

Impact of alien plants on Western Ghats causes concern

These plants, which are not native to the region, threaten to alter natural habitats and native biodiversity.

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An elephant among a dense growth of Senna trees in Wayanad Wildlife Sanctuary. Elephant habitats are being rapidly taking over by the *Senna*. | Photo Credit: Anoop N.R.

A 2020 study showed that the *Lantana camara*, a tropical American shrub, has invaded more than 40 per cent of India's tiger habitats, threatening them through a causal chain that ultimately depletes the tiger's prey base. The shrub's presence was most prominent in the Shivalik hills, central India, and the southern Western Ghats. Notwithstanding its pretty flowers, which make the lantana an ornamental garden shrub, it is among the world's 10 worst invasive species and one of high concern in India.



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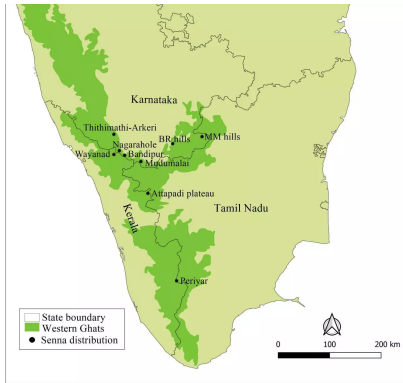
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A map showing the current distribution of Senna in the Western Ghats. | Photo Credit: Anoop N.R./ATREE

When animals, plants, or other organisms are introduced in areas outside their natural range, they might eventually turn into invasive alien species, degrading natural habitats and affecting native biodiversity.

According to the International Partnership for Biodiversity and Ecosystem Services, biotic invaders threaten around one-fifth of the earth's surface. They have certain common features—like the ability to reproduce quickly, the lack of natural predators, the capacity to outcompete local species for food, water, and habitat—which ensure that they flourish wherever they go.

Impact of alien plants on Western

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WATCH:

A 2020 study showed that the *Lantana camara*, a tropical American shrub, has invaded more than 40 per cent of India's tiger habitats, threatening them through a causal chain that ultimately depletes the tiger's prey base. | Video Credit: Text by Anoop N.R. & T. Ganesh; Video by Saatvika Radhakrishna

Though the impact of invasive species is well known across the world, efforts to manage them are usually

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minimal in undeveloped and developing countries. In India, so far nearly 1,600 invasive plant species have been introduced and the number is likely to rise further. Forest departments and non-profits have been largely unsuccessful in their efforts to control them since tailor-made national policies or legal frameworks to tackle their spread are nearly non-existent in India. One of the commonest and deadliest invasive trees of the Western Ghats is the *Senna spectabilis*, called *manja konna* in the local language.



Lantana camara, among the world's 10 worst invasive species and one of high concern in India, is a favoured garden shrub since its pretty flowers attract butterflies | Photo Credit: Getty Images/ iStock

Spreading fast

Senna is a medium-to-large tree indigenous to tropical America which is introduced in areas outside its native range for various purposes such as to providing shade, making fences, and as an ornamental plant. It has been introduced in around 20 countries across the globe, including India, where it can be found in the forests of Kerala, Tamil Nadu, and Karnataka.



Senna spectabilis, also known as golden wonder, is often grown as ornamental trees in parks and gardens in urban areas too. | Photo Credit: Wiki Commons

Planted in postcolonial times by forest departments, the species has now spread widely and is quickly replacing native vegetation. Although we have no data on the exact nature of the spread, the *Senna* is undoubtedly one of the worst invasive species of the Ghats. Here, it is found between the Brahmagiri hills in the north and the Palakkad gap in the south; Wayanad sanctuary and the adjacent Begur Range in Kerala; Nagarahole and Bandipur Tiger Reserves and the adjacent Thithimathi forest and Kushalnagar, Bilgiri-rangana Hills, MM Hills and Cauvery Wildlife Sanctuary; Mudumalai and Sathyamangalam Tiger Reserves; and Nilgiri North Forest Division in Tamil Nadu.

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These and adjacent areas make up the Brahmagiri-Nilgiri Eastern Ghats elephant landscape, one of the richest forests in the country in terms of biodiversity, and possibly the largest breeding ground of the Asian elephant, gaur, tiger, and wild dog. Apart from the Nilgiris, Periyar Tiger Reserve in Kerala also has the *Senna*, but there its growth has not speeded up as much as it has in the Nilgiris. Researchers speculate that it was first introduced in the Wayanad sanctuary, from where it colonised other landscapes. But we cannot say this for sure since there are many isolated populations of the tree,

planted in different time periods.

The elephant habitat in Wayanad is rapidly being taken over by *Senna spectabilis* and disrupting native vegetation. Keshavan, 50, is a temporary watcher with the Kerala Forest Department. Passionate about forests, he lives in a “colony” on the bank of the Nulpuzha river near Muthanga, inside the sanctuary. During our field visits, Keshavan said that the Wayanad forest had undergone major transformations since his childhood. Among the changes he mentioned was the spread of *Senna*. “Only three to four trees were planted near the Muthanga forest office for shade. The sight of the bright yellow flowers was spectacular,” he said, pointing at old, hacked trunks of *Senna*.

“Forest departments and non-profits have been largely unsuccessful in their efforts to control invasive species since tailor-made national policies or legal frameworks to tackle their spread are nearly non-existent in India.”

“Later,” said Keshavan, “the tree started spreading, and now it is everywhere in the sanctuary, including in the barren and dry eucalyptus plantations, along the river banks and swamps. It has affected wild ginger, turmeric, tubers, and all medicinal plants which were common in the forest. It grows at an astonishing speed, and animals don’t eat its leaves because they give off a foul smell when crushed. Your eyes and face burn when you debark the trees to kill them. Elephants and other animals avoid areas that have an abundance of *Senna*. Villagers of Nedumthana and Begur forest hamlets in the Tholpetty range also say that the *Senna* is destroying their forests

and the State should do something to stop its spread.”

Uprooting *Senna* saplings, he added, “We can find a solution but we must start soon.”

Highlights

One of the commonest and deadliest invasive trees of the Western Ghats is the *Senna spectabilis*.

Planted in postcolonial times by forest departments, the species has now spread widely and is quickly replacing native vegetation.

Forest departments have been largely unsuccessful in their efforts to control them since tailormade national policies to tackle their spread are nearly non-existent in India.

It is essential to understand the manner of spread to develop strategies for region-specific management of the species

High survival rate

The *Senna* spreads mostly in open areas, monoculture plantations, and riparian forests. It takes two to three years for the plant to grow into a tree and start flowering. One tree produces around 6,000 seeds every season, whose survival rate is very high.



Forest department personnel uprooting *Senna* seedlings in the Kakkapadam area under the Muthanga forest range of the Wayanad Wildlife Sanctuary. | Photo Credit: Special arrangement

Native food sources below the tree’s canopy get destroyed, impacting the survival of herbivores and dependent carnivores. The resulting reduction of foraging grounds pushes wildlife beyond the boundaries of protected areas, leading to negative interactions with

humans. Large mammals like elephants, who avoid *Senna*-infested areas, may get confined to areas with no *Senna*, toppling the ecological balance.

Considering the botanical features of the species (coppicing effect, production of a large number of seeds, seed dispersal by native mammals, seed bank in the soil, deep roots, etc), its removal is a costly and challenging process. Various mechanical and chemical control methods were tried by the Kerala Forest Research Institute, the Kerala Forest and Wildlife Department, and a non-profit called Forest first.



A forest department worker debarks a *Senna spectabilis* tree in the Wayanad Wildlife Sanctuary. | Photo Credit: Special arrangement

Anurag Varakil, a biologist involved in the removal of *Senna* in Wayanad Wildlife Sanctuary, said: “Large trees have roots that go deep and wide, which makes it difficult to remove the entire root system even during the monsoon when the soil is damp. The trees regrow from the stumps next year. So we have to continue the removal

process for at least three years.”

Destroying the seed reserve requires continuous removal of seedlings by hand during monsoon. Some seeds might remain dormant for years before bursting into life again. Hence, systematic long-term monitoring is needed for complete uprooting of the trees.

Proper girdling or ring-barking (removal of bark from around the circumference of a tree to disrupt the movement of water and nutrients between the roots and the top) of adult trees during peak summer is one of the best methods to kill the trees, according to Kerala Forest

Research Institute and forest department officials.

Citizen science

PARDESI programme

Scientists from Ashoka Trust for Research in Ecology and the Environment (ATREE), in collaboration with Keystone Foundation and World Wildlife Fund, have started an initiative to study the distribution patterns of invasive species in the Nilgiris Biosphere Reserve (NBR). This endeavour, titled the Participatory Assessment of the Regional Distribution of Exotic Species in India (PARDESI) programme, aims to engage citizens, who can utilise the Open Data Kit Collect application (ODK app) on their smartphones to identify and map invasive species. A comprehensive list of 89 invasive plant species from the Moyar-Bhavani Landscape (MBL) of the NBR has already been compiled. In the coming years, PARDESI seeks to cover the entire Western Ghats biodiversity area besides establishing a sustainable monitoring system.

Region-specific management

However, the removal of *Senna* creates open spaces that might get infested by other invasive species. There is also a chance of soil erosion in such cases. To avoid this, the managed areas must be replanted with native plant species. Since the *Senna's* density and age is lower in areas of recent invasion, removal should start from these places.

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We also noticed that the species spreads from one landscape to another through connecting landscapes. It is

important to identify these corridors, where barriers can be created. Since the trees are spread across States, their containment requires coordinated efforts among governments.



A farmer burning dry lantana shrubs on the periphery of his field near Jamni in Kumram Bheem, Asifabad district, Telangana, in 2019. | Photo Credit: S. Harpal Singh

There are several methods for management of invasive species in India: manual and mechanical, use of fire, chemical control, and biological control. Cutting, uprooting, and mechanical methods are commonly used to curb the spread of invasive plants such as *Lantana camara*, *Prosopis juliflora*, *Opuntia stricta*, as well as of *Senna*, in some protected areas of the Western Ghats. Most such eradication efforts have failed mainly due to topographical complexities; no sooner are the trees removed than the seeds are dispersed by mammals and birds, and new shoots emerge. It is essential to understand the manner of spread to develop strategies for region-specific management of the species.

As ecologists Ankila J. Hiremath and Siddhartha Krishnan asserted in a 2016 article, “India needs a single, comprehensive legal and policy framework on invasive species and a single nodal agency responsible for its coordination and implementation.”

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