WHY FORESTS NEED TO BE ENLISTED IN CLIMATE CHANGE ACTIONS

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> *"Forests have a vital role to play in overcoming this challenge. Rainforests store vast amounts of carbon. That's true across the planet, and in America, too. Our Tongass National Forest, a temperate Alaskan rainforest comprises only 2% of America's forest land base, but may hold as much as 8% of all the carbon contained in the forests of the United States."*
> **Secretary of Agriculture, Tom Vilsack**
> http://www.usda.gov/blog/usda/entry/h2_the_urgent_need_to 12.17.2009

FORESTS AND CARBON CYCLES

Forests are a critical part of the global atmospheric carbon cycle that contribute to climate stabilization by absorbing (sequestering) and storing vast amounts of carbon dioxide (CO_2) in trees (live and dead), soils, and understory foliage. Photosynthesis is the process by which forests fix carbon – that is, plants absorb CO_2 and use light energy and water to manufacture carbohydrates as food, releasing oxygen as a byproduct.

As a forest ages, it continues to accumulate and store carbon, functioning as a net carbon "sink" for centuries. Ongoing carbon accumulation and storage have been measured in old forests that are >800

years old[1].

When an old-growth forest is cut down, much of this stored carbon is released as CO_2 – a global-warming pollutant – switching it from a sink to a "source" or "emitter" of CO_2. For instance, nearly 60% of the carbon stored in an old-growth forest is emitted as CO_2 when it is converted to young growth, via decomposition of logging slash, fossil-fuel emissions from transport and processing, and decay or combustion (within 40-50 years) of forest products, often in landfills[2]. Planting or growing young trees does not make up for this release of CO_2 from a logged forest. Indeed, after a forest is clearcut, it remains a

Logging on the Tongass rainforest releases vast amounts of CO_2 as a global warming pollutant

net CO_2 emitter for its first 15 or more years, and even if not cut down again will not reach the levels of carbon stored in an old forest for centuries. Globally, deforestation and forest degradation contribute about 17% of the world's annual greenhouse gas

[1] Luyssaert, S. et al. 2008. Old-growth forests as global carbon sinks. Nature 455:213-215

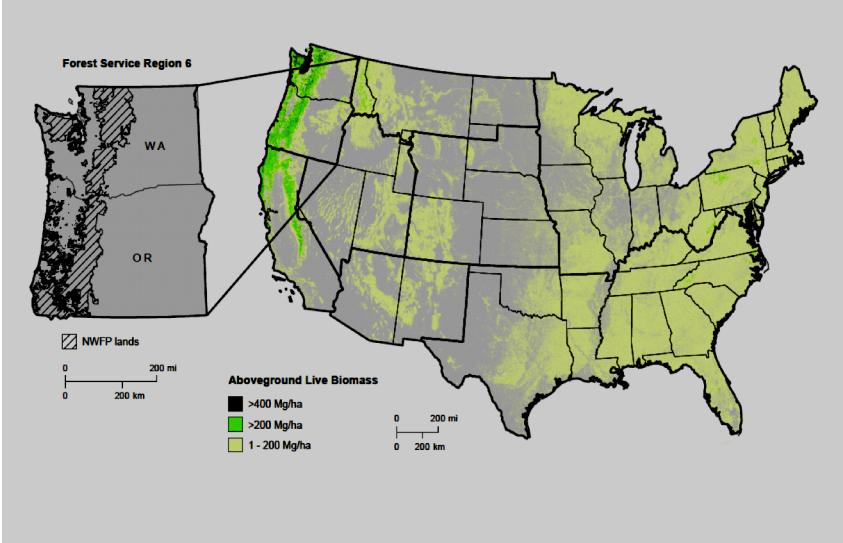
[2] Harmon, M.E. W.K Ferrel, J. F. Franklin. 1990. Effects on carbon storage of conversion of old –growth forests to young forests. Science 247:699-702

pollutants[3], more than the entire global transportation network, which is why many countries are seeking ways to reduce greenhouse gas emissions from logging.

ENLISTING CARBON RICH FORESTS IN CLIMATE CHANGE ACTIONS

Scientists and many countries have increasingly recognized that if we are to avoid catastrophic effects of global warming within this century, we must take a comprehensive approach to reducing greenhouse gas pollution overall. Part of the solution to global warming must come from reducing emissions from forest losses, as recognized by the United Nations REDD+ (Reduce Emissions from Deforestation and Forest Degradation[4]) Programme in developing countries. The U.S. can provide these countries with a leadership example by conserving its own older forests.

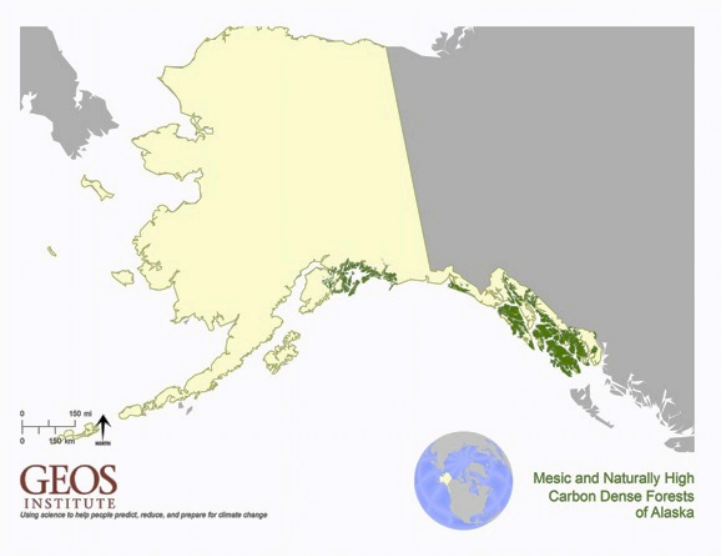
Forests in the United States, especially older carbon dense ones, can play a critical role in reducing climate change impacts through sequestering and storing carbon for centuries if undisturbed. New forest and inventory and analysis (FIA) data from the USDA Forest Service demonstrates that the U.S. forests store the equivalent of around 21% of the nation's emissions[5]. Notably, National Forests store approximately 28% more carbon than private lands and therefore are important as carbon sinks.



Naturally carbon dense forests in moist areas with long fire return intervals (green areas on the map are preliminary estimates) maintain carbon stores for centuries if they are undisturbed.

[3] Intergovernmental Panel on Climate Change. 2007. Synthesis report. An assessment of the IPCC on climate change.
[4] http://www.un-redd.org/
[5] King et al. 2012: Front. Ecol. Enviro 10 (10):512-519.

Importantly, forests in the Pacific Northwest are nationally significant carbon stores[6], mostly because of the strategic role older forests provide as carbon sinks. Additionally, mature moist forests on public lands in Oregon and Washington store the equivalent of nearly 130 times the state's annual greenhouse gases[7].



Alaska's Tongass rainforest is also a global champion in storing carbon (green areas on map). These rainforests store the equivalent of nearly 80 times Alaska's annual emissions[8].

For more information go to http://www.geosinstitute.org/banking-on-forests.html

FOREST CARBON FACT FINDER:

- Managing forests to optimize carbon stores through preservation or lengthened timber rotations would provide co-benefits for climate adaptation, including clean water, climate refugia, and connectivity across fish and wildlife habitat.
- More carbon is removed by thinning than the most severe forest fires because, in order to influence fire behavior, forests need to be thinned over large landscapes resulting in cumulative losses of stored carbon and emissions from fossil fuels, including biomass conversion.
- Accurate assessment of whether a forest practice yields carbon benefits requires managers to conduct a life-cycle analysis of "upstream" and "downstream" carbon losses, as well as gains.

[6] www.fs.fed.us/rmrs/forest-carbon/

[7] Over 9 million acres of older carbon dense forests have been identified in Oregon and Washington (Krankina in review). These 9 million acres store about 450 metric tons of carbon per acre or 15 billion metric tones of CO_2 (e) total. By comparison, Oregon and Washington emitted about 115 million metric tones of CO_2 (e) in 2010.

[8] 5 million acres of old-growth rainforest store about 234 metric tons of carbon per acre or 4 billion metric tons of CO_2 (e). By comparison, Alaska emitted 55.2 million metric tons of CO_2 (e) in 2010.