

Undermining the long-term resilience of the Amazon rainforest

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Amazon degradation fire logging rainforest

In one sentence

Amazon forest is degraded by selective logging, forest fires, invasions by lianas and bamboo and by edge and fragmentation effects. These impacts help explain the decline in Amazon forest resilience.

The resilience of Amazon forest is degraded by a variety of stressors linked to climate change and direct human impacts such as deforestation, logging and forest fires. Edge and fragmentation effects follow from deforestation, as does the initiation of forest fires, while degradation from logging leads to larger and more intense forest fires. Forest degradation from all these sources facilitates biological invasions by lianas and bamboo that further weaken and degrade the forest. Lianas are also favored by drier microclimate (from both drought and edge effects) and by global increase in atmospheric CO₂. A series of studies by the AGROECO group at Brazil's National Institute for Research in Amazônia (INPA), and in collaboration with other groups, contributes to quantification of these effects and of the interactions between them. The effect of selective logging on the spread and intensity of forest fires in northern Amazonia more than doubles biomass loss as compared to the logging itself, adding a physical impediment (in addition to inherent economic impediments) to the sustainability of forest management. The advance of climbing bamboos in southwestern Amazonia is facilitated by logging, increasing the risk of forest fires as well as killing and damaging trees. Advances in classifying forest-fire intensity from satellite imagery indicate that Amazonian forest fires are more intense than was suggested by previous methods. Ongoing lengthening of the dry season and increasing frequency of major droughts are resulting in tree mortality both from lack of water and from forest fires. These impacts help explain the decline in Amazon forest resilience detected by other research groups.