

# Cloud forest trees drink water through their leaves

Robert Sanders, UC Berkeley



Tropical montane cloud forest trees use more than their roots to take up water. They also drink water from clouds directly through their leaves, University of California, Berkeley, scientists have discovered.

While this is an essential survival strategy in foggy but otherwise dry areas, the scientists say that the clouds the trees depend on are now disappearing due to climate change.

“The study highlights the vulnerability of this rare and already endangered ecosystem to climate change,” said Todd Dawson, senior author of the study and UC Berkeley professor of integrative biology. Changes in cloud cover have already been correlated to declines and disappearances of cloud forest animal populations, such as frogs and salamanders.

The new study will be published next year in the journal *Ecology Letters* and is available online this month.

In tropical montane cloud forests, leaves are constantly bathed in clouds, making them wet. The leaves of the most common cloud forest trees drink this cloud water when water from the soil just isn’t enough, said Greg Goldsmith, lead author of the study and a graduate student in Dawson’s lab.

“Many cloud forests experience an annual dry season when the primary water source isn’t rain, but rather, the moisture from the clouds,” he said. “This is when the trees are most likely to draw water in through their leaves.”

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Working in Monteverde, Costa Rica, the researchers studied patterns of leaf wetness caused by the clouds by setting up small plastic “leaves” that use changes in the voltage of an embedded electrical circuit to detect wetness. Then, they installed miniature sensors on the branches of cloud forest plants to see whether or not water was entering leaves when they were wet.

“The textbooks teach us that water enters roots, moves up the trunk and into the branches, then finally exits the leaves. That’s true, but it’s not the whole story,” Goldsmith said. “With our sensors, we observed water entering the leaves and actually moving back down the branches toward the trunk.”

The research builds on previous work by Dawson, who demonstrated a similar phenomenon in California redwoods.

However, the study found that not all trees can drink the same amount of cloud water.



“The trees that are drinking the most water through their leaves may be more vulnerable to decreases in cloud cover resulting from rising temperatures,” said Goldsmith, who received funding from a National Geographic Society Young Explorers Grant to conduct the research.

“The study provides a clear demonstration of the interactions between clouds and cloud forest plants and will serve as a cornerstone for future research on the effects of climate change on tropical montane cloud forest ecosystems,” Dawson added.

In addition to funding from the National Geographic Society, Goldsmith was supported by a National Science Foundation Graduate Research Fellowship, a Smithsonian Institution Short-Term Fellowship and a Wang Family Fellowship from UC Berkeley.

[The incidence and implications of clouds for cloud forest plant water relations](#) [1]

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