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How forest management and deforestation are impacting climate

Date: February 4, 2016
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Summary: Two new studies reveal how altering the composition of trees in forests is influencing not only the carbon cycle, but air surface temperatures to a significant degree as well.
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FULL STORY



Coniferous (dark green) and broadleaved (light green) trees in summer in Alsace (France) exhibit differences in surface properties. This material relates to a paper that appeared in the Feb. 5, 2016, issue of Science, published by AAAS. The paper, by K. Naudts at Institut Pierre Simon Laplace in Gif-sur-Yvette, France, and colleagues was titled, "Europe's forest management did not mitigate climate warming."

Credit: Ernst-Detlef Schulze

Two new studies reveal how altering the composition of trees in forests is influencing not only the carbon cycle, but air surface temperatures to a significant degree as well. The results highlight how human-made changes to forests hold more severe consequences than previously believed. Worldwide, reforested areas are increasingly prominent; for example, in Europe, 85% of forests were managed by humans as of 2010. Strong favoritism of foresters to plant more commercially valuable trees -- such as Scot pines, Norway spruce and beech -- has resulted in reforestation of 633,000 square kilometers of conifers at the expense of broadleaved forests, which decreased by 436,000 square kilometers since 1850.

To gain more insights into the impact of this favoritism, Kim Naudts and colleagues reconstructed 250 years of forest management history using a land-cover model, but also included forest management factors such as changes in tree species. Their analysis reveals that the conversion of broadleaved forests to coniferous forests caused significant changes in evapotranspiration and albedo, the amount of solar energy reflected from the Earth back into space. These changes, in combination with the release of carbon that is associated with managed forests, are contributing to warming rather than mitigating it. This is happening despite an overall increase in tree coverage.

Thus, climate frameworks should account for land management practices in addition to land cover when trying to mitigate warming, the authors say.

A second study describes how changes in global forest cover are affecting the fluxes of energy and water between the land and the atmosphere, and how this process can vary across different forest regions. In the past, the degree to which biophysical effects of deforestation can influence climate have been debated in the scientific community, but these results shed new light on the matter, suggesting that aridness and forest type are important variables.

Such data could better inform climate treaties, the authors, Ramdane Alkama and Alessandro Cescatti, note. Their analysis, based on satellite data of surface temperature and variations in forest cover, reveals that forest clearing is causing an increase in average and maximum surface temperatures, except at the northernmost latitudes.

They note that evapotranspiration plays a key role in how forest clearing impacts temperatures, since arid areas show the strongest warming pattern, followed by the temperate, the tropical, and the boreal zones. Together, these two studies demonstrate previously unappreciated complexities of the role that forests play in affecting the carbon cycle and air surface temperatures.

Story Source:

The above post is reprinted from materials provided by **American Association for the Advancement of Science**. *Note: Materials may be edited for content and length.*

Journal References:

1. K. Naudts, Y. Chen, M. J. McGrath, J. Ryder, A. Valade, J. Otto, S. Luyssaert. **Europes forest management did not mitigate climate warming.** *Science*, 2016; 351 (6273): 597 DOI: 10.1126/science.aad7270
2. R. Alkama, A. Cescatti. **Biophysical climate impacts of recent changes in global forest cover.** *Science*, 2016; 351 (6273): 600 DOI: 10.1126/science.aac8083

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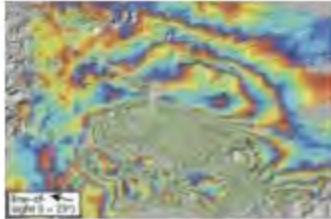
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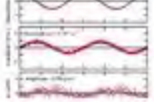
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