

Biodiversity Restoration Based on the Miyawaki Method and Ecosystem Benefits in Thailand

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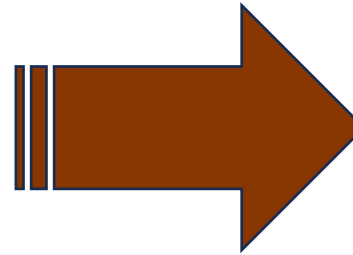
1.

Introduction: context and Important

Thailand & Global biodiversity crisis

1. Loss of biodiversity rural /urban
2. Degraded areas increase
3. Pollution (air water soil etc.)
4. Climate change
5. Disaster frequency and higher damages

Science – based
restoration



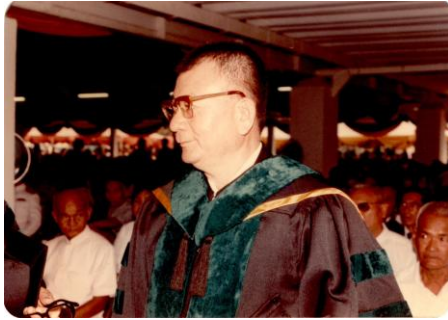
Within decades
Not centuries

Why Miyawaki method ?

- Reduction of degraded land
- Increasing biodiversity
- Prevention of disaster
- Sustainable agriculture
- Food security
- Better environment (air, water, climate, CO₂, PM, etc.)
- Local networking

2.

Miyawaki Method and forest restoration in Thailand



A unique technique to recreate **native forest** within a **short time** from **degraded land** with **native species**, planting **mixed species**, **dense**, **multi-layer**, and **random**.

Prof. Dr. Akira Miyawaki

(1928-2021)

Phytosociology survey on Mangrove in Thailand
Honorary Doctorate, Maejo Univ. 1984



5 Key steps of the Miyawaki Method application

1. Survey native species/Potential Natural Vegetation (PNV)
2. Identify on forest stratification (canopy, subcanopy, shrub, and ground layer)
- 3 Improve soil with organic matter
- 4 Quality of potted seedlings (well developed root system)
- 5 Watering, weed controls, and silvicultural practice such as pruning (as necessary) during 3 years

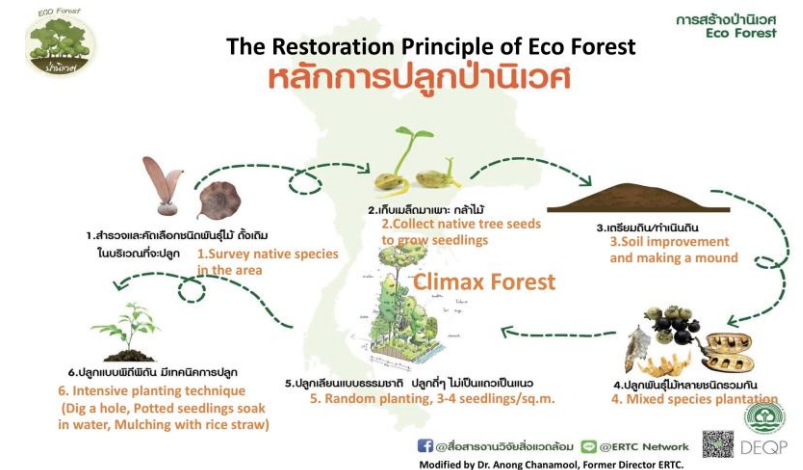
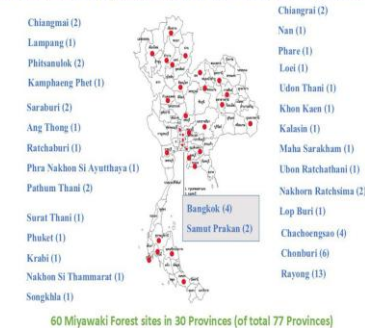


Forest Stratification (Model)

Miyawaki's technique applied for Forest Restoration in Thailand since 1991

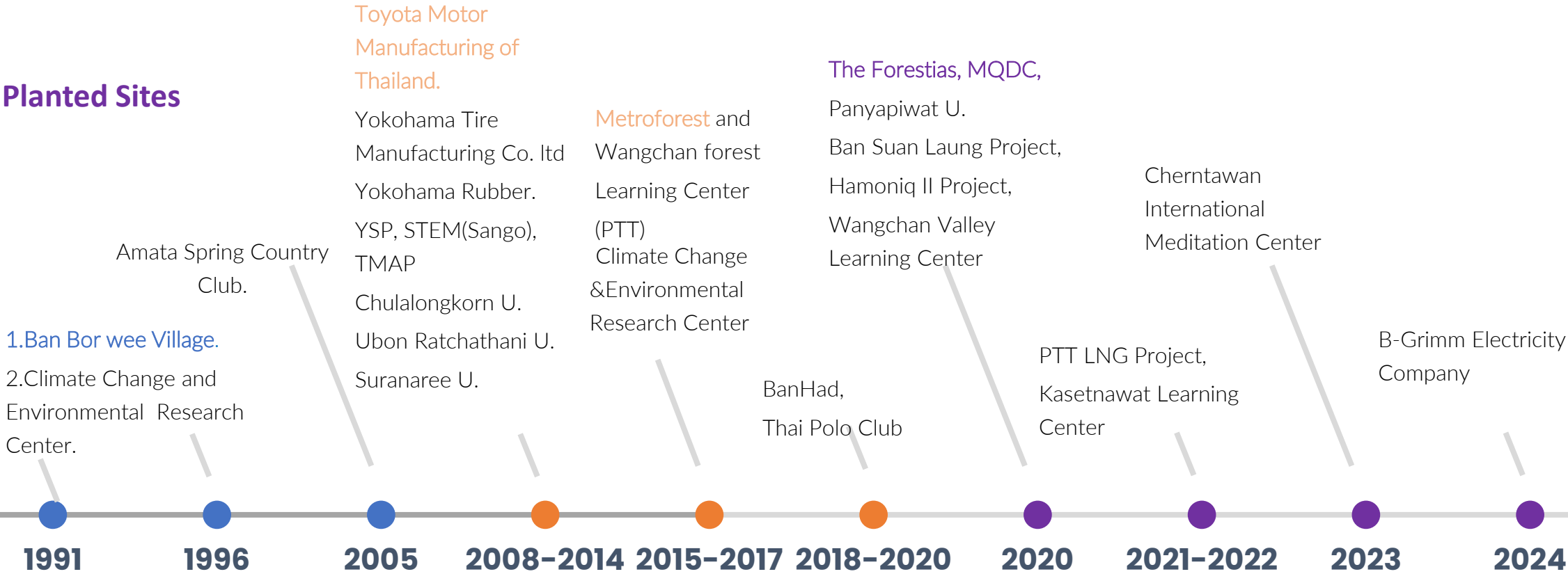
1. Planting with native species
2. Mound making & Soil preparation.
3. Potted seedlings: Seedlings height 60 - 80 cm.
4. Dense planting: Dense planting 3 - 4 seedlings/ sq. m.
5. Mixed species
6. Multi-Layer planting: Planted with tree, shrub, and herb.
7. Random planting
8. Planting techniques: seedlings soak with water before planting, mulching with rice straw, etc.

The Locations of Miyawaki-Based Forest in Thailand (1991-2024)



Timelines of Miyawaki-Based Forests in Thailand (Since 1991)

Planted Sites

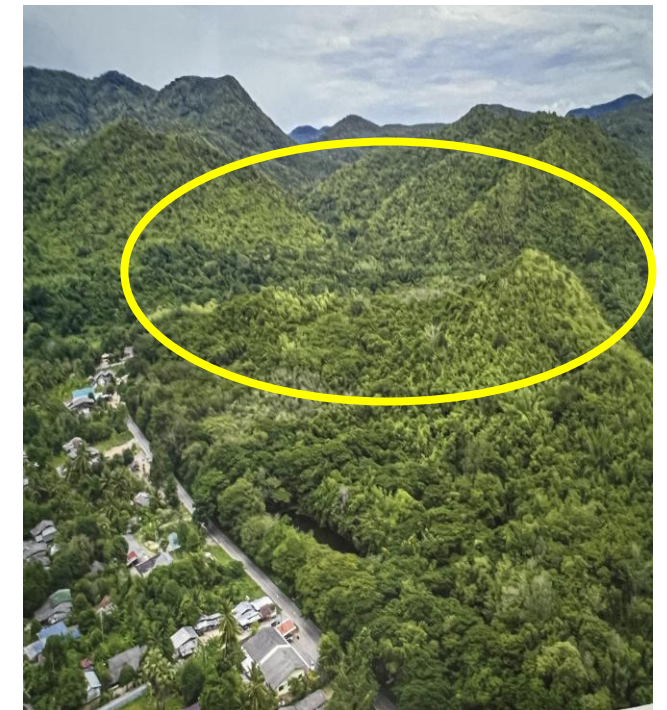


3.

Grounding the results

The first forest restoration site based on Miyawaki method in Thailand

Place: Ban Bor Wee, Ratchaburi Province.





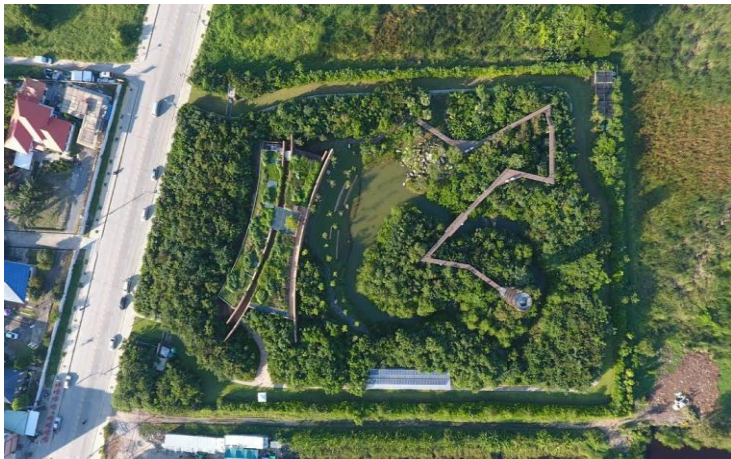
PTT Metro Forest Learning Center, Bangkok.

started in 2013

Area 19,200 sq.m. (1.92 ha.)

300 species

30,000 potted seedlings



Ecological Forest Restoration

Outdoor explorer



Edutainment Center

The other Learning Centers

1. The Chiva Panavet Learning Center

(Toyota Motor Thailand Co., Ltd., Chachoengsao Province.)



2. The Wang Chan Forest Learning Center

(by PTT Public Company Limited,, Rayong Province.)



3. The Center of Excellence for Forest Conservation

(by PTT LNG Company Limited, Rayong Province.)

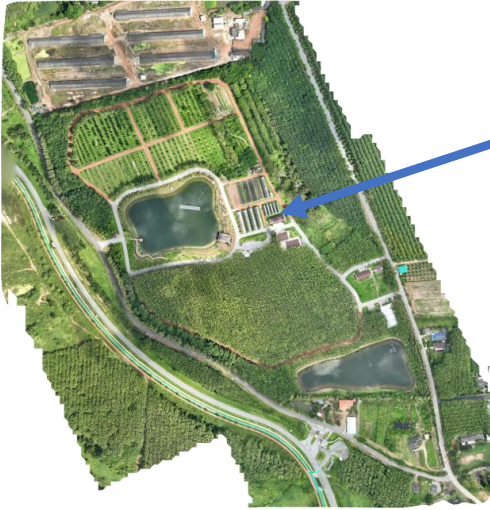


4. The Forestias Project

(MQDC Company Limited, Samut Prakan Province.)



Kasetnawat (Innovative Agriculture) Learning Center By CDTI



Kasetnawat Learning Center (established in 2018 by HRH Princess Maha Chakri Sirindhorn)

“A Center for Education & Development in Modern Agriculture”

- **Area: 24.72 ha (154 rai)**
- **Consists of protection strip, fruit orchard, mixed orchard, coffee plantation, para rubber plantation, and ponds**

Practices/Activities;

- 1. Created nature forest /Protection Strip**
- 2. Fruit orchard**
- 3. Mixed orchard**
- 4. Agro-forestry (coffee plantation)**



5. Planting understory of Para Rubber Plantation



Alpinia nigra

6. Mushroom cultivation



Bolete

(*Thaeogyroporus porentosus*)

7. Bee keeping

Stingless Bee
(*Trigona* spp.)



Indian honey bee
(*Apis cerana*)

8. Biological substances from plants to control pest and diseases



Example of Planted Tree, Shrub and Herb

(Photograph taken from the site)

Trees



Toona ciliata
ยมหอม



Parkia speciosa
สะตอ



Morinda citrifolia
ยอบ้าน



Bixa orellana
คำชะอี

Example of Planted Tree, Shrub and Herb

(Photograph taken from the site)

Shrubs



Rauwenhoffia siamensis
นมแมว



Clinacanthus siamensis
ลิ้นงูเห่า



Uvaria grandiflora
กล้วยเหวลึง



Amomum villosum
เร่วน้อย



Etlingera elatior
ดาหลา



Anomianthus dulcis
หมากฉี่ฉ้วน

Example of Planted Tree, Shrub and Herb

(Photograph taken from the site)

Herbs



Zingiber zerumbet
กระเทียม



Hedychium coronarium
มหาหงส์



Costus speciosus
เอื้องหมายนา



Plumbago indica
เจตมูลเพลิงแดง



Plumbago zeylanica
เจตมูลเพลิงขาว

Medicinal Plants



Barleria lupulina
เร่วหางงู



Euphorbia thymaloides
ต้นตีนตุ๊กแก



Clerodendrum serratum
ยี่หุบ



Phyllanthus pulcher
ข้าวสุก



Artemisia annua
โถงฟ้า

Animal Biodiversity

Bird	54 spp.
Butterfly & Insect	52 spp.
Mammal	4 spp.
Reptile	4 spp.
Amphibian	2 spp.
Total	116 spp.

Reptiles



Ptyas korros
งูสิงตาโต



Calotes versicolor
กิ้งก่าคอแดง

Mammals



Tamiops rodolphii
กระเล็นขนปลายหูยาว



Menetes berdmorei
กระรอกดินข้างลาย, กระจ๊วน

Resident Birds



Scarlet-backed Flowerpecker (*Dicaeum cruentatum*)
นกสีชมพูสวน



Ruby-cheeked Sunbird (*Chalcoparia singalensis*)
นกทินปลีแก้มสีทับทิม



White-throated Kingfisher (*Halcyon smyrnensis*)
นกกระเต็นออกขาว



Sooty-headed Bulbul (*Pycnonotus aurigaster*)
นกปรอดหัวสีเขม่า



Intermediate Egret (*Ardea intermedia*)
นกยางโทนน้อย

Butterflies



Neptis hylas
ผีเสื้อกะลาลีธรรมดา



Cupitha purreea
ผีเสื้อเหลืองปีกใบ



Iambrix salsala
ผีเสื้อจิ้งหอนอมมะพร้าว



Ypthima baldus
ผีเสื้อสีตาลจุดตาห้าธรรมดา



Arhopala centaurus
ผีเสื้อฟ้าไม้ก่อดมเสียง



Jungfowl (*Gallus gallus*)
in durion orchard



Eggs of jungfowl on the ground

Enlargement to the local villagers to enhance community resilience

- Telling the story for scaling-



Eco printing on clothes

Ecosystem Benefits and Services (From Miyawaki Forest)

Restoring habitat and food chains

- Native trees attract native insects, birds, and pollinators
- Microhabitats and soil biodiversity
- Flowering and fruiting very quickly

Socio-culture services

5 learning centers
(environmental education/awareness)

Wellbeing and aesthetics

Forest Bathing (on growing movement)



Future Directions

- Miyawaki Forest Network for Thailand
- Promote mini forest / small- scale urban forests and linked
- Public –private-academic collaboration model
- Integration into national restoration strategy



Key Takeaways

Miyawaki method = science + native species + community

The dense planting encourages competition and cooperation among species



4.

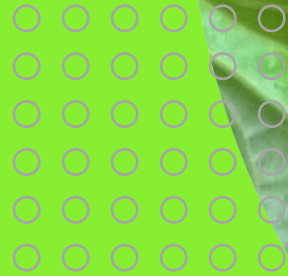
Conclusions

- **Biodiversity restoration is not just planting trees but restoration for ecosystem**
- **The Miyawaki method is a powerful nature – based restoration (science-based and community – driven restoration)**
- **Strengthening community participation/connection**
- **Rapid and self –sustaining ecosystem restoration**

THANK YOU

GET IN TOUCH

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Uvaria grandiflora