

Role of Miyawaki forests in mitigating urban heat island effects

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In the far past, afforestation was largely a means to generate income from timber and other products. Today, it is integral to our survival.

Loss in green cover and increased concretisation in urban areas has led to cities becoming 'urban heat islands', which pose significant threats to not just human populations but also contribute to global climate change.

In countries like India that are highly vulnerable to climate breakdown, forests are an integral element towards mitigation. Tree cover of almost 1.6 million hectares was lost between 2001 and 2018 in India — nearly four times the geographical area of Goa, according to a study released by the World Resources Institute.

In this pledge to the UNFCC, the Indian government promised to cover 33% of its geographical area with forest cover by 2022, which currently stands at 24%. One possible method to achieve the target would be the Miyawaki method of afforestation. Also called the Potted Seedling Method, this afforestation technique uses native species to create dense, multilayered forests.

Akira Miyawaki, the earliest known pioneer of this <u>system</u> used potential natural vegetation (the species that would exist at a given location if not impacted by human activities), phytosociology (ways in which plant species interact with each other) and a four-layered system of planting, to design his own system for planting forests.

In the face of a climate breakdown, Miyawaki forests are a "welcome addition to the environment," said Tarun Gopalakrishnan, Centre for Science & Environment. Planting dense forests with indigenous species, a central tenant in Miyawaki method, is "more suited to building sustainable long-standing forests which set up a kind of equilibrium and these ecosystems are the best at sequestrating carbon for a climate challenge," he added.

Planting solo trees like oak, which have become known through popular knowledge is not the same as planting a forest, explained Sheeba Sen, CEO of Alaap. "These trees behave differently as compared to trees in a dense forest. Like rural kids and urban kids who've had different starting points in life and then behave differently."

Its benefits include lowering temperature, making soil nutritious, supporting local wildlife and sequestration of carbon. The idea is to mimic nature while creating these tiny crosssections of tiny islands called Miyawaki forests, added Sen.



Miyawaki method also called the Potted Seedling Method is an afforestation technique that uses native species to create dense, multilayered forests. Photo by Arnold Joyce.

Miyawaki in India

In India, this method is slowly gaining momentum. The social enterprise Afforestt has worked with various companies and individuals to create these forests. Recently, they worked with the Department of Biotechnology (DBT), Government of India (GOI) to convert a sewage-ridden patch of land near the Barapullah drain. This was part of a bigger project named Local Treatment of Urban Sewage Streams for Healthy Reuse (LOTUS HR) to clean the drain. LOTUS is a joint initiative of DBT, Ministry of Science & Technology, GOI and the Government of Netherlands that set up a demonstration plant to clean up the Barapullah drain. With early site inspections in January 2018, the foundation of the forest was laid on July 2018.

Afforestt's Miyawaki technique includes a six-step process that starts with surveying the soil to assess physical texture, organic carbon, soil pH and more. Then a survey of native species and biomass is done by visiting and collecting relevant data from the nearest natural forest in the region. After which, native saplings are procured and planted in layers, as per Miyawaki guidelines. Finally, the site is monitored and maintained for a period of 2 to 3 years, after which the sites become self-sustainable.



"Roughly costing around Rs. 50,000 to Rs. 60,000 to create a tiny forest of 300 ft & 100 square metre, this method guarantees a high survival and growth rate compared to conventional forests, if the technique is followed to the T," said Sunny Verma, Executive Director, Afforestt.

Dr. Shailja Gupta, Principal Scientist at DBT looks at this method as a "terrific option in urban cities where land and space are a constraint. Allowing maximum optimisation of land, the results are very rewarding with a visible increase in growth to nearly 10 ft of over 2000 species that were planted, and of which almost all are thriving," she said.

Though the potential native vegetation survey is the most critical part of forest creation, Gupta explained that its beauty lies in the close proximity of saplings (minimum of 3 saplings per square metre) which allows the root systems to remain connected with each other, to help in their upkeep of immunity such that no fertiliser or pesticide is required to keep them healthy and growing. It also helps ward off diseases, which is hugely important, added Dr. Gupta.



Miyawaki forest at Barapullah, Delhi. Photo by Arnold Joyce.

The Noida District Magistrate, Mr. BN Singh, who is also keen on the Miyawaki method, has found a rather unconventional way of ensuring afforestation. He said that over the years migration into the city has put pressure on resources such as land, water, and others. Government land is being captured for unauthorised construction, selling, buying, etc.

As an initiative to utilise available land and increase green cover in the city, he proposed a Memorandum of Understanding (MoU) between local bodies and private and public companies that are ready to invest funds either through CSR or otherwise. These partnerships allow the respective parties involved to use the land for the sole purpose of afforestation for a stated period of time, without any other rights or ownership.

In their newest variation of MoU, the district administration of Gautam Budh Nagar signed an MoU with Samsung India to develop a Miyawaki forest in a land area of 71,000 sq mt in the Dadri area, around 35 km from the company's Noida manufacturing plant. This has been signed under the firm's corporate social responsibility (CSR) initiative. The district administration has given the land to Samsung India for 10 years towards afforestation.

"By connecting organisations through MoUs and creating forests, it will have a demonstrative impact as well. Now once the forest grows in the Collectorate office it might motivate others to do this as well," said Singh.

Mr. Singh added, "Once developed this would be the largest Miyawaki forest in India. Hope some good patches of dense forest will be visible in the district in coming years."



8500 saplings were planted in 3000 square metre area at the Collectorate's compound, Noida in August 2019. Photo by Arnold Joyce.

The way forward for an expensive method

The issue though with this method can be its high cost. Given that urban land is usually in a degraded state, the cost of preparing the soil and land can be high. Second, these are dense plantations. So the number of saplings needed increases, thereby raising costs.

Alaap's Sheeba Sen admits to the current cost issues and added, "Cost issues is a valid thing because the supply chain of the nurseries is not set. Answering to the sudden demand, the cost per sapling has gone up to over Rs 100 per sapling, increasing the costs immensely."

Amritha Ballal, urban architect and founding partner at the integrated design firm Space Matters expressed that the government's push towards promoting supply of saplings of native species at their nurseries and using that in afforestation within the city would be very helpful in boosting biodiversity.

"The paradigm shift is from just planting trees to creating a forest. It will take some time to say that the results are also 30 times better. If your costs are more, the results are worth much more in comparison. We have to empower people and make them feel confident

about their investment in plantations which will come through transparency and effective use of technology," said Sen.

Prem Parivartan, fondly known as Peebal Baba, claims to be one of the earliest champions of Miyawaki system in India. He remembers his first initiative in Patiala not receiving a positive response from farmers and others involved. This was mainly due to the intensive methodology and the costs that came with it. Though his journey with Miyawaki ended years ago, he believes this to be one of the best methods of forest creation in India.

He said, "If a mandate comes into action giving every district a target to create XX amount of forests, in a couple of years we'll see a huge difference in our society. But this requires political will."

Going forward, creating Miyawaki forests can't be looked as a solution in isolation, but a small significant part of mitigating the effects of climate change.

"There needs to be a shift from plantation for ornamental landscapes to creating biodiverse native habitats in private as well as public projects. Not just for fighting heat island effects but also for groundwater recharge," said Ballal.

As DBT's Shailja Gupta said, "For government organisations to find funds through non tendering systems is always a challenge. So I'd want more public sector organisations like ONGC and others that have CSR to adopt little spaces and create Miyawaki forests. Going forward if the public and private sector join in as well as this becomes a citizen movement, it will help."

Source: <u>https://india.mongabay.com/2019/09/role-of-miyawaki-forests-in-mitigating-urban-heat-island-effects/</u>