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MIYAWAKI METHOD OF FOREST CREATION

One of the pioneering methods of forest creation in the world, combined with the experience and expertise of Afforestt.

INTRODUCTION

On receiving the Asahi Glass Foundation's 15th international global environmental award, the prestigious Blue Planet Prize, Dr. Akira Miyawaki drew the world's attention towards the need for the Restoration of a Green Global Environment. Here are some important excerpts from that historic speech which also form the foundation of the work done by Afforestt:

Protecting the environment means protecting life

"Why is it that while we are blessed with such an environment, there exist a great many people who feel vague unease about the future? Perhaps it may come from some basic, animal instinct within us human beings who have been made to dwell in an unliving, uniform urban environment from which the greenery and the indigenous forests that once covered the land have almost all been lost."

The role of forests in protecting life

"Among the different types of greenery, real forests made up of trees native to the area are three-dimensional, multi-layered communities having 30 times the surface area of greenery of single-layered lawns, and have more than 30 times the ability to protect against natural disasters and to conserve the environment. These forests are completely unyielding to natural disasters such as fires, earthquakes, typhoons, or tsunamis. So the greenery that is most important to us now is the greenery of native forests made up of trees native to the area, as symbolized by the groves of village shrines. Native forests protect life and protect the environment.

I have been working on creating forests of indigenous trees in their native habitat for over 30 years, together with people of foresight from the government, private companies and the general public. Rather than simply restoring forests that were there before, this work involves creating genuine native forests through rigorous field surveys and research into the ecology of the vegetation in order to ensure a future without making mistakes that have been made so far. Forests that have been regenerated on the basis of potential natural vegetation cost nothing to maintain, are long lasting, and carry out a diverse range of functions. Native forests protect the lives of all the people born and raised in the area, and the people who go to school or work there. They sharpen the senses of the people for the creation of culture and give rise to their intellect for new developments. I became wholly engrossed in regenerating this three-dimensional green environment almost without realizing it. The conviction and the activities with which I devote myself to creating forests for life are not something that came about overnight; I hope you will look at them as the way I have lived for 78 years."

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Creating Forests based on Potential Natural Vegetation

“From around the end of the 1960s onward there was a rapid growth in industry, and there was exploitation of nature on a massive scale. Atmospheric and water pollution became more and more serious, and such hazards came to be addressed as grave social problems. There was an unexpected backlash of public opinion, and civil campaigns opposed to pollution and the destruction of nature spread from the regions. The small laboratory where we *weed people* worked, which had previously had no connection to society, suddenly had visitors coming one after another. I thought their only real interest in coming was probably just to ask us to plant some greenery to atone for the pollution they had caused. I always answered that I would not help by planting greenery just as a temporary cover-up. I would, though, be very happy to cooperate in creating a real, native forest based on the potential natural vegetation of the area. Most of the people who came to the laboratory said no way, that's just pure cheek, and went home in a huff. But there were some people who thought that this Miyawaki person's ideas might just have something to them, and so to find out more they asked me to give lectures at their company headquarters or came back with their company executives in tow to hear again what I had to say. These people seriously looked into creating forests.”

“The first forest I created was at the request of Nippon Steel Corporation.I carried out a vegetation survey of the surrounding area, and found the primary trees for potential natural vegetation such as Machilus tunbergii, Castanopsis cuspidate, blue Japanese oak, and Quercus mytsinaefolia, growing at nearby Usa Shrine to heights of over 20 meters and with trunk diameters at breast height of over 80 centimeters. These were species with deep roots or axial root systems, which are difficult to transplant-so difficult that gardeners tend to dislike them. I couldn't have created a real forest without full use of these species, and through trial and error I found that planting potted trees worked well. I planted acorns in pots, and after a year and a half or two years there would be 30-centimeter seedlings with well-established root systems. I planted these on the mound, where the topsoil had been restored, together with all the other people working on the project.”

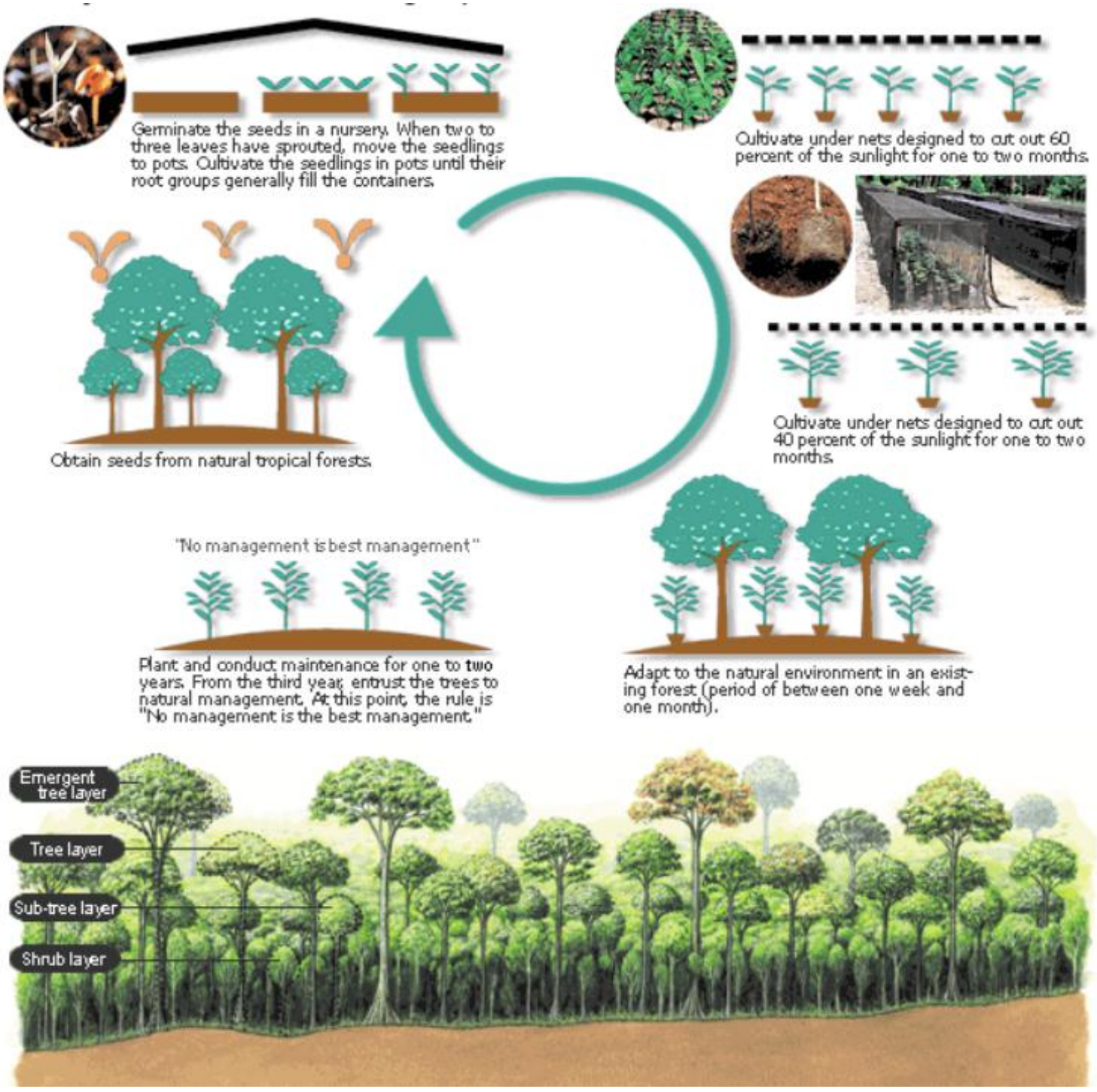
“For a natural plant community (society), the best situation is where the plants compete with each other and have to put up with each other. Our method of planting trees followed the law of the forest, and seedlings whose roots had filled the pot were planted, different species mixed together. In a natural forest, between 30 and 50 seedlings sprout per square meter. There are some places in Borneo where there are between 500 and nearly 1,000 seedlings per square meter. We densely planted different species together in a proportion of about three seedlings per square meter.”

“In a natural forest, seedlings emerge from a covering of fallen leaves, and when creating the forest we spread a thick layer of rice straw on the ground. Three or four kilos of straw per square meter is about right, and we spread it gently as if we were putting a blanket over a sleeping baby. The straw gradually forms a mulch, which is extremely important; even if there is no rain the seedlings do not have to be watered, and even if there is a sudden, 150 millimetre deluge one night the soil will not be washed away. The mulch also serves to protect against cold, and makes it difficult for weeds to grow. As the straw rots, it fertilizes the soil.”

“Our way of creating forests using seedlings of trees indigenous to the area with well-developed roots, planted densely and with different species mixed together, gradually became better understood. Electricity companies such as Tokyo Electric Power, Kansai Electric Power, Kyushu Electric Power, and Okinawa Electric Power, and companies such as Toray, Honda

Motors, and Mitsui Fudosan - thinking about it now, these were international corporations—all put our ideas for forest creation into practice."

The Miyawaki method is also called the Potted Seedling Method



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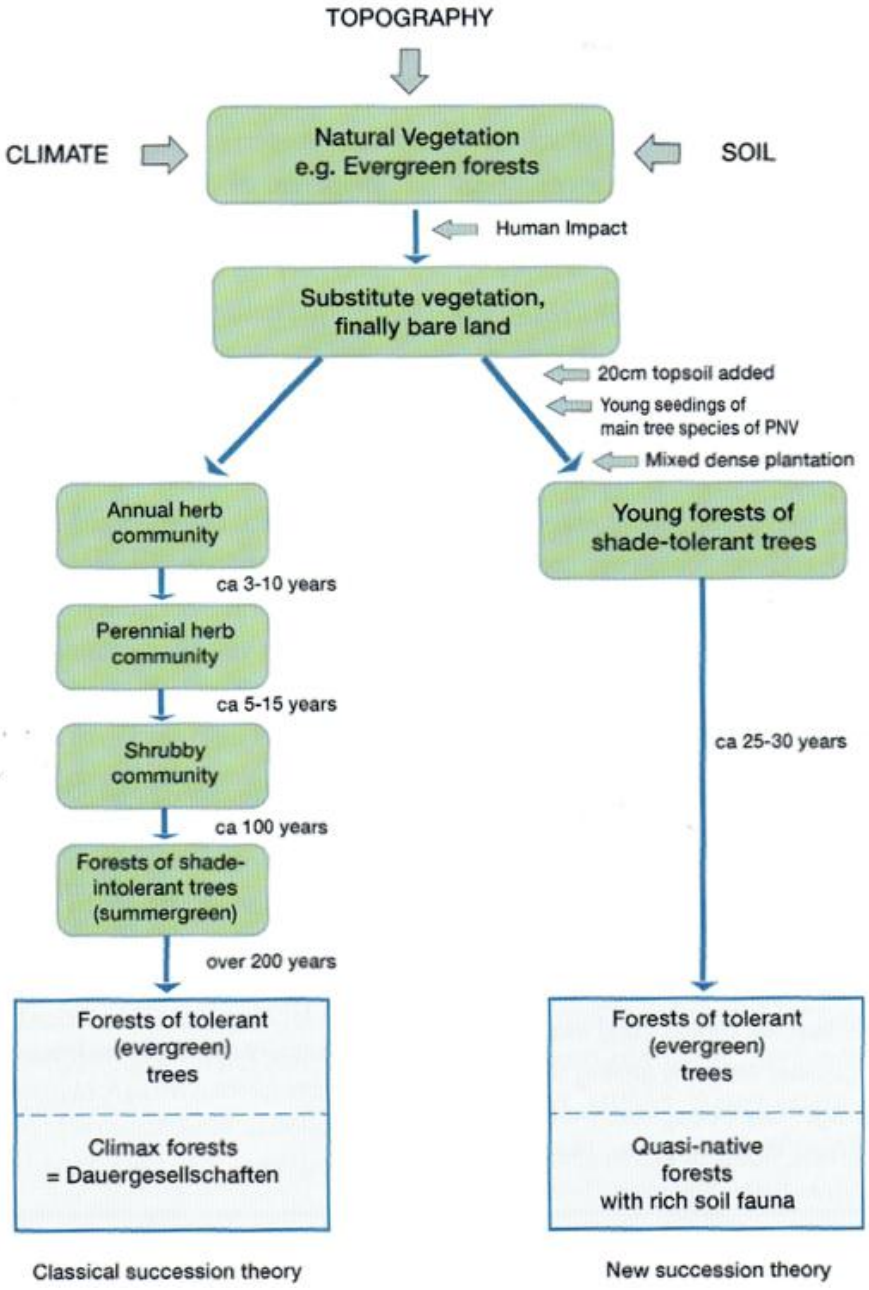
Comparison between Miyawaki's new succession theory and classical succession theory



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Afforestt Forest Creation Footprint

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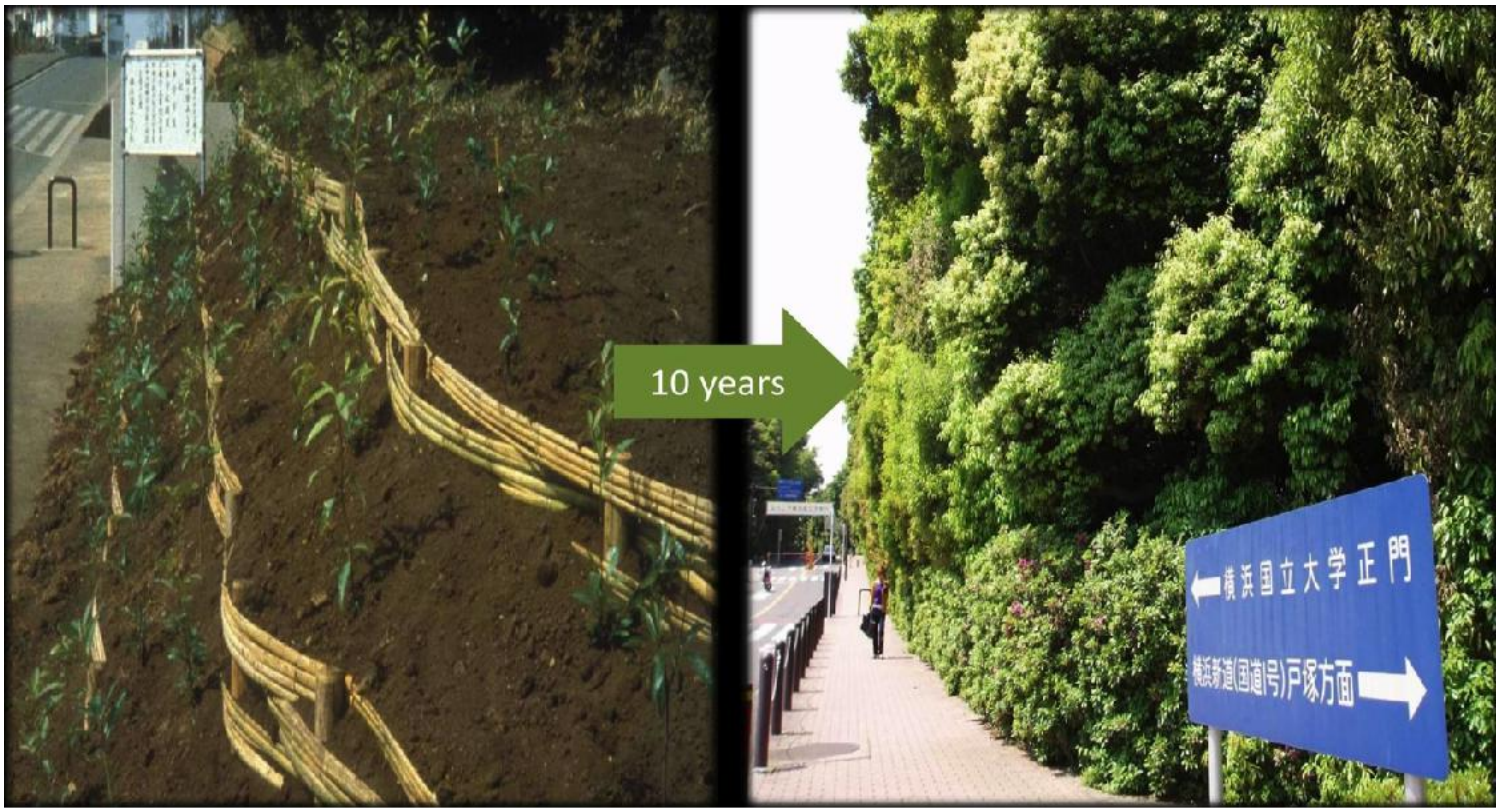

In pic above: Forest Created by Dr. Miyawaki in front of the main gate of Yokohama National University.

In pic above: Forest Created by Afforestt in Delhi.

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Advantages of Forests over lawns, conventional plantations and monoculture

No to Lawns

- Regular maintenance required.
- No output. Occupies ground
- Thin single layer greenery.
- Does more harm than good to the environment.

Yes to Forests

- Maintenance Free
- Gives you fresh fruits. Occupies empty space.
- 30 times more CO2 absorption and water retention.

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No to conventional plantations

- 1 Tree per 10 Sqmt
- Limited Varieties
- Single layered greenery
- Extensive maintenance
- Susceptible to pests and diseases

Yes to multilayer forests

- 30 Trees per 10 Sqmt. (100 Sqft.)
- Minimum 50 different species.
- Multi layered green forest.
- Maintenance free.
- 100% organic, 'Zero' pesticides used.
- Natural biodiversity.

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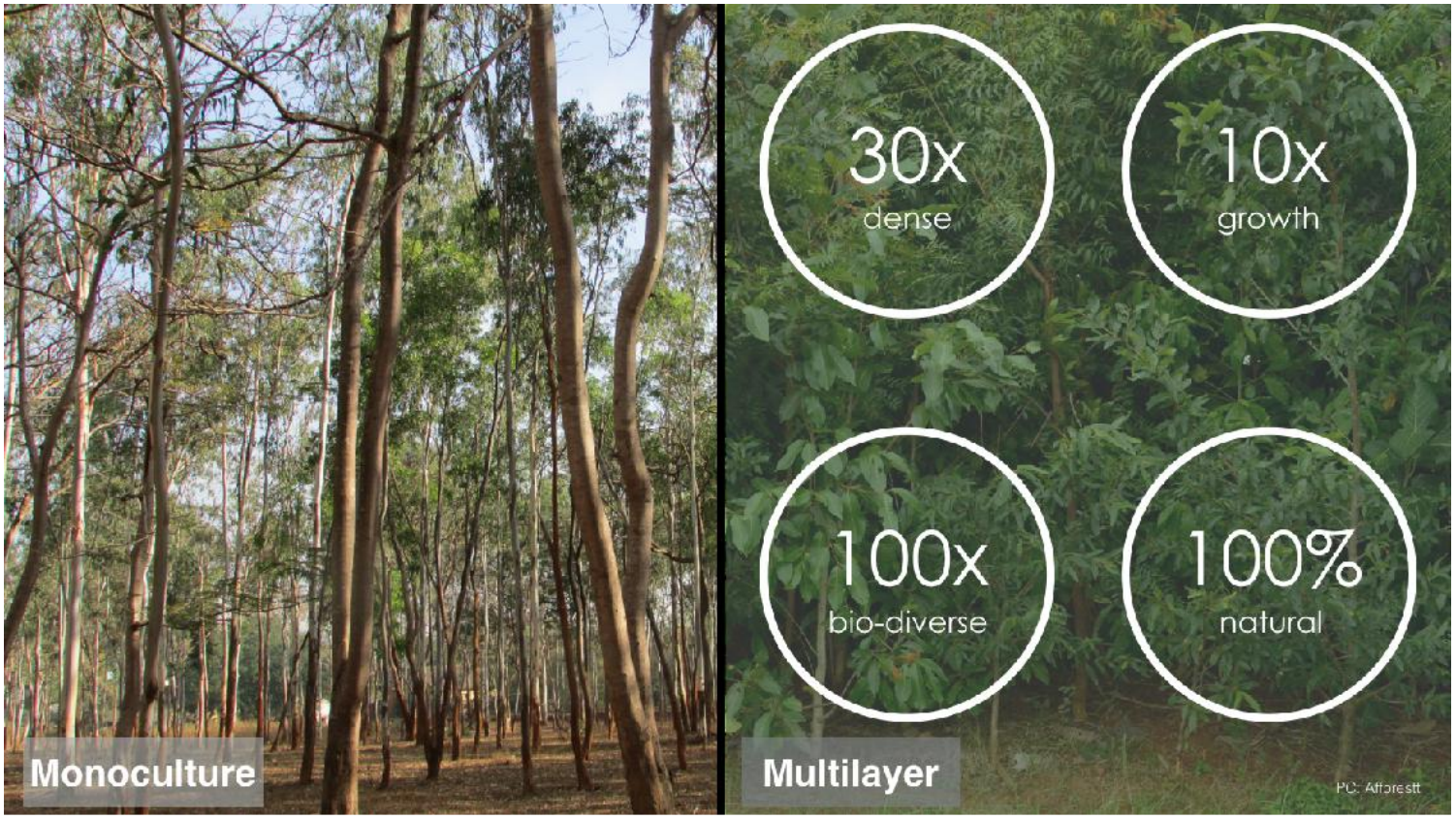

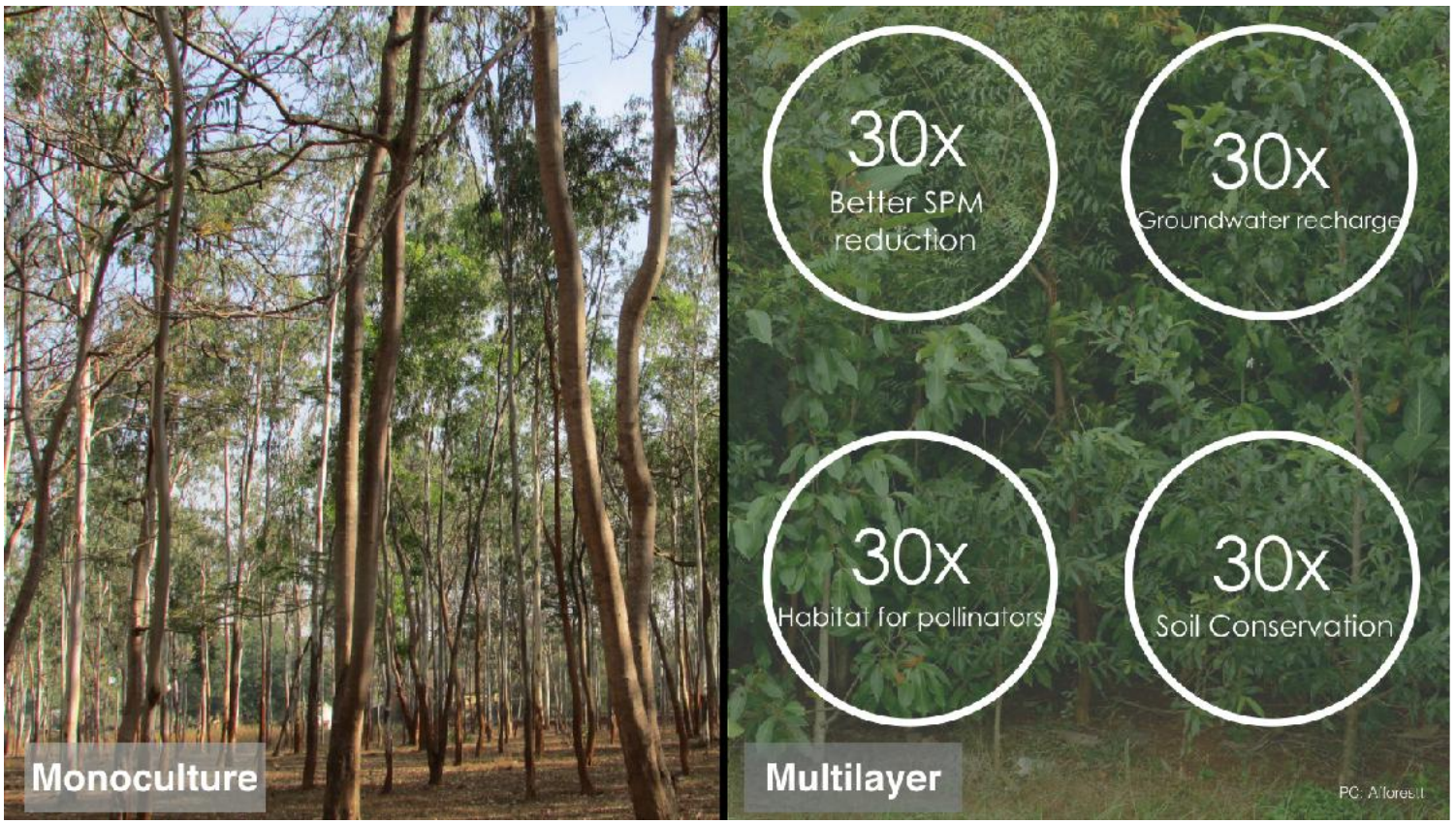

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THE 6 STEP PROCESS

STEP 1 - Soil Survey

Detailed soil analysis is done to assess the soil on the following parameters:

- Physical Texture
- Organic Carbon
- Nitrogen
- Soil pH
- Visible evidence of micro or macro fauna in the soil

This helps in determining and quantifying the materials that will be used for soil nourishment. Examples of nourishment materials used include:

- Perforation Material such as agricultural crop husk.

- Water retention material such as coco peat or sugarcane bagasse.
- Nourishment material such as farm yard manure.
- Mulching material such as straw.
- Liquid Soil microbiology enhancer such as *Jeevamrit.*
- Solid Soil microbiology enhancer such as *Ghanjeevamrit.*

STEP 2 - Native Species and Biomass Survey

Native species survey entails the following:

- Visit local forests and conduct potential native vegetation (PNV) surveys.
- Collate primary and secondary data and validate it.
- Gather all species related quantitative and qualitative data essential to creation of species' combination as per the Miyawaki method.
- Allocate each specie to a different layer in the forest - Shrub, Sub tree, Tree or Canopy.
- Find suppliers of healthy seedlings of species required.
- Ensure genetic authenticity of seedlings and genetic diversity among trees of same specie.
- Final quantification and order list is created to balance the layers and ensure best combination of Major, Supporting and Minor Species.

Biomass survey entails the following:

- Find appropriate suppliers of soil nourishment materials. Thorough survey of biomass suppliers is essential.
- Assess quality at source and match it with quality standards defined.
- Create robust supply chain, and finalise logistics.
- Ensure no adulteration of any form has been done.

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STEP 3 - Sapling procurement

- Find appropriate suppliers.
- Assess quality at source and match it with quality standards defined.
- Create robust supply chain, and finalise logistics.
- Ensure proper stocking and handling on-site.
- Assess root zones of seedlings and ensure they are as per quality standards required for Miyawaki method. Fully developed root zones essential, along with healthy shoots.
- Check propagation methods and ensure they are as per quality standards required for Miyawaki method

Step 4 - Soil preparation

- Uniform and consistent biomass mixture preparation using JCB and manpower.
- Enrich biomass mixture itself using soil microbiology enhancers.
- Uniform mixing of biomass into soil upto a depth of 1 meter.
- Mound securing and finishing.
- Soil nourishment at different levels during excavation using soil microbiology enhancers.

Step 5 - Plantation

- The species are distributed as per layers in accordance with Miyawaki method
- Plantation instructions given and followed as per requirement of the method.
- Root zones secured during plantation using soil microbiology enhancers.
- Each sapling staked using appropriate materials.
- Forest floor mulched as per standards set by the method.

Step 6 - Maintenance and Monitoring

- Maintenance training given as per pre defined standards.
- Site specific maintenance needs assessed and accounted for.
- Replacement and addition of materials as per needs of the project.

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- Project monitoring to assess overall results.
- Regular checks to ensure that the forest progresses towards becoming self sustainable within 2-3 years.

CORRECT IMPLEMENTATION OF MIYAWAKI METHOD

Our journey in the field of forest creation has been one of discovery, learning and unlearning. We have kept ourselves open to making changes that will help us protect the philosophy and values of the Miyawaki method. We have mechanisms in place to help us assess our own work critically, and continuously improve results.

Apart from Dr. Akira Miyawaki, we closely follow the teachings of some great scientists and practitioners in the field of nature conservation and *rewilding*. These include, Masanobu Fukuoka, Yacouba Sawadogo, Dr. Elaine Ingham, Subhash Palekar, Pradip Krishen, Peter Wohlleben, Suzanne Simard, Diana Beresford-Kroeger and Belinda Wright. We are ever so grateful to them.

During our interactions with Dr. Miyawaki's team we realised that any forest created is *real* only if it makes an attempt at replicating a native forest. This took us back inside forests. Every forest creation project is an opportunity for us to discover the jungles of that region, followed by finding suppliers of seedlings of jungle species.

So far, we have surveyed forests in 12 regions in India. This has helped us identify and plant 253 jungle species across the country.

It is our responsibility to point out the differences between real vs fake, as we believe that if the method is followed religiously, it can help us bring back our lost forests.

S. No.	Incorrect	Correct
1	Creating a forest without doing a jungle survey.	Miyawaki method demands that a local forest be surveyed, and the same species be planted as found. This is the first and most essential step. If a jungle is not surveyed and replicated, then we are just doing a dense plantation, not creating a forest.
2	Assuming that everything planted and growing locally is native.	Acknowledging that jungle species have not been propagated through plantations, and remain forgotten. The acknowledgement leads to the studying and implementation of Miyawaki method.
3	Use everything available at a local nursery.	Most nursery business thrives on marketing and selling exotic, non-native plants. In order to create a real forest, we must find the most genuine suppliers of jungle seedlings.

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S. No.	Incorrect	Correct
4	If a specie was *introduced* in a region during the last century or more, and is growing fine, then it can be considered naturalised and native.	Anything *introduced* by humans is non-native. Theory of Potential Native Vegetation (PNV) focuses on species that grow in a region without any human intervention, established over millennia.
5	If you plant seedlings at a density of 3-5 saplings per sq m, then it can be called Miyawaki method.	Dense plantation is not Miyawaki method. The method requires creation of the perfect species' combination, replicated from local forests, with close consideration given to layers, qualities and species' associations.
6	Soil preparation is the most important aspect of forest creation.	Soil preparation is useless if we have made compromises in selecting species.
7	Species being used for gardening, landscaping, avenue plantations or fruit orchards can be used to create a forest.	A forest is a balanced mix of native species. These are a part of the native flora of primary and secondary forests of the region. Any specie introduced in a region for conventional greening or commercial initiatives cannot be used.
8	We can create a dense timber plantation , or fruit orchard using Miyawaki method, for commercial gains.	Forests have innumerable qualities - fruits, flowers, soil nourishing, bird attracting, timber, medicinal, habitat for insects and pollinators, and habitat for other fauna. Yet forests can only provide for our needs, not our greed. We cannot grow a forest for commercial gains.
9	Planting grasses is allowed	Grasses come at a much earlier stage of ecological succession. The final stage i.e. *Climax* stage is what the Miyawaki method tries to replicate. Grasses are absent in this stage. If we put grasses along with trees, then the trees will suffer in the long run. Bamboo too is a grass and cannot be planted. Nevertheless, grasslands are important and should be created separate from forests.
10	Miyawaki method achieves fast growth and quick results, with focus on fast growing species.	Although the method ensures faster growth compared to conventional plantations, a forest created using Miyawaki method also has all the slow growing species of the region. Due to the density, the *average* growth rate is faster. However, slow growing species are an essential part of the forest being created.
11	Forest creation requires a fixed amount of water.	Water requirement varies form region to region, and is calculated according to average annual rainfall, soil conditions, local climate and terrain.
12	Usage of artificial fertilisers, insecticides, pesticides, fungicides etc.	The use of any artificial fertilisers, insecticides, pesticides, fungicides etc. at any point during forest creation and maintenance will cause irreparable damage and destruction.

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S. No.	Incorrect	Correct
13	Foliage in the forest should be spotless and green.	The forest becomes home to innumerable plant eating insects. The forest is meant to provide habitat and food for it’s fauna. Leaves, flowers, seeds and wood being consumed is a natural phenomenon. Similarly, leaves changing colour, or being shed according to the season is natural too.
14	Use of sprinklers and drip irrigation.	Using a hose pipe and shower ensures that all parts of the forest receive water, as opposed to only root zones in drip irrigation.
15	Allowing weeds to grow.	Keep the weeds out till the forest grows a little and controls weed growth on it’s own.
16	Flooding the forest with water.	The forest needs sufficient moisture, than an overload of water. Flooding will kill the roots and soil microbiology.
17	Cutting and pruning.	NEVER cut or prune even a single stem in the forest. Natural forests are never pruned. If any cutting or pruning is done, the forest will become weaker. Dr. Miyawaki says, "No maintenance is the best maintenance. If a forest requires maintenance after the first 2-3 years then it's a fake forest."
18	Cleaning the forest floor.	NEVER remove the mulch or the forest's organic matter (leaves, flowers, twigs, seeds, wood, stems) from the forest floor. If organic matter is removed and the soil is exposed, it will kill good soil microbiology and degrade the forest.