



## Deforestation and Climate Change

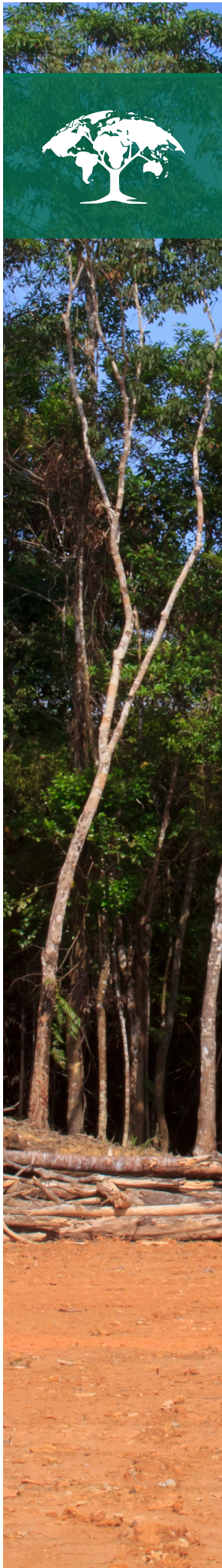
Richard A. Houghton and Alessandro Baccini

### KEY SCIENCE POINTS

- 450 billion tons of carbon are stored in the vegetation (biomass) of the world's forests. This is more than half the amount now in the atmosphere.
- Another 500 billion tons of carbon are stored in forest soils.
- Deforestation and forest degradation release 1 billion tons of carbon to the atmosphere each year, most of it from the vegetation but about 25% from soils.
- Emissions from deforestation represent 10% of CO<sub>2</sub> emissions annually.

Each year, 1 billion tons of carbon are released to the atmosphere from deforestation, forest degradation, and other types of land use, making “deforestation” second only to fossil fuel combustion as the major source of CO<sub>2</sub> driving climate change. Commercial and subsistence agriculture, logging and the road building associated with these economic pursuits continue to threaten intact forests in many countries across the tropics, where deforestation rates continue to climb.

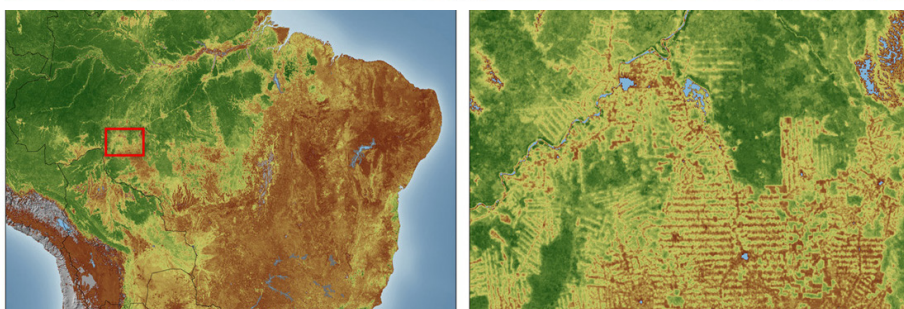
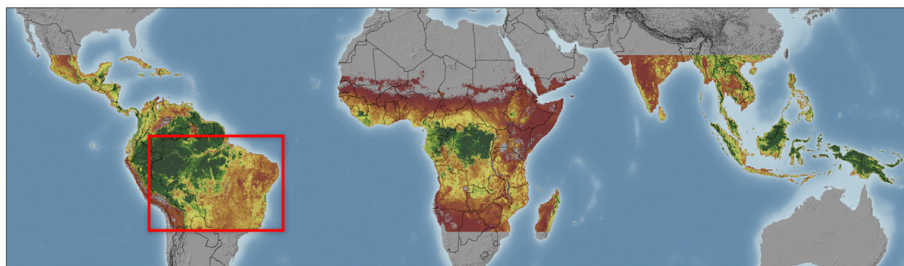
The vital role of forests in mitigating climate change was recognized in 2008 by the United Nations in the creation of the Reducing Emissions from Deforestation and forest Degradation (REDD) program, which seeks to reward developing countries for reducing deforestation and for increasing carbon stocks in forests.





## IMPLICATIONS

- Global population is expected to reach 9 billion by 2050, amplifying the need for food, fiber and fuel and putting pressure on remaining forest areas.
- To withstand that pressure, forests have to be protected, either by regulations, the market, or other financial mechanisms recognizing the importance of forests in mitigation and adaptation to climate change.
- These mechanisms will require frequent and accurate monitoring, reporting, and verification (MRV) of changes in forest carbon stocks.
- MRV will require a combination of on-the-ground and satellite-based data on rates of deforestation and changes in carbon stocks.
- Countries are most likely to accept REDD+ if the data and models necessary for MRV are developed with scientists from those individual countries.



Predicted Aboveground Woody Biomass  
0 10 100 175 250 >450  
tonnes per hectare

Cartography by Greg Fiske

## RECOMMENDATIONS

- Identify lands best suited for conservation and those best suited for agricultural development
- Implement policies that encourage optimal land use.
- Provide economic incentives for forest communities to avoid deforestation.
- Measure progress in maintaining forests by monitoring changes in aboveground carbon including deforestation, degradation and growth.
- Use observations and models to account for belowground pools of carbon and carbon removed for wood products.
- Protect forests, especially in regions where carbon storage or potential carbon storage is highest.

## FURTHER READING

Baccini, A., S.J. Goetz, W.S. Walker, N.T. Laporte, M. Sun, D. Sulla-Menashe, J. Hackler, P.S.A. Beck, R. Dubayah, M.A. Friedl, S. Samanta, and R.A. Houghton. 2012. Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. *Nature Climate Change* 2:182-185; doi:10.1038/nclimate1354.

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