STATUS OF INDIA IN EXPANDING ITS GREEN COVER THROUGH MIYAWAKI FORESTING TECHNIQUE

[1]*SHINOGI K C, [1]SANJAY SRIVASTAVA, [2]I RASHMI, [3]ADHINI S PAZHANY, [1]NISHANT KUMAR SINHA, [1]BHARAT PRAKASH MEENA

[1]ICAR-Indian Institute of Soil Science, Bhopal, Madhya Pradesh; [2]ICAR-Indian Institute of Soil and Water Conservation Regional Centre Kota, Rajasthan; [3]ICAR-Sugarcane Breeding Institute, Coimbatore, Tamil Nadu
*Corresponding author, E-mail: shinojikallely@gmail.com

Forests, one of the key carbon sinks of the world, grabbed enormous global attention with the 'Forest Principles' formulated in the United Nations Conference on Environment and Development (UNCED) held at Brazil in 1992. The document that emphasised on a global consensus on the management, conservation and sustainable development of all types of forests (both natural and man-made) is reportedly the first global agreement on forests. Thereafter, under the United Nations Framework Convention on Climate Change (UNFCCC) the 2015 Paris Agreement encouraged the signatory countries to create additional carbon sinks and reservoirs by expanding forest cover. Deforestation is considered as one of the prime causes of climate change along with burning of fossil fuels.

World data on deforestation over the past three decades conveys that these initiatives lead to some radical changes in the forest loss pattern i.e., average rate of net forest loss per year has declined from 7.84 million hectares of 1990-2000 to 4.74 million hectares during 2010-2020. In fact, more than sixty percent of the world forest area (4.06 billion hectares) located in ten countries including India (https://www.fao.org/state-of-forests/en/). Under the Paris agreement India has committed to create an additional carbon sink of 2.5-3 billion tonnes of CO2 equivalent by 2030 through increasing the area under forest and tree cover. Though the target set by India is not easily achievable as a forest takes nearly 100 or more years to grow naturally, quite a good number of efforts to increase the green cover had been taken up by different state governments, non-governmental organizations and even multinational companies working in the country. One of such afforestation technique introduced to India by the automobile manufacturer Toyota in connection with the environment and social activities of the company was the crowd foresting technique developed by the Japanese botanist Dr. Akira Miyawaki. In June 2009, Toyota developed the first Miyawaki forest of India, in 4 hectare land around their manufacturing plant located at Bidadi town of Bangalore in Karnataka state with the technical assistance of Dr. Miyawaki.

MIYAWAKI FORESTING TECHNIQUE

Integrating the concepts of ecological successions, potential natural vegetation (PNV), cooperative processes of high density plating in humus rich soils, Dr. Akira Miyawaki developed the ecological engineering technique popularly known as "Miyawaki method" in the early 1970s for the restoration of indigenous forests in Japan using native tree species. This crowd foresting technique build a dense and efficient forest ecosystem as equivalent as that of a 100-150 year old forest in a short span of 20-30 years if developed in compliance with the recommended steps. Four steps of the Miyawaki foresting technique to establish a forest successfully as promised includes

Initial Survey of the Locality: to develop an understanding about the soil characteristics of the site and the potential natural vegetation of the locality. According to different definitions PNV covers either the original vegetation or the subsequent vegetation established naturally in the area subsequent to any major environment al changes like soil erosion. The underlying idea is the planting native vegetation would help forest cover to get established even under no human interference in later stages of the forest development process.

Collection of Seeds: starts once the tree species for planting are being identified. Identification of trees should be planned in such a way that the forest after establishment be a multilayered one. Hence, identified tree species are divided into four layers like shrub, tree, sub tree and canopy layers and percentage of each tree species will be decided accordingly. Seeds of the selected vegetation are collected in large numbers from a natural forest locally or from a similar geo-climatic area and germinate them properly in a nursery bed. Transplant the seedlings at 2-3 leaves stage to grow bags filled with potting mixture prepared using equal amount of soil, coir pith/wood chips, rice/wheat hull and dry cow dung. Keep these plants under partial shade for a minimum period of 2-3 months before planting in the main field.

Preparation of the Planting Site: starts with loosening the soil by incorporating organic biomass like wood chips, coir pith, bagasse, rice or wheat hull etc. so that the soil hold more water. For this, the first step is digging the soil up to one metre deep. Then, the soil to a depth of 50cm will be taken out and fill it with a mixture of soil (20-30 cm topsoil of the site), locally available organic biomass, and dry cow dung. Also, microorganisms isolated from a natural forest soil used to enhance the soil fertility of the new forest. This loosened fertile soil help the samplings to grow fast with better spread of roots deep into the soil.

Planting: will be done densely where one square meter area accommodates at least 4 trees with different layers (1 canopy level,1 tree level, 1 sub tree level and 1 shrub level) for a multilayered forest. Mulch the site using any organic mulch preferably rice/wheat straw is necessary to protect the soil from being eroded. As the soil is loose saplings need to be supported with sticks to withstand conditions like wind, heavy rain etc. (Figure 1). The planted site needs to be managed with timely irrigation and weeding in the first 2-3 years. Once the trees attain a height of 2 meters or more the forest does no require any human interference to grow further.

Figure 1. Miyawaki forest in the first year: plants supported using ropes (Photo courtesy: Mr. Vinod Kumar D K IFS)

RELEVANCE OF MIYAWAKI FORESTING TECHNIQUE: THE INDIAN CONTEXT

India, a country with nearly 80.73 million hectares area under forest and tree cover (24.5 percent of its geographical area) including 71.22 million hectares forest cover (FSI, 2019) reportedly losing its primary forest at an alarming rate. The Global Forest Watch (GFW) estimations convey that between 2002 and 2020 India lost nearly 3.4 percent of humid primary forest (349000 ha). The loss of tree cover during this period estimated as 1.93 million hectares, equivalent to 951 million tonnes of CO2 emission (https://www.globalforestwatch.org/). Since shifting agriculture and commodity driven deforestation are the two known reasons behind the loss of natural forests in India, their restoration through natural forest

regeneration process in a short time is an impractical solution. But, increasing concerns over the relation between loss of forests and tree cover with climate change, declining water resources, and biodiversity demands expanding the area under green cover within minimum possible time. One of the best solutions available in the country to resolve this issue is promoting establishment of manmade forests through Miyawaki forest technique in the available spaces.

In India, major agencies involved in the promotion and establishment of miyawaki forests are non-governmental organizations (NGO) though recently some state governments also adopted this afforestation technique to develop urban forests and social forestry related activities. Some NGOs and service providers engaged in creating native forests in the country using miyawaki are Afforestt and SayTrees, Enviro Creators foundation Invis multimedia, RISE foundation etc. They have already established more than 100 miyawaki forests throughout the country. Unfortunately, there are no data available on the exact numbers and area of miyawaki forests that have been developed in India. However, promoters of the Miyawaki foresting technique proved with their results that if properly adopted this ecological engineering technique quickly produces a multi-layered forest (Figure 2) that in turn enhance the water availability and natural biodiversity. However, the main hindrance behind popularising this foresting technique is the high cost of establishment. In general, for setting up a miyawaki forest in India the approximate cost involved ranges between `300 and `350 for one square feet area, that covers the costs of land preparation, organic biomass, saplings, watering and pruning of plants in the first three years (Source: https://www.crowdforesting.org). According to experts the establishment cost vary between locations based on the variations in the local availability of required inputs like dry cow dung powder, wood chips, coir pith compost, rice husk, bagasse etc. and quantity of organic biomass use based on the soil type.

Figure 2. View of a three year old Miyawaki forest in Kerala developed by Natures Green Guardians Foundation, Invis Multimedia Pvt. Ltd, Culture Shoppe Pvt. Ltd. and Organic Kerala Mission Society with the support of Department of Tourism, Government of Kerala (Photo courtesy: Mr. Vinod Kumar D K IFS)

WAY AHEAD

There is no doubt in the potential of Miyawaki crowd foresting technique in the restoration of the lost tree cover in a short time in India. This technique is highly effective in the establishment of urban forests as well as converting unproductive wastelands into ecological and socially beneficial productive lands. Still, its expansion in the country require proper efforts as well as financial investments from the side of government like distribution of necessary inputs or subsidies for purchase of inputs through some schemes to those who are ready to spare a fraction of their land for maintaining this tiny forest.

REFERENCES

FSI. 2019. India State of Forest Repost 2019. Forest Survey of India, Ministry of Environment Forest and Climate Change, Government of India.

***