Are forest climate mitigation strategies one-size-fits-all?

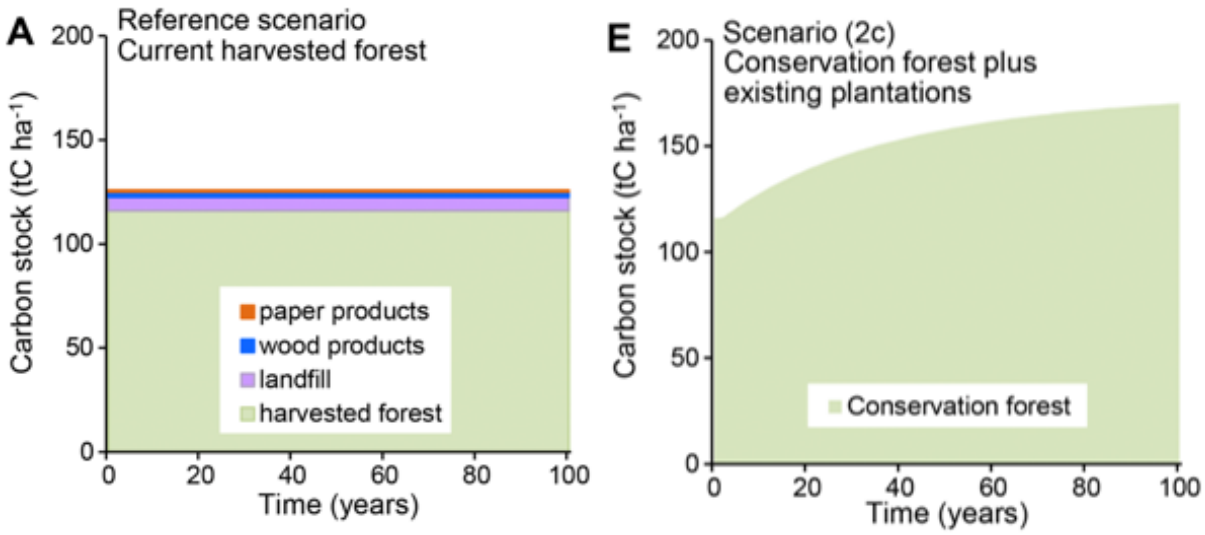
December 15 2015, by Jeff Atkins

The IPCC's Fifth Assessment lists sustainable harvesting as having the most significant climate mitigation benefit for the world's forests. This view has been widely embraced, from the media to forest managers. However, researchers from Australian National University and Griffith University show this may not be a one-size-fits-all strategy. In their October, 2015 article in PLOS ONE, "Under what circumstances do wood products from native forests benefit climate change mitigation?", Heather Keith, David Lindenmayer, Andrew MacIntosh, and Brendan

Mackay examine different scenarios of forest management and their effects on climate mitigation and find that a strategy that maintains and conserves native forests while moving timber and wood products to existing plantations offers the most significant climate mitigation benefit in the case of two Australian forest types.

Forests serve to mitigate climate by storing carbon. As a forest develops and matures, it not only stores carbon in the standing biomass (a tree is half carbon—so the bigger the tree, the more carbon that is being stored), trees also expand root systems and facilitate carbon storage in forest soils through the accumulation of soil organic matter, humus, and litter on the forest floor. Mature forests often have dense canopies that create cooler environments within the forest, allowing litter and organic matter to build up, furthering the storage of carbon in various forest pools.

In a mixed eucalyptus forest in the South Coast of New South Wales, Keith et al. estimate that conserving the forest and using plantations to create wood products increases the forest carbon accumulation rate between 5-10%. In mountain ash forests of the central highlands of Victoria, they estimate this method to increase carbon accumulation by 40-50%. While the research is informed by two Australian case studies, a wide range of published forest parameters and values were used in the model and, in the assertion of the researchers, these findings are likely relevant for native forests, world-wide, with the largest climate mitigation benefits in the first 100 years following implementation.



At left, total carbon stocks in an Australian eucalyptus forest under current harvest. At right, total carbon stocks using both plantations and conservation strategies. As the conservation model approaches 100 years, more carbon is stored in the forest, but the reference scenario remains static (adapted from Keith et al. 2015).

An increase in carbon accumulation of 40-50% over other harvest methods is a substantial amount. When we think of the range of native forests in other countries and the potential for conservation, the appeal of this strategy is evident. Not only are there the direct mitigation benefits of preserving native forests, but potentially other significant ecological and social benefits for preserving native forests—from preservation of biodiversity to increased opportunities for recreation and tourism.

"Native forests are most valuable for mitigation when conserved because their biomass carbon stocks continue accumulating under natural ecosystem processes of regeneration and growth." – Keith et al. 2015

The conservation strategy outlined by Keith et al. not only depends on conserving the native forests and allowing them to mature, but also on utilizing existing plantations to produce the supply of wood products needed to offset the supply lost by taking native forests out of the production cycle.

Wood products typically produce fewer greenhouse gas (GHG) emissions than non-wood, more fossil fuel intensive alternatives. Wood products also have the benefit, again since wood is 50% carbon, of serving as a primary unit of carbon storage. Moving wood production to plantations rather than native forests also limits GHG emissions through the streamlining of the process as plantation forestry is more streamlined.

"The efficiency of plantation production is demonstrated by the total carbon dioxide emissions for logs from softwood plantations being 50–75% less than for hardwood logs from native regrowth forests in Australia. Emissions per cubic metre of log harvested from Australian native hardwood forests were estimated to be among the highest in the world [61]. Carbon storage can be maximised in plantations by increasing the proportion of merchantable biomass, efficiency of processing, and longevity and recycling of products." – Keith et al. 2015

It is likely, given the agreement reached among nearly 200 nations at COP21 this past week, that forest conservation as a climate mitigation tool will be rather popular. The COP21 agreement not only highlights the needs for incentives to avert further deforestation, but also includes specific language on utilizing conservation and sustainable management to conserve forests and bolster forest carbon stocks. While the inclusion

of forest conservation may be partly attributable to the need to exclude language from the agreement regarding greenhouse gas neutrality, it is still a promising step.

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