



Fewer trees, less rain: study uncovers deforestation equation

By Richard Macey

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Australian scientists say they have found proof that cutting down forests reduces rainfall.

The finding, independent of previous anecdotal evidence and computer modelling, uses physics and chemistry to show how the climate changes when forests are lost.

Ann Henderson-Sellers, director of environment at the Australian Nuclear Science and Technology Organisation, at Lucas Heights, and Dr Kendal McGuffie, from the University of Technology, Sydney, made the discovery by analysing variations in the molecular structure of rain along the Amazon River.

Not all water, Professor Henderson-Sellers said, was made from the recipe of two atoms of "common" hydrogen and one of "regular" oxygen.

About one in every 500 water molecules had its second hydrogen atom replaced by a heavier version called deuterium. And one in every 6500 molecules included a heavy version of the oxygen atom.

Knowing the ratio allowed scientists to trace the Amazon's water as it flowed into the Atlantic, evaporated, blew back

inland with the trade winds to fall again as rain, and finally returned to the river.

"It's as if the water was tagged," she said.

While the heavier water molecules were slower to evaporate from rivers and groundwater, they were readily given off by the leaves of plants and trees, through transpiration.

"Transpiration pumps these heavy guys back into the atmosphere."

But the study showed that since the 1970s the ratio of the heavy molecules found in rain over the Amazon and the Andes had declined significantly.

The only possible explanation was that they were no longer being returned to the atmosphere to fall again as rain because the vegetation was disappearing. "With many trees now gone and the forest degraded, the moisture that reaches the Andes has clearly lost the heavy isotopes that used to be recycled so effectively," Professor Henderson-Sellers said.

Tom Lyons, professor of environmental sciences at Perth's Murdoch University, said there was now "certainly very strong evidence that changes in surface conditions have an impact on the climate. In some parts of the world the impact is very marked". The Amazon research "helps us understand the mechanism".

Professor Henderson-Sellers said the average water molecule fell as rain and re-evaporated five times during its journey from the tropical Atlantic to the river's starting point in the Andes mountains. Forests played a vital role in keeping the heavy molecules, and their far more common relatives, moving through the water cycle.

"People will tell you that when you remove the forests it rains less," she said, adding, however, such anecdotal evidence, and even computer modelling, did not convince everyone.

"This is the first demonstration that deforestation has an observable impact on rainfall."

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