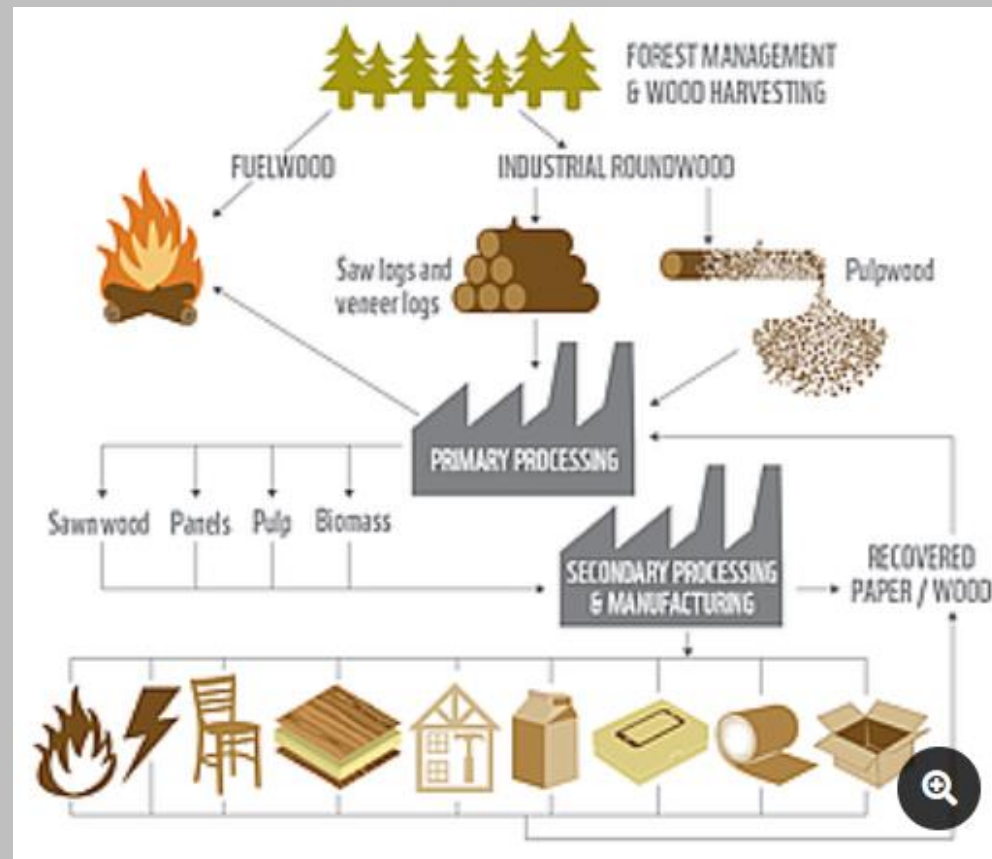


## NRC 225 Forests and People Spring 2023

### The Wood We Use:

From Forest → Mill → Manufacturing → Market (Societal Demands for Wood)



## NRC 225 Forests and People Spring 2023

In Massachusetts, we import 95-98% of the wood products we use each year from other states and nations...



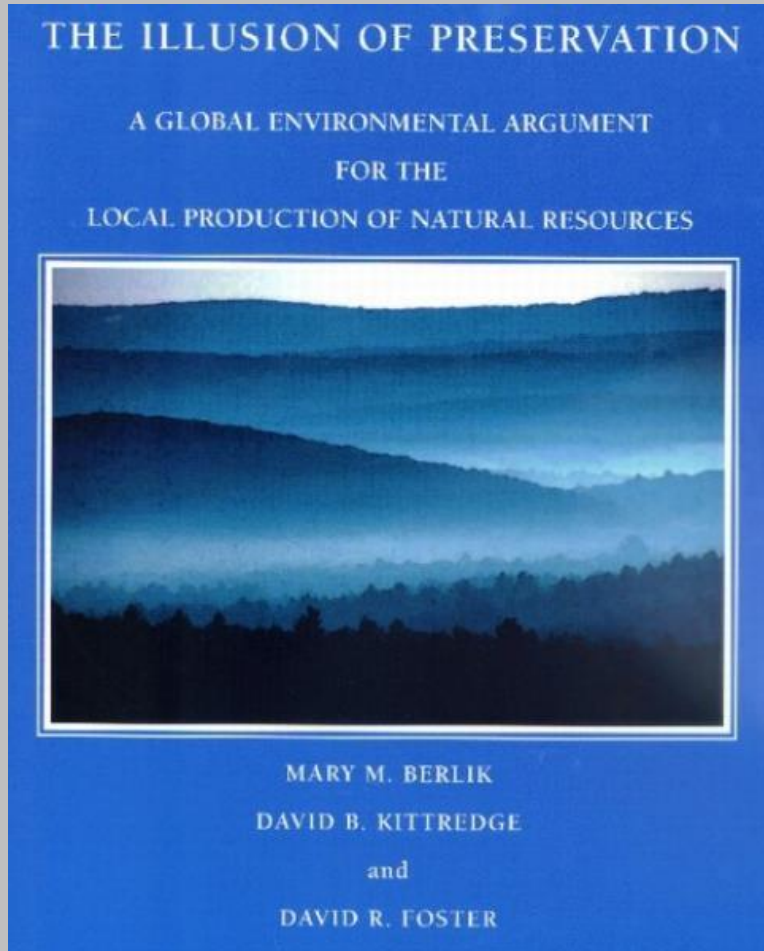
...Which means that we export 95-98% of the environmental costs of wood product harvesting each year onto other states and nations.

## NRC 225 Forests and People Spring 2023

Who bears the environmental costs associated with the harvesting practices that provide >95% of our annual wood consumption?

“...[M]ajor future suppliers of wood for the United States include Canada and Siberia for softwoods and tropical countries for hardwoods. These are areas where the environmental effects of harvesting are generally more severe than in the Northeastern U.S. (Bowyer, 1994 and 1997)”.

“The tropics, especially Indonesia, Malaysia, and Brazil are a growing source of hardwoods (ITTO, 1999). These regions all experience severe environmental impacts including the logging of primary forests, timber exploitation, forest quality degradation, land-use conversion, and wildlife persecution”.



[https://masswoods.org/sites/masswoods.org/files/pdf-doc-ppt/IllusionofPreservation\\_0.pdf](https://masswoods.org/sites/masswoods.org/files/pdf-doc-ppt/IllusionofPreservation_0.pdf)

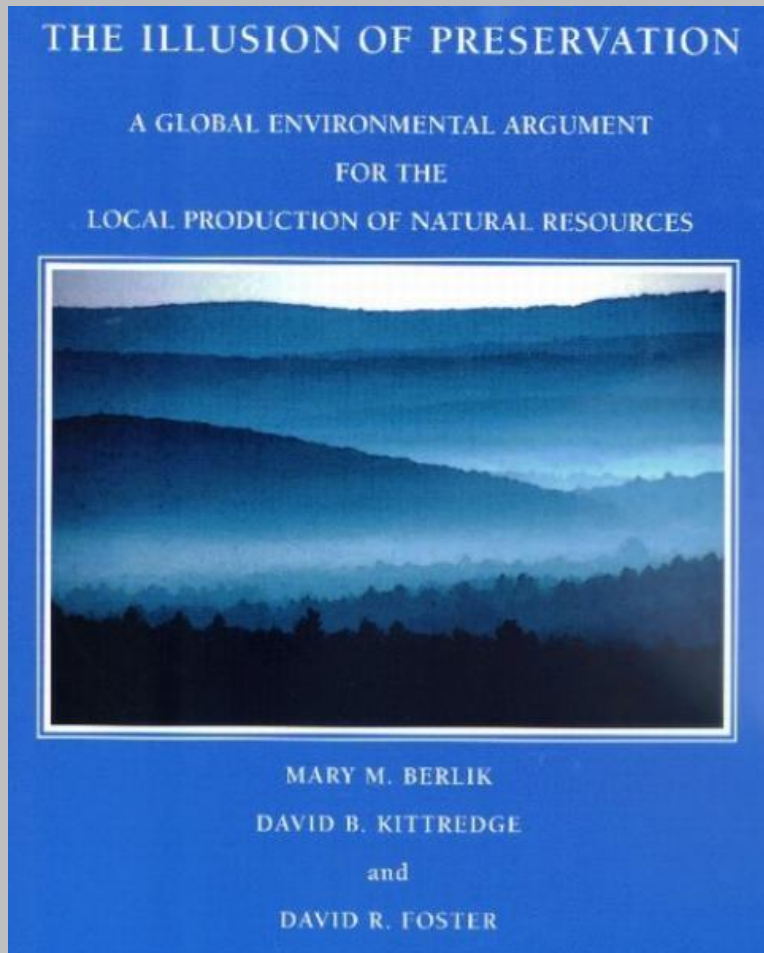


# Massachusetts Executive Office of Energy & Environmental Affairs (EEA)



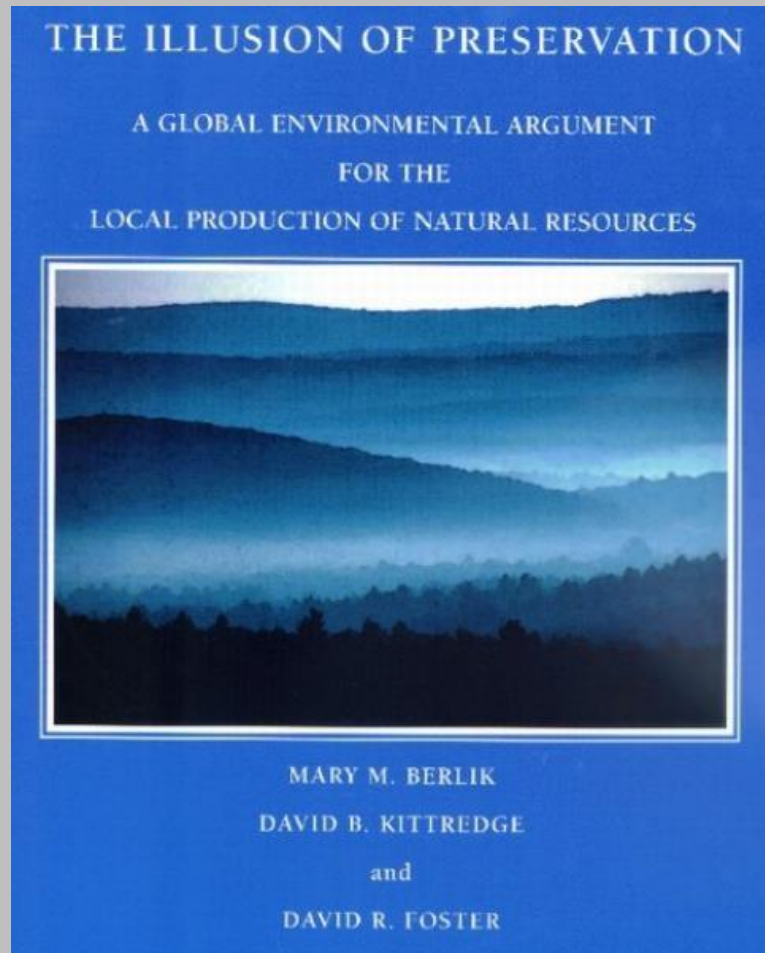
- **Environmental Justice** (EJ) is based on the principle that all people have a right to be protected from environmental hazards and to live in and enjoy a clean and healthful environment.
- EJ is the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies and the equitable distribution of environmental benefits.
- EEA's Draft Environmental Justice (EJ) Strategy is part of Executive Order 552, which requires that EEA agencies develop their own strategies to “proactively promote environmental justice in all neighborhoods in ways that are tailored to their agencies’ mission.” EEA’s EJ Office convened and led the EJ Task Force to develop this draft EJ Strategy. EEA is taking public comments on the draft EJ Strategy until January 27, 2023.

## NRC 225 Forests and People Spring 2023



**How much of our own wood consumption can we sustainably supply from our own forestlands while also having high amounts of carbon storage, high quality recreational opportunities, a diversity of wildlife habitat, and extensive forest reserves where no commercial harvesting occurs?**

## NRC 225 Forests and People Spring 2023



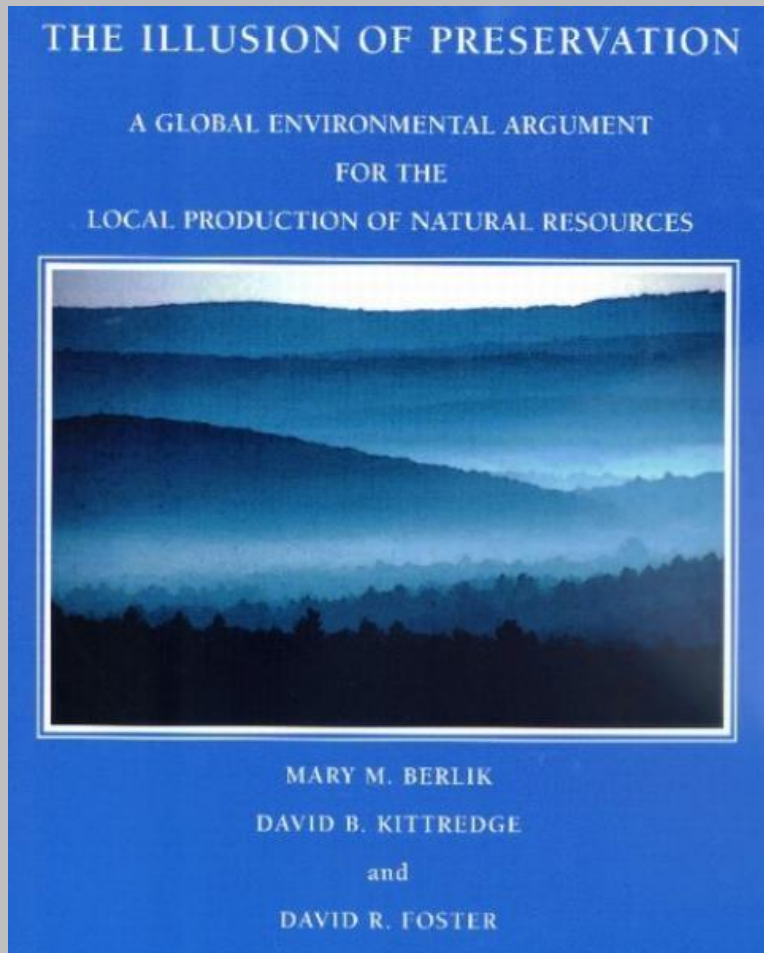
2% → 12%

Such higher levels of production would contribute toward meeting more of our own needs at home and lessen the need to bring wood from elsewhere.

To the citizen, tourist, or person enjoying the outdoors in rural Massachusetts, we believe that such heightened timber management would not look appreciably different from the current heavily forested condition.



## NRC 225 Forests and People Spring 2023

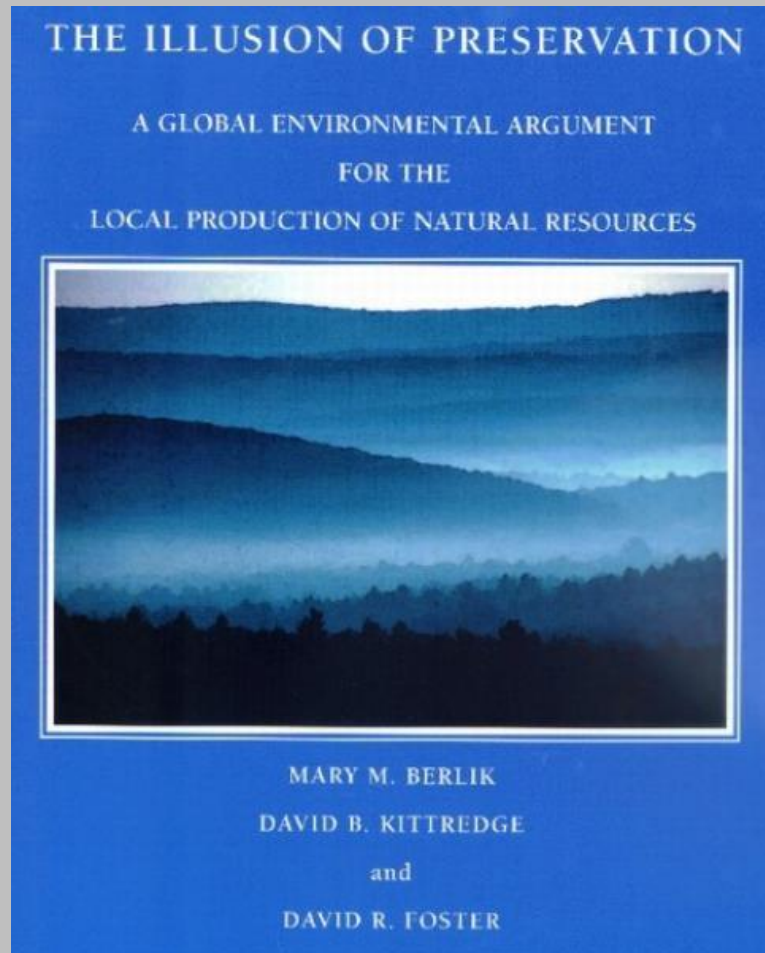


**What would a forested landscape look like that was sustainably producing 12% of our annual wood consumption?**

It would not require highly intensive silvicultural methods, such as planting, fertilization, pesticides, monocultures, genetically improved trees, or pre-commercial thinning.

All the evidence considered in the development of our overall sustainable growth estimate was based on conventional silvicultural scenarios of natural regeneration of mixed stands of native species composition, and intermediate thinning typical of conventional New England “woodlot” management.

## NRC 225 Forests and People Spring 2023



[https://masswoods.org/sites/masswoods.org/files/pdf-doc-ppt/IllusionofPreservation\\_0.pdf](https://masswoods.org/sites/masswoods.org/files/pdf-doc-ppt/IllusionofPreservation_0.pdf)

### What are the climate change implications of substituting other materials for wood?

Steel, concrete, and aluminum can replace wood in construction, but these materials incur serious environmental, transportation, and energy costs (Bowyer, 1994)

Lumber is the least energy intensive construction material and its production releases significantly less carbon dioxide and toxic products than substitutes (Table 1).

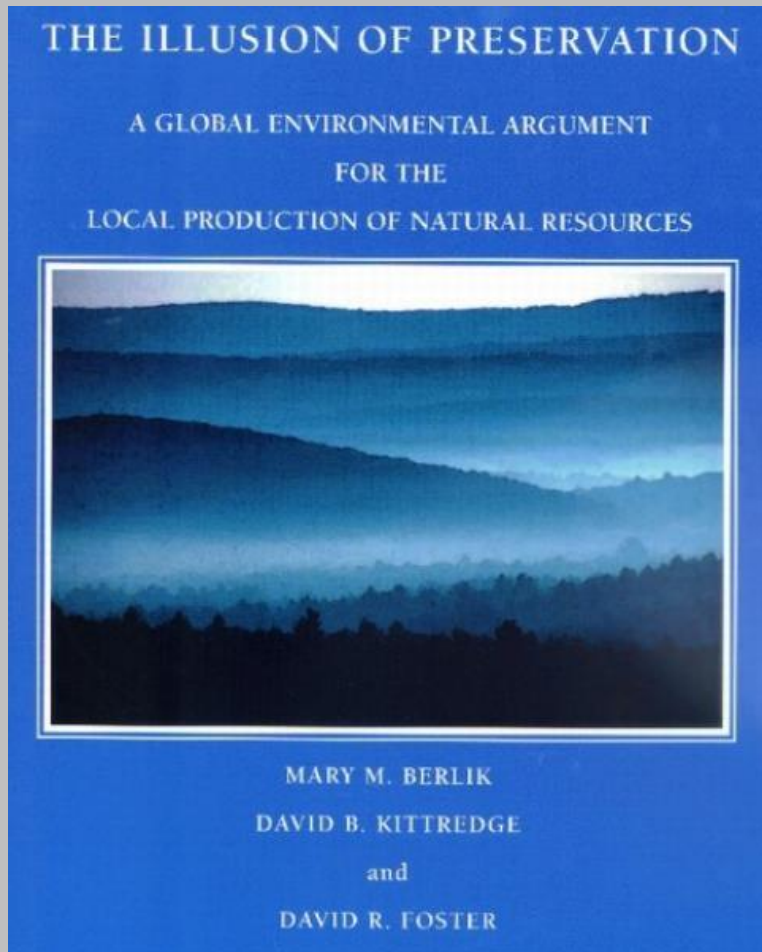
TABLE 1: Energy use by material.

Material	Fossil fuel energy (MJ/kg)	Fossil fuel energy (MJ/m <sup>3</sup> )
Rough sawn timber	1.5	750
Concrete	2	4,800
Steel	65	266,000
Aluminum	435	1,100,000

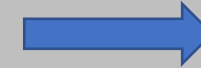
[Source: [www.fwprdc.org.au/publications/online/epotbrochure/manufacture](http://www.fwprdc.org.au/publications/online/epotbrochure/manufacture). Ferguson, I., B. La Fontaine, P. Vinden, L. Bren, R. Hateley, and B. Hermesec, 1996, "Environmental Properties of Timber." Research Paper commissioned by the Forest & Wood Products Research & Development Corporation.]



## NRC 225 Forests and People Spring 2023



2%



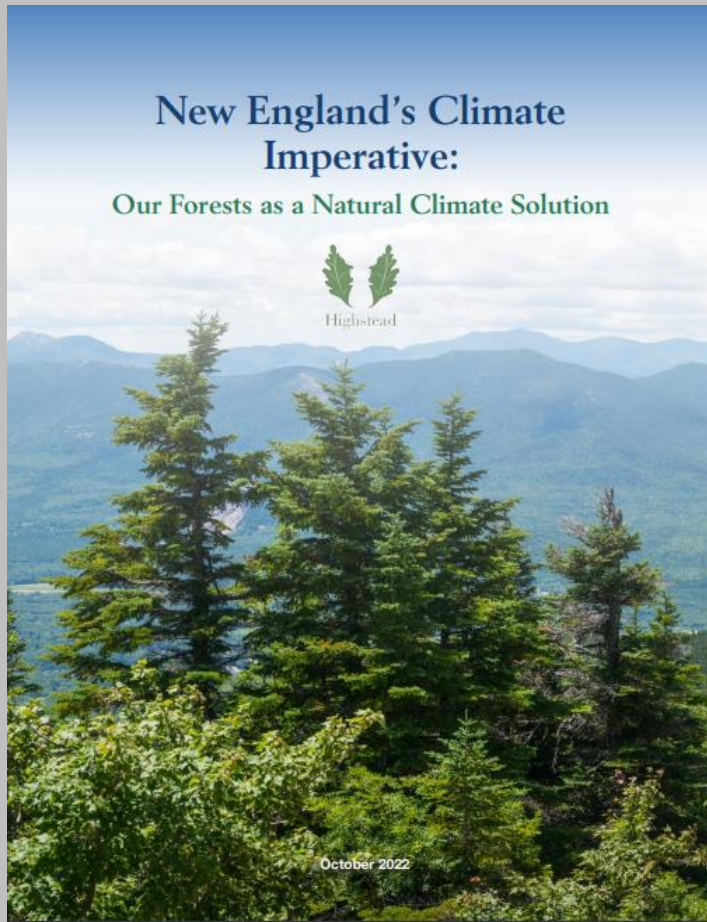
25%

1. Decrease consumption of wood products (and substitutes) for paper and construction by  $\geq 15\%$  to match European rate;
2. Increase recycling rates of wood fiber, solid wood, and paper products from  $< 50\%$  to  $\geq 70\%$  to match European rate;
3. Pursue a balanced approach to forest conservation based on large forest preserves, increased and sustainable production from native forests, and intensive management of plantations.

## NRC 225 Forests and People Spring 2023

### KEY FINDINGS

New England forests are a critical yet underutilized tool in fighting climate change. They store massive amounts of carbon—and each year they sequester more.



**14%**  
of CO<sub>2</sub> emissions is  
absorbed by  
New England forests  
each year

New England  
forests can do  
even more to  
tackle climate  
change....

Five Forest  
Carbon Pathways  
can be followed...

**21%**  
of current CO<sub>2</sub> emissions  
could be sequestered by  
adopting these pathways

  
**28,000 acres**  
of forests are permanently  
converted to development  
each year

Revise state  
property tax policies  
to incentivize  
keeping forestland in  
forest use

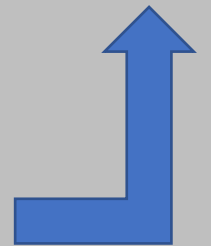
 **Avoided Deforestation:**

 **Wildland Reserves**

 **Improved Forest Management**

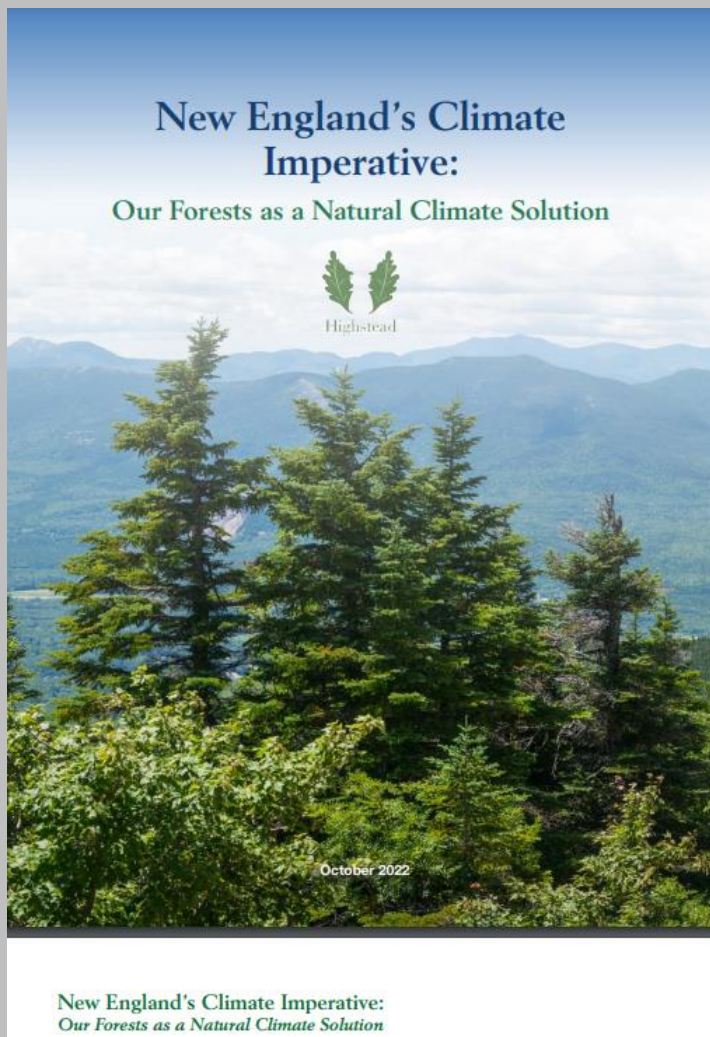
 **Mass Timber Construction**

 **Urban and Suburban Forests**





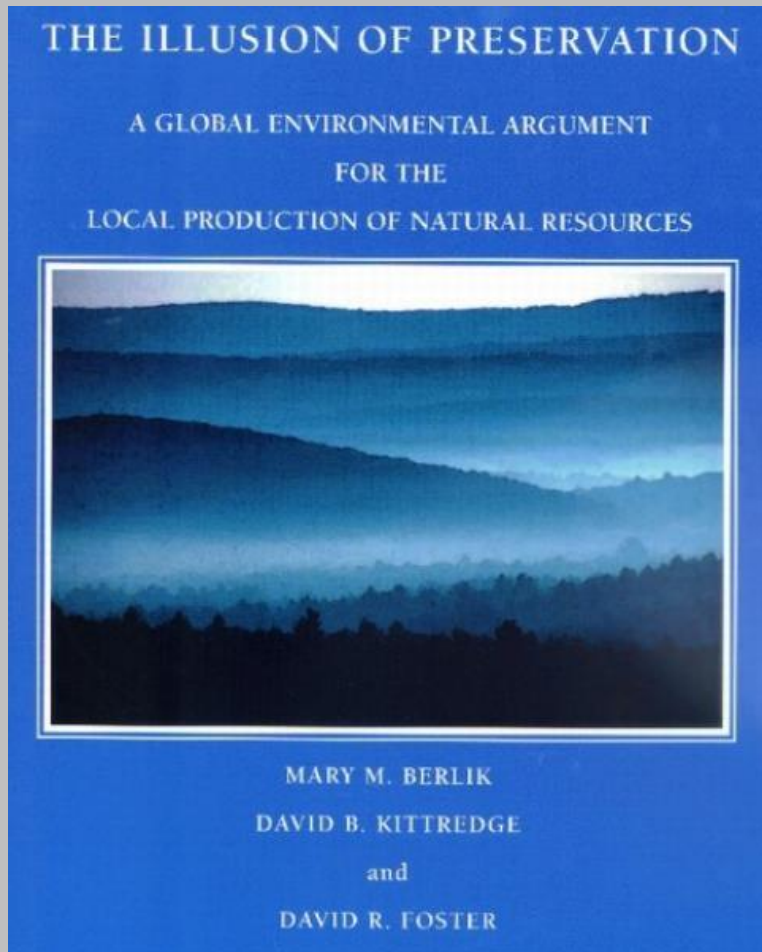
## NRC 225 Forests and People Spring 2023



Pathway	Description and Carbon Benefit
<b>Avoided Deforestation</b>	Reduce the current average number of acres of forestland converted to other land uses (e.g., residential development) to retain existing forest carbon storage and sequestration capacity.
<b>Wildland Reserves</b>	Designate additional Wildland Reserves to let trees reach old growth age to accumulate and store more carbon.
<b>Improved Forest Management (IFM)</b>	Society is heavily dependent on wood products, and New England is a great place to grow trees. Employ climate smart forest management techniques that maintain harvest volumes while also increasing carbon storage (an additional 203 million U.S. tons CO <sub>2</sub> e could be sequestered by 2050). Thin some [over-stocked] forest areas to increase productivity, increase rotation ages on most stands, and shift some harvests to at-risk stands.
<b>Mass Timber Construction</b>	Substitute mass timber materials for concrete and steel to store more carbon and decrease carbon emissions associated with carbon-intensive building materials
<b>Urban and Suburban Forests</b>	Increase tree cover and patches of forest in urban areas.



## NRC 225 Forests and People Spring 2023



- Currently there is no environmental ethic focused on meeting wood needs locally and little criticism of consumption behavior.
- Instead, an anti-logging ethic reigns and degradation of the global environment ensues.
- A new environmental effort is needed to expose this illusion of preservation. This effort will depend primarily on greater discussions concerning the ethical implications of excessive consumption joined with indiscriminate protectionism.
- The message could become stronger and more locally relevant in the context of programs that reduce wood use and encourage ecologically sound harvesting.

# T<sup>3</sup>

## (Think Things Through)

Always ask yourself: “OK, if we do that, *then what?*”

“What are the ramifications and outcomes (the domino effect) of taking a recommended action?”

- If we stop using wood products, what is the carbon cost of alternative materials used to replace wood?
- If we continue to use wood products, do we not have a responsibility to account for any and all environmental and social impacts of that use?

# As Mass Timber Takes Off, How Green Is This New Building Material?

*Mass timber construction is on the rise, with advocates saying it could revolutionize the building industry and be part of a climate change solution. But some are questioning whether the logging and manufacturing required to produce the new material outweigh any benefits.*

BY JIM ROBBINS • APRIL 9, 2019



Mjøsa Tower, the world's tallest wooden building, under construction in Brumunddal, Norway. [ANTI HAMAR](#)

<https://e360.yale.edu/features/as-mass-timber-takes-off-how-green-is-this-new-building-material>



Mass Timber – large structural panels, posts, and beams glued under pressure or nailed together in layers, with the wood’s grain stacked perpendicular for extra strength – is not only prized as an innovative building material, superior to concrete and steel in many ways, it is also hoped it will come into its own as a significant part of a climate change solution.

Among architects, manufacturers, and environmentalists, many want nothing less than to turn the [coming decades](#) of global commercial construction from a giant source of carbon emissions into a giant [carbon sink](#) by replacing concrete and steel construction with mass timber. That, they say, would avoid the CO2 generated in the production of those building materials and sequester massive amounts of carbon by tying up the wood in buildings for decades or even longer, perhaps in perpetuity.

There are new mass timber buildings in London, Atlanta, and Minneapolis, and an 80-story high-rise is proposed for Chicago.



Mjøsa Tower, the world's tallest wooden building, under construction in Brumunddal, Norway. [ANTI HAMAR](#)

“Because its components are fabricated off-site to [precise specifications], it goes together really fast on site,” said Dawson. “So you can cut months off the construction time. It’s more predictable than concrete. You can work through cold weather and don’t have to worry about the temperature tolerances of concrete. It’s also a lot quieter than other kinds of construction, so you can be a good neighbor.” It’s stronger than steel, lighter, and, surprisingly, may be as fireproof.

Architects say the exposed wood interiors in these buildings are warmer than other materials and far more aesthetically pleasing. [Michael Green](#), who builds mass timber structures in British Columbia, said some people walk into buildings he has designed and want to hug the wooden interiors. The dense laminated beams also hold up well to fire, unlike other kinds of wood construction.



Mjøsa Tower, the world's tallest wooden building, under construction in Brumunddal, Norway. [ANTI HAMAR](#)

<https://e360.yale.edu/features/as-mass-timber-takes-off-how-green-is-this-new-building-material>



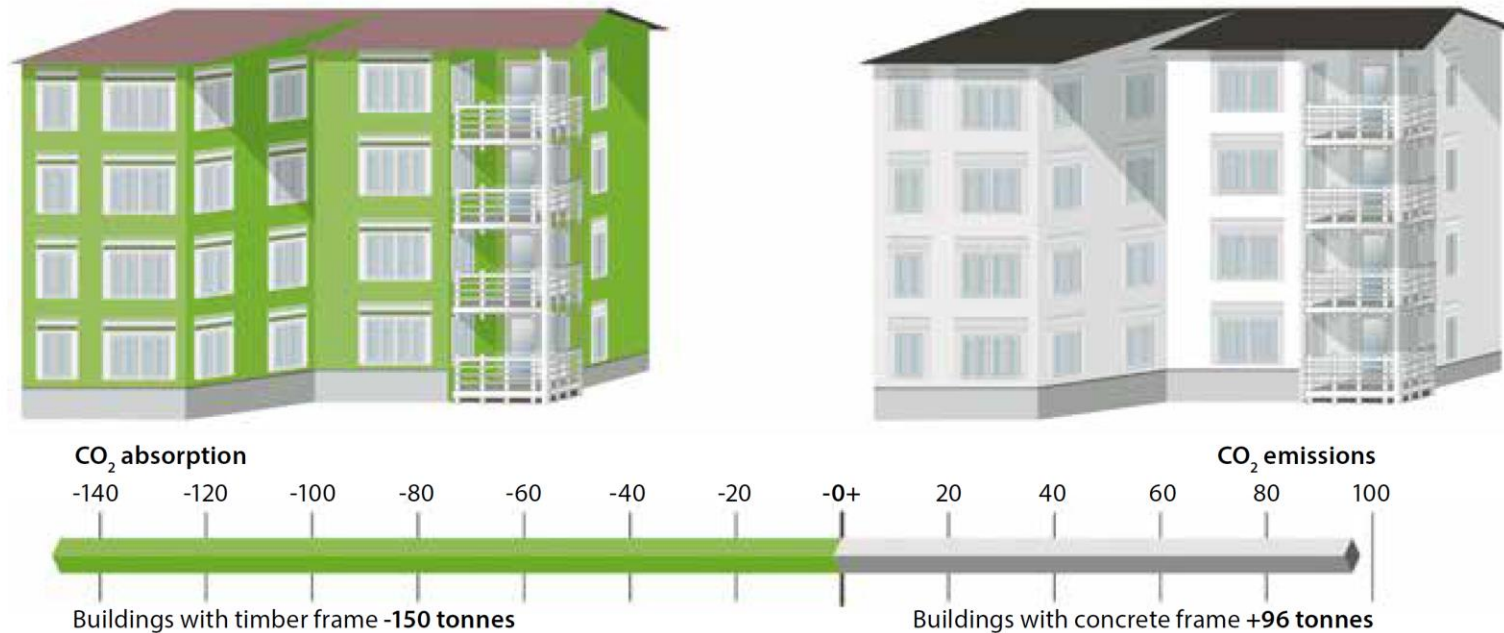
### Carbon dioxide balance in the production of a four-storey building

The carbon dioxide balances for two otherwise identical houses—one with a timber frame and the other with a concrete frame—have been compared over a 100-year period. The study has been carried out by researchers from Mid Sweden University in collaboration with, among others, Finnish researchers. The figure shows net emissions of

around 96 tonnes of carbon dioxide from the building with the concrete frame, while the building with the timber frame produces no emissions; instead it had a net uptake of 150 tonnes of carbon dioxide (a positive value means net emissions, a negative value means net uptake).

Building with timber frame

Reference building with concrete frame



*The analyses take into account energy consumption in the production and distribution of the building materials used, as well as the construction of the building. In the case of the wooden building it is assumed that the by-products from harvesting of the forest and production of the sawn timber are used as biofuel and thus replacing fossil fuels. In the case of the concrete building, the uptake of carbon dioxide by the cement through the carbonisation process has been taken into account. It has also been assumed that the harvested trees are replaced by new saplings that bind carbon dioxide through photosynthesis. The carbon from the harvested trees is stored in the wood as long as the material still exists. It is assumed that once the buildings have been demolished the wood will be used to replace fossil fuels.*

Source: Mid Sweden University.

**150  
Tonnes  
Carbon  
Stored**

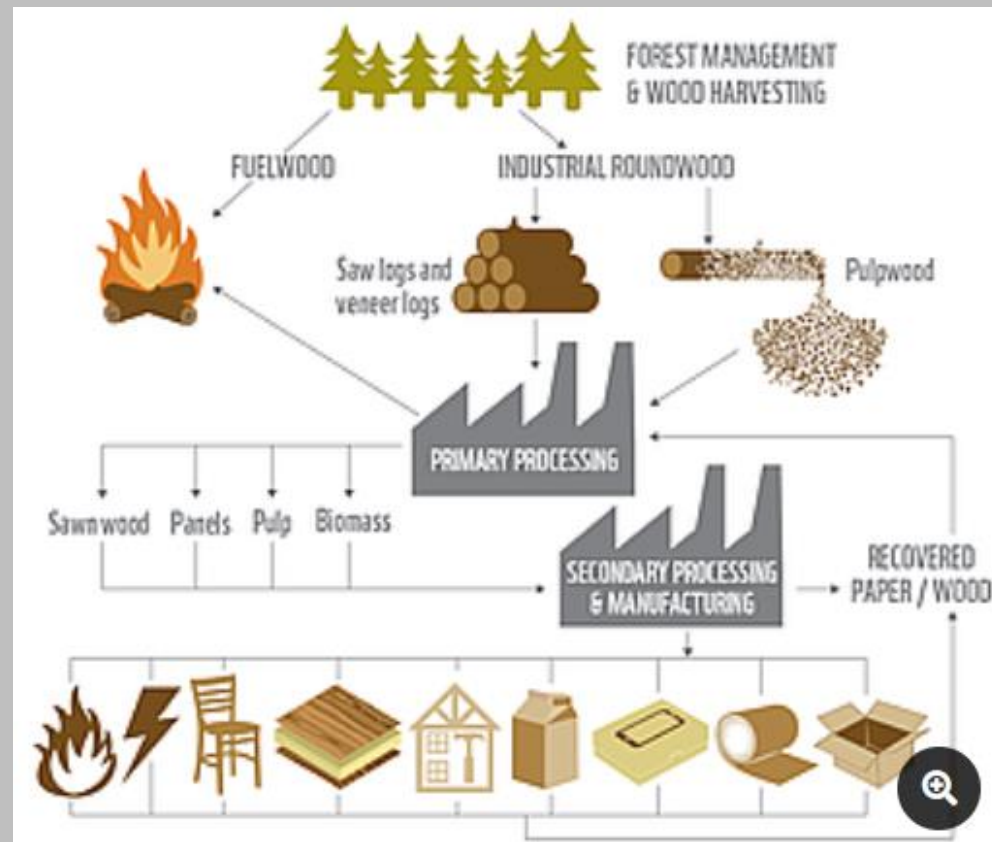
**96  
Tonnes  
Carbon  
Emitted**



## NRC 225 Forests and People Spring 2023

### The Wood We Use:

From Forest → Mill → Manufacturing → Market (Societal Demands for Wood)



## NRC 225 Forests and People Spring 2023

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.



The IPCC found that sustainably managing forests will yield the highest carbon benefits over the long term because of its ability to mitigate carbon-emitting disturbance events and store carbon in harvested wood products. Sustainable forest management can lower greenhouse gas (GHC) emissions, enhance forest carbon sequestration and maintain forest carbon stocks.

<https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg3-chapter9-1.pdf>

## NRC 225 Forests and People Spring 2023

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.

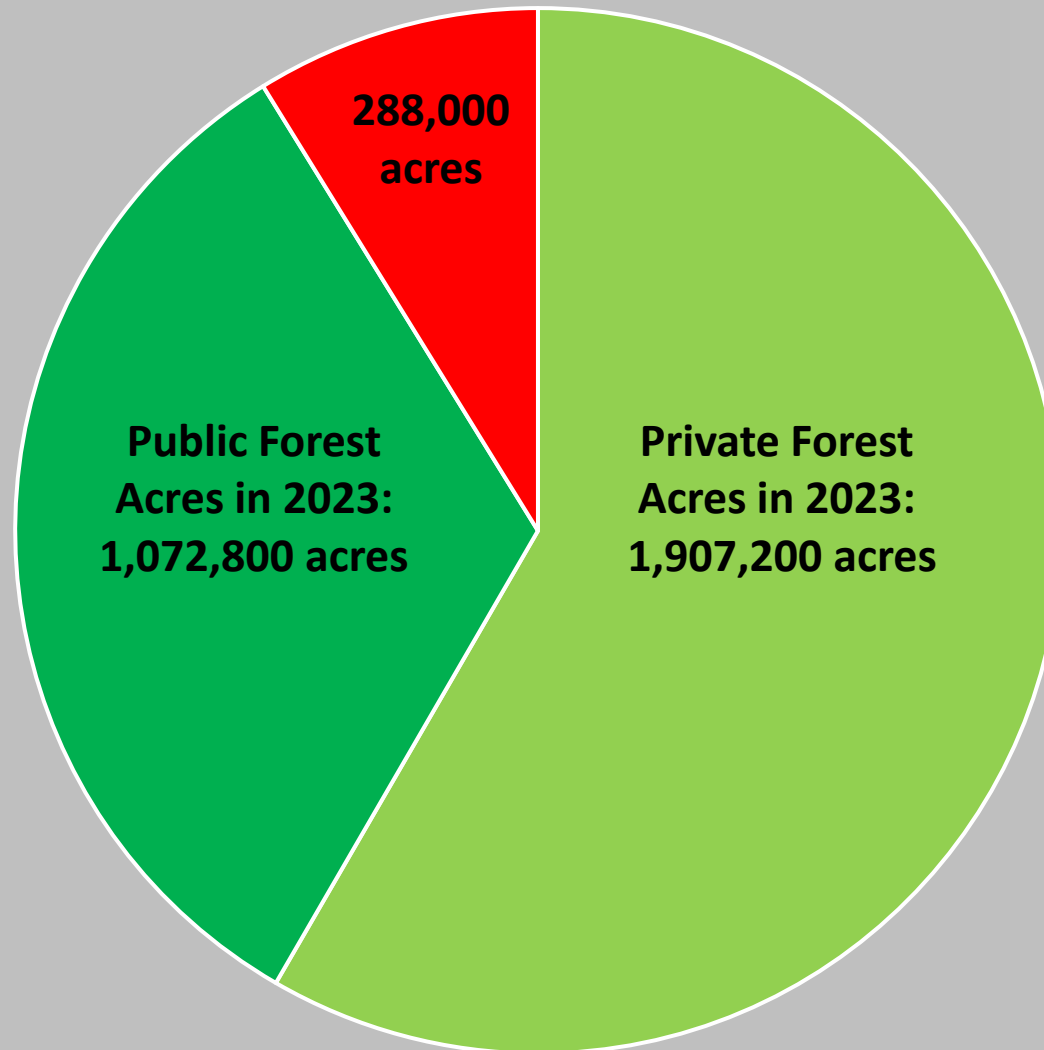


Forestry can make a very significant contribution to a low-cost global mitigation portfolio that provides synergies with adaptation and sustainable development. However, this opportunity is being lost in the current institutional context and lack of political will to implement and has resulted in only a small portion of this potential being realized at present (high agreement, much evidence).

<https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg3-chapter9-1.pdf>



## NRC 225 Forests and People Spring 2023



**Forest Conversion to Development  
in Massachusetts 1980-2020**

**The single most important  
conservation action humans can  
take to mitigate climate change is to  
retain forestland in forest use.**

**Why don't we do a better job of this  
in Massachusetts?**

**NRC 225 Forests and People Spring 2023**

**Ecosystem  
Services**

