

# The Fire-Lantana Cycle Hypothesis in Indian Forests

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**A**nthropogenic fires in Indian forests probably date back to the arrival of the first people on the Indian subcontinent. Fires were used to clear areas for habitation, and quite likely, to facilitate hunting. People continue to use fires today for several reasons. For instance, early-summer fires are lit to promote the growth of fresh forage for livestock. Fire is also used to facilitate the collection of several important non-timber forest products such as leaves of *Diospyros melanoxylon* or tendu, that are collected to make bidis, and flowers of *Madhuca indica* or mahua. With shrinking forest areas but a large forest-dependent population, there is evidence that the frequency of fires in our forests today is greater than it has been in the past. Thus, contemporary fire regimes are probably qualitatively different from historical fire regimes in the effect that they have on forests.

Fires can affect forests at multiple spatial scales. Fires can alter species composition. For example, the increased abundance of thick-barked, fire resistant species, or of species that can tolerate fires by resprouting, can be a legacy of frequent burning. Fire can also alter vegetation structure by killing standing trees, opening up the canopy, and converting once closed forests to open woodlands. Finally, very frequent fires can result in soil degradation.

Such frequently disturbed, degraded landscapes may be vulnerable to invasion by exotic species. Elevated levels of disturbance can result in an increased availability of space and resources that could be preempted by invasive species. We hypothesise that there may be a positive feedback between contemporary fires in Indian forests and invasion by *Lantana camara*, leading to a fire-lantana cycle analogous to the invasive grass-fire cycle seen in other parts of the world. We propose that lantana invasion may be facilitated by fire, and that lantana, once established, fuels further fires, setting up a self-feeding fire-lantana cycle (see flowchart).

Lantana was introduced to India during the mid-to-late 19th century as an ornamental plant and has since become widespread, ranging from dry-to-moist deciduous forests of southern India, all the way to the Himalayan foothills. It grows profusely, forming dense thickets, suppressing the regeneration of native vegetation, affecting animal habitat, and potentially affecting the supply of other ecosystem goods and services on which society depends. Lantana has several characteristics that might give it an advantage under conditions of frequent fire. It resprouts on being burnt, it flowers and fruits year round, and its seeds are widely dispersed by birds and animals enabling it to readily germinate following a disturbance. Studies from

Australia confirm that lantana is favoured by disturbances such as fire and grazing. There is also anecdotal evidence to suggest this. According to local Soliga elders in the Biligiri Rangan Hills in South India, for example, the initial spread of lantana coincided with the last mass-flowering and die-back of bamboo, which was followed by widespread fires.

Surprisingly, there are few empirical studies in India that look at lantana and its invasive ability, especially in response to fire, despite its pervasive distribution. There is an urgent need to empirically understand the effects of fires at multiple spatial scales and to understand the ecological mechanisms of lantana's success. It is only with such information that we can hope to attempt restoration and management and to find a way out of the fire-lantana cycle.

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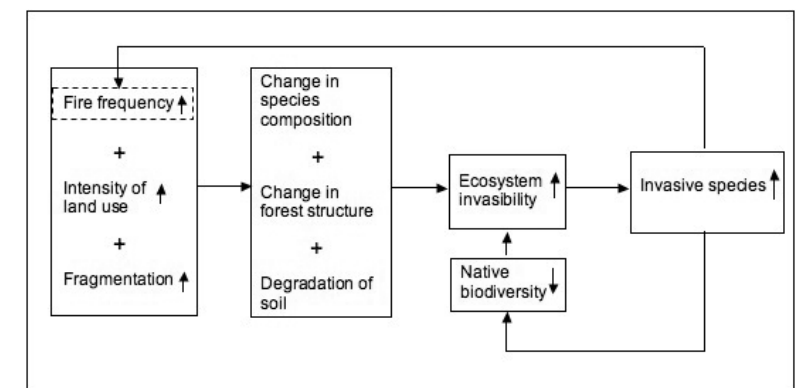
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Photos: Bharath Sundaram



The hypothesised fire-lantana cycle