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Planting trees in wrong places heats the planet

Kenya has a nationwide tree-planting public holiday every November 13. Planting trees in the wrong places can actually contribute to global warming, scientists said on Tuesday, but a new map identifies the best locations to regrow forests and cool the planet. Trees soak up carbon dioxide and restoring areas of degraded woodlands or planting saplings to boost forest cover is one tool in the fight against climate change. But in some cases, more trees means less sunlight is reflected back from the earth's surface and more heat is absorbed by the planet.

There are some places where putting trees back leads to net climate negative outcomes. Scientists had already understood that restoring tree cover led to changes in albedo—the amount of solar radiation bounced back off the planet's surface—but didn't have the tools to account for it. Using new maps, researchers were able to consider, for the first time, the cooling effect from trees and the warming caused by decreased albedo. They found that projects that didn't factor albedo into the equation overestimated the climate benefit of additional trees by between 20 to 80 percent.

But the maps also provide the tools to help policymakers identify where best to funnel scarce resources for maximum climate impact. There's also lots of places still where restoring tree cover is a great idea for climate change. We're just trying to help people find those spots. Tropical environments like the Congo Basin boast high carbon storage and low changes in albedo.

Albedo is highest in the frozen areas of the world, and mirror-like clean snow and ice with high levels of albedo reflect up to 90 percent of the sun's energy. It is one of Earth's major cooling agents, along with lands and oceans that absorb excess heat and planet-warming greenhouse gas emissions. Many countries have promised to plant billions of trees as a bulwark against global warming but not all efforts deliver for the planet equally, this study showed. Moist, tropical environments like the Amazon and Congo Basin boasted high carbon storage and low changes in albedo, making them ideal locations for restoring forest cover.

The opposite was true in temperate grasslands and savanna. Even projects in the best locations were probably delivering 20 percent less cooling than estimated when changes to albedo were taken into account.



Mangrove trees planted in Pari island to slow erosion caused by rising sea levels.

Restoring forests delivered undeniable benefits for people and the planet, such as supporting ecosystems and providing clean air and water, among many. (Source: Natalia Hasler et al, Accounting for albedo change to identify climate-positive tree cover restoration, *Nature Communications* (2024)).