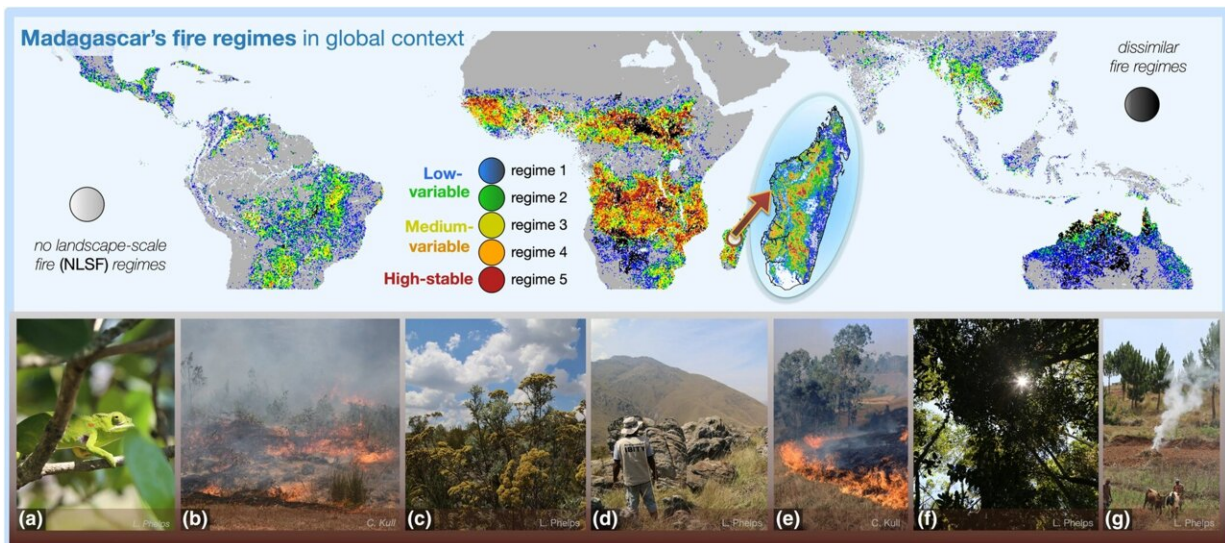


Tree loss on Madagascar not caused by small-scale fires used for land clearing

May 18 2022



Madagascar's fire regimes projected across the tropics: Low-variable (blue and green regimes); medium-variable (yellow and orange regimes); high-stable (red regime). Gray pixels represent no landscape-scale fire (NLSF) regimes where burning did not occur across the study period. Black pixels represent fire extremes that were not represented on Madagascar. For individual MESS maps of each fire regime and the mutually exclusive subset of fire regimes (MESS > 24), see Supplementary Information (Figure S6; bottom). Photos: (a) tapia ecosystem on Ibity Massif, Central Highlands with chameleon, (b) uncontrolled, peri-urban landscape fire in Ambositra [photo by C. Kull, 2019], (c) a forest-savanna boundary in Ambohitantely, Central Highlands, (d) ancient biodiverse grasslands on Ibity Massif, (e) landscape fire in an agricultural region near Ambositra, likely for grassland renewal [photo by C. Kull, 1998/9], (f) tree cover on a forest-savanna boundary in Ambohitantely, (g) smallholder land use on Ibity massif. Credit: *Global Change Biology* (2022). DOI: 10.1111/gcb.16206

Once humans discovered how to tame fire, they began using it for heat and cooking as well as to scare away animals and to alter their environs, especially burning areas to plant and to restore grazing land. In Madagascar, scientists and conservationists have long believed that fire is a leading cause of high landscape degradation, but an international team of researchers have found that medium to large fires on the island are similar to other tropical locations.

"On Madagascar, it is assumed that fire is driving degradation," said Leanne Phelps, postdoctoral fellow in anthropology at Penn State, School of GeoSciences, University of Edinburgh and Royal Botanic Gardens, Edinburgh. "We are taking a new comparative approach and asking: Is fire different on Madagascar? And is it responsible for high rates of landscape degradations?"

The researchers report today (May 18) in *Global Change Biology* that Madagascar's fire regimes are similar to 88% of tropical burned areas with shared climate and vegetation characteristics. They also found that Madagascar's relatively high tree losses were not centered around boundaries between forest and savannah, but occurred internally in forests without landscape-scale fires, suggesting medium to [large fires](#) did not cause high rates of tree loss.

Landscape-size fires are anything over about 50 acres. In Madagascar they are used on grass lands to improve grazing for cattle. However, the researchers found that "fire is declining across tropical grassy ecosystems with major implications for ecosystems livelihoods and the future of fire risk."

"We found that rather than Madagascar being an exception, it is a microcosm of global patterns," said Kristina Douglass, Joyce and Doug

Sherwin Early Career Professor in the Rock Ethics Institute and Assistant Professor of Anthropology and African Studies, Penn State. "Despite what people think, fire is declining in [grassy areas](#) in general and it is declining faster on Madagascar. It is not the primary driver of tree loss. Fire is not a uniform proxy for degradation."

The assumption is usually if people are there and large areas are burning, that is causing high landscape degradation.

"We need to use more evidence-based approaches to understand why landscapes change," said Phelps. "Mitigating [climate change](#) and managing biodiversity become difficult when we aren't looking closely enough at the causes of problems."

The researchers believe that more research is necessary to determine where [fire](#) poses the highest risks and where it is actually needed to ensure that savannahs and forests thrive, and that invasive species do not invade.

More information: Leanne N. Phelps et al, Madagascar's fire regimes challenge global assumptions about landscape degradation, *Global Change Biology* (2022). [DOI: 10.1111/gcb.16206](https://doi.org/10.1111/gcb.16206)

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