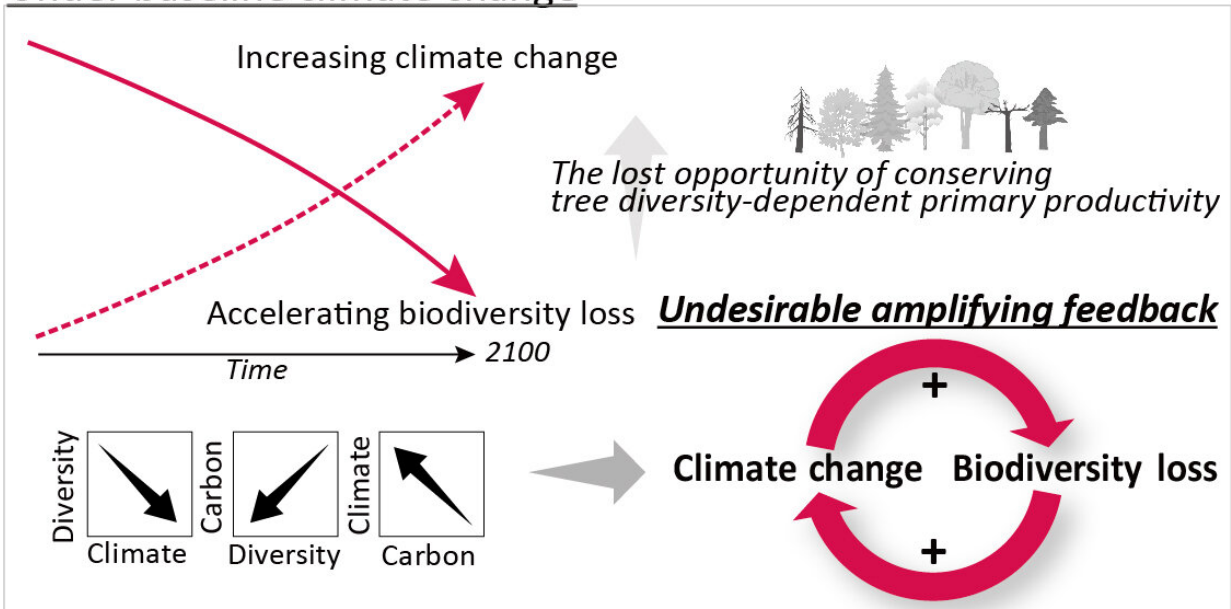


# **Tree diversity may save the forest: Advocating for biodiversity to mitigate climate change**

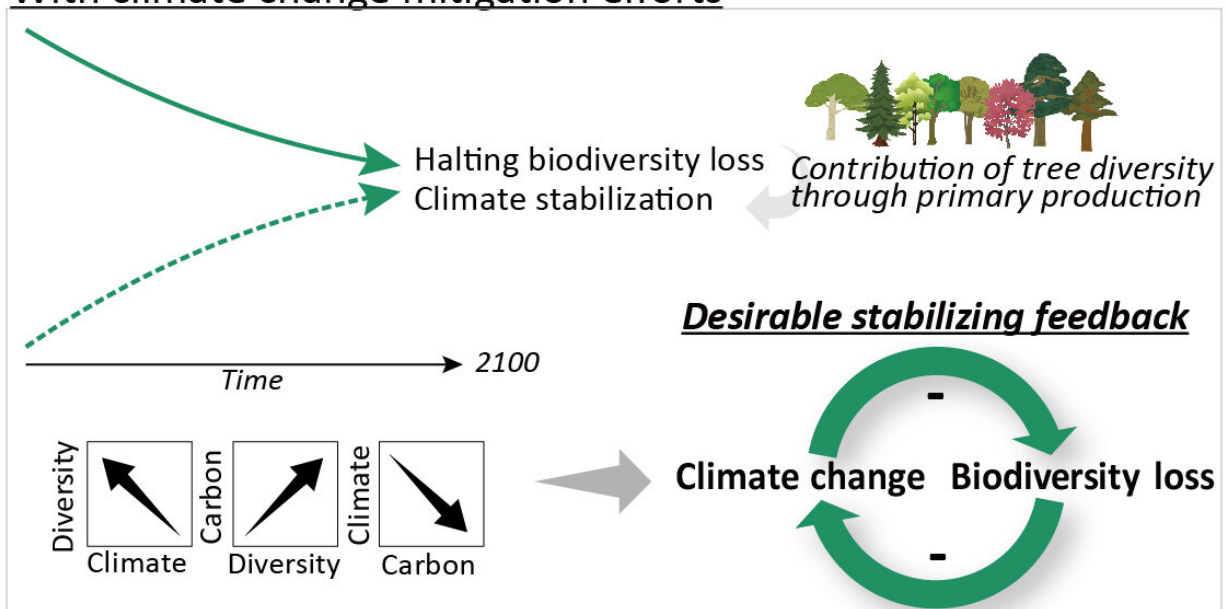
June 8 2021

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## Under baseline climate change



## With climate change mitigation efforts



There is much emphasis on the undesirable feedbacks where climate change

drives biodiversity loss (magenta arrows feedback). Here, we highlight the contribution of an underutilized positive feedback in which biodiversity-dependent productivity could contribute to climate change mitigation (green arrows feedback). The conservation and restoration of tree diversity could enhance this feedback and promote the desirable pathway whereby forest biodiversity contributes to climate stabilization. Credit: Yokohama National University

When it comes to climate change, policymakers may fail to see the trees for the forest. It turns out that the trees may be the answer after all, according to a study published by authors from more than seven countries on June 3rd in *Nature Climate Change*.

"Climate change and [biodiversity loss](#) are two major environmental challenges," said paper author Akira S. Mori, professor at Yokohama National University. "But the vast majority of attention has been paid to one unidirectional relationship—[climate change](#) as a cause and biodiversity loss as a consequence."

Mori and his co-authors argue that climate change and [species diversity](#) across ecosystems are mutually independent, and, while they can influence each other, they are not a direct cause and effect. The problem, Mori said, is that this perspective is largely lacking from both policy efforts and science so far.

"There is now recognition of the need for nature-based solutions, which involve working with nature to address society challenges, including [carbon storage](#) by restoring forests," Mori said. "However, natural climate solutions are currently missing biodiversity as part of the equation: it is not yet widely appreciated as a powerful contributor to climate stabilization."

To quantify how biodiversity, or the lack thereof, might influence climate change, the researchers used a multi-faceted modeling approach to assess how mitigation efforts impacted the diversity of woody plant species—namely, trees and shrubs—that can enable forests to store carbon. They divided the forested areas of Earth into 115 million grids, allowing them to analyze how shifts in [species richness](#) on the local level could change primary productivity—the ability to process [carbon dioxide](#) into other, benign and beneficial molecules, such as energy and oxygen. The researchers considered these changes and impacts against a baseline scenario in which [global temperatures](#) continue to rise, and another scenario in which climate change is mitigated before reaching temperature increases of two degrees Celsius by the end of the 21st century.

"We found that greenhouse gas mitigation could help maintain tree diversity, and thereby avoid a nine to 39% reduction in terrestrial primary productivity across different biomes, which could otherwise occur over the next 50 years," Mori said, noting that avoiding such a reduction could have significant social and [economic benefits](#) for communities.

The researchers scaled up the local estimates to understand how countries with varied biomes might fare in potential scenarios of reduced biodiversity and unabated climate change.

"We found that countries with the highest country-level social cost of carbon—the marginal damage expected to occur in a particular country as a consequence of additional carbon dioxide emissions produced anywhere in the world—have the greatest incentive to mitigate climate change to avoid its economic damages and also tend to be the countries where climate change mitigation could greatly help maintain primary productivity by safeguarding tree diversity, regardless of model or scenario," Mori said.

For example, the United States and China, two of the biggest carbon producers, would likely experience the most significant economic damages due to global warming, which, Mori said, incentivize the countries to maintain tree diversity as part of their effort to mitigate emissions.

"Our results emphasize an opportunity for a triple win for climate, biodiversity and society, and highlight that these co-benefits should be the focus of reforestation programs," Mori said.

The researchers are now preparing for two United Nations Framework Conventions: COP15, focused on biodiversity, in October and COP26, focused on climate, in November.

"We are aiming to provide strong implications for international policies since the interdependence of biodiversity and [climate](#) change are still not fully recognized by many governments," Mori said.

**More information:** Akira S. Mori et al, Biodiversity–productivity relationships are key to nature-based climate solutions, *Nature Climate Change* (2021). [DOI: 10.1038/s41558-021-01062-1](https://doi.org/10.1038/s41558-021-01062-1)

Provided by Yokohama National University

Citation: Tree diversity may save the forest: Advocating for biodiversity to mitigate climate change (2021, June 8) retrieved 16 August 2024 from <https://phys.org/news/2021-06-tree-diversity-forest-advocating-biodiversity.html>

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