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THEY GROW FAST AND EASY BUT DO MIYAWAKI FORESTS MEET THE FUNDAMENTAL PRINCIPLES OF ECOLOGICAL RESTORATION?

Relevant for: Environment | Topic: Biodiversity, Ecology, and Wildlife Related Issues

A Miyawaki forest in Bengaluru. | Photo Credit: K. Murali Kumar

A thick wooded grove hugging a walking track in Navi Mumbai's 42-acre Nisarg Udyan, an erstwhile dumping ground, is teeming with life. Along a path that follows the grove's spine, a line of 15-foot kadam trees tower over shorter neighbours: peepal, teak, neem, jamun, palas. Clustered tightly together, it's hard to tell one bark from the next, as I feel my way past several leaf-types, some half-eaten. Buried in the shadows, on the leaf-littered floor, are little mahua saplings, nirgundi and kari patta shrubs, and other plants I do not recognise and (due to the mind-boggling number of saplings) I do not ask about. This green wall, comprising some 40,000 saplings from 60 species, was planted exactly a year ago.

This micro forest adopts the technique of a Japanese botanist, Akira Miyawaki, who, in the 1970s, began to plant young native plant species — trees, shrubs, and grasses — in tight groves to restore degraded lands. Saplings planted close together grow rapidly as they compete for light. By planting a native tree assortment, replicating the vegetation layers found in a mature forest, Miyawaki was engineering (and fast-forwarding) the stages of ecological succession by which a degraded plot turns naturally into a forest. In his lifetime, Miyawaki is said to have monitored the planting of over 1,500 forests, from Japan to Southeast Asia, Brazil and India.

"A lot of the popularity is because of the results," says Shubhendu Sharma, founder of Afforestt, a native forest-planting firm, who popularised Miyawaki's methods in India. "The before and after pictures of these forests are incredibly different, incredibly unique and this type of transformation is not seen in most other techniques."

There are hundreds of thousands of Miyawaki forest trees in India, from Thiruvananthapuram to New Delhi. Chennai's municipal body promised to set up 1,000 mini-forests across the city, and the country's largest Miyawaki forest is in Hyderabad planted across 10 acres. These forests have sprung up in smaller urban centres, in the schools of Tirunelvelli, around temples in Tiruchi and even around a prison in Rohtak.

These fast-shooting micro forests, say advocates of the method, could cool concrete cities, clean the air, sustain wildlife, and form carbon sinks. The method is quickly finding favour in government corridors and corporate boardrooms to restore urban spaces. But the theory, critics say, far outstrips the evidence in India. They argue that the method is expensive, its benefits unclear, and Miyawaki's techniques violate fundamental principles of ecological restoration.

In 2009, Sharma, then an engineer at a Toyota factory, was inspired by Miyawaki's presentation during an afforestation drive at the Toyota campus in Bengaluru. First, Sharma volunteered to reforest the campus, then he set up a micro-forest in his own backyard. In 2011, he quit his job to set up Afforestt, and has established 138 forests in 44 cities around the world. Along the way, Afforestt published a Miyawaki do-it-yourself method online and offered tutorials, inspiring others to join the movement.

Sharma's journey has coincided with a global tree planting boom. In 2011, the Bonn Challenge set out to restore 350 million hectares by 2030. In 2020, the World Economic Forum launched the One Trillion Trees Initiative inspired by a highly criticised study in *Science* the previous year, which said that the “most effective climate change solution to date” was reforesting.

Closer home, our tree obsession has fuelled large-scale campaigns in Telangana (to sow 2.3 billion seedlings in four years), in Uttar Pradesh (where 260 million saplings were planted in one day last year) and in Karnataka and Tamil Nadu where Isha Outreach’s Cauvery Calling movement plans to plant 25 million saplings along the Cauvery river basin.

Done right, tree planting can have massive benefits. They store earth-warming carbon dioxide, sustain wildlife, improve the health of ecosystems, and provide employment. But sticking the wrong trees in the wrong soils, or in soils that have never supported forests before is harmful: it reduces biodiversity, drives species to extinction, and hampers ecosystem resilience.

The focus of Miyawaki’s work was to bring back the lost natural vegetation of any given geography,” Sharma tells me. “But unfortunately, because of how fast the method spread in India, a majority of Miyawaki projects have been executed without the basic foundations.” By foundation, Sharma means sourcing the natural vegetation of the landscape, whether grasses, mangroves, or desert shrubs, that are native to the original local ecosystem — not just trees.

As Miyawaki projects have skyrocketed in Chennai, R.J. Ranjit Daniels, an ecologist and trustee of the Care Earth Trust, has watched the city’s open landscapes being clogged with micro-plantations that, he says, have disregarded the structure and composition of plants, neglected native species, and the region’s natural ecology.

Chennai’s native vegetation was likely dominated by palmyra palms, a cocktail of grasses and short herbs. Tree cover was sparse, and canopies sprawled wide (rather than straight up), says Daniels, listing out a handful of local tree species: the banyan, Indian laurel, Indian beech, and portia. “But now, we are not creating anything like this,” he says.

Pradeep Tripathi, founder of Green Yatra, a non-profit that extensively uses the Miyawaki method, says that tree-planting organisations untrained in the method are tarnishing Miyawaki’s reputation. “The majority of groups don’t conduct surveys to find out what the native species of the landscape are,” he says. “They plant whatever they find.” To maintain the Miyawaki gold standard, Tripathi is proposing an accreditation system for legitimate operators.

Sharma knows the trappings of fast-growing trees too well. He has watched clients substitute native slow-growth species for non-native faster-growing trees. “In our narrow focus of quickly bringing back forests, we were forgetting the original ecosystem. This is the road that will eventually lead you to create a monoculture,” says Sharma.

Even when done right, there have been no assessments to compare the biodiversity and ecosystem impacts of Miyawaki forests with corresponding plots restored through other methods in India. Several questions remain unanswered: how do forests support native biodiversity? What impacts do they have on the groundwater? What carbon sequestration benefits do they provide? “Without evidence, how do we accept this method as an alternative?” asks Daniels.

Researchers from the Wageningen University in the Netherlands have found that Miyawaki forests in the country support greater biodiversity than those in nearby non-Miyawaki forests. But comparative research of this kind has not been carried out in India. Miyawaki trees absorb 30 times more carbon than monoculture plantations, advocates routinely claim. Yet carbon sequestration data from the Netherlands found carbon absorption benefits of Miyawaki forests appear to be on par with other forms of native reforestation.

Besides selecting the wrong trees, Miyawaki forests have been planted in ecosystems that have never supported many trees: in Kutch in Gujarat, Jaipur in Rajasthan and Hyderabad in Telangana. “If you are in an arid part of Gujarat, Rajasthan, or other parts of the Deccan Plateau, it doesn’t make sense to grow Miyawaki forests because such a forest never existed there to begin with,” T.R. Shankar Raman, scientist at Nature Conservation Foundation, says. Non-forested habitats — from tree-less deserts, to savanna grasslands to lateritic plateaus — cover 3,19,000 sq.km. (roughly 10%) of the country’s surface.

Planting Miyawaki saplings in bone-dry landscapes by pumping the soil with water and nutrients might produce a patch of trees, but destroy native ecosystems, pushing plants and animals that depend on them to the brink. The new trees could impact the region’s hydrology that native shrubs and grasses have adapted to, sucking up already scarce resources, exhausting the water table. Even if the right plants are sought for the right soils, ecologists argue, the Miyawaki technique violates a fundamental code of restoring a natural ecosystem to its original state. “The Miyawaki forests are not a kind of forest that you see in nature,” Raman says, “It’s a very artificial forest.”

Miyawaki forests are not intended to, and will never replicate natural forests, Tripathi says, but it is a technique to restore biodiversity and fight climate change impacts in cities. “We are implementing the Miyawaki method in cities where land is scarce. This method allows us to create mini-forests in a very small area,” he says.

“It’s like if you bring a polar bear into your home and you create one room that is full of ice, the polar bear will survive, but you know, people will laugh at you,” says Pradip Krishen, naturalist-author. The room of ice, for Krishen, is a metaphor for Miyawaki’s unconventional methods: planting species tightly together that don’t resemble natural ecology, sowing saplings without regard for how species and organisms interact together, or bombarding new saplings with nutrients, water and soil to promote their fast growth in a manner that does not fit the natural order. Referring to the ecological restoration of the Rao Jodha Desert Rock Park, a project that he led, Krishen says: “Once we’ve planted something, we don’t water it. The attempt is to try and grow things that are perfectly adapted to live in those conditions.”

The tree-planting NGOs say they want to engage with ecologists and naturalists who disagree with the Miyawaki technique. “ They are welcome to visit our sites, better understand our practices, and help improve our methods,” says Durgesh Agrahari, head of projects and partnerships at NGO SayTrees.

Tree researchers are beginning to slowly uncover the marvellous world of how trees communicate and cooperate in the natural world, behaviours that are integral to their survival and well-being. Trees, for example, can nurture sick neighbours, and warn other trees of danger by sending electrical signals through fungal networks in the soil. These underground fungi-tree symbiotic alliances are called mycorrhizas by which tree roots meld with thin fungal networks to extract nutrients and water, and in return, provide the network with carbohydrates produced through photosynthesis.

In the original Miyawaki method, for example, saplings were traditionally planted on mud mounds, created by digging up the nutrient-rich top-soil from another ecosystem, earth that was previously rich in micro-organisms and fungal-tree networks specific to that area. “In 2017, we completely changed this process, when we started to realise that we were disturbing another ecosystem,” says Sharma. In his journey, Sharma is expanding his work from tree afforestation to rewilding, which has a stronger ecosystem-based outlook. Chennai’s city corporation is now abandoning its Miyawaki push, and instead looking to plant micro-forests through traditional methods.

For Krishen, the cardinal principle of any ecological restoration exercise is to restore nature in its own image. “We have trees, plants and grasses, they have adapted through a process of evolution for millions of years,” says Krishen. “I don’t think the fundamental idea of Miyawaki is suited to our ecology at all.”

The writer is a freelance journalist.

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