trees can no longer absorb carbon and actually begin emitting carbon dioxide. Once harvested, the carbon stored in these trees is permanently sequestered in the products made from the hardwood.

Wood represents 47 percent of all raw materials used in the U.S. But the energy used to produce wood products accounts for just 4 percent of the energy used to make all manufactured materials. “Carbon footprint” is a concern for global manufacturing, as

enormous amounts of energy are required to process, manufacture and deliver virtually every product used today. Building products like steel, aluminum, concrete, glass, synthetics, etc., require significantly more energy to produce, install and dispose of at the end of their natural life cycles as compared to American hardwoods.

WOOD IS THE NATURAL CHOICE

(Provided by the Hardwood Forest Foundation)

Wood products come from a resource that grows, matures and is regenerated for future generations. How do other building materials compare?

Steel

- Embodies 26 percent more energy than wood
- Emits 34 percent more greenhouse gases than wood
- Releases 24 percent more pollutants into the air than wood
- Discharges 400 percent more water pollution than wood
- Produces 8 percent more solid waste than wood
- Uses 11 percent more resources than wood

Concrete

- Embodies 57 percent more energy than wood
- Emits 81 percent more greenhouse gases than wood
- Releases 47 percent more pollutants into the air than wood
- Discharges 350 percent more water pollution than wood
- Produces 23 percent more solid waste than wood
- Uses 81 percent more resources than wood

Moreover, modern wood manufacturing processes are extraordinarily efficient. Virtually every part of the log is used as lumber or valuable by-products, while finished wood products are re-usable, recyclable and biodegradable.

The conclusion is that American hardwoods and the products made from them are natural, eco-friendly, intrinsically green and, therefore, preferable. U.S. Senate Resolution 411 (August 2010) and the USDA announcement (March 2011) endorses U.S. hardwoods as "a preferred green building material."

Despite contemporary and common misconceptions, there is no better or more natural choice for green building and a healthy environment than American hardwoods. The forests that yield these products — hardwood flooring, furniture, millwork, etc. — are abundant, renewable, sustainable and environmentally preferable. Joint collaboration among U.S. federal and state authorities and forestry industry associations has instilled policies and practices to ensure the long-term viability of this resource. This is evidenced by the fact that national governmental agencies in the United States and the United Kingdom (and by extension, the European Union) have declared American hardwoods to be a "legal and sustainable" resource and preferable as green building materials.

RESOURCES

[1]Footnote:

Sources for statistics cited throughout this paper include: U.S. Forest Service, Forest Inventory and Analysis National Program; American Hardwood Export Council, "Assessment of Lawful Harvesting and Sustainability of U.S. Hardwood Exports"; Forest Stewardship Council; Environmental Protection Agency (EPA); Engineered Wood Association; California Forest Product Commission.

[2]Footnote:

Figures 1, 2 and 4 were provided by the Assessment of Lawful Harvesting & Sustainability of US Hardwood Exports, Version 1.0, produced October 1, 2008. This document was prepared for the American Hardwood Export Council by the following collaborating authors:

- Alberto Goetzl, Seneca Creek Associates, LLC
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- Philip Guillery, Tropical Forest Trust
- Gary Dodge, PhD, Consulting Biologist/Ecologist
- Scott Berg, R.S. Berg Associates

[3]Footnote:

Figure 3 was provided by the NHLA "Why North American Hardwoods" article. The complete article can be reviewed here.

[4]Footnote:

These figures were provided by NHLA "Why North American Hardwoods" article. The complete article can be reviewed here.

Appendix 1

S.Res. 411 (111th): A resolution recognizing the importance and sustainability of the United States hardwoods industry and urging that United States hardwoods and the products derived from United States hardwoods be given full consideration in any program. See the whole resolution here.

Appendix 2

Life Cycle Assessments

The American Hardwood Export Council (AHEC) published its ISO-compliant Life Cycle Assessment (LCA) report of rough-sawn, kiln-dried hardwood lumber in July 2012. It covers the environmental life cycle of hardwood lumber from point of harvest in the U.S. through delivery at importers' yards in major export markets.

This report provides quantitative data of global warming potential, acidification potential, eutrophication potential, photochemical ozone creation potential and ozone depletion potential. It also provides a qualitative assessment of toxicity, biodiversity, land use and land use change, and water resource impacts. The report includes a sensitivity analysis to show how environmental impacts vary according to key factors such as species, lumber thickness, and transport distance and mode.

The report is an essential requirement for use of AHEC's LCA data in science-based assessments of the sustainability of U.S. hardwood lumber compared to other wood and non-wood materials. It demonstrates the credibility and reliability of the LCA data that AHEC will be making available to manufacturers, designers and retailers through formal Environmental Product Declarations (EPDs) and AHEC's own online species guides and environmental profiles.

Earlier comparative LCA studies include:

- "Environmental and energy balances of wood products and substitutes" commissioned by the United Nation's Food and Agriculture Organization (FAO) — In 2002, the University of Hamburg undertook a comprehensive review of LCA work during the previous decade. The authors concluded, "The results of the comparative LCA studies clearly indicate that wood products and products systems show advantages in most environmental impact categories. The subjective impression that wood products are better than competitive products with respect to environmental aspects can be scientifically proved." **[1]**

- Also in 2002, the UK Building Research Establishment (BRE) published results from the study, 'Environmental Profiles of Building Materials, Components and Buildings'. BRE scored timber highly in the 13 environmental impacts studied — from climate change, pollution to air and water, waste disposal, and transport pollution and congestion. Timber was recognized as the only building material to have a positive impact on the environment due to trees' ability to absorb carbon dioxide. BRE concluded that "timber and wood-based materials have excellent environmental performance… often better than that of alternative materials. Timber and wood-based materials can make an important contribution to achieving more sustainable production." **[2]**

- In their 2006 study of the flooring industry in Germany, Nebel, Zimmer, and Wegener examined the whole life cycle of four wood floor coverings, including solid parquet, multilayer parquet, solid floor boards and wood block **[3]**. The authors pointed out that, compared with all German volume domestic products, wood flooring contributed significantly less (factors of 5 to 50 lower) to impact categories including climate change, acidification, eutrophication, photo-oxidant formation and ozone depletion. Storage of carbon inherent in wood flooring coupled with energy production alternatives to fossil fuels realized by residual wood and post-consumer wood streams represent significantly reduced, perhaps even negative, global warming potential for these products.

- In 2004 research, the Consortium for Research on Renewable Materials (CORRIM), a U.S. nonprofit corporation of 15 research universities, concluded that steel framing used 17 percent more energy than wood construction for a typical house in Minnesota, while concrete construction used 16 percent more energy than a wood construction house in Atlanta. In both situations, the consortium found that the use of steel had 26 percent more global warming potential than wood, and concrete had 31 percent more. **[4]**

- The Athena Model, developed by the nonprofit Athena Sustainable Materials Institute, compares the cradle-to-grave ecological quotient of wood, steel and concrete across the six stages of a material's life expectancy: resource extraction, manufacturing, on-site construction, facility occupancy, demolition and ultimate reused or recycling. The Athena Model found wood to have the lowest environmental impact in each of these categories, and that wood exceeds the other materials in terms of environmental soundness and energy use; production of greenhouse gases; air and water pollution; production of solid waste; and overall ecological resource use. **[5]**

[1] Dr Mohammad Scharai-Rad and Dr Johannes Welling, 2002, Environmental and energy balances of wood products and substitutes. Department of Wood Technology, University of Hamburg and the Federal Research Centre for Forestry and Forest Products, Hamburg. Results published by the FAO, Rome, 2002. A full copy of their report is available here.

[2] Building Research Establishment, 2002, Digest 470: Life cycle impacts of timber. A review of the environmental impacts of wood products in construction. Details of BRE and their publications are available on their website.

[3] Nebel B, Zimmer B, Wegener G (2006): Life cycle assessment of wood floor coverings — A representative study for the German flooring industry. Int J LCA 11 (3) 172-182.

[4] Consortium for Research on Renewable Industrial Materials (CORRIM), summary report from Forest Products Journal, June 2004, Vol 54, No. 6 Available here.

[5] Full details on this and other LCA studies by ATHENA are available at the Canadian Wood Council website. Details about the ATHENA Sustainable Materials Institute are available here.