

Notes from the Other Side of a Forest Fire

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Although widely used as a tool in forest management across the world, causing fires is illegal in Indian forests. This article points out that the present understanding of fire as essentially disruptive has its antecedents in a colonial perspective that came from seeing the forest primarily as a source of timber. However, the practices of indigenous communities as well as the insights of ecological studies point to the importance of using fire in controlled ways to manage dry and deciduous forest ecosystems.

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If you do not burn the forest, it will burn.

— A Kattunayakan Adivasi saying

As the summer approaches, forest officials across India begin to mobilise large workforces of fire-watchers. They spend sleepless nights as forest fires erupt across the country, while other forest management activities take a back seat. There is a feeling of panic and negativity as the media fervently reports fires supposedly “destroying” and “ravaging” verdant forest landscapes. Even the Central Bureau of Investigation has been called to investigate forest fires in the past (PTI 2016a), and a former minister of the environment, forest and climate change was asked a question in Parliament about the rising incidence of forest fires (PTI 2016b). At least one person has lost his life this year fighting a forest fire (Kumar 2017).

Fire management is perhaps one of the most misrepresented conservation issues in India. Although widely used as a tool in forest management across the world, causing fires is illegal in Indian forests under Sections 26 and 33 of the Indian Forest Act, 1927, and Section 30 of the Wildlife (Protection) Act, 1972. We outline a counter-narrative and call for a more nuanced understanding of forest fires in India, more in tune with history, ecology and evolving conservation science, and with traditional ecological knowledge.

Contrasting Views on Fire

India’s fire history and its interplay with colonialism is perhaps the best starting point for our argument. In a well-articulated review, Stephen Pyne (1994) argues that fire has been an integral part of people’s lives, both as actual practice and in folklore. It has played a definitive role in shaping India’s landscape. Local people used fire as an essential part of land management, where it “converted organic residues into fertilizer, kept woodlands

and prairies in grass, assisted hunting, cleansed soil of pathogens, and supported foraging for flowers, bees, tubers, and herbs” (Pyne 1994: 7). India’s mosaic was intricately ordered by fire, where “fresh browse appeared at the proper place at the proper time; deer migrated to those sites; tiger followed the deer” (Pyne 1994: 13).

However, this local understanding of forest fire was completely at odds with the colonial view. In the latter, forests were valued only for their timber, and it was believed that fire severely hindered tree growth. Early foresters of the Imperial Forest Service—created in 1864—were trained in European silvicultural practices, where fire was indeed a severe deterrent to efficient tree cultivation, and these assumptions were applied to India. The traditional burning regimes in India caused considerable perturbation among the imperial foresters. The mid-1800s witnessed a range of “disbelieving Britons” disparagingly describing fires in India, where “every forest that would burn was burnt almost every year” (Shebbeare [1928], quoted in Pyne [1994: 6]). And, “nearly the whole body of the population in the vicinity of forest tracts have, or imagine they have, a personal interest in the creation of forest fire” (Doveton [1875], quoted in Pyne [1995: 14]).

Despite scepticism about the feasibility of completely suppressing fires in India’s forests, most colonial officers zealously pursued a stringent fire suppression policy, in part because of the broader colonial agenda—“to control fire was to control native populations” (Pyne 1994: 12). But, by the early 1900s, an increasing number of opposing voices began to emerge from within the foresters themselves, primarily from field officers. They claimed that excessive suppression of the practice was hindering natural regeneration, promoting disease, pests and weeds, decreasing soil fertility, and increasing the instances of devastating wildfires. A hunting club in the Nilgiris complained that game had deteriorated in areas where fire had been excluded, and “tigers no longer kept to their place—their place being scrambled and overgrown” (Pyne 1994: 14). It was also creating unmanageable discontent among local communities,

where “exhortations and bribes with goats could not extinguish all the native firebrands” and “prosecutions for forest offences, meant as deterrents, only led to incendiarism, which was followed by more persecutions and the vicious circle was complete” (Chaturvedi [1925], quoted in Pyne [1994: 15]).

By the 1930s, fire was again allowed in some forests, though it was considered a primitive practice and a “necessary evil.” But, half a century of the suppression of fire had broken down traditional management practices, and resulted in major changes in vegetation. The significant expansion of the human population in post-independence India, combined with diminishing forest cover, further complicated fire regimes. European-educated Indian foresters, under pressure to prove their mettle, enforced fire suppression with even more vigour than before. “All fire is bad” became an integral part of India’s conservation discourse, further fortified and almost universally operationalised with the Wildlife (Protection) Act, 1972. India’s long tradition of controlled burning, evolved over the 50,000 years since humans first inhabited the subcontinent (Gadgil and Homji 1985), was forgotten in most parts of India.

What Is ‘Natural’?

Fire is widely perceived as “unnatural” and human-induced and, by extension, detrimental and to be prevented. But the question of what is “natural” warrants some discussion. Scientific opinion is converging on the idea that “natural” could also include human activity, and that the idea of “pristine” or “untouched” forests is a myth. Even “virgin” tropical forests, from the three largest rainforest blocks in the world, have a long history of human activity and fire: anthropogenic *terra preta* soils over vast areas of the Amazon basin go back 3,500 years; 3,000-year-old tools and pottery fragments occur in the Congo basin; and the Indo–Malayan region has signs of pre-historic agriculture from 8,000 years ago, while “virgin” rainforests in the Solomon Islands are in fact just 150 years old (Willis et al 2004). All of India’s “pristine forests” were and are inhabited by indigenous people, who

have been managing and modifying these habitats for centuries.

While most fires are perhaps anthropogenic, global distributions of lightning flashes show that there is substantial lightning over India during the dry season prior to the onset of the monsoon (Christian et al 2003). Regardless of the source, the distinction between natural and unnatural fires is not ecologically meaningful, given that vegetation has evolved with fires over many centuries, and shows unique suites of adaptations to burning, suggesting that the “natural” baseline for forests in India must include fire.

Defining Forests: Trees vs Grasses

The role of fires in forests is better understood with a clearer ecological definition of a forest. Whereas the general understanding of a forest invariably involves a dense stand of trees, exactly how dense it needs to be remains vague. The Food and Agriculture Organization (FAO) defines “forests” as areas larger than 0.5 hectares with more than 10% tree cover (FAO 2015). So, technically, up to 90% of a forest’s area could, in fact, be not covered by trees. In India, these open patches are dominated by C_4 grasses. These grasses are highly productive in the growing season and dry out rapidly in the dry season, forming flammable fuel and promoting fires where they occur, such that fire resistance is a characteristic trait of most trees and herbs associated with them (Bond 2008; Ratnam et al 2011). Fire is, therefore, clearly an integral long-standing part of Indian dry forests (Edwards et al 2010; Ratnam et al 2016).

The role of grasses and fires in tropical dry forests has been omitted from the narrative of these systems in India on account of our historical legacy. India’s ecosystems were formally classified by the early British foresters purely from the perspective of timber operations. Thus, large tracts of peninsular India, with deciduous trees in a grassy understorey, came to be classified as “forests.” With the word “forest” focusing attention on the trees, the grasses and their major role in these ecosystems went largely unrecognised. In contrast, in Africa and South America, mixed tree–grass systems are classified as “savanna” and it is

well-recognised that fire is critical to these systems (Bond et al 2005). Periodic fires in these systems allow for the regeneration of trees, the regrowth of nutritious grasses that support charismatic large herbivores (and even more charismatic large carnivores), and a distinct and diverse community of understorey herbs and grasses, many of which are valued for their medicinal properties or as alternative food sources (Stott 1990; Sankaran 2009; Bond and Parr 2010). This is the forgotten perspective that we urgently need to bring back to the landscape of dry and open forest (or rather, savanna) management in India (Ratnam et al 2011).

Fire and Dry Deciduous Forests

The impact of fire in dry deciduous systems is poorly understood, particularly in terms of fire intensity and its varying impacts. A key feature of this system is exceptionally slow tree growth, with some species taking up to 10 years to reach heights of 1–2 metres. The assumption has been that even ground fires, which seem to destroy tree saplings that are 1–2 metres tall, are actually setting the system back by 5–10 years. But, recent research from the Mudumalai Tiger Reserve shows that this is not necessarily the case. The root systems of these trees appear to remain intact after low- to moderate-intensity fires. Surprisingly, the saplings are then able to “bounce back” to their pre-fire height in just one or two years, and then continue to grow at a very slow pace. Further, trees in such fire-prone forests that “escape the fire trap” then have a much higher survival rate than trees in tropical moist forests that do not burn (Mondal and Sukumar 2015). This points to possible long-term adaptation to fire by deciduous trees in tropical dry forests.

Only a very small percentage of anthropogenic fires become high intensity and uncontrollable, with a significant impact on natural systems. All of these intense fires occur only in tandem with a wider set of environmental and climatic variables—very low humidity, high wind speeds, high temperatures and high dry biomass (fuel) load. On particular days during the dry season, when all the conditions are met, any small accidental trigger is enough to set off a fire that can spread

rapidly. Given the thousands of villagers who live in and around forests, and tourists who visit, accidental sources are a very real possibility.

There are essentially two major drivers influencing forest fires: the amount of biomass available to burn (fuel load), and the readiness of the fuel to actually burn (flammability). If an area is protected from fires for many years, the build-up of fuel loads creates the conditions for a potentially intense and destructive fire (Mondal and Sukumar 2016). From the perspective of controlling intense and damaging wildfires, preventing the large build-up of dead biomass through controlled burning is the only feasible management option. Such controlled burning has to be carried out early in the dry season (in January) when temperatures are relatively low, thus preventing an intense conflagration, without the negative impact of an uncontrollable, high-intensity fire later in the season.

Indigenous Burning Regimes

“If you do not burn the forest, it will burn” is an often-repeated Kattunayakan saying about forest fires. Adivasis have historically used fires to manage their forests, and these practices—for example, by the Soligas in the Bilgiri Rangaswamy Temple Wildlife Sanctuary (BRT) in Karnataka—have been reasonably well-studied and documented.

The practice of setting low intensity early summer fires, called *taragu benki* or litter fires, was widespread as a part of the complex ecological and agricultural practice of the Soligas until the sanctuary was notified in 1974. *Taragu benki* are set in the month of February, associated with the prevailing winds (*taragudaragali*) and rains (*kari malé* and *edaka malé*). The benefits of these fires are perceived to be widespread.

Soligas note that early season fires do not kill established seedlings as the rootstock is not affected. They claim the suppression of fire has resulted in a dramatic change in the forest structure, particularly the spread of the weed *lantana camara* and the subsequent decline in the population of understory plants. Even species of canopy trees have declined on account of *lantana* inhibiting

sapling growth. The Soligas also suggest that there is an increase in the mortality of adult trees due to hemiparasites, which were kept in check by ground fires.

This body of traditional knowledge resonates closely with early anecdotal writings by foresters as well as contemporary ecological studies in BRT. A recent study has shown that the population of two species of trees are being adversely affected by reduced seedling recruitment into the canopy due to *lantana*, and due to increased mortality of adult trees caused by hemiparasites like mistletoe (Ticktin et al 2012). Another study has shown that changes in *lantana* cover are negatively related to fire frequency; that plots that burnt more frequently over a 10-year period had less *lantana* than plots that did not burn as frequently (Sundaram et al 2015). A third study has shown that areas that had burnt had far fewer hemiparasite infected trees than areas that were not burnt (Setty 2004). Despite all this evidence, there is still enormous resistance to the suggestion that fires be seen as part of normal environmental processes.

The Nuance of *Lantana* and Fire

Lantana camara is a particularly problematic weed native to South and Central America, and is increasingly being recognised as a key problem in Africa, Asia and Australia, where all attempts at controlling it over the last 200 years have failed (Bhagwat et al 2012). The plant has spread rapidly across most southern Indian forests over the last decade, possibly on account of prolonged droughts and very severe fires in 2002 that caused standing tree mortality, and the subsequent failure of the monsoon for two years. Most of the areas previously occupied by C_4 grasses have now been colonised by *lantana* (Ramaswami and Sukumar 2013; Sundaram and Hiremath 2012).

The Soligas have long maintained that the suppression of controlled early season burning in the 1970s, with the notification of the wildlife sanctuary, has led to the rapid spread of *lantana*, even though *lantana* had been in this area since the 1930s. We now know that fires kill *lantana* seeds in the soil, a possible mechanism by which the spread of *lantana* was checked by fires (Sundaram et al 2012;

Hiremath and Sundaram 2013). A reintroduction of cool dry season burning would require prior clearing of *lantana* to reduce the fuel load, and is likely to bring back a healthy grass-covered forest floor.

Conclusions

India has a long history of carefully managing and using fire to maintain forest ecosystems. This legacy that evolved over almost 50,000 years was radically altered by the perspectives and policies of the Imperial Forest Service under colonial rule, which continued to be maintained by the Indian Forest Service. Forest-based communities have burnt the forest understory as part of their management practice, and they continue to have a deep understanding of the role of fire in forest ecosystems. Ecological science clearly shows that fires have an important, albeit complex role to play in dry and deciduous forest ecosystems—which should more accurately be described as savannas—that have evolved in conjunction with fire over many centuries. The comparatively recent suppression of fire in forest management and conservation has been having widespread and adverse consequences across the country, and this requires urgent attention.

We do not of course suggest that uncontrolled, devastating wildfires should be left unchecked; these clearly have a significant negative impact on forest ecosystems, particularly in evergreen and semi-evergreen systems that do not have a history of burning. But, for dry or savanna systems, controlling fire with fire is the only feasible solution. We argue that the blanket ban on fires in all forest ecosystems is highly misplaced, and the case for having a more nuanced policy on fire management is unequivocal. We also urge that a comprehensive research programme on the management of fire and invasive plants be established, drawing on indigenous knowledge and using an experimental approach. There are numerous studies that are emerging from other tropical countries along these lines, and we hope that India is also able to learn from and contribute to this growing body of work.

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