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NEWS

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Cutting down just a few trees affects climate

Chopping down vast swathes of forest is known to have an effect on climate, but what is the impact of cutting down a handful of trees? A new study (http://iopscience.iop.org/1748-9326/9/3/034002/article) shows that even small-scale land clearance – a few hectares or less – causes a noticeable change in local temperature.

According to climate models, tropical deforestation causes warming, while loss of forest at high latitudes brings about cooling. The transition from warming to cooling occurs at a latitude of around 35°. But most land-use change occurs at far smaller scales: does the loss of a few trees really make much difference to climate?

To answer this question Xuhui Lee (http://environment.yale.edu/profile/lee/), from Yale University, US, and colleagues paired up forest flux stations, which record air temperature and gases such as carbon dioxide, with nearby weather stations, situated on open land, in 40 locations across North and South America and 12 locations in Eastern Asia. By comparing the temperature difference between the forest flux tower and the open weather station, the researchers were able to estimate the impact that small-scale deforestation has in each place.

The team found that small-scale deforestation has the greatest localized warming effect in the tropics – between 10°N and 10°S. After that the impact decreases, switching to a cooling effect at a latitude of around 35°. The warming when trees are felled at low latitudes is most likely caused by the loss of evapotranspiration. Meanwhile, the cooling effect seen at higher latitudes could well be due to the increase in reflectivity (albedo) when trees are removed from the landscape, particularly in snowy regions.

The higher latitude cooling effect wasn't as strong in Eastern Asia as it was in the Americas. "We believe the reason for this is less snow accumulation in Asia in the winter," explained Lee, whose findings are published in **Environmental Research Letters** (ERL) (http://iopscience.iop.org/1748-9326/9/3/034002/article).

At tropical and subtropical latitudes (15°S to 20°N) the data showed that local deforestation caused a warming effect of more than 0.5 °C on daily maximum temperature. In boreal latitudes (over 45°N and S) the team observed a cooling effect of nearly 1 °C on daily

minimum temperature.

The findings confirm that the climate benefit of tree planting is location-specific and that in northern Europe and Canada planting trees may actually lead to warming. “We think that the carbon sequestration credit of tree planting should be reduced to account for the albedo warming effect, especially in mid to high latitudes,” said Lee.

Related links

Response of surface air temperature to small-scale land clearing across latitudes Mi Zhang *et al.* 2014 *Environ. Res. Lett.* **9** 034002 (http://iopscience.iop.org/1748-9326/9/3/034002/article)

ERL (http://erl.iop.org)

Xuhui Lee, Yale School of Forestry & Environmental Studies (http://environment.yale.edu/profile/lee/)

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About the author

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