Reduction in Amazon deforestation avoids 1,700 deaths per year

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Because of decreasing deforestation and emissions from forest fires in the Amazon over the past ten years, the amount of particulate matter (aerosols), ozone, carbon monoxide, nitrogen oxide and other atmospheric pollutants released by burning biomass has fallen by 30% on average during the dry season in southern Brazil, Paraguay, northern Bolivia and Argentina.

This improvement in the region's air quality may be helping to prevent the premature deaths of some 1,700 adults per year throughout South America.

These estimates come from a study performed by researchers at the University of São Paulo (USP) in Brazil in collaboration with colleagues from the Universities of Leeds and Manchester in England and the Massachusetts Institute of Technology (MIT) in the United States.

"The study shows for the first time that reducing deforestation results in improved air quality, which in turn leads to a reduction in the number of deaths due to exposure to atmospheric pollution in most of South America," told Paulo Artaxo, Full Professor of Physics at USP and one of the authors of the paper.

According to the researchers, since 2004, Brazil has achieved substantial reductions in deforestation, as well as in the number of fires deliberately set to clear undergrowth and prepare areas for planting and grazing. Forest fires release large quantities of particulate matter and toxic gas

into the atmosphere.

Between 2001 and 2012, deforestation in Brazil fell by some 40%, from 37,800 square kilometers (km^2) per year in 2002-04 to 22,900 km^2 per year in 2009-11, according to the authors of the paper.

To explore whether the reduction in deforestation led to observable impacts on air quality and human health, the researchers analyzed records for 2001-12 showing aerosol volumes from forest fire emissions over southwestern Brazil and Bolivia during the dry season (August-October), when the concentration of particulate matter in the atmosphere is especially high.

Measurements by satellite and ground-based sensors showed that total emissions of particulate matter from fires decreased during the dry season in Amazon forest areas with the largest number of fires during the period 2002-12, especially in years with lower deforestation rates.

When they input these measurements into a global atmospheric circulation model, the researchers found that concentrations of particles with diameters of less than 2.5 microns?(μm), which have the worst impact on health, were 30% lower than in years with high deforestation rates during the dry season in southern Brazil, as well as in Paraguay, northern Bolivia and Argentina.

Impact on health

To estimate the impact of the particulate matter emitted by forest fires on human health, the researchers calculated rates of premature adult mortality from cardiopulmonary disease and lung cancer due to exposure to aerosols with diameters of less than 2.5 μm in 2002-11.

Mortality rates were calculated for adults older than 30 years in age

using consistent epidemiological data from the literature, Artaxo explained.

The study concludes that the greatest risk to health arises close to deforestation fires, but most premature deaths occur outside the Amazon region, owing to atmospheric transport of smoke to more densely populated regions.

Based on their calculations, the researchers estimate that the 40% reduction in deforestation in Brazil in the 2001-12 period prevented some 1,700 premature adult deaths annually throughout South America due to a decrease in forest fire emissions.

According to the authors of the study, to maximize these benefits, public policy should aim at zero deforestation and the end of slash-and-burn in all moist tropical forest areas.

More information: C. L. Reddington et al. Air quality and human health improvements from reductions in deforestation-related fire in Brazil, *Nature Geoscience* (2015). DOI: 10.1038/NGEO2535

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