

Keynote Address

RESTORATION OF TROPICAL RAINFORESTS BASED ON VEGETATION ECOLOGY – ITS SIGNIFICANCE, RESULTS AND VISION FOR THE FUTURE

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Summary: Vegetation is the only one producer in the ecosystem on the earth and animals including humans are consumers. Human life depends on green vegetation. Indigenous forests are the basis of human existence and tropical rainforests are reservoirs of biological resources including unknown genetic resources needed for food and medicine for our future healthy life. The world's three largest tropical rainforest areas are Congo (West Africa), Amazon (South America) and Borneo (Southeast Asia). However, recent industries such as timber production by large-scale logging and monoculture of oil-palm and gum trees have rapidly destroyed precious rainforests of each region.

Keywords: Tropical rainforest, restoration of native forest, potential natural vegetation

INTRODUCTION

Universiti Putra Malaysia, Yokohama National University and Mitsubishi Corporation embarked on a joint project on rehabilitation of tropical rainforest at the UPM Bintulu Campus in Sarawak in 1990. The project was to rehabilitate a degraded area into a man-made tropical rainforest through replanting a mixture of indigenous trees species of Borneo.

MATERIALS AND METHODS

A study was conducted on the application of “Miyawaki method” to establish a stand of Malaysian native primary forests comprising of *Dipterocarpaceae* and Non-*Dipterocarpaceae* species. The selection of tree species was based on the potential natural vegetation advocated by Prof. Reihhold Tüxen in 1956. The potential natural vegetation of Bintulu District, Malaysia was identified through ecological vegetation field surveys in forests surrounding this district. Dense mixed planting of saplings of indigenous tree species was applied. This method follows the system of natural forests. The planting site of about 50 hectares was barren land from slash-and-burn farming. It was divided into four phases based on different degree of degradation. More than 70% of the area employed open planting method and the rest which was under partial shade area was planted by line, cluster and spot planting methods.

Seeds of native tree species were collected, germinated and nursed in potted saplings with fully developed root systems. They were mixed and planted densely, following the system of natural forests. For the first few years weeding was done, but after that nature managed itself through natural selection and there was no artificial maintenance.

RESULTS AND DISCUSSION

Until 2011, 350,000 seedlings from 126 tree species were planted at four different areas and surrounding the nursery. Meanwhile, 100 research plots were established and growth performances of planted seedlings were recorded twice a year.

In 2000, 15 tree species started flowering and fruiting in the plots established in 1991 to 1993. Some of the young seedlings have reached 4.5 meters in height. Seeds of these tree species were collected and used for subsequent replanting.

With time, the number of survived plant species decreased because of natural selection. Instead, surviving trees grew tall and thick, and form a splendid quasi-natural multi-layered forest. Planted trees at Phase One area are about 15 m high.

Likewise, a project of restoring a tropical lowland forest in Amazon was launched in Belém, Brazil in 1992. At the first planting ceremony 1,500 local people planted 15,000 potted saplings of main and companion tree species from the local potential natural vegetation including *Virola*. Plantation of potted saplings with fully-developed root systems was repeated every year, and today they have grown to a tropical forest with rich biodiversity.

In Africa, restoration of natural forests began following ecological vegetation field surveys in Kenya right on the equator. Kenya had once bountiful natural forests around Nairobi and in central Kenya. However, native forests were destroyed during the colonial period. Some forests lost the function of buffers for water supply. The reforestation project in Kenya in cooperation with local NPO, Nairobi University and the Forestry Bureau of Kenya goes into 5th year in 2011. Indigenous tree species have been planted every year, and we are in a smooth process toward forest restoration.

CONCLUSION

It is necessary to cultivate oil palms, gum trees and field crops as economic activities of local people. At the same time, preservation and regeneration of rainforests with biological resources is significant. We intend to advance restoration of native forests integrated with wise land use to ensure affluent life of local residents, together with people with foresight and ability at any place on earth. On March 11, 2011, Eastern Japan suffered major damages from the Great East Japan Earthquake and tsunami. Our surveys on the disaster areas showed that monoculture forests of fast growing non-native tree species such as *Pinus thumbergii* were almost destroyed and some were carried landward, but that main tree species from the local potential natural vegetation such as *Persia thumbergii* and evergreen *Quercus* stood firmly and exerted effect on reducing the power of tsunami. Forests of indigenous trees save lives and property of local people. Ecological reforestation based on the potential natural vegetation is indispensable in our safe living environment and regional economy.

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