Forests and Forest Products

Presented October 2014, Kathryn Fernholz
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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.
This presentation will answer many questions about forests and forest products, such as: Where do our trees and forests grow? How have forests changed over time? What is the relationship between people and forests – now and in the past? How are forests managed – and are they being managed responsibly? Are our forests and forest products sustainable? Why is wood an environmental-friendly choice?

This presentation was developed by a third party and is not funded by WoodWorks or the softwood lumber check-off.
Learning Objectives

1. Describe the abundant ecological capacity of North America to support a wide distribution of forests and forest types.
2. Understand how the symbiotic relationship between forests and the people of North America have evolved over the past centuries.
3. Discuss how the use of a variety of forest products can economically support sustainable management of forest lands.
4. Describe how to quantify environmental choices in the selection of materials through the use of LCA and carbon accounting.
Where do our trees and forests grow?
How have forests changed over time?
Trend in US forestland area, 1630 to present

Note: Data prior to 1950 are based on historical evidence, not field sampling.
Source: USDA Forest Service, Forest Inventory Analysis Program. 2006.
U.S. Forestland Area 1630-2012

Forest area, 1760-2000

* Since 1900, forest area in the U.S. has remained statistically within 745 million acres +/-5% with the lowest point in 1920 of 735 million acres. U.S. forest area in 2000 was about 749 million acres.

Basis for chart data:
- FIA Field Inventory Reports
- Forest Service report estimates prior to FIA field inventories.
- Based on Bureau of the Census land clearing statistics.
- Based on estimates of forest clearing proportional to population growth.

Bars include area in all 50 current States.

Source: National Report on Forest Resources and other historic data
Regional forest trends in the 48 States, 1760-2000

Original forests in what is now the U.S. totaled about 1.05 billion acres (including what is now the State of AK and HI). Clearing of forest land in the East between 1850 and 1900 averaged 13 square miles every day for 50 years; the most prolific period of forest clearing in U.S. history. This coincides with one of the most prolific periods of U.S. immigration. Currently, forests cover about 749 million acres of the U.S. or about 33 percent of all land.

Basis for chart data:

- **1940- pres.** FIA Field Inventory Reports
- **1900 – 1930** Forest Service report estimates prior to FIA field inventories.
- **1850 – 1890** Based on Bureau of the Census land clearing statistics.
- **1760 – 1840** Based on estimates of forest clearing proportional to population growth.

Source: National Report on Forest Resources and other historic data

Return to FIA Home
“...we identified the rise in timber net returns as the most important factor driving the increase in forest areas [in the United States] between 1982 and 1997.”

(Lubowski et al. 2008)
What is the relationship between people and forests – now and in the past?
Native American Nations
Our Own Names & Locations

This document lists the true names and original pre-contact boundaries of every Native American nation in what is now the contiguous United States of America, including the larger, well-known ones as well as many that did not fall under European governance and influence. Most of the tribal names are the names they use in their own languages. The only exceptions are for tribes who are no longer recognized as such. It is a visual reminder of who sailed hundreds of years before any European set foot, creating a series of treaties with America, as well as explaining the non-Native public, who can't always appreciate our ancestral homeland.
America: Built by Forests

Settlers coming to North America cleared an average of 2.1 acres of forest per person to survive and grow food

5 to 6 million acres of US forests were cleared to produce iron during the 1800s

By 1850, there were approximately 3.2 million miles of wooden fences in the United States, (enough to encircle the earth 120 times)

By the late 1800s, railroads accounted for between 20 and 25 percent of U.S. timber consumption -- in 1900 alone, over 15 million acres of forests were cleared just to replace railroad ties

Photo courtesy of the Forest History Society, Durham, N.C.

New England sees a return of forests, wildlife
These woods are lovely, dark, and back

By Colin Nickerson  |  GLOBE CORRESPONDENT  |  AUGUST 31, 2013

Across New England, areas like the Swift River Valley (above, left, in the 1880s and in 2010) in Petersham have seen their forests, once cut down and cleared for farmland, replenished in the 21st century.

A wilderness comeback is underway across New England, one that has happened so incrementally that it’s easy to miss.

But step back and the evidence is overwhelming.

Today, 80 percent of New England is covered by forest or thick woods. That is a far cry from
Across New England, areas like the Swift River Valley (above, left, in the 1880s and in 2010) in Petersham have seen their forests, once cut down and cleared for farmland, replenished in the 21st century.
Source: Understanding Eastside Forests
How are forests managed – and are our forest products sustainable?
U.S. Forest Growth and All Forest Product Removals, 1920 - 2011
Billions of cubic feet/year

North American Wood Utilization

1940:
- 35-39% processed into lumber
- 20% recovered for energy production or heating
- 41-45% incinerated as waste (without energy recovery) or landfilled

2005:
- 52% processed into lumber
- 36% transferred to other facilities to use as raw materials
- 11-12% recovered for energy production

Forest Certification, Regulations, etc.

Why is wood an environmentally-friendly choice?
Forest Carbon flows on a stand-level

Source: Eliasson et al. 2011
Figure 1. Carbon storage over time under a no-harvest scenario compared to a sequence of 45-year rotation harvest, illustrating additional carbon storage from making and using wood products that substitute for concrete walls in residential housing construction. Diagram courtesy of Jay O’Laughlin, University of Idaho as part of the 2008 Policy Analysis Group on Carbon Sequestration Strategies in the Forest Sector.
“In the long-term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fiber, or energy from the forest, will generate the largest sustained mitigation benefit.”

- IPCC Fourth Assessment Report
Life Cycle Assessment (LCA)

Measures:

All inputs:
- Raw materials
- Energy
- Water

All outputs:
- Products
- Co-products
- Emissions
- Effluents
- Wastes

Consider all stages in production, use, disposal
Life Cycle Assessment (LCA) for the Roof of Raleigh-Durham Airport Terminal

Athena Sustainable Materials Institute (2011)
Life cycle assessment showed that use of wood rather than steel resulted in:

- **Energy savings of 5,600 MWh**, equivalent to the electricity use of 500 homes over 1 year or 23 days of operational energy use for the terminal.

- **Global Warming Potential (GWP) savings of 1,000 t CO$_2$e**.
“Wood products are manufactured from renewable raw material; they are reusable and biodegradable, and they continue to store carbon throughout their lifetime. These characteristics make wood an excellent alternative to many of the materials that are now widely used in construction and consumer goods, which leave a much larger ‘carbon footprint’ and include concrete, steel, aluminum and plastic. Increasing production and consumption of wood products will therefore be part of a sustainable future.”

- State of the World’s Forests – 2012
United Nations Food and Agriculture Organization
Conclusions

• North America has the ecology for growing trees, and forest area has been stable for many generations.
• Modern forestry includes responsible material use, advanced technologies, trained professionals, certification, regulation, research, monitoring, etc, etc, etc.
• Forests and forest products provide diverse benefits, including carbon storage.
• Strong markets for wood products provide incentives for landowners to keep lands forested.
Questions?

This concludes The American Institute of Architects Continuing Education Systems Course

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