



MM0200036

sion from good forest to degraded forest or shifting cultivation and from irrigated cultivation to urban/industry area. (Table 3).

Change is not evident if the area converted is too small a fraction to the new area. For Mandalay, Sagaing and Magway Divisions, urban areas and water bodies are comparably smaller than new surface types.

### Improved models encouraged

The surface type distribution in Mandalay, Sagaing and Magway Divisions have their due response of precipitation to the model. Good forests are the most efficient and the deserts are the poorest in the moisture transfer flux consideration. It must be kept in mind that numerical models are not real. It may be close to reality only if assumptions imposed to the model and the method approach are adequately organised. However improved numerical models are necessary media to portray the effect of one activity separately from others with the least demand of time and cost particularly in the environment management. Greening has to be encouraged for a healthy sustainable environment.

### Reference

1. Shinjiro, K., et al. (1999): GAME-TROPICS studies on deforestation effects in Indochina. GEWEX News, World Climate Research Program.
2. San Hlla Thaw (1999): Potential precipitation due to moisture flux in Mandalay, Sagaing and Magway Divisions, presented at the paper reading session of the Department of Central Myanmar Dry Zone Greening, Yezin, Pynmana.

*Dr. San Hlla Thaw is a Director of the Department of Meteorology and Hydrology.*

# Greening the Dry Zone of Myanmar

Tun Tun

### Location

The Dry Zone of Myanmar lies in the central portion of the country, astride the mighty Ayeyarwady River, between latitudes 19° 20" to 22° 50" and longitudes 93° 40" to 96° 30". Incorporating 57 townships in 13 districts in Sagaing, Mandalay and Magway Divisions, the Dry Zone covers a total area of 33,680 sq miles.

### Background

Three mountain ranges traverse central Myanmar from north to south. The Rakhine or the Western Range, which is situated along the western coast, forms a natural barrier, causing the South-West monsoon rain bearing clouds to shear upwards, overpassing the Ayeyarwady valley and creating a rain-shadow effect. Thus the area has historically been known to be dry, with annual precipitation falling far short of what is received in other parts of the country.


Historical and cultural records, an abundance of petrified trees that have been uncovered within the area and remnant clusters of old-growth forests indicate that extensive forested lands did exist in central Myanmar. However, the Ayeyarwady River being the main accessible source of travel, most of the ancient civilizations and kingdoms thrived along its extensive valley. As a result, central Myanmar is still the most

densely populated area even today, with about a third of the total population living within its confines. It has been estimated that about half of the total cattle, sheep and goat population also resides within the dry zone. As such, the resultant effect of population pressures and over-grazing was a major factor that contributed to the overall degradation of the environment.

Not only was there a high demand for woodfuel in the olden days, when it was heavily relied upon for multifarious purposes and to construct huge religious and residential edifices, there was a continued demand in pre-independence era, when woodfuel was the main source of energy to operate small home industries such as brick, pottery, jaggery and bean paste manufacturing and tobacco curing etc. Large industries and transport vehicles such as steamships and trains also consumed large portions of the forests.

The Second World War and the internal strife that plagued the country from the onset of its independence in 1948, led to undisciplined utilization of forest resources, causing the environmental situation to deteriorate further. Successive governments being aware of the severe soil degradation setting in, made sincere efforts to check the situation. It was not fruitful as had been due to constraints

34 / 01



imposed by the widespread insecure conditions prevailing throughout the country. Effective measures were possible only after 1971, when the insurgent groups were driven out of the country proper, to the periphery of its borders.

#### Topography

The Dry Zone is ringed in by Rakhine Range to the west, the Bago Range to the south and the Shan Plateau and the Eastern Range to the east. Extensions of these ranges form isolated low-laying ranges and hillocks in almost all of the townships, with elevations varying between 500-1800 feet. Mount Papa, an extinct volcano lies at the center of the Dry Zone, a prominent landmark rising to a height of 4891 feet.

The main rivers that traverse the area are the Chindwin, the Ayeyarwady, the Mu, the Myitnge, the Zawgyi, the Yama, the Yaw, the Salin, the Mone and the Mann. Tributaries that drain into Ayeyarwady River from the west, have mostly been sanded up and flow in raging torrents only during the monsoon.

Most of the land is flat and undulating, making it suitable for extensive

agriculture. The fact that ancient civilizations thrived on these plains, can perhaps, be taken as an indication that the region's soil once was productive.

#### Soil Types

Topsoil is virtually non-existent in most parts, as a result of decades of rampant deforestation and removal of vegetation, leading to severe soil erosion caused by wind and water. In areas where the topsoil still remains, it is usually a thin layer and most of the remaining areas are covered with sedimentary sandstone and shale or exposed bare rocks making it unproductive.

Major soil types are sandy loam and loamy sand with most of the land covered with a yellowish and brownish coloured crushed sandstone. Hard clay slate can be found in some areas, whereas areas adjacent to Mount Popa are covered with volcanic lava that is more productive.

Rains usually occur from late May to early June after which it is completely dry with occasional rains from mid June to early August. The second rainy season is from mid August to end

*Aerial scattering of seeds is under way to green the mountain ranges on the west bank of Ayeyawady River.*

---














*Historical and cultural records, an abundance of uncovered petrified trees in the area and remnant clusters of old-growth forests indicate that extensive forested lands did exist in central Myanmar once.*

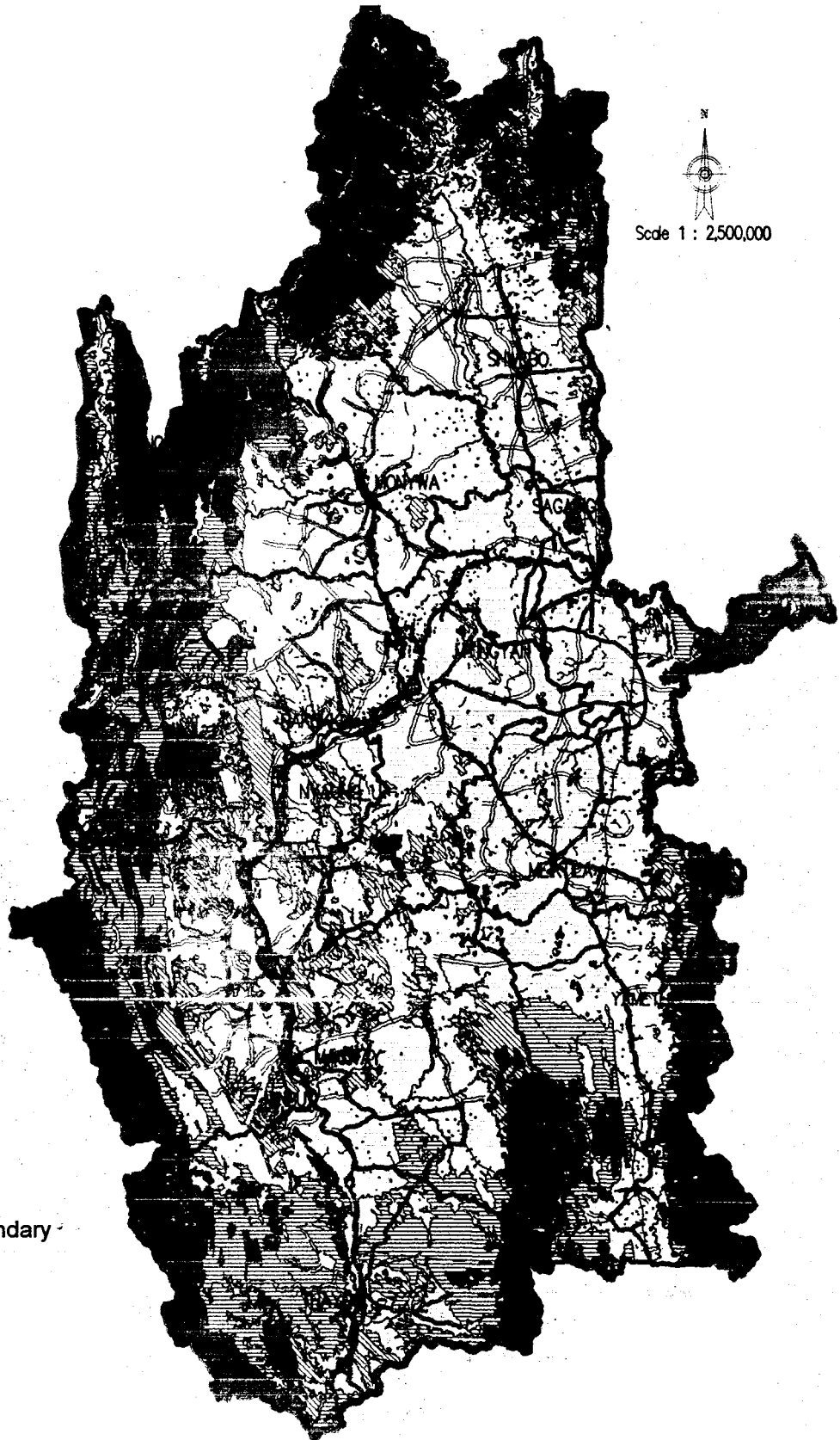
---

# LAND USE AND LAND COVER MAP OF DRY ZONE

N  
Scale 1 : 2,500,000

## LEGEND

-  Good Forest
-  Degraded Forest
-  Shifting Cultivation
-  Agriculture
-  Water
-  Other
-  District Boundary
-  Township Boundary
-  Dry Zone Project Boundary
-  Railway
-  Main Road
-  Secondary Road
-  River/Stream



## LAND USE DATA OF THE DRY ZONE

Sr	Forest Type	Area/acres Overall Total
1	Moist Forests	614760.2
2	Hill Forests	87380.9
3	Dry Forests	46428.5
4	Mixed Deciduous Forests	2042203.7
5	High Indaing Forests	223906.6
6	Semi-Indaing Forests	4036.6
7	Bamboo	483.5
8	Moist Forest Bamboo	182507.8
9	Scrub Forests/Land	1143782.5
10	Scrub Land/Grass	551244.5
11	Scrub Land/Bamboo	70034.9
12	Scrub Land/Shifting/Cultivation	745098.1
13	Shifting Cultivation	994308.0
14	Shifting Cultivation/Bamboo	1064768.2
15	Grass Lands	50780.6
16	Forest Plantation	48888.1
17	Permanent Agriculture	9177364.7
18	Agriculture/Vegetative Bunds	416513.2
19	Ya (Upland farming)	1924351.0
20	Alluvial Island Cultivation	430081.4
21	Horticulture	14084.8
22	Water Bodies	302177.8
23	Swamps	11984.5
24	Urban Areas	172083.3
25	Sand	238205.6
	<b>Total</b>	<b>21557459.2</b>

Source: Forest Department

The above land use data is compiled by Remote Sensing and GIS section of Forest Department using the satellite images of 1996-97 and GIS technology for 37 townships, 13 districts and three Divisions of the Dry Zone Greening Department.

Sentences often come again in late fall of October as a result of the monsoon from the South China Sea and can be quite considerable when storm conditions prevail.

Precipitation ranges from 20 inches to 40 inches annually, with an average of 28.44 inches. Some fringe townships receive as much as over 56 inches, whereas several drought prone areas receive less than 10 inches. Yearly and seasonal rainfall frequencies and volumes are irregular, making agriculture most unpredictable.

### Temperature and Humidity

Temperatures vary from above 110°F in March and April which are the hottest months and to 46°F in January. The highest average temperature is around 90°F. The mean temperature difference is around 90°F.

The annual average humidity is around 63%. During the hottest months of March and April it is about 42% and in the wettest month of September it is around 80%.

### Forest Type and Tree Species

Tree species that grow in the Dry Zone are mainly of the dry forest type, with the predominance of the thorny species. There are also isolated areas of the Dry Upper Mixed Deciduous forest type, mostly on the hills where the forests have not degraded so severely. There are also belts of Lower Mixed and Moist Upper Mixed Deciduous forests on the fringe areas, especially to the west and the northwest.

The prominent tree species that grow naturally in the Dry Zone are: *Chukrasia tabularis*, *Homalium longifolium*, *Azadirachta indica*, *Cassia siamca*, *Tamarindus indica*, *Acacia leucophloea*, *Acacia catechu*, *Acacia arabica*, *Albizia procera*, *Albizia lebbek*, *Albizia chinensis*, *Zizyphus jujuba*, *Hesperethusa*

*caemilata*, *Santalum album*, *Hamiltonia*, *Cassia fistula*, *Caesalpinia pulchella*, *Syzygium lineatum*, *Bauhinia variegata*, *Bauhinia arborescens*, *Bauhinia macrocarpa*, *Terminalia oliveri* etc.

*Prerocarpus macrocarpus* grows mainly in the fringe of Lower Mixed and Moist Upper Mixed Deciduous forests but several locations can be found within the Dry Zone proper where they grow relatively well. *Tectona grandis* (Teak) is widespread but the development of the trees and quality of timber do not measure up to those that grow in the more moist areas.

*The concept of forest rehabilitation has changed from a focus mainly on plantations to that of giving priority to natural regeneration.*

### Land Use

Of the total surface area of 21,557,459 acres, about 4,250,596 acres or 19.7% are relatively good forests, 1,815,842 acres or 8.4% degraded forests, 2,804,174 acres or 13% degraded forests effected by shifting cultivation, 11,962,396 acres or 55.5% cultivable land, 422,273 acres or two per cent land under other uses and 302,178 acres or 1.4% water bodies.

### Forest Rehabilitation Efforts

The "Rural Land Development Department" was established in 1953 and assigned the task of rehabilitating forests, principally in the Dry Zone. The main focus was on plantations and the major effort was directed towards rehabilitating Mount Popa. However, the prevailing insecure conditions hampered most of the efforts.

A concerted drive to regreen the

*Creation of water bodies helps regional greening and provides water for local people. (Above)*

*A protected area in Nahtogyi township. (Centre)*

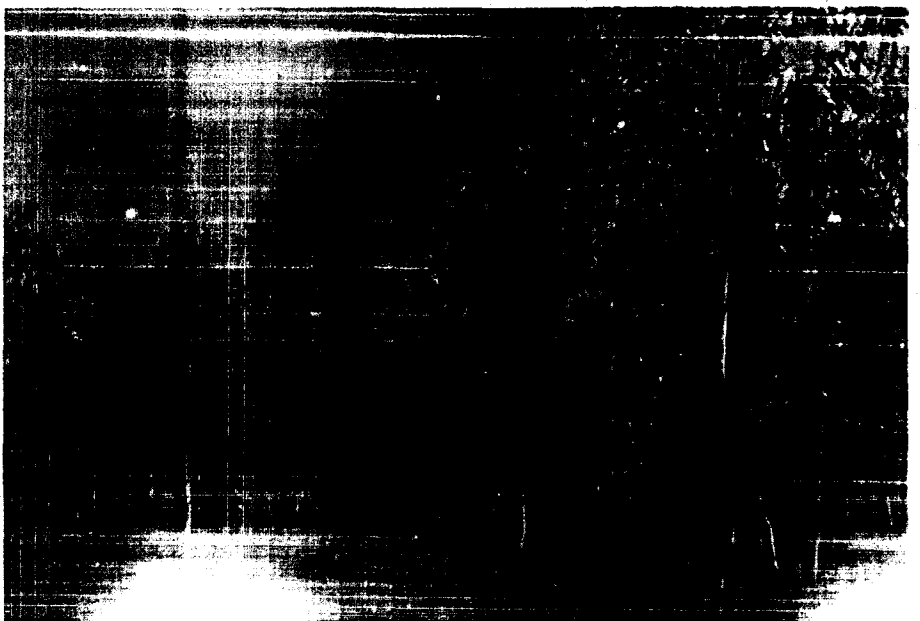
Dry Zone was initiated in 1971 but again the focus was on plantations. But the concept of natural regeneration was advocated and several locations that were considered to have the potential to regenerate naturally were put under protection. The most visible impact was on Mount Popa, where 90% of the forests that exists today regenerated naturally.

The focal species selected for the establishment of plantations were mainly exotic species such as *Prosopis juliflora* and *Eucalyptus camaldulensis*. Although *Prosopis* progressed profusely, *eucalyptus* did not perform to expectations.

In 1991, the Ministry of Forestry initiated a programme to regreen the Mingan and Gway Cho ranges in Chauk township. In 1992, a pilot "Regreening of the Central Dry Zone" project was launched. This was expanded in 1993 to include 42 townships in nine districts with a target to establish 50,000 acres of plantations on degraded lands, over a period of five years, mainly to supplement local firewood demands. Both the plowing and trenching methods were employed, depending upon soil conditions.

In 1994, the pilot project was reor-

*Establishment of forest plantations benefits the nation at present and also in the future.*



ganizers of the "Nine Critical Districts Dry Zone" project and under "Special Project Status". At the same time, a nation-wide greening campaign was launched in 1995. The year 1995 was designated as the "Fuelwood Substitution Year" and the "National Committee for Fuelwood Substitution" was formed.

Chairman of the State Peace and Development Council Senior General Than Shwe, out of awareness for the need to stave off further degradation, made frequent on-site visits and has been instrumental in enhancing the efforts to prevent desertification from setting in. In 1996, the duration of the project was extended by another 12 years.

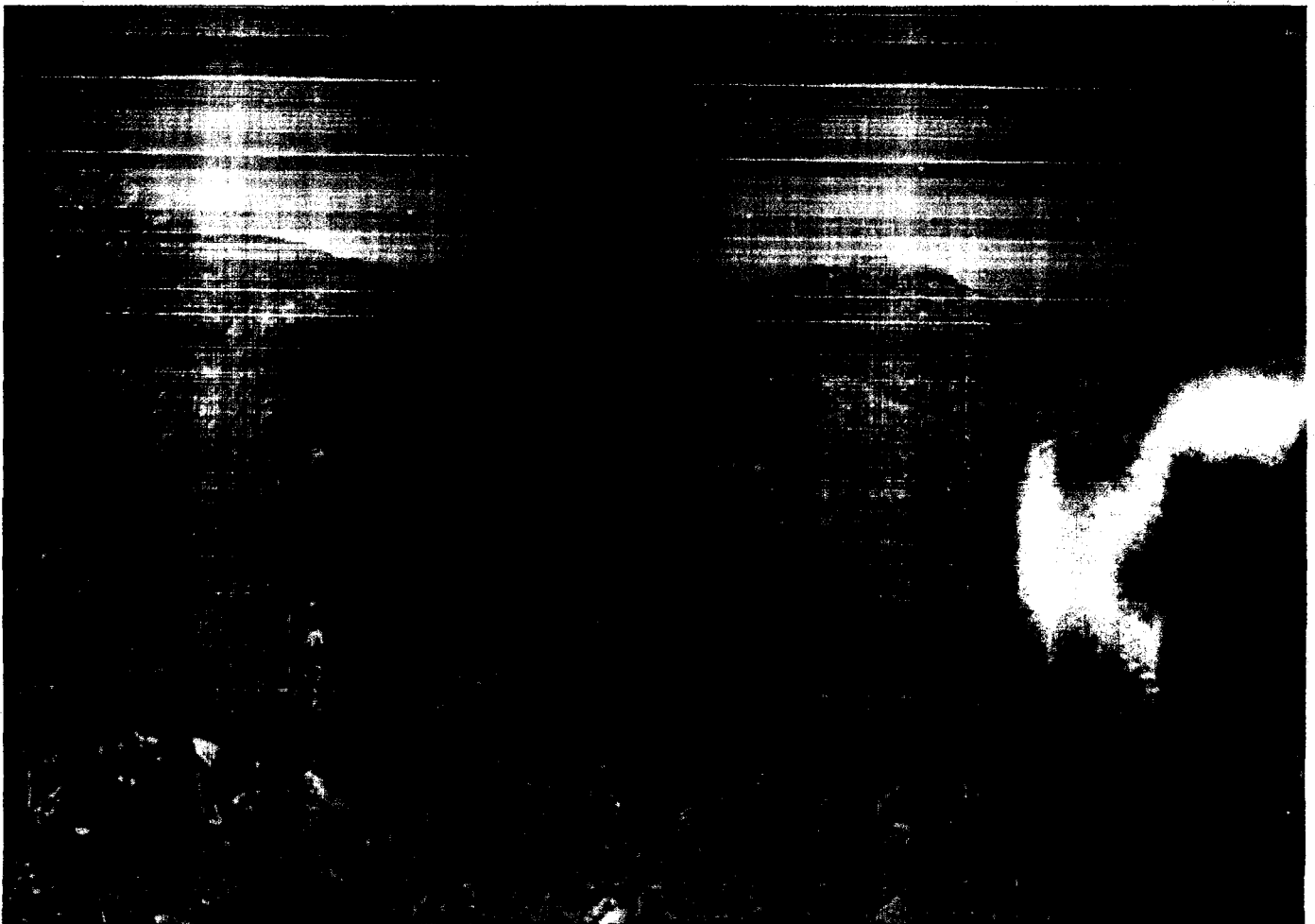
Myanmar acceded to the "United Nations Convention to Combat Desertification in those Countries ex-

periencing serious drought and Desertification" in January 1994. According to the guidelines laid down by the Chairman of the State Peace and Development Council an independent "Dry Zone Greening Department" was established in June 1997. It is headquartered in Mandalay and is solely responsible for rehabilitating the forests of the Dry Zone.

The concept of rehabilitation has changed from a focus mainly on plantations to that of giving priority to natural regeneration wherever feasible. In cases where plantations are necessary, complete clearing of the land is not carried out, remnant roots are not dug up but left to coppice and planting is carried out only in places where regeneration is considered not possible; more or less on a gap-planting model. Planting schedules were modified so that the seedlings could be planted with the first rains wherever possible.

**In 15 to 20 years, naturally regenerated forests will reach maturity, contributing significantly to the amelioration of climate and soil conditions, bringing about a better environment for the people of the Dry Zone.**

*Green and lush areas like the one in the photo below are increasing in the Dry Zone of Myanmar.*



These efforts have borne fruit, for great changes have become evident in the Dry Zone today and natural regeneration has proven to be a more viable option than rehabilitating degraded lands. When roots had been dug up and the fuel in the past thus making natural regeneration impossible in numerous areas and plantations were the only recourse.

As a result of years of comprehensive extension activities, peoples' awareness and participation in the rehabilitation endeavours has developed to the extent that it has currently become a major force. The advent of the "Community Forestry Instructions" has acted as an impetus as local people are now able to establish individual and community forest plantations on degraded lands for local fuel supply need or for commercial purposes.

### Objectives

The Ministry of Forestry has laid down a four point strategy: (1) Plant wherever necessary and as much as possible; (2) Promote natural regeneration wherever feasible; seek the willful support and cooperation of the local populace and related organizations to ensure effective protection; (3) Innovate fuel substitution means, distribute them widely and make them accessible to rural people so as to reduce dependency on woodfuels; (4) Construct small ponds, reservoirs and check dams where feasible to retain as much moisture as possible so that it will help sustain the vegetation in the hot and dry season and will have a spreadout effect that will eventually enhance the vegetation cover on the micro scale.

It is envisaged that as the trees grow progressively, they will help to create a better environment, provide soil

cover, make lands productive and recharge ground water resource. As most of the tree species belong to the Dry Deciduous type the leaves that fall in the dry season will decompose to restructure the topsoil. In 15 to 20 years naturally regenerated forests will have matured sufficiently to contribute significantly to the amelioration of the climate and soil conditions, bringing about a better environment and a better life for the people of the Dry Zone.

*U Tun Tun is the Director-General of the Dry Zone Greening Department.*

**BEAUTIFUL ISLAND**

**Beautiful Island Co., Ltd.**  
 No.114, G/F, 41st Street,  
 Botataung Township, Yangon, Myanmar.  
 Tel: 951-24587, 298963 Fax: 951-254855  
 Telefax: 21201, 21236BM, 1978-UMO  
 Email: bi@datserco.com.mn  
 Factory Tel: 951-591266