



GOVERNMENT OF INDIA
MINISTRY OF
ENVIRONMENT AND FORESTS

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REPORT ON

FOREST RESOURCES SURVEY OF ANDAMAN GROUP OF ISLANDS

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भारत सरकार
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FOREST SURVEY OF INDIA
CENTRAL ZONE

NAGPUR (2000-2001)

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OF

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2000-2001

PREFACE

The special study of forests of Andaman Group of Islands was undertaken by Forest Survey of India, Central Zone, Nagpur during the year 1993-94 to assess the state of forests of these areas. Under this project, status of regeneration both in worked and unworked areas was studied and the growing stock was assessed in different types of forests to have an idea of sustained yield capacity of these forests.

The present report gives the comprehensive account of distribution of vegetated area in different land use, topography, crop composition, soil depth and top height classes. It gives complete details of Division wise and forest type wise growing stock, utilizable growing stock. Distribution of status of regeneration both in worked and unworked areas has also been described in details in the last chapter.

The report is the outcome of excellent field work carried out by the field staff of Forest Survey of India, Central Zone, Nagpur and is based on the huge data collected by them during the ground survey. The ground survey was carried out by the field parties led by S/Shri M.K.Madaria, P.R.Singh, R.K.Mahobe, J.S.Kumbhkar, S.S.Kumbhare, all Junior Technical Assistants and S.S.Baghel, Deputy Ranger under the supervision of S/Shri B.R.Pandey and M.D.Singh, both Senior Technical Asistants. The above work was carried out under the overall supervision and direction of Shri S.B.Elkhunchwar, IFS, Deputy Director and Shri P.V.Savant, IFS, Joint Director, Forest Survey of India, Central Zone, Nagpur. Data processing was done by Data Processing unit, M.D.M.U. Forest Survey of India, Dehradun under the supervision of Shri S.K.Chakravarty, Deputy Director. The report has been prepared by Shri S.B.Elkhunchwar, IFS, Deputy Director, Shri P.V.Savant, IFS, Joint Director and Shri Devendra Kumar, IFS, Joint Director.

Smt. Gressamma Varghese and Shri D.N.Kadu both Stenographers have typed this report. Maps and diagrams have been prepared by Shri D.S.Gulkari and Shri C.B.Murty, Draftsmen. The co-operation extended by the officers and staff of Andaman and Nicobar Forest Department was very useful without which it was not possible to complete the survey work within such short period. The same is thankfully acknowledged.

It is hoped that the report will be very useful to State Forest Department and other agencies who are engaged in the field of Forest Conservation and Development Planning.

Sd/-
Devendra Pandey
Director
Forest Survey of India,
Dehradun.

SUMMARY

The special study of Andaman forests was undertaken by the Forest Survey of India, Central Zone, Nagpur during the year 1993-94 to assess the growing stock and status of regeneration of forest. Under this study, the ground survey of growing stock of Andaman forests was carried out and status of regeneration both in worked and unworked areas was studied and the capacity of sustained yield of forest areas with respect to raw material which were being made available to different industries was assessed. The field work was started in October, 1993 and was completed in January, 1995. The areas under tribal reserves, National Parks and Sanctuaries and that of Nicobar group of Islands were excluded from the survey. The salient features of the survey can be summarized as under:

1. 45.90% of the forests are dense forests with crown density 70% and above and 42.32% area contains moderately dense forests with density varying between 30% to 70%.
2. 21.35% of the forest area contains Evergreen forests, 48.10% area is occupied by Semi-evergreen and 30.55% area contains Moist deciduous forests.
3. 33% area has been worked whereas 67% is unworked.
4. 61.25% of the forest area is hilly. Only 5% is flat and rest has gently rolling topography.
5. 55.17% of the vegetated area has top height of more than 31 meter (71% of Evergreen forest pertains to this category) whereas 28.50% area has top height between 25-30 meter.
6. The total no. of stems in the forest area have been assessed to be 141.24 million, with an average of 460 stems per hectare.
7. The total growing stock of Andaman forests (harvesting volume) has been assessed to be 26.11 million cubic meter (in quarter girth) with an average of 85.09 cubic meter per hectare(in quarter girth).

8. As per the quantum of utilizable growing stock in worked area, the contribution of plywood is maximum i.e. at 33.51%. In this stratum, the contribution of others is as follows:
- | | |
|---------------------------|--------|
| i) Ornamental | 9.93% |
| ii) Constructional timber | 15.92% |
| iii) Softwood commercial | 15.36% |
| iv) Miscellaneous | 23.67% |
| v) Non-commercial | 1.5% |
9. In Evergreen forests there is slight fall of growing stock in ply wood, ornamental, Constructional and Miscellaneous category in worked areas while there is a little increase in soft wood and non-commercial timber.
10. In Semi-evergreen forests, ply wood, constructional, softwood and non-commercial categories have shown slight improvement in worked areas whereas ornamental and Miscellaneous categories have decreased.
11. Moist Deciduous forests show slight improvement in ply wood, constructional categories while slight fall was noticed in softwood in worked areas but there has been a substantial decrease of nearly 50% of ornamental wood in worked areas, besides the non-commercial timber has been totally eliminated.
12. The total annual availability of utilizable timber in Andaman forests has been assessed to be 1,01,245 cubic meter, here yield has been restricted to 50% of the exploitable growing stock. The contributions of ply wood, ornamental, constructional and softwood categories to this annual yield is 40.17%, 23.39%, 19.17% and 17.36% respectively.
13. In Evergreen forests, the worked areas show slight improvement of ply wood species in established regeneration. However, in constructional species, regeneration position has improved marginally but in ornamental and softwood categories the position is not satisfactory.

In Semi-evergreen forests, ply species and constructional species have shown improvement after working but in softwood category Established, Unestablished and Recruits position is not satisfactory.

In case of Moist Deciduous forests, established seedlings for ply species show a little improvement but in other two categories i.e. in ornamental and softwood, the position is poor. Constructional species have shown definite increase in all categories of regeneration. The ornamental category shows decreasing trend in Established seedlings but Unestablished and Recruits position is slightly better.

- 14) The regeneration in the forest of Andaman Group of Islands, as a whole has been found to be adequate with established stocking of 2333 seedlings per hectare. However, proportion of commercial species is 15% only. This entails a thorough review of the working of forest under appropriate silvicultural system.

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FOREST SURVEY OF INDIA CENTRAL ZONE, NAGPUR

ACKNOWLEDGEMENT

This organization expresses its gratitude and sincere thanks to the Principal Chief Conservator of Forests, Andaman and Nicobar Islands, Conservator of Forests, Dy.Conservator of Forests, South Andaman, Little Andaman, Middle Andaman, Baratang, Diglipur, Mayabander Divisions respectively and their staff who provided their valuable co-operation to the field parties of our organization during the Survey work without which it was not possible for them to complete the survey work in stipulated time. It is worth while to acknowledge the co-operation, especially in Little Andamans extended by the Managing Director, Forest Development Corporation of Andaman and Nicobar Islands and his subordinate officers and staff. Lastly, but not least, this organization expresses its sincere thanks to the Officers and staff of Andamans Civil Administration for the services provided to our staff during the entire field survey.

*F.S.Jafry
Joint Director.*

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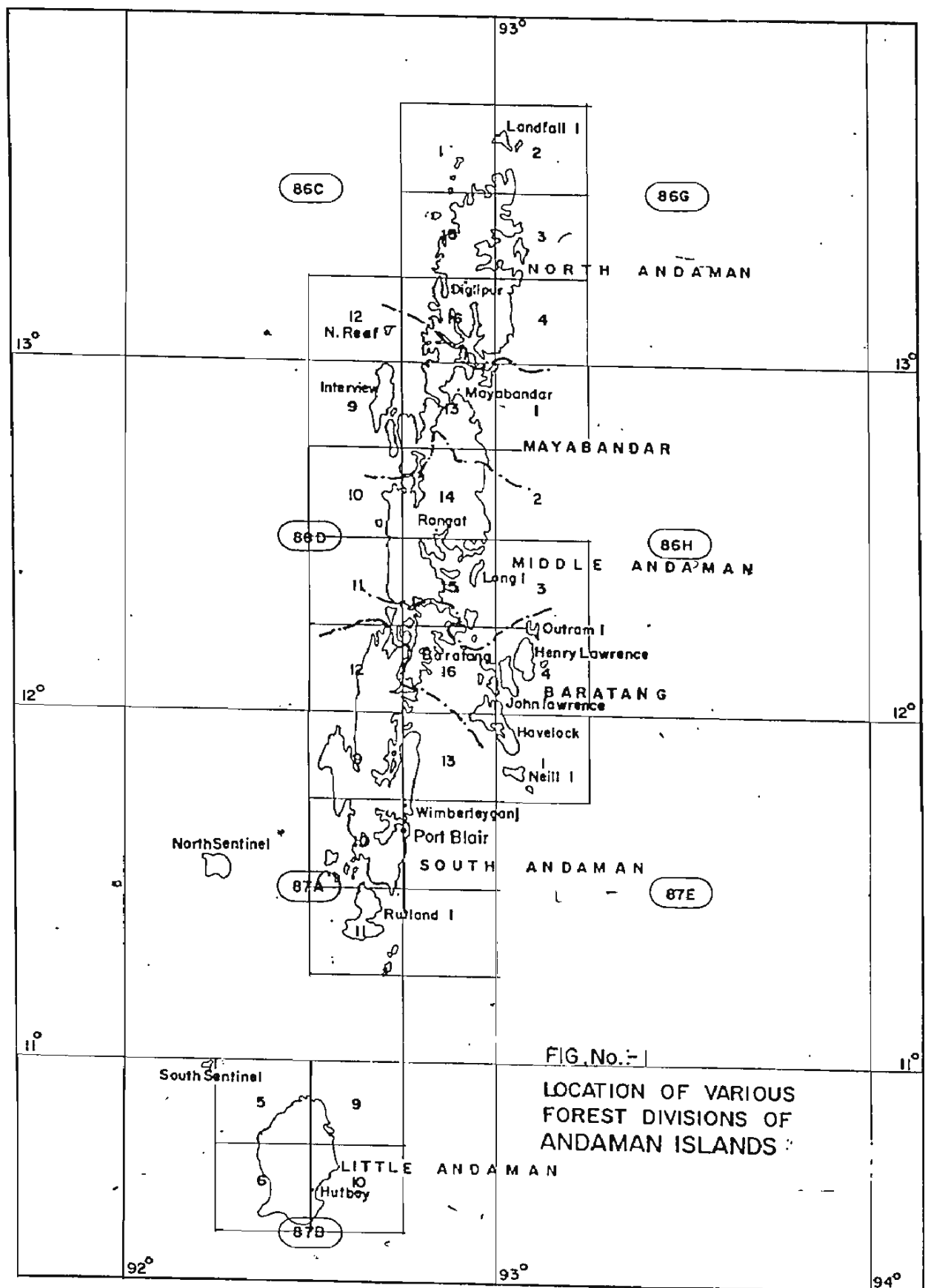
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CHAPTER I

INTRODUCTION

1.0. SITUATION:

The Andaman and Nicobar Islands, called the emerald islands, are the far away lands of the Indian Republic, approximately 1200 km to the southeast of Calcutta and Chennai in the Bay of Bengal. They are situated between 6° 45'N to 13° 41' north latitudes and 92° 12' and 93° 57' east longitudes.

The Andaman and Nicobar groups of Islands are distinctly separated by 10° Channel as the Andaman group of Islands and the Nicobar group of Islands. The entire group of Islands have emerged during the course of geological upheaval and are of oceanic and volcanic in origin. These Islands are also regarded as extension of Arakan - Yomah mountain ranges of West Burma, traversing in a chain form, culminating in the proximity of Sumatra-Java. There are over 306 fairly big Islands and also few islets totalling 572 in all. Out of these only 38 are inhabited. However, the fresh water availability is restricted to only 36 Islands. Geographically these Islands occupy an area of 8290 km², the length stretching up to 464 km and the width being 51 km in case of the Andaman group while the Nicobar group extends up to 292 km in length and 57 km in width.

1.1 TOPOGRAPHY.

The general terrain of the Islands is undulating and rugged throughout, barring Little Andaman Island and Car Nicobar where flat terrain exists, while in the Great Nicobar Islands, mountaneous terrain is conspicuous. In North Andaman the mountain rises upto 732 m in the Saddle Peak, whereas the Mount Thullier in Great Nicobar rises up to 642 m. There are several creeks connecting various Islands in the Andaman group.

1.2 CLIMATE:

The climate is wet tropical. It is warm and humid for most of the year. Seasons can be divided into dry and rainy seasons. Extreme winter and summer are practically unknown but there is general nip in the air during the months of December, January and February, particularly in the Forest camps in the interior. Mists hang over the forest, particularly over openings in the forests during these months. The months of March, April, May and October can be uncomfortable on account of high humidity although temperature is not high.

The mean annual temperature is 26°C. The maximum temperature recorded was 33°C in the month of April and minimum temperature recorded was 18.6°C during the month of January.

The relative humidity varies from 63% to 90%, the highest being during the months from May to November, i.e. during the Southwest and beginning of the Northeast monsoons. The relative humidity is also greater in the evening than in the morning.

The average annual rainfall is 3000 mm. The Southwest monsoon, which brings most of the rain, begins in May and ends in October. After the Southwest monsoon ends in October, there are variable and mostly light winds from the south or southeast. The Northeast monsoon starts in November. From the latter half of November till the end of December the winds at first blow from southeast and later veering to northeast, are very strong and are frequently accompanied by rain. January, February, March and April are the calmer and drier months of the year. Total average rainy days are 150.

Cyclones seldom pass over the Islands. Although most of them form in the Andaman sea, while passing to North, however, they affect weather conditions in the Islands. During 1792, 1844, 1891, 1941, 1969, 1978 & 1983 cyclones passed over certain parts of these Islands causing damage to the growing stock.

1.3 ROCK AND SOIL:

Main rock system consists of sedimentary rocks, made up of sand stones and conglomerates, as well as igneous rocks have resulted due to the volcanic process. Besides these, quartzites, lime stones, shales and grey sandy stones are found. The Andaman group has primarily siliceous sedimentation, while in Nicobar group, calcareous soils are obtained. Basaltic and dolomite rocks are found in Little Andaman and Nancowrie group but Kamorta and Terressa Islands where tree cover was removed in the past, have developed hard iron rich shales with shallow soils and poor nutrients in the subsoil.

Soils are mostly alluvial in valleys, highly porous with little water holding capacity. In the hills hard clayey soils are obtained. Sandy loam and alluvial soils have accelerated water run off due to porosity and poor water holding capacity. The soils are generally acidic with pH varying between 4.5 to 6.0.

1.4 POPULATION

Population in the Islands is ever-increasing, especially, after Independence, as the settlers started streaming in. The year wise figures are as below:

1971 : 1,15,133

1981 : 1,88,741

1991 : 2,79,111

1.5 ADMINISTRATION:

The Andaman and Nicobar Islands are a Union Territory headed by Lieutenant Governor. The administration is governed through elected representatives of the council. The governance is done through the Chief Secretary and various secretaries. Islands were

divided into two districts viz; Andaman and Nicobar districts. There are 7 Tahsils i.e. Diglipur, Mayabandar, Rangat, Port Blair, Ferrarganj, Car Nicobar and Nancowrie. In the district of Andaman there are 3 community development blocks i.e. Ferrarganj in South Andaman, Rangat in Middle Andaman and Diglipur in North Andaman. There are two community development blocks in Nicobar district i.e. one in Car Nicobar and another in Nancowrie. There are 44 Gram Panchayats whose working is being monitored by Directorate of Rural Development.

Inspector General of Police is the head of Police Department which has a strength of 2450.

1.6 INFRASTRUCTURE:

Three major islands i.e. the South Andaman, the Middle Andaman and the North Andaman are connected by Andaman Trunk Road(ATR) with a length of about 290 kms. The South Andaman has better net work of roads than other islands. Inter-islands transport is done by marine vessels.

1.7 LIVE STOCK:

The total live stock population in the Islands is about 1.36 lakhs, out of which 47325 are cattle and 14400 are buffaloes. A separate Animal Husbandry and Veterinary Department implements various schemes for Animal Husbandry and Dairy Department.

1.8 AGRICULTURE AND FISHERIES:

Comparatively very small area is under agriculture as major area is under forest. The major crop is paddy and coconut plantations are very common in the Islands. Fisheries is also a major occupation in the Islands. The total marine fish production in the Islands is about 14,000 M.T. Inland fish production was 53 MT in 1990-91.

1.9 TRIBAL POPULATION:

There are five major tribes in Andaman and Nicobar Islands. The Shompens are found in the Great Nicobar Islands and its number is estimated to be around 300-400. The Nicobarese are found all over Nicobar Islands especially in Car Nicobar and their population is 21172. The Onges are found in the Little Andaman Islands and are settled mostly in northeastern corner of the islands. Their number is only 98 and the tribe is being brought in the main stream of civilization. The Great Andamanese, totalling only 28, have been settled in the Sfrat Island. The Jarawas, numbering approximately 200, are found in the South Andaman and Middle Andaman Islands. They are extremely hostile tribe but the administration has been able to make contact with them over the last 10 years. However, they still remain quite hostile to the intruders in their territory. The Sentinalese live in North Sentinel Islands. They are also extremely hostile tribe. All efforts to make contact with them have been foiled by them. However, during 1993, contact party was able to make some contact with them.

1.10 TOURISM:

The Andaman Islands have, over the years, developed into a good tourist area. Many people from the mainland have interest in the Cellular Jail where great revolutionaries of the country were jailed in the Pre-independence era. It, indeed, is a pilgrimage center for many. Mahatma Gandhi Marine National Park (previously Wandoor MNP), is one of the main attractions for the tourists. Vast stretches of unpolluted pristine beaches offer a major attraction for tourists from abroad. Port Blair has many good hotels and lodges as well as Tourism Departments guest houses. The Andaman Administration is developing a few other islands having tourist potential.

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CHAPTER II

THE FORESTS

2.0 GENERAL DESCRIPTION:

Tropical forests of the Andaman Islands, to which the current forest inventory was restricted, are among the richest - pristine - forests of the country. The equatorial proximity, marine environment and high precipitation spread over 8-9 months have given rise to various ecosystems such as corals, mangroves, beach forests and terrestrial forests. Forests of the Andaman and Nicobar Islands are rich in biodiversity with almost 2000 plant species belonging to 682 genera and 137 families, of which 14% are indigenous to the Islands, 54% occur in other parts of the country while 32% are of extra-Indian origin. They are, indeed, a veritable heaven for a nature lover and a professional. Mangroves of the Andaman Islands are one of the most beautiful sights to behold with - widths extending sometimes to two kms, heights - reaching 20-25 meters and girths measuring up to 90 cm. It is a professional forester's dream to roam and work among giant *Dipterocarpus*, *Terminlias*, *Artocarpus*, *Salmalia* etc. with densities beyond 80%.

2.1 FOREST TYPES:

Forest vegetation of the Andamans is mainly the function of the climatic or edaphic factors and can be categorised as :

A. Tropical Climatic Forests

- (i) Giant Evergreen Forests,
- (ii) Andaman Tropical Evergreen Forests, and
- (iii) Andaman Moist Deciduous Forests.

B. Edaphic Pre climax Forests

These are influenced by site factor in addition to climate.

- (i) Southern Hilltop Tropical Evergreen Forests,
- (ii) Andaman Semi-Evergreen Forests,
- (iii) Littoral Forests, and
- (iv) Tidal Swamp Forests (Mangroves)

Vegetation of these islands has been classified by Champion and Seth into different types depending upon the nature of soil, tidal influence, moisture retainability and floristic composition. However, these forest types are not distinctly demarcated, but on the other hand they imperceptibly merge into one another and form an intimate mixture. Important forest types are :

- 1. IA/C1 - Giant Evergreen Forest,
- 2. IA/C2 - Andaman Tropical Evergreen Forest,
- 3. IA/C3 - Southern Hilltop Tropical Evergreen Forest,
- 4. 2A/C1 - Andamans Semi-Evergreen Forest,
- 5. 3A/C1 - Andamans Moist Deciduous Forest,
- 6. 4A/L1 - Littoral Forest, and
- 7. 4B/TS2 - Tidal Swamp Forest (Mangrove).

Brief description of the above types is given below :

1. IA/C1 Giant Evergreen Forests:

Description: This is the most luxuriant type of forest met with and is the climatic climax where site conditions are optimum for the tree growth. The top canopy formed by the giant trees is almost entirely evergreen and though usually irregular may locally be more or less complete.

Distribution: This type is present in small areas near the banks of the larger streams, where soils are deep alluvium.

Locality factors: A rainfall of over 3,000 mm is well distributed, sufficiently retentive soil.

Floristics: This type is so intimately mixed with the semi-evergreen forests that delimitation is difficult. Adequate floristic lists are wanting but evergreen consociations include *Dipterocarpus alatus*, the loftiest tree in the Andamans, *Artocarpus chaplasha*, *Artocarpus gomeziana*, *Dipterocarpus gracilis*, *Calophyllum soulattri*, *Sideroxylon longipetiolatum*, etc. of the top canopy, *Dipterocarpus* species form the greater percentage. Other species present near the top canopy are *Amoora wallichii*, *Pterocymbium tinctorium* etc. In the lower storey can be found *Pometia pinnata*, *Messua ferrea* etc. Climbers present are *Dinochloa andamanica*, *Gnetum scandens* and a variety of canes.

2. IA/C2 - Andamans Tropical Evergreen Forests:

Description: Not so luxuriant as the Giant Evergreen (*Dipterocarpus*) Forest, particularly in height, density and size of the giant top storey, which is very irregular and incomplete but otherwise very similar in composition. There are fewer species in the top canopy, deciduous species being rather more frequent, and gregarious occurrence commoner.

Distribution: Throughout the Andamans typically as caps to the hills with moist deciduous forests on the slopes.

Locality factors: A rainfall of over 3,000 mm, well distributed and sufficiently retentive deep soil with good internal drainage.

Floristics

(1) Andamans (Chengappa)

I. *Dipterocarpus grandiflorus*,* *D. pilosus*, *Artocarpus chaplasha*, *A. Gomeziana*, *Calophyllum soulattri**, *Planchonia andamanica*, *Hopea odorata*, *Endospermum chinense*, *Sideroxylon longipetiolatum*.

II. *Xanthochymus andamanicum*, *Myristica andamanica*, *M. glaucescens*, *Baccaurea sapida*, *Croton argyratus*, *Pterospermum aceroides*.

III. *Anaxagorea luzeniensis* etc:

IV. *Dinochloa andamanica*, *Calamus palustris*, *Gnetum scandens*, *Ancistrocladus extensus*.

Note: 1

Dipterocarpus forms more or less pure stand in the top storey but is present in all layers.

Note: 2

This type covers the hills. The valley forests have a different composition and include *Musa* species, and tree ferns, as well as the extensive climbing bamboo *Dinochloa*, *Dipterocarpus* is absent.

General Note:

Dipterocarpus grandiflorus is a conspicuous member of evergreen forests occurring on moist clayey hill slopes which are best viewed as examples of Type IA/C2. *Dipterocarpus kerrii* association which is dominated by this species only attains a moderate height, occurs in a few localities like Gopalkabang Valley in South Andaman.

3. 1A/C3 Southern Hill-Top Tropical Evergreen Forests:

Description: A more or less inferior addition of the tropical wet evergreen, not more than 10m high in extreme cases.

Distribution On the upper slopes and tops of hills and some times on steep slopes lower down.

Locality factor Exposure to wind and generally less favourable conditions of soil and climate than the main climax form. Rainfall is usually high, over 3,500 mm and humidity is high during the period of low rainfall.

Floristics:

(i) Andamans (Parkinson and Chengappa)

I. *Dipterocarpus costatus*, *Messua ferrea*, *Canarium manii*, *Harpulia cupanioides*, *Hopea andamanica*, *Cretoxylon formosum*, *Euphorbia trigona* and *Euphorbia epiphylloides*.

II. *Memecylon caeruleum*, *Cryptocarya ferrarsi* and some small bamboo and *Phoenix* species.

Note: Apparently a true edapho-climatic climax in the areas mentioned, sometimes forming a transition to the Sub-tropical Motane type.

4. 2A/C1 Andaman Semi-Evergreen Forest:

Nomenclature : Low Evergreen Forest (Chengappa)

Description A luxuriant type of forest with many giant trees which include both deciduous and evergreen species often intimately mixed but frequently in groups, particularly the evergreens. Climbers are often heavy, bamboos may or may not be present. Chengappa describes it as the densest forests in Andamans.

Distribution In the main valleys.

Locality Factors: The chief characteristic is the immature alluvial soil sufficiently old and raised above flood level to be able to progress to the climatic climax, but with a good sub-soil water supply and well-drained soil.

Floristics:

I. *Dipterocarpus alatus*,* *D. Pilosus*,* *Pterygota alata*, *Pterocymbium tinctorium*, *Sterculia campanulata*, *Terminalia bialata*,*, *Terminalia procera*,* *Albizzia chinensis*, *A.lebbek*, *Calophyllum soulattri*, *Salmalia insignis*, *Artocarpus lakoocha*, *A.chaplasha*, *Pterocarpus dalbergioides*.

II. *Lagerstroemia hypoleuca*, *Dillenia pentagyna*, *Dracontomelum mangiiferum*, *Pometia pinnata*, *Myristica irya*, *Pisonia excelsa*, *Litsea panamonja*, *Zanthophyllum andamanicum*.

II.a. Usually no bamboos, *Oxytenanthera* spp.

III. *Saprosma ternatum*, *Moosa andamanica*, *Micromelum pubescens*, *Clerodendrom viscosum*, *Leea indica*, *Clinogyne grandis*.

Note*: This type is economically the most important of those found in the Andamans and owing to its accessibility, it is being steadily cleared or worked over.

5. 3A/C1 Andaman Moist Deciduous Forests:

Description: There is typically a somewhat irregular top storey of predominantly deciduous trees about 40 meter or more in height, many of the trees being of very large girth and heavily buttressed. Beneath these trees is a rather definite second storey of numerous species including some evergreen, though most are deciduous including some evergreen, and there is a fairly complete shrubby ever-green undergrowth, including patches of bamboos, climbers are heavy and often includes canes.

Distribution: Met with throughout the Andaman Islands covering nearly half their total area.

Locality Factors: The underlying rock is chiefly rather hard coarse grained sandstone with bands of shale and conglomerate, and the soil which is often shallow, is a sandy or clayey loam of light yellow colour. This type is confined to the hilly ground and does not extend much above 100 meter where it is displaced by Tropical Evergreen Forest. It occurs on the flat alluvial ground where the low Evergreen Forest is in possession.

Floristics:

I. *Pterocarpus dalbergioides**, *Terminalia bialata**, *T.manii*, *T.procera*, *Canarium euphyllum*, *Pterocymbium tinctorium*, *Tetrameles nudiflora*, *Chukrassia tabularis*, *Albizzia lebbek*, *Lagerstroemia hypoleuca*.

II. *Lanea coromandelica*, *Adenanthera pavonica*, *Dillenia pentagyna*, *Diospyros marmorata*, *Saccopetalum tinctorium*, *Sageraea elliptica*, *Crotoxylon formosum*, *Semicarpus kurzii*, *Cinnamomum* spp., *Pterospermum aceroides*.

III. *Oxytenanthera nigrociliata*, *Rambusa schizostachyoides*, *Pleiopermium alatum*, *Ganthium gracilipes*, *Ixora grandifolia*.

IV. Ventilao spp., Buttneria andamanensis, Ventilago madraspatana, Delima sarmentosa, Acacia pennata, Entada phaseolides, Calamus species.

Note:* This type is unquestionably a stable pre-climax to the tropical evergreen determined by the soil which is such that it dries out considerably in the period January-April in which little rain falls. Although the forests have not until recently suffered from the hand of man, the planned management to which they are being subjected is unquestionably altering their character, the regenerated stands being more predominantly deciduous in character. It is possible that this forest might in part be classified with the Semi-Evergreen.

4A/L1 Littoral Forests:

Nomenclature: The term Beach and Dune Forest are in general use.

Description: The most characteristic species is the tall evergreen *Manilkara littoralis* which often forms an almost pure fringe on sandy beaches and dunes along the sea face. Scattered smaller evergreen trees occur with fewer deciduous trees and these form the dominant canopy. There are numerous shrubs and where the undergrowth is light, many times grasses and surface creepers are conspicuous binding the sand. In the depressions, which are swampy usually with saline water, the tidal species are poorly developed with a dense under growth; if the water is fresher, tall grasses (*Phragmites*) occur.

Distribution: All round the coast wherever a fair width of sandy beach occurs.

Floristics :

I. *Manilkara littoralis**

II. *Pongamia pinnata*, *Morinda citrifolia*, *Erythrina variegata* var. *Orientalis*, *Calophyllum inophyllum*, *Terminalia catappa*, *Barringtonia asiatica*, *Cordia subcordata*.

II. *Thespesia populnea*, *Hibiscus tiliaceus*, *Pandanus tectorius*.

IV. *Ipomoea pescaprae*, *Crinum asiaticum*, *Vigna retusa*, *Scaevola frutescens*.

V. *Mucuna gigantea*, *Colubrina asiatica*, *Caesalpinia bonducella*.

7. 4B/TS2 - Mangrove Forest (Tidal Swamp Forest):

Description: Typically a closed evergreen forest of moderate height, composed of trees specially adapted to survive on tidal mud which is permanently wet with salt water and submerged during every tide. Stilt roots are very typical (notably in *Rhizophorea*), so also are leathery entire leaves and vivipary.

Distribution: In the river deltas along the edge of the water ways and sheltered muddy coasts.

Floristics:

Rhizophora mucronata,* *R. ~~C~~andelaria* (outer edge), *Bruguiera conjugata*,* *B. parviflora* (just behind), *Avicennia officinalis*, *Ceriops tagal*,* *Kandelia candel*, *Xylocarpus molluccensis*, *Sonneratia caseolaris*, *Excoecaria*, etc.

8. 4C/FS2 Sub-montane Hill Valley Swamp Forest:

Highly restricted type with species of little forestry value.

Note:(*) Against a plant name implies that the species is particularly characteristic of the type.

2.2 IDENTIFICATION OF FOREST TYPES FOR ANALYSIS:

For the purpose of this survey, only three main forest types were considered i.e. Evergreen, Semi-Evergreen and Moist Deciduous. Littoral Forest type is negligible in extent and since Mangrove forests are now protected, sample plots were not laid in them. Each grid was allotted to different forest types i.e. Evergreen, Semi-Evergreen and Moist Deciduous, after the survey was completed by very carefully studying crop composition of each enumerated sample plot as given in the plot enumeration form. A key was prepared listing group of species common for a particular forest type and depending upon the percentage occurrence as well as absence of certain species in a forest type, the grid was properly allotted. Thus, where *Pterocarpus dalbergioides* and *Lagerstroemia hypoleuca* alongwith *Tetrameles nudiflora*, *Sageraea elliptica* - *Milinsa* species, *Lannea coromandelica*, *Canarium euphyllum*, *Diospyros oocarpa* occurred and *Dipterocarpus* spp was absent, such grids were allotted to Moist Deciduous Forests. Similarly where *Dipterocarpus* spp and *Pterocarpus dalbergioides* occurred together and where either of these two occurred with *Artocarpus chaplasha*, *Albizia chinensis*, *Artocarpus lakoocha*, *Dracontomelum mangiferum*, *Pisonia excelsa*, *Letjyan*, *Fagraea morindaefolia*, *Silaipatti*, *Areca triandra*, Lakho, it was allotted to Semi-Evergreen Forests. In the Evergreen Forests, *Pterocarpus dalbergioides* is absent and exclusively present are *Artocarpus gomeziana*, *Calophyllum inophyllum*, *Planchonella longepetiolatum*, *Mesua ferrea*, *Planchonia andamanica* and *Endospermum chinensis*.

This method of identification has been found quite dependable, as will be seen from the fact that percentage of volume of a forest type, in any Division, out of total volume more or less is the same as the percentage of the area of that type out of the total area.

2.3 FOREST MANAGEMENT UNITS AND AREA:

The Andaman and Nicobar Islands Forest Department is headed by Principal Chief Conservator of Forests who is assisted by the supporting staff of Chief Conservator of Forests, Conservator of Forests, Andaman & Nicobar circle, Conservator of Forests,

Head quarter and Conservator of Forests, Development and Utilization, and Chief Wildlife Warden. Dy. Conservator of Forests, Headquarter, Mill Division, Utilization, Wildlife, Working Plan, Silviculture, manage Divisional Units. There are 6 territorial Divisions, i.e. Nicobar, South Andaman, Baratang, Middle Andaman, Mayabandar and Diglipur. There is also a Social Forestry Division. Forest area of 196 km² of the Little Andaman Island has been leased to Andaman and Nicobar Islands Plantation Development Corporation. 112 km² of Mayabandar Division has also been leased to the Corporation.

2.4 FOREST AREA:

Forest area related to the current inventory i.e. excluding Nicobar group of Islands is as below. The area of inventory excludes Sanctuaries and National Parks, Protection and Mangroves areas. The areas of Mayabandar and Diglipur Divisions have been marked out by dot grid method as the boundary was known.

S.No.	Name of Division	Geographical area in km ²	Forest area in km ²	Forest area covered by Inventory in km ² .
1.	Little Andaman	734.39	668.10	276.00
2.	South Andaman	1456.72	1136.49	634.88
3.	Baratang Divn.	690.49	645.60	565.17
4.	Middle Andaman	998.44	957.04	565.86
5.	Mayabandar Divn.	1254.20	1113.75	893.86
6.	Diglipur Divn.	1084.72	1042.10	722.86
Total ..		6218.96	5563.08	3658.63

16.18% Forest area is under Tribal Reserve, 13.57% are Mangrove forests and 7.40% area is managed under National Parks and Sanctuaries.

2.5 FOREST MANAGEMENT:

The forests of the Andamans were virgin till settlement started in 1857. Earlier working was selective, irregular and in the most accessible areas. Main species being extracted was *Pterocarpus dalbergioides*. In 1921, clear felling system was introduced but abandoned after 3 years. From 1921 again irregular extraction continued and soft wood found market during 1927. The first working plan was prepared by F.H. Todd for North Andaman and the object was to work in the forests to produce regular and periodically increasing yields - by improvement fellings, being careful in selection of trees for felling, fire protection and dibbling in the blank. Subsequent working plans suggested selection fellings for naturally regenerating areas. Main species were *Dipterocarpus*, *Terminlia bialata*, *Canarium euphyllum*, *Pterocymbium tinctorium* etc.

It was after Independence that the forest management was really systemised by the working plan of B.S.Chengappa, Conservator of Forests, Working Plan in 1952. The entire Islands were divided into three Divisions i.e. South, Middle and North, and a separate plan was prepared for each Division. Apart from Protection Circle, Mangrove Working Circle and MFP Working Circle, Non-Tidal Working Circle was managed under what is now popularly known as Andaman Canopy Lifting Shelter wood System, which by gradual canopy manipulation in stages for optimum penetration of light envisaged introducing natural regeneration of important species with the least soil exposure, though retaining heterogeneous character of the original stand. In the degraded and poorly stocked areas, natural regeneration was supplemented by broadcasting seeds of important species. Rotation was fixed at 150 years for hardwoods and at 75 years for softwoods. Yield was fixed by area with a volume check.

Subsequent working plans have more or less kept the same prescriptions, though by clear felling, about 10,000 ha area of teak plantations have been raised. They are poor, by Andaman standards and have been discontinued. Plantations of other species

like *Pterocarpus dalbergioides*, *Dipterocarpus*, *Pershia insignis* etc. have also been raised to a small extent.

Current Working Plan for South and Middle Andaman Division as well as Baratang Division by B. K. Basu and D'cruz's Working Plan for North Andamans (Mayabandar and Diglipur Divisions) have retained the same Silvicultural system. Major changes are :

i) Conversion period is now 75 years for both hardwood and softwood;(ii) Rotation for hardwood is kept at 100 years and for soft wood at 75 years; (iii) Exploitable girth for hard wood is 150 cm gbh' (ob), for soft wood, it is 120 cm gbh (ob) and for Noncommercial wood it is 180 cm gbh (ob);(iv) Only 15 trees per ha are allowed to be felled and a minimum 10 sound and healthy commercial trees per ha, of girth above 120 cm, well distributed over the area are to be retained as mother trees; and (v) Only 50% volume of the total estimated harvestable volume is allowed to be removed, as per the directives of the Central Government.

2.6 DAMAGE TO FORESTS:

(i) **Weeds:** Weeds often pose a problem for effective natural regeneration of important species, especially in Evergreen and Semi-evergreen Forests. *Strobilanthes*, *Eupatorium* and *Mikanea* deserve mention.

(ii) **Climbers:** Many trees in all the three forest types are heavily laden with climbers. Climbing bamboo - *Dinochloa andamanica*, *Thunbergia laurifolia*, *Entada Scandens* are the worst. *Pterocarpus* suffers the most because of low branching and *Dipterocarpus* suffers the least because of straight, branchless bole.

(iii) **Ficus:** An epiphyte does extensive damage to timber trees.

(iv) **Loranthus** is the only parasite found in these forests and extensively infests *Pterocymbium tinctorium* (Papita) a soft wood and *Planchonia andamanica* .(Red Bombway) a constructional hardwood and is believed to cause death of trees.

(v) **Fungi:** Several types are found, some causing hollowness in *Pterocarpus dalbergioides* and death of *Tectona grandis* poles.

(vi) **Wild Animals and cattle:** *Sus andamanensis*, Wild pig, which is endemic to the Andamans and spotted deer, which was introduced by the British and have multiplied enormously, are the two herbivores of note. The former causes little damage due to declining number but the latter does considerable damage to the young regeneration of especially *Pterocarpus dalbergioides*, *Terminalia bialata* and other important species.

Cattle damage due to increase in cattle population is on the increase especially in Diglipur Division.

(vii) **Insects:** Stem borers are common in teak plantations, *Salmalia insignis* and *Semul* plantations. A defoliating caterpillar affects *Terminalia bialata* and *Albizia lebbek*.

(viii) **Storms:** Storms accompanied by strong winds and especially cyclones (1976 & 1988) do considerable damage. During survey in Baratang and Middle Andamans lot of *Tectona grandis* (teak) trees in plantations have been found uprooted. Cyclone damage is in the form of uprooting of trees and log loss in rough seas.

(ix) **Fire:** Fire is generally unknown due to evergreen nature of the understorey.

(x) **Man:** Encroachments, especially in Diglipur Division are a threat to reckon with, due to ever-increasing population on account of influx of migrants.

2.7 FAUNA:

The fauna of the Andaman and Nicobar Islands is unique. Many species are found in these Islands only, like the Nicobar megapode, Norcondum hornbill, found only on the Norcondum island, numbering about 200, Andaman teal, a rare bird now, Andaman serpent eagle, are worth mentioning.

Salt water crocodile is abundantly found and all members of the survey parties saw them many times. Seven species of turtle have been recorded. The Andaman pig is the largest indigenous animal. Crab eating Macaque is found only in the Nicobar Islands. Amongst crustaceans the most important is the giant rubber crab in South Sentinel Island. The sea water is full of variety of fish. Noteworthy are dugong - especially near Little Andaman, sharks, dolphins, tunas, etc.

Spotted deer were introduced and have very large population through out the Islands.

Elephants - mostly confined to Interview Islands - were introduced from mainland and have sizeable population and sometimes are a threat to humans in Diglipur Division.

Number of lizards and snakes are found. The commonest snake is the viper. King cobra and cobras have been listed but are rare and were never seen during the survey.

2.8 FOREST PRODUCTION:

HARVESTING OF THE FOREST PRODUCE

Since the Industrial Coupe System has completely been stopped with effect from 1.7.1990, timber extraction from the forests of this territory are done departmentally from the Andaman group of Islands. The Andaman and Nicobar Forest and Plantation Development Corporation Limited. continued to work in Little Andaman and a portion of North Andaman.

The quantity of timber extracted during the year under report are as under:-

Sl.No.	Name of Agency	Quantity of timber extracted (in cu.m.)	
		1990-91	1991-92
1.	Forest Department	58744.715	52938.489
2.	Through the contractors & delivery to Department	5531.274	7130.913
3.	Forest Development Corporation,	33612.000	41808.423
4.	By Villagers for domestic use	919.476	932.485
5.	*Woodbased industries on payment of royalty	4802.255	1980.369
TOTAL		103609.720	104790.679

(Industrial Coupe System has been completely stopped with effect from 1.7.1990).

The timber extracted through all these sources are consumed locally by the wood based industries besides meeting the demand of local population and other departments.

Two departmental Saw Mills at Chatham and Betapur continue to cater the local requirement of sawn timber in the territory. The Saw Mill at Chatham produced 8034.084 cu.m. and at Betapur 1629.575 cu.m. of sawn timber during the year. A quantity of 673.421 cum sawn timber was chemically treated in the Chatham Saw Mill. In addition, it also produced 26100 kg of Charcoal. Details of the disposal of the sawn timber produced in these saw mills are as under:

Disposal of sawn timber	1990-91	1991-92
a) Sold to public	6379.529	6282.616
b) Sold to Govt. Department	3562.619	667.053
c) Consumed by Forest Deptt.	717.904	1923.963
TOTAL ..	10660.052	8873.632 cu.m.

CHAPTER III

RESOURCES SURVEY METHODOLOGY

3.0 OBJECTIVES OF THE SURVEY:

A special study in respect of the forests of the Andaman group of Islands was desired by the Inspector General of Forests in July, 1993 to find out the status of the forest area which has been worked in the past with the following objectives.

3.1 OBJECTIVES:

- 1) To find out status of regeneration in worked area in comparison to unworked areas.
- 2) To find out the status of growing stock.
- 3) Whether vegetation was improving or decreasing in worked areas?

To achieve the above objectives, a regular Forest inventory was required to be carried out as per the Guiding Manual of the Forest Survey of India and consequently, following objectives were also set:

- 4) To collect information on distribution of forest with regard to various parameters such as topography, aspect, slope, soil-depth etc.
- 5) To collect various information on crop data including origin of crop (whether the crop is of seed origin, coppice origin or a plantation), its composition, height, size, quantum of regeneration, injury to crop, fire incidence, grazing incidence, presence of weeds and grasses etc.

- 6) To estimate the forest areas under different crop compositions and also to assess the extent of forest area under nonforest use.
- 7) To focus attention of the planners and forest officials on the critical aspects and condition of the forests for timely remedial measures and for future planning.

3.2 AREA CONSIDERED FOR SURVEY:

For the purpose of this special study, forest area falling under the Andaman group of Islands only, including the Little Andaman, was considered. The area details have already been given in Chapter II. In order to decide forest areas, recent Survey of India toposheets, preferably of 1:50,000 scale were used. All those areas which were demarcated by double dotted forest boundaries on these toposheets and were having green wash within or outside such boundaries, were taken as forest areas for undertaking this inventory. Any other area reported to be forest area by local Divisional Forest Officers were also taken as forest area.

3.3 PILOT SURVEY

In order to achieve the objectives set out for the present special study in the forests of Andaman and Nicobar Islands, a pilot survey was conducted to determine the variance and the most efficient sample plot size. As the forest composition obtained in the Islands is of heterogeneous character and that the forests are scattered in various Islands, with a view to have proper representation of regeneration and growing stock details, the sample plots were selected by marking grids at 1 ¼' x ¼' interval and by using the table of random numbers on the toposheets of 1:50,000 scale. Three concentric square plots of size 0.1 ha, 0.2 ha and 0.3 ha were located and laid at the same spot with the same plot center for the purpose of the pilot survey. The sides of these three plots were 31.62 m, 44.72 m and 54.77m respectively. The data were collected, firstly, from the innermost 0.1 ha plot, then further by adding this data to that collected from the concentric square plot surrounding it, being also 0.1 ha, making it the data for 0.2 ha and then adding this data again to the data collected from the concentric square plot of 0.1 ha surrounding this

area, thus forming data for 0.3 ha. Data were collected in respect of 39 locations. On analysis of the data, 0.2 ha sample size was found to be most suitable and efficient for the purpose of present inventory to meet the objectives of the survey, because though 0.3 ha plot showed the lowest standard error, there was not much difference between the standard errors of 0.2 and 0.3 ha plots and in a forest like the Andamans, to collect data from 0.3 ha plots was very cumbersome, time consuming and many times layout of such large plots would have been impossible in hilly terrain or where plots were located near sea, as was found during the Pilot Survey.

RESULTS OF PILOT SURVEY

Results of the Pilot Survey is detailed below:

I - NATURAL REGENERATION AREA (N.R.A)

Plot size	Mean stems	Variance	Co-efficient of variation	Percentage error
0.1 ha	45.588	270.632	36.086	8.75
0.2 ha	91.529	669.756	28.275	6.860
0.3 ha	139.118	1418.485	27.073	6.566

II - UNWORKED AREA (U.W.)

Plot size	Mean stems	Variance	Co-efficient of variation	Percentage error
0.1 ha	45.696	230.585	33.231	6.93
0.2 ha	94.565	957.257	32.717	6.82
0.3 ha	143.522	2046.715	31.521	6.57

III - COMBINED (N.R.A. + U.W.)

Plot size	Mean stems	Variance	Co-efficient of variation	Percentage error
0.1 ha	45.65	241.105	34.015	5.38
0.2 ha	93.275	817.076	30.646	4.519
0.3 ha	141.650	1741.362	29.460	4.658

Details of location and layout of plots in the field are as described for the regular survey in succeeding paragraphs except for the fact that regular survey had 0.2 ha plot whereas pilot survey had 0.1, 0.2 and 0.3 ha plots with the same plot center.

3.4 INVENTORY DESIGN:

Inventory design for this survey was slightly different than the normal methodology being uniformly applied currently by all the zones of Forest Survey of India. Normally two 0.1 ha plots are laid in a grid of $2\frac{1}{2} \times 2\frac{1}{2}$ ' on toposheets of 1:50,000 scale. However, because of the smaller breadth of the 4 major Islands i.e. Little Andaman, South Andaman, Middle Andaman and North Andaman and even smaller areas of numerous Islands, such a large grid would not have been suitable as many plots $1\frac{1}{4} \times 1\frac{1}{4}$ ' would have fallen in the sea and no. of plots would have also been quite less. Hence a grid of was marked with one sample plot located in each grid.

This also ensured higher intensity of sampling because the intensity in regular inventory is 0.01% as two plots of 0.1 ha are laid in a grid of $2\frac{1}{2} \times 2\frac{1}{2}$ ', roughly equal to 20 km². In case of the Andaman inventory, a grid of $1\frac{1}{4} \times 1\frac{1}{4}$ ' having an area of 5 km² had one plot of 0.2 ha and hence the intensity was 0.04%.

3.5 METHOD OF REFERRING TO TABLE OF RANDOM NUMBERS:

The length and width of each $1\frac{1}{4}' \times 1\frac{1}{4}'$ grid along 'X' and 'Y' axis in mm on 1:50,000 scale toposheets was measured and then the length of the side of the plot as on the map corresponding to the 0.1 ha plot on the ground was calculated which came to 0.6324 mm. 'X' and 'Y' were reckoned as the length and width of the grid and 's' the side of the plot on the map. Further, 's' was subtracted from 'X' and 'Y' to give (X-s) and (Y-s).

Two random nos. consisting of three digits each were selected. If these random numbers were in the range of 0 to (X-s) and 0 to (Y-s), then, these numbers were retained, and half of the side of the plot on map i.e. 0.3162 mm (S) was added to both sets of random numbers to obtain desired co-ordinates of 'X' and 'Y' by treating the last digit of the random numbers as the decimal number. The resultant co-ordinates were rounded upto nearest mm in two digits and the co-ordinates so obtained were marked on grid taking its southwest corner as origin in order to locate the plot center.

In case the set of random numbers were higher than (X-s) and (Y-s), then the (X-s) and (Y-s) were subtracted one time or two times as the case was from their respective set of random numbers and the reminders were retained for adding S/2 in both and later rounded upto the nearest mm to find out co-ordinates of the plot center.

In both the eventualities, as the case may be, the exercise had to be repeated for each grid.

Example:

Let the length and width of $1\frac{1}{4}' \times 1\frac{1}{4}'$ grid along 'X' and 'Y' axis be 45.5 mm and 46 mm respectively and the length of the side of the plot(s) is 0.6324 mm on 1:50,000 scale toposheet. Therefore, (X-s) and (Y-s) come to 44.9 mm and 45.4 mm respectively. Let the random numbers taken for 'X' and 'Y' are 844 and 630 respectively.

Since these numbers are greater than the range of (X-s) and (Y-s), the (X-s) i.e. 44.9 is subtracted from 63.0 to get 17.6. The last digit of these numbers being treated as decimal number. Now, half of the side of the 0.1 ha plot i.e. $S/2 = 0.3$ mm is to be added to both the remainders and the resultant co-ordinates of 'X' and 'Y' come to 39.8 mm and 17.9 mm respectively. After rounding it to the nearest mm, the desired co-ordinates for marking of the plot center treating the S-W corner of the grid as origin are 40 mm and 18 mm for 'X' and 'Y' co-ordinates of the grid. Likewise the exercise was repeated for each grid.

In case the random number taken out was smaller or within the range of (X-s) and (Y-s) then the half of the side was added to each of such set of the random numbers and rounded up to mm for marking co-ordinates of the plot center on the grid.

3.6 LOCATION OF PLOT ON MAP.

The procedure for layout of the sample plot was to be same as detailed in the current F.S.I. Field Manual: "Lay out of the plots in the field". Instead of $2\frac{1}{2}' \times 2\frac{1}{2}'$ grids marked earlier, in the present Pilot Survey the grids were marked at $1\frac{1}{4}' \times 1\frac{1}{4}'$ interval and $1\frac{1}{4}' \times 1\frac{1}{4}'$ that instead of two randomly located plots, there was only one plot in a grid. In all there would be 144 grids, identified by four digit code numbering from 0000 to 1111. South western corner of each toposheet was numbered as 0000. The first two numbers would denote Division number along 'Y' axis and the later two numbers would stand for Division number along 'X' axis. Thus, there were Divisions from 00 to 11 on both axes providing 144 grids on each toposheet.

The grids marked ABCD were read as 0204, 0506, 1008 and 1111 (see attached diagram 1).

The sample plots were then marked as per the procedure detailed at para 3.4.1 after referring to the table of random numbers.

3.7 LOCATION OF PLOT ON THE GROUND:

As stated earlier, the survey was confined to forest areas only as decided on the basis of forest boundaries and green wash shown on the topo-sheets. The plot has to be visited when it falls in some forest area. All the forested plots of the survey area excluding National Parks, tribal areas and mangroves, duly marked on toposheets, were allotted to various crews. The crews had drawn up their programme of halts at some convenient places in order to tackle maximum plots from those camps. The plots marked on the toposheet had to be exactly located on the ground with the help of some conspicuous features which could be identified on the map as well as on the ground. Usually the following features were selected for this purpose:

1. Bench Mark,
2. Triangulation point,
3. Village or road trijunction,
4. Old bridges and culverts,
5. Confluence of rivers or streams and junction of roads,
6. Prominent bends in roads, rivers or streams,
7. Old ponds and wells,
8. Springs,
9. Prominent topographical features in hilly region such as spurs, knolls etc, and
10. Mile stones or kilometer stones on the road side,

3.8 LAYOUT OF PLOTS IN THE FIELD.

After locating any of the above reference points on the ground as well as on the map, the bearing and distance from reference point to the plot center were marked.. This distance was traversed at the bearing calculated for the plot using Silva Compass and

distance by measuring nylon rope/tape etc. While using compass the magnetic declination as indicated on the concerned toposheet was also taken into account. Similarly, for distance measurement, the slope correction was applied to cover the actual horizontal distance of the plot measured from the map.

On reaching the plot center, a square plot of 0.2 ha was laid out by taking distance of 31.62 m. in all the four directions (north, south, east and west) from the plot center. Thus, an exact plot of 0.2 ha. area (having each side equal to 44.72 m. and diagonal of 63.24 m.) was laid out horizontally after making corrections for the slopes measured with the help of Blumleiss Hypsometer along 4 semi diagonals (north, south, east and west).

3.9 FORMAT FOR DATA COLLECTION:

After laying out the plots in the field, various data were collected in the following field forms in codified manner (except in Plot Approach Form, wherein information was collected in descriptive manner) as described in the Field Manual issued to the crews for the purpose of data collection. This facilitated the transfer of data on punch cards, consistency checking of collected data and finally in processing the data on electronic computer at a later stage. Various field forms used in this survey were:

1. Plot Approach Form,
2. Plot Description Form,
3. Plot Enumeration Form,
4. Sample Tree Form,
5. Bamboo Enumeration-Cum-Clump Analysis form, and
6. Bamboo Weight form,

1. Plot Approach Form:

As the title suggests, the form was a record of approach to the plot center from the field camp of a crew. It was filled in by the Crew Leader as he proceeded from his camp

to some conspicuous feature called reference point existing near the plot. The distance and bearing from this well defined reference point to the plot center were also recorded on it. The exact location of plot center i.e. bearing and distance from two trees to the plot center was also mentioned together with the time of departure from camp, time taken in various studies and time of arrival in the camp.

This form helps the check crew or any other person to relocate the plot easily when required. The data on this form is recorded in descriptive manner with a neatly drawn sketch showing the location of reference point and the plot center.

2. Plot Description Form:

This form is designed for recording qualitative description of 2 ha area around the plot center. The information regarding administrative units, legal status, land use, topography, soil, vegetation, bamboo regeneration, biotic influence, accessibility and plantation potential etc. were recorded. The data were recorded in codified manner and was transferred to punch cards for further computer analysis. The stratification of area and classification of growing stock was done on the basis of these descriptions only.

3. Plot Enumeration Form:

In this form, all the trees with dia 10 cm. and above and all the bamboo clumps occurring in all 0.1 ha sample plots were recorded by species. This was meant for computing total growing stock existing in all such sample plots and finally in whole of the survey area which was estimated on the basis of these plots.

This form helps in distributing the growing stock in terms of stems and volume by various parameters like species, diameter class, forest types etc.

4. Sample Tree Form:

Detailed information regarding the species, diameter at breast height (over bark), height of tree, clear bole, bark thickness, dominance and defects etc. of all the trees occurring in north west quadrant of all the plots, were recorded in this form.

On the basis of these parameters (i.e. height, diameter and clear bole), we get volume of the plots which further enables us to estimate the total growing stock of the area falling under various strata.

5. Bamboo Enumeration-cum-Clump Analysis Form.

In this form, the data of individual culms occurring in the selected clumps bearing S.No. 1,9, 17,25,33 etc. (i.e. the first and every eighth clump appearing in Plot Enumeration Form) were recorded. Thus, the information about age, soundness, size and condition etc. of the culms of the above clumps was obtained and analysed in various columns of this form.

This information gives the position of total bamboo stock by clump sizes occurring under various conditions.

6. Bamboo Weight Form:

This form was designed for collecting data to determine the green weight of bamboos of different species and sizes and further for establishing relationship between green weight and dry weight of bamboo culms. The data were recorded in respect of two selected culms from each dia. class i.e. 2 to 5 cm, 5 to 8 cm and 8 cm and above and the green weight of three 50 cm long sub-samples, each taken from the bottom, the middle and the top portions, of the culms were recorded. With the help of data of this form, the total green bamboo stock was estimated. On the basis of past experience of

complete drying of bamboos and in estimating air dry weight it was well established that the air dry weight comes to 60% of green weight in Central India so this factor was applied and total air dry weight was also estimated accordingly.

3.10 FIELD WORK:

The field work of Andaman and Nicobar Islands was completed during the period October, 1993 to January, 1995. One Base camp was established at Port Blair. There were four crews deployed on this work, each consisting of one Junior Technical Assistant as Crew Leader, one Deputy Ranger and two Fieldmen.

3.11 FIELD CHECKING:

The Deputy Director, Shri S.B.Elkunchwar, IFS, was in charge of the survey work, assisted by Shri B.R.Pandey, Senior Technical Assistant, both of whom stayed in the Islands with field crews for long duration and checked number of plots between them by remaining present at the time of actual field work and in fact directed inventory work on spot for number of grids.

3.12 MAPS AND PLOTS:

Map sheets of 1:50,000 scale were available and used for the current survey of the Andamans. Following toposheets covered the inventory area tackled by the Forest Survey of India. Some sheets having the entire areas under Tribal Reserve or Sanctuaries i.e. sheets having protected areas are not mentioned.

Division	Toposheet No.
(i) Little Andaman	: 87 B5 to B 10
(2) South Andaman Division	: 87 A9 to A11 and A 13 to A 14 D12 and D 14.
(3) Baratang Division	: 87 A13, 87 E1, 86 D16 and 86 H4
(4) Middle Andaman Division	: 86 D12 to D15
(5) Mayabandar Division	: 86 C16, 86 D9 and D 13.
(6) Diglipur Division	: 86 C14 to C16 and 86 G2 to G4.

CHAPTER - IV

DATA PROCESSING

4.0 SAMPLING DESIGN:

Pilot Survey:

The forests of Andaman & Nicobar Islands have a heterogeneous composition with various forest types. In order to prepare a suitable design for the forest inventory, a pilot survey was undertaken by marking plots in $1\frac{1}{4} \times 1\frac{1}{4}$ grids in both worked and unworked areas. The main objective of the pilot survey was to decide the optimum size of the plot. The results established that 0.2 ha plot size would be suitable for the main survey.

In the case of Andaman & Nicobar Islands existing sampling design and methodology, developed by Forest Survey of India, was not used to carry out forest inventory survey. For this purpose, Survey of India toposheets in the scale of 1:50,000 were selected for the area to be surveyed and in each of these toposheets, grids at the interval of 1.25' latitude by 1.25' longitude were marked and one sample plot of 0.2 ha area each were marked at the center of each of these grids. The plot center marked on the toposheets was laid on the ground by the field parties and the data was collected in the prescribed field forms.

4.1 FIELD DATA:

The basic data of the inventory survey were collected in Plot Description Form, Plot Enumeration Form, Sample Tree Form, Bamboo Enumeration Form etc. The field forms containing field data were precoded so that the data could easily be transferred to the floppy/tape/disk directly.

Card design	No.of records
1. Plot Description Forms	533
2. Plot Enumeration Forms	5587
3. Sample Tree Forms	11644
4. Bamboo Enumeration Forms	438
5. Bamboo Weight Forms	103
TOTAL	18305

4.2 PLOT DETAILS IN ANDAMAN & NICOBAR ISLANDS:

There were 533 plots in Andaman & Nicobar Islands in all. These plots were divided in six forest divisions. The details are as:

Sl. No.	Forest Divison	Total covered (all land use class)	Plantation	Regeneration	Mangrove
1.	South Andaman	100	9	1	-
2.	Middle Andaman	106	12	-	-
3.	Little Andaman	51	8	-	-
4.	Baratang	71	5	-	2
5.	Mayabandar	93	6	-	1
6.	Diglipur	112	-	-	-
	Total	33	40	1	3

The area figures will be as under:

Sl. No.	Forest Division	Forest Area inventoried (km ²)	Weightage for area per plot(km ²)
1.	South Andaman	634.88	6.3488
2.	Middle Andaman	565.86	5.3383
3.	Little Andaman	276.00	5.4117
4.	Baratang	565.17	8.19087
5.	Mayabandar	893.86	9.71587
6.	Diglipur	722.86	6.4541
	Total	3658.63	

The weightage to each plot in each forest division was calculated with a separate factor as stated above to estimate the area under different parameters for worked and unworked areas. So far as the estimation of stems and volume are concerned, the total plots were 489 (i.e. excluding plantation, regeneration and mangroves (533-44=489). There were three forest strata only in Andaman & Nicobar Islands i.e. Evergreen, Semi-evergreen and Moist Deciduous.

4.3 DATA PROCESSING:

The data processing involved the following steps:-

i) Manual processing:

The field forms received in the Machine Data Management Unit (MDMU), were checked with the list supplied by the Zonal Office. Entries of the field forms were made in the register, regarding the number of field forms relating to each map-sheet, grid and plot. The total number of records required to be entered under each card design was also counted and indicated in the register for future references.

Job numbers, card design and left hand zeros, wherever missing, were filled up in the field forms to avoid mistakes during data entry on to the floppy or disk. Each entry in the field form was checked for consistency in the data. The maximum and minimum value of the codes were checked. The data was loaded on to the floppy/disk and verified. Then the listings were taken and checked manually. Sample statistics were calculated and checked with the computer output results. The programmes were developed according to the requirement of the data processing. Final computer output results were checked for consistency and relevance of results. Area tables were also prepared by using the weightage of each plot.

ii) Processing on electronic computer:

Estimation of Stems and Volume:

The data were loaded on floppy/disk through direct data entry operations and verified. The listings of loaded data were taken to check the data. Volume of each diameter class was estimated with the help of the volume factors given by the Zonal Office and supplied by the Andaman & Nicobar Islands Forest Department. For lower and upper diameter classes the volume factors were calculated by the method of interpolation and extrapolation. For this statistical packages like Stat Pack and MTB were used extensively.

After taking into consideration, contribution of volume of each diameter class growing stock tables by species and diameter class wise under each crop composition were prepared. For growing stock estimation distribution of stems enumerated were obtained in VAX-11/780 with the help of new programmes. Then the data so obtained were entered in PC and the final estimates of distribution of various species in diameter classes were prepared by using Ratio method of estimation for each forest stratum and both for worked and unworked areas. After this, the volume was estimated by multiplying the volume factors of various species. Similarly, for estimating the standard error, plot-wise distribution of stems enumerated were obtained from VAX-11/780 and by entering this in PC and multiplying by volume factors table plot volume was estimated. This plot volume was used for estimating the standard error.

The volume factors table for important species is given in Annexure I.

4.4 ENUMERATED TREE VOLUME:

To estimate the volume of each enumerated tree species, programmes were developed first for calculating the distribution of stems by species and diameter classes in each plot for all the six forest divisions. Further, these stems were multiplied by each volume factor as it was done in case of volume estimation. Thus these enumerated tree volumes were obtained in each diameter class by species.

4.5 PLOT VOLUME

The estimated volume of each enumerated tree in each diameter class in a plot when added up over the whole plot provided the plot volume. It was also converted to per hectare. The particular plot volumes were used to estimate the sampling error of the growing stock for each crop composition.

4.6 SAMPLING ERROR:

In order to estimate the sampling error the sample was considered to constitute simple random sample of unequal clusters because only one plot was enumerated from a grid. As such, the ratio method of estimate was used and the sampling error was estimated as follows:

Let n = total no. of clusters (grids) in the sample

Y_i = sum of per hectare volumes in i th grid

x_i = number of plots in the i th grid

$$\bar{X} = \frac{1}{n} \sum_{i=1}^n x_i = \text{Average number of plots per grid}$$

$$\hat{R} = \frac{\frac{1}{n} \sum_{i=1}^n Y_i}{\frac{1}{n} \sum_{i=1}^n X_i} = \text{estimate of average volume per hectare over all grids}$$

Estimate of variance of \hat{R} is

$$\text{Var}(\hat{R}) = \frac{N-n}{Nn} \sum_{i=1}^n \frac{(y_i - \hat{R} x_i)^2}{n-1}$$

$$N - n$$

(Ignoring ----- the finite population correction factor)

$$N$$

$$\hat{\text{Var}}(R) = \frac{1}{n(n-1)} \sum_{i=1}^n X_i^2$$

$$Y_i^2 - 2 \hat{R} \sum_{i=1}^n Y_i X_i + \hat{R}^2 \sum_{i=1}^n X_i^2$$

Estimate of the Standard Error (SE) of R is

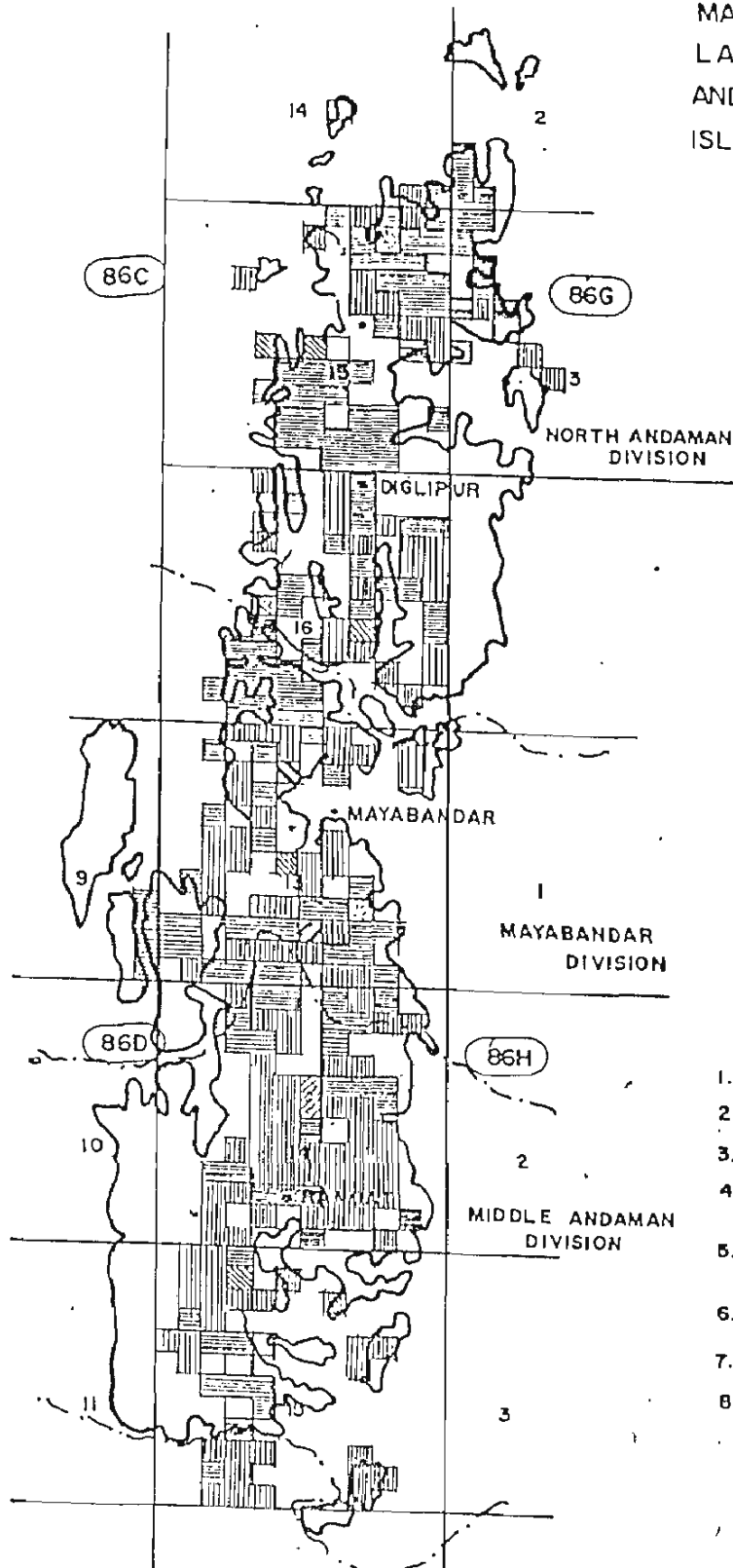
$$SE = \sqrt{\hat{\text{Var}}(R)}$$

$$SE\% = \frac{SE}{\hat{R}} \times 100$$

Standard errors have been estimated for the growing stock in each forest type and over the entire area irrespective of the strata.

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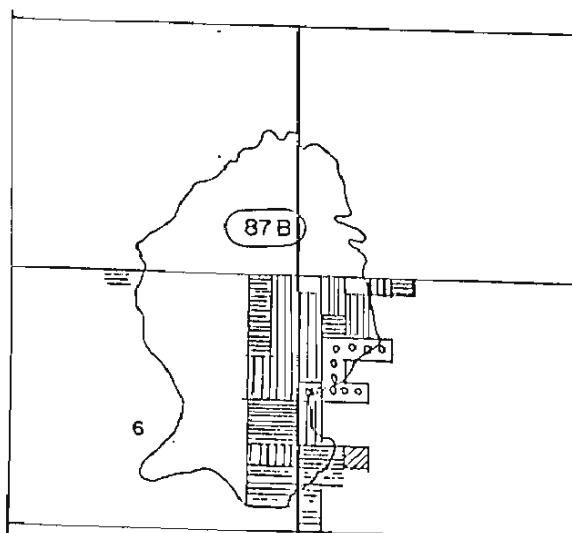
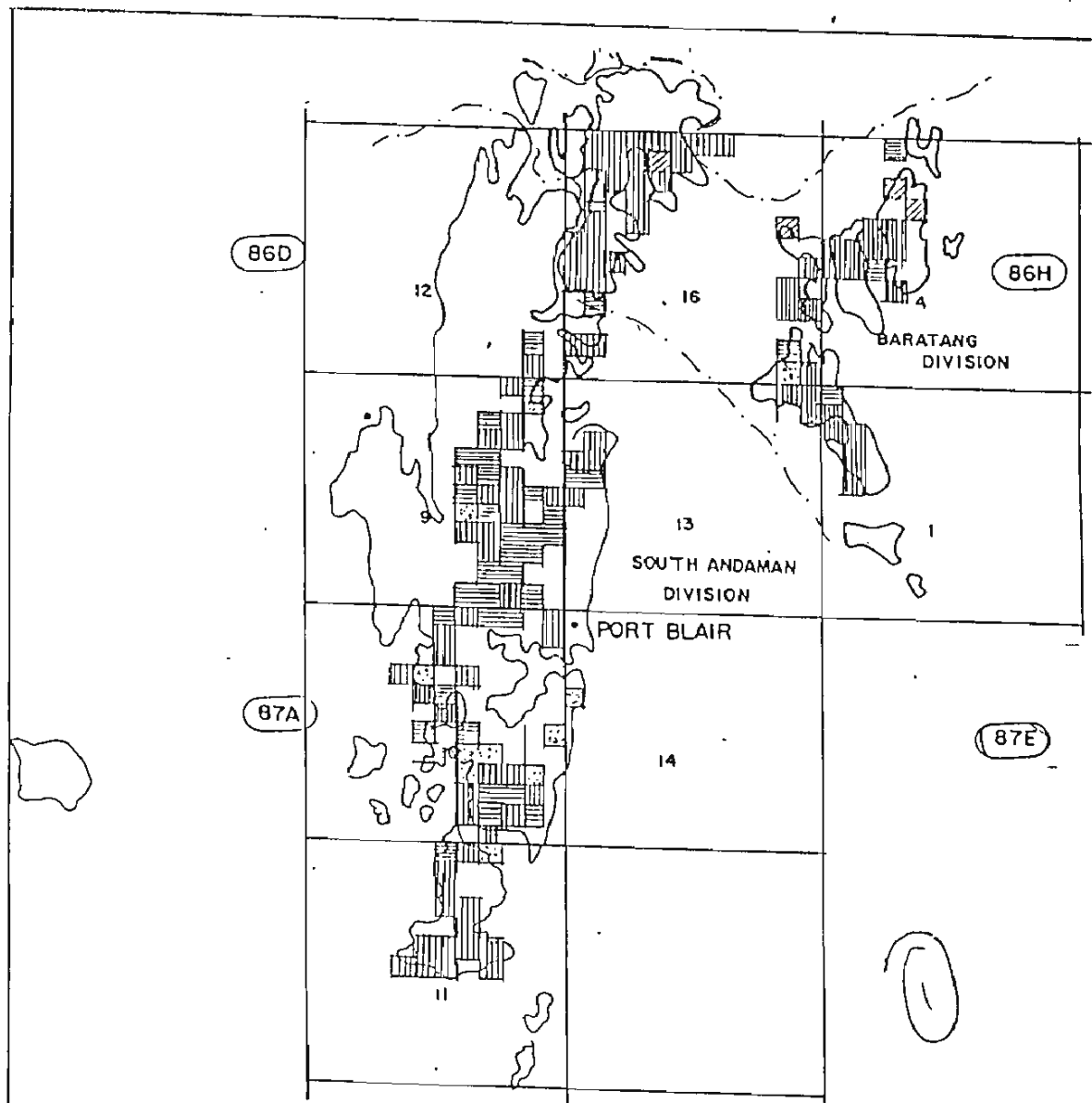
MAP SHOWING
LAND USE OF
ANDAMAN & NICOBAR
ISLANDS



I N D E X :

1. DENSE FOREST
2. MODERATELY DENSE
3. OPEN FOREST
4. NON FORESTRY
PLANTATION
5. HABITATION &
AGRICULTURE
6. WATER BODY
7. YOUNG PLANTATION
8. BAMBOO BREAK





CHAPTER V

INVENTORY RESULTS: AREA

5.0 GENERAL

For the purpose of analysis, the forest area of the Andaman Islands was stratified after the survey was completed into two main strata viz; worked forests and unworked forests. These areas of worked and unworked forests are exclusive of Tribal Reserves, National Parks, Sanctuaries, Protected Areas and Mangrove Forests and cover the areas which have been converted or will be converted under the prescribed silvicultural system. However, for area details this stratification was not taken into account except in Table 5.2T. The Andaman forests have also been categorised into three forest types viz; Evergreen(EG), Semi-Evergreen (SE) and Moist Deciduous(MD) and these types have accordingly been accounted for in the basic unit that is the Division, hence each Division shows the details of the forest types. Any information, therefore, can be totaled up forest type wise for the entire Andaman Islands.

The number of sample plots inventoried are given below:

S.No.	Division	No. of sample plots
1	Little Andaman(LA)	51
2	South Andaman (SA)	97
3	Baratang (BT)	64
4	Middle Andaman (MA)	94
5	Mayabandar(MB)	87
6	Diglipur (DP)	112
Total ..		505

5.1 FOREST AREA BY LAND USE CLASSES:

Table No. 5.1T below shows the area break-up by land use classes for each Division as well as total area of the Andaman Islands. It is seen that 88.22% forest has a density over 30%, i.e. moderately dense and dense forests, 45.90% being dense forest (density above 70%) and 42.32% being moderately dense forest (density between 30% to 70%). It is seen that Baratang Division has the least dense forest at 10.94%, though moderately dense forest is highest at 78.12%. Middle Andaman has the most area under dense forest at 60.64% closely followed by Diglipur at 59.82%.

Open forest is absent in Little Andaman Division and negligible in other divisions. Agricultural lands are found mostly in Diglipur and Middle Andaman Divisions. Non-forestry plantations are found in Little Andaman (15.68%) and South Andaman (8.24%) Divisions. Bamboo brakes are found only in Mayabandar Division over 9.72 km². Following table gives Division wise details of break-up of area by land use classes.

TABLE 5.1T
FOREST AREA BY LAND USE CLASSES(KM²)

S.No.	Landuse	Forest Division						Total	%
		LA	SA	BT	MA	MB	DP		
1.	Dense forest	113.65	196.81	57.34	304.28	495.51	432.425	1600.05	45.90
2.	Moderately dense	108.24	304.74	409.54	154.81	272.04	225.894	475.264	42.32
3.	Open forest	-	19.05	8.19	5.34	19.43	6.454	58.464	1.68
4.	Scrub forest	-	-	8.19	-	-	-	8.19	0.23
5.	Bamboo brakes	-	-	-	-	9.72	-	9.72	0.28
6.	Shifting cultivation	-	-	-	-	-	-	-	-

7. Young plant.	-	-	-	10.68	-	-	10.68	0.31
8. Tree in line	-	-	-	-	-	-	-	-
9. Forest roads	-	-	-	-	-	-	-	-
10. Grass lands	-	-	-	-	-	-	-	-
11. Barren lands	-	-	-	-	-	-	-	-
12. Agri. lands	-	-	8.19	10.68	-	19.362	38.232	1.10
13. Non-forestry plots	43.29	50.79	-	-	9.72	-	103.80	2.98
14. Habitation	5.41	6.35	-	-	9.72	-	21.48	0.61
15. Water bodies	5.41	-	16.38	-	-	-	21.79	0.62
16. Other lands	-	-	-	-	-	-	-	-
17. Young crop of regeneration	-	-	-	-	-	-	-	-
18. Inaccessible plots	-	38.09	16.38	16.01	29.15	38.725	138.355	3.97
Total ..	276	615.83	524.21	501.8	845.29	722.86	3485.99	-

Note: In Little Andaman Division, though the area covered is 276 km², 86.59 km² was in Tribal Reserve and hence will be excluded for calculations of stand and stock.

5.2 FOREST AREA BY FOREST VEGETATION:

Table No. 5.2T overleaf shows break up of forest areas by Divisions, Status and Forest types. Overall, it is seen that out of the total forest area of 3148.81 km², 1037.25 km² (33%) area has been worked and 2111 km²(67%) area is unworked. For the entire Islands, Evergreen Forest type is found over 672.13 km² (21.35%) area, Semi-evergreen

over 1514.67 km² (48.10%) and Moist Deciduous on 962.01 km²(30.55%) area. Evergreen forests are maximum in South Andaman Division i.e. 45.12% of the area of the division. Semi-evergreen forests are maximum in Little Andaman Division i.e.75.61% of its area, whereas Moist Deciduous forests are maximum in Middle Andaman Division at 40.91%.

It is found that Moist Deciduous forests are absent in Little Andaman Division and are maximum in extent in Diglipur Division (296.89 km²) followed by Mayabandar Division (272.04 km²). It is seen that Semi-evergreen forests are more than other two forest types in all the Divisions, except South Andaman where it is marginally less.

It is seen that the maximum unworked areas are to be found in Diglipur and Mayabandar Divisions which combinedly used to be North Andaman Division, followed by Middle Andaman Division. It is apparent that forests of South Andaman and Baratang Divisions were touched first for scientific management and hence have lesser of unworked areas. In Diglipur Division, till 1995, all the fellings were carried out in areas incharge of the Revenue Department.

TABLE 5.2T
BREAK UP OF FOREST VEGETATED AREA IN ANDAMANS

STRATUM	Forest Division (Area in km ²)							%
	LA	SA	BT	MA	MB	DP	Total	
I. WORKED								
EG	5.41	139.67	57.34	26.69	19.43	-	248.54	
SE	27.06	139.67	139.24	74.74	136.02	-	516.73	
MD	-	44.44	81.91	106.77	38.86	-	271.98	
TOTAL	32.47	323.78	278.49	208.20	194.31	-	1037.25	32.94

II. UNWORKED

EG	48.71	95.23	65.53	42.71	106.87	64.54	423.59
SE	140.71	76.19	81.91	133.46	262.33	303.34	997.94
MD	-	25.4	49.15	85.41	233.18	296.89	690.03
TOTAL	189.42	196.82	196.59	261.58	602.38	664.77	2111.56 67.06

III. WORKED+ UNWORKED:

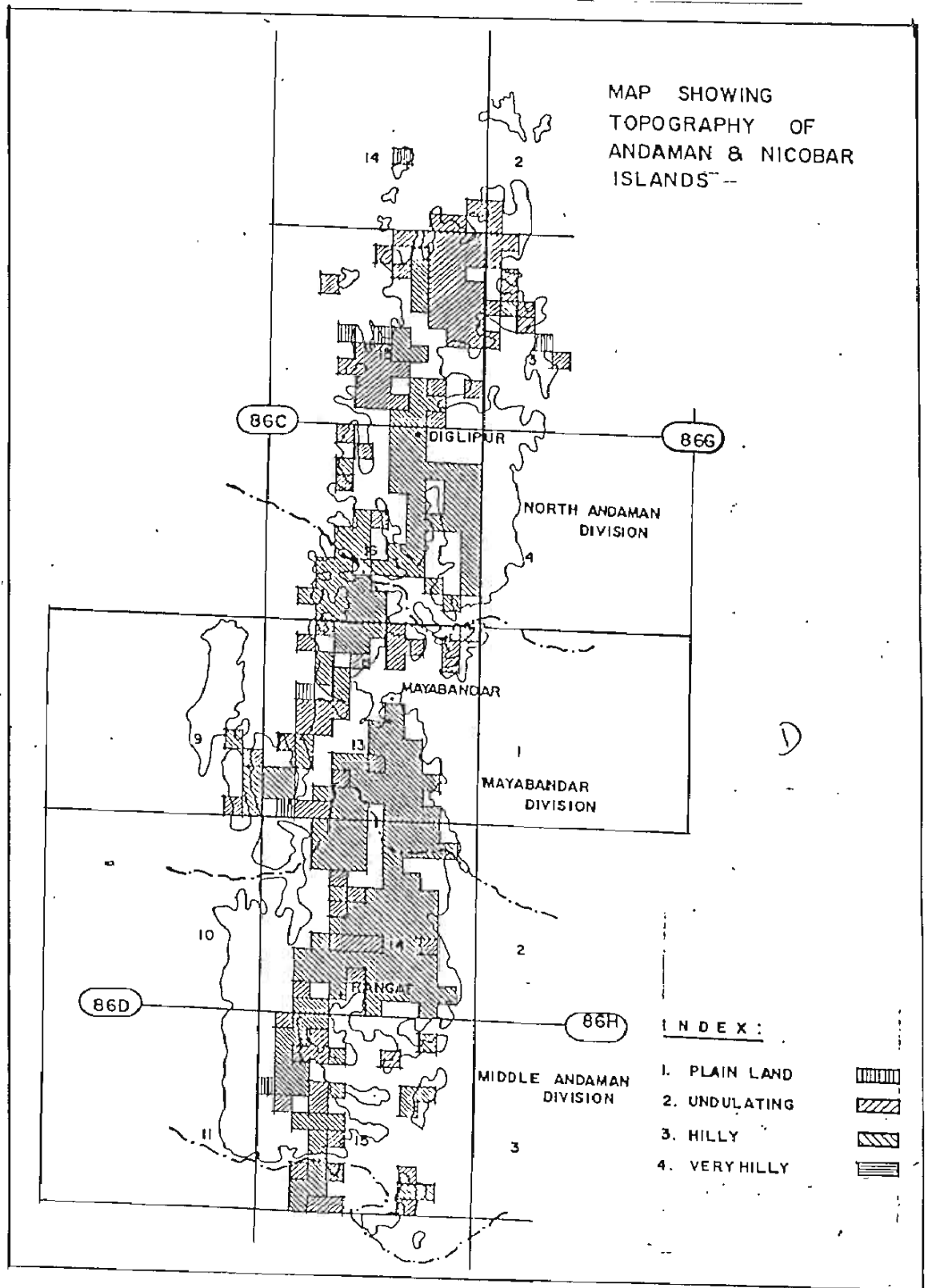
EG	54.12	234.90	122.87	69.40	126.30	64.54	672.13	21.35
SE	167.77	215.86	221.15	208.20	398.35	303.34	1514.67	48.10
MD	-	69.84	131.06	192.18	272.04	296.89	962.01	30.55
TOTAL	221.89	520.60	475.08	469.78	796.69	664.77	<u>3148.81</u>	100%

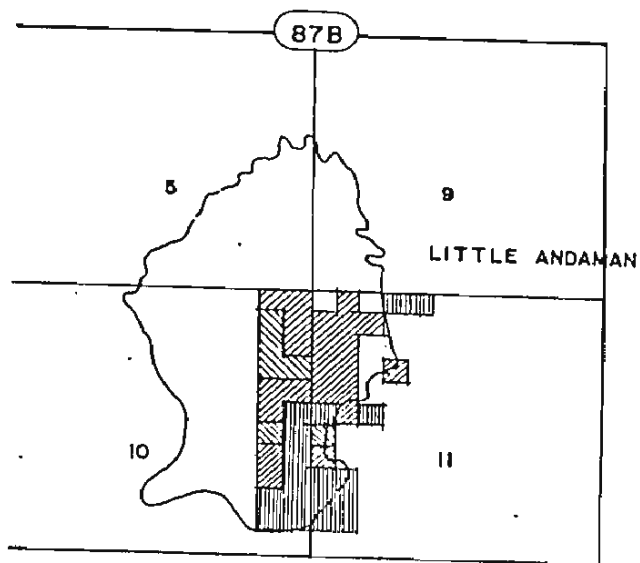
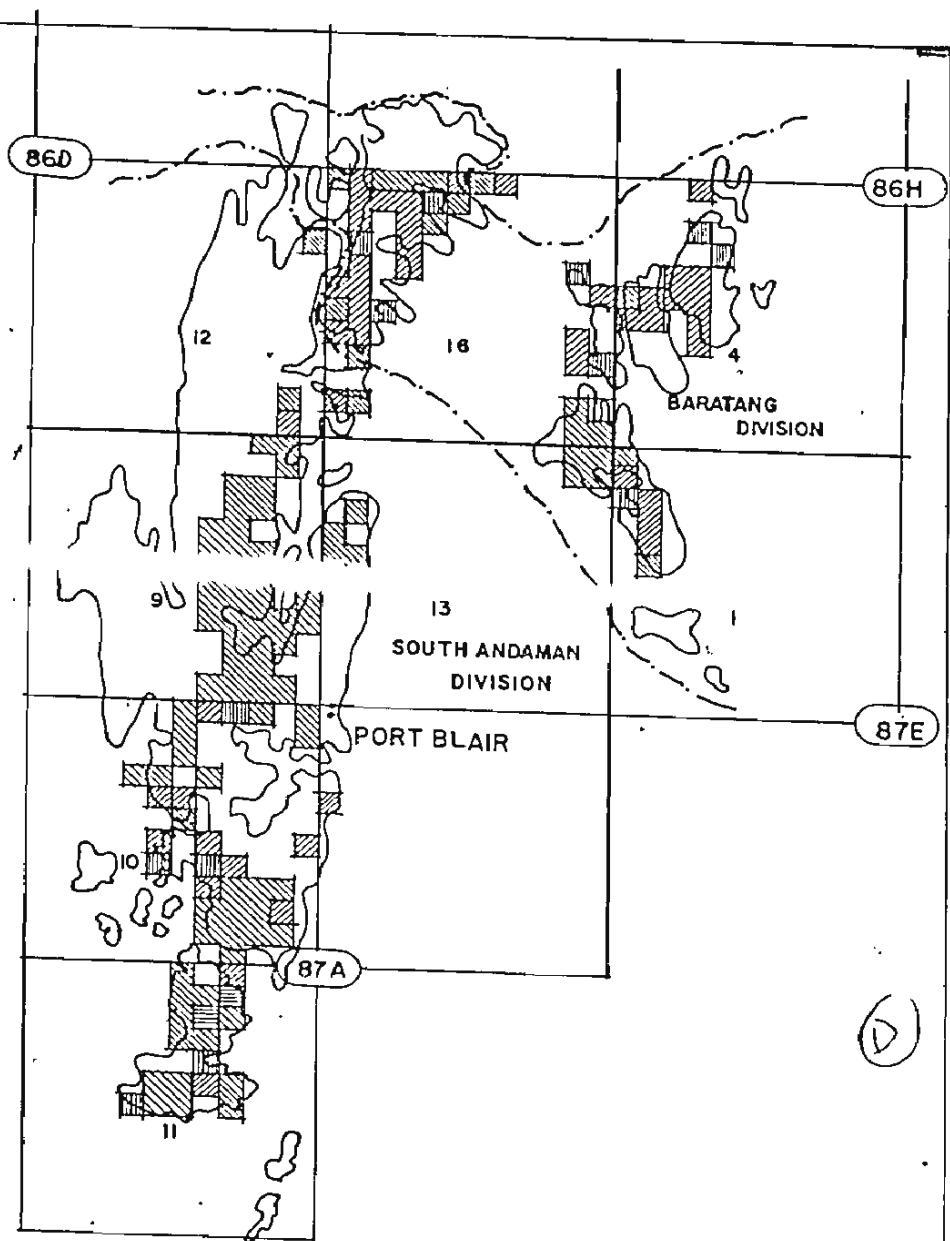
Note: In case of Little Andaman Division, vegetated area shown is 141.87 km² instead of 221.89 km² area calculated as per Table No. 5.2(T) of Chapter V. This is because the area leased to Corporation is 196 km², out of which 54.13 km² is non-vegetated. Hence, 196 - 54.13 = 141.87 km². For all further calculations this figure of 141.87 km² is reckoned to have correct assessment. In all 16 plots were laid in Tribal Reserve, outside of leased area, so as to have per ha. estimates with the least standard error.

5.3 AREA BY TOPOGRAPHY CLASSES.

Area by topography classes is given in Table No. 5.3T. Major area of 1928.78 km² i.e. 61.25% of the total area falls in hilly category. Only 5.34 km² area i.e. 0.18% falls in very hilly category whereas moderately hilly area is 1059.32 km² i.e. 33.64% and flat land is 155.39 km² i.e. 4.93%. Within forest types, forest area under hilly terrain is found to be maximum i.e. 76.39% in Evergreen forest, 61.62% in Semi evergreen forest and 50.09% in Moist deciduous forest. Percent area in gently rolling and flat land combined together in Moist Deciduous forest type is, hence the most i.e. 49.91%. There is, thus, an indication that most of Moist Deciduous and Semi evergreen forests are found

MAP SHOWING
TOPOGRAPHY OF
ANDAMAN & NICOBAR
ISLANDS--





on gentler slopes and flat ground. One very interesting observation is that the Evergreen forests are not found in sizeable extent on flat grounds except in the Little Andaman Islands. Of course, the area found to exist on flat floors of valleys but the extent of area is not much.

TABLE 5.3T
BREAKUP OF FOREST VEGETATED AREA (KM²) BY CROP
COMPOSITIONS AND TOPOGRAPHY CLASSES IN ANDAMANS

Forest type	Flat	Gently rolling	Hilly	Very hilly	Total
EVERGREEN					
LA	27.06	16.24	10.82	-	54.12
SA	-	19.05	215.85	-	234.90
BT	-	73.72	49.14	-	122.86
MA	-	-	69.40	-	69.40
MB	-	9.72	116.59	-	126.31
DP	-	12.91	51.63	-	64.54
TOTAL	27.06	131.64	513.43	-	672.13
SEMI-EVERGREEN					
LA	64.94	81.18	21.65	-	167.77
SA	6.35	25.40	84.12	-	215.87

BT		131.06	90.10	-	221.16
MA	5.34	16.01	181.50	5.34	208.19
MB	9.72	87.44	301.19	-	398.35
DP	6.45	41.99	154.90	-	303.34
<hr/>					
TOTAL	92.80	483.08	933.46	5.34	1514.68
<hr/>					
MOIST DECIDUOUS					
LA	-	-	-	-	-
SA	12.70	25.40	31.75	-	69.85
BT	16.38	65.53	49.15	-	131.06
MA	-	69.40	122.78	-	192.18
MB	-	77.73	194.31	-	272.04
DP	6.45	206.54	083.90	-	296.89
TOTAL	35.53	444.60	481.89	-	962.02
<hr/>					
GRAND TOTAL	155.39	1059.32	1928.78	5.34	3148.83
PERCENTAGE	4.93	33.64	61.25	0.18	100
<hr/>					

5.4 FOREST VEGETATED AREA BY CROP COMPOSITIONS AND SLOPE CLASSES:

It is seen from Table No. 5.4T that negligible area of 19.88 km² is in slope class 60-100% and maximum area of 2466.87 km² i.e. 78.34% falls within the slope class 10%

MAP SHOWING
SLOPE CLASS OF
ANDAMAN & NICOBAR ISLANDS

86C

14

2

3

NORTH ANDAMAN

DIGLIPUR

4

MAYABANDAR

1

9

13

10

86D

86H

2

MIDDLE ANDAMAN

RANGAP

11

12

16

4

INDEX:

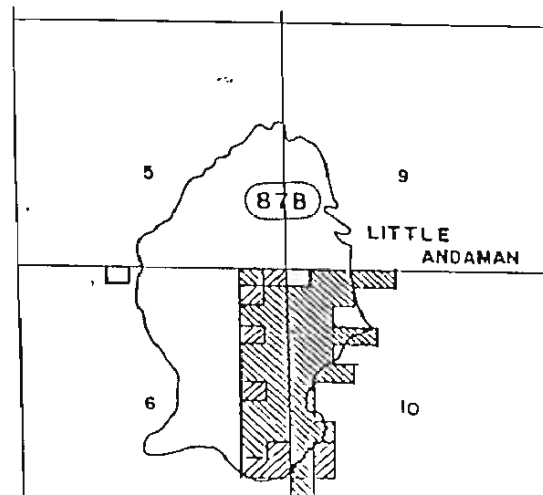
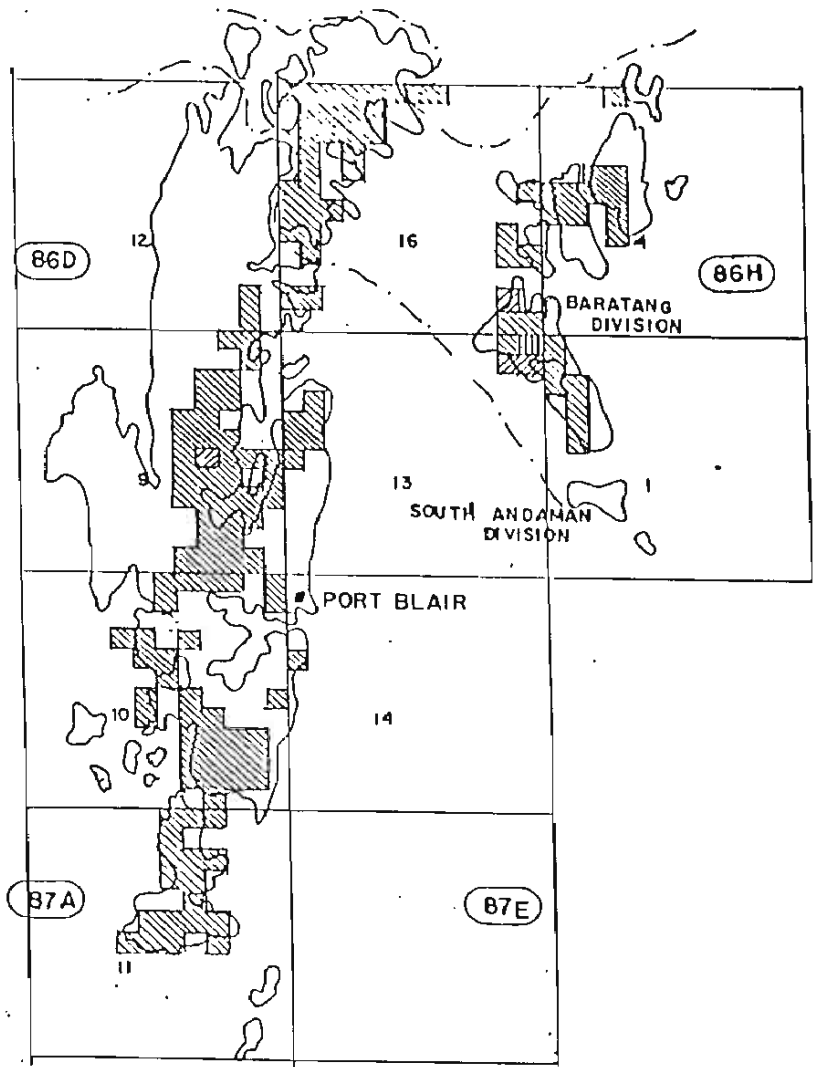
1. LESS THAN 10%

2. 10 TO 60%

3. 60 TO 100%

1. LESS THAN 10%
2. 10 TO 60%
3. 60% TO 100%





to 60%. Here also, it is seen that Evergreen forest type is found mostly on slopes beyond 10%.

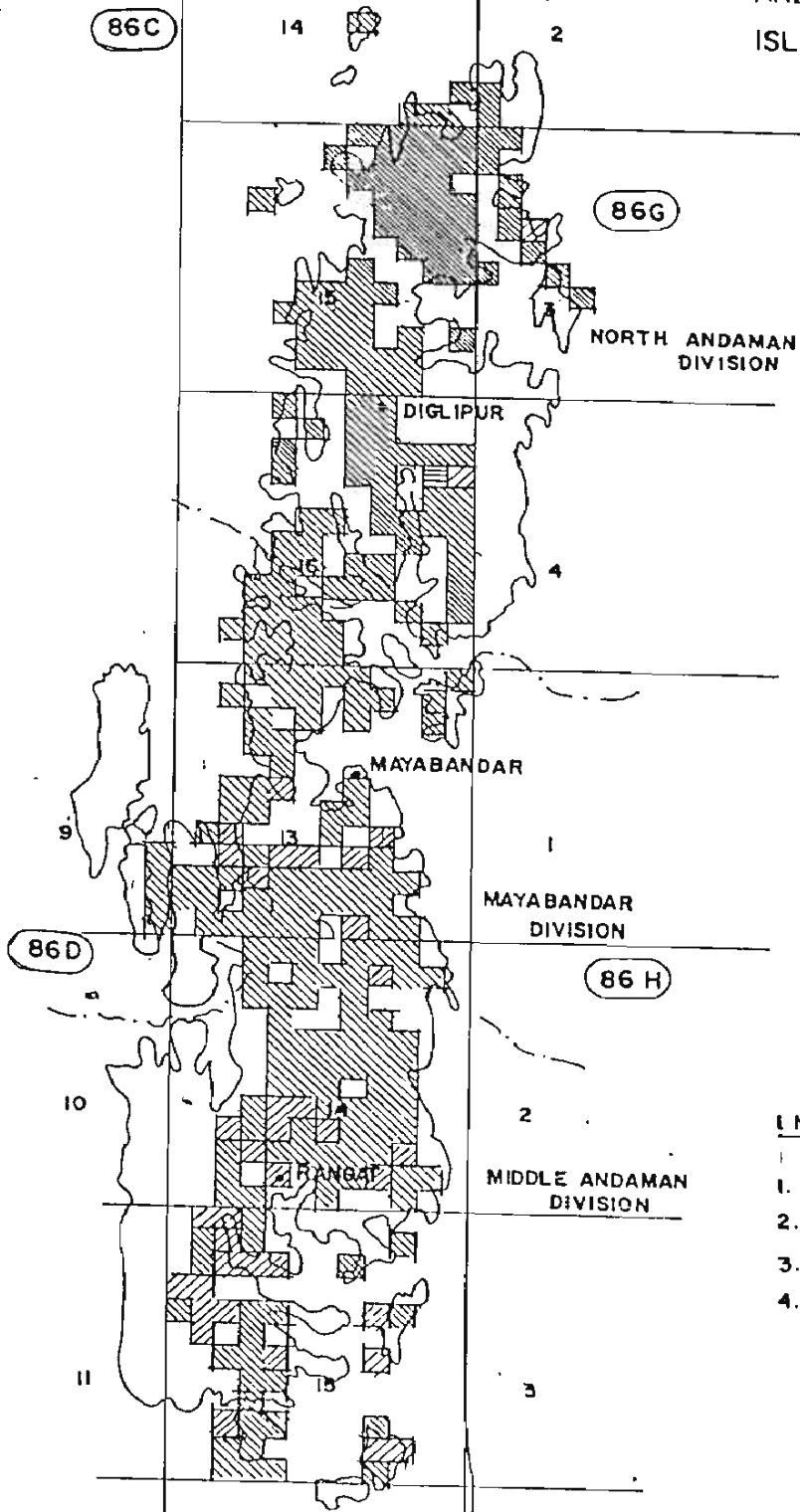
TABLE NO. 5.4T
BREAKUP OF FOREST VEGETATED AREA (IN KM²) BY CROP
COMPOSITIONS AND SLOPE CLASSES IN ANDAMANS.

Forest type	0-9	10-59	60-100	100+	Total
EVERGREEN					
LA	43.30	10.82	-	-	54.12
SA	6.35	228.55	-	-	234.90
BT	24.58	90.10	8.19	-	122.87
MA	9.72	116.58	-	-	126.30
MB	10.68	58.72	-	-	69.40
DP	-	64.54	-	-	64.54
TOTAL	94.63	569.31	8.19	-	672.13

SEMI-EVERGREEN

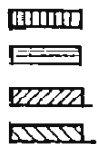
LA	108.23	59.54	-	-	167.77
SA	31.74	177.77	6.35	-	215.86

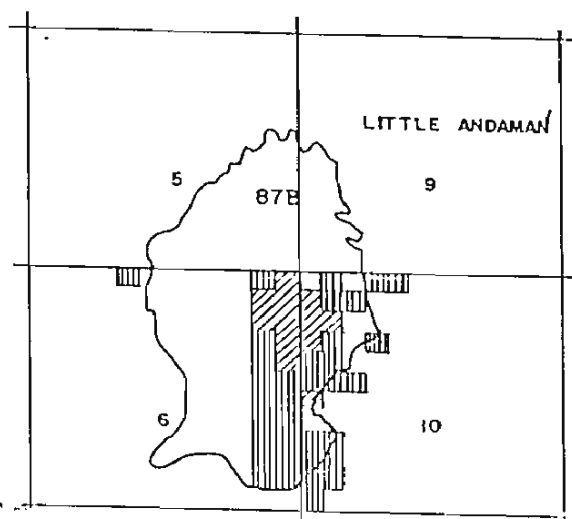
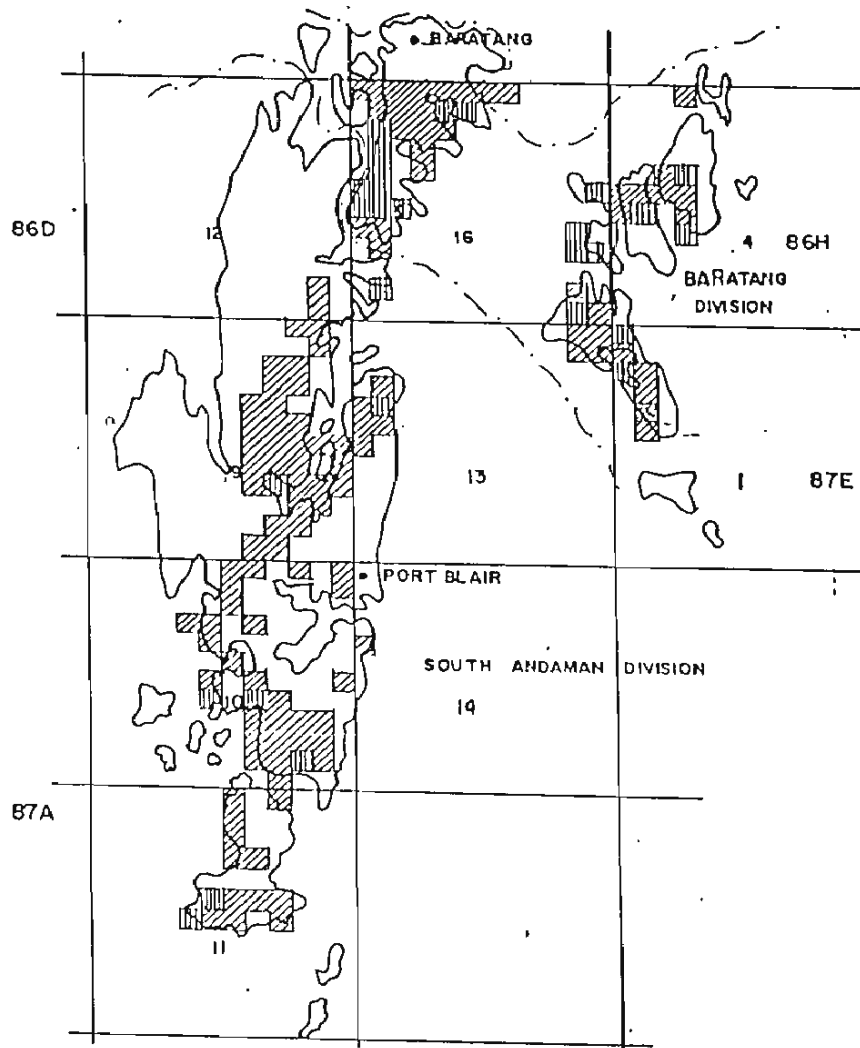
MAP SHOWING
SOIL DEPTH OF
ANDAMAN & NICOBAR
ISLANDS



INDEX

- 1. VERY SHALLOW
- 2. SHALLOW
- 3. MEDIUM
- 4. DEEP





BT	81.90	139.25			221.15
MA	58.29	340.06	-		398.35
MB	16.02	186.84	5.34		208.20
DP	58.09	245.26	-		303.35
<hr/>					
TOTAL	354.27	1148.72	11.69	-	1514.68
<hr/>					

MOIST DECIDUOUS

LA	-	-	-	-	-
SA	25.40	44.45	-	-	69.85
BT	49.15	81.91	-	-	131.06
MA	29.15	242.89	-	-	272.04
MB	32.03	160.15	-	-	192.18
DP	77.45	219.44	-	-	296.89
<hr/>					
TOTAL	213.18	748.84	-	-	962.02
<hr/>					
GRAND TOTAL	672.08	2466.87	19.88	-	3148.83
<hr/>					

5.5 FOREST VEGETATED AREA BY CROP COMPOSITIONS AND SOIL DEPTH CLASSES:

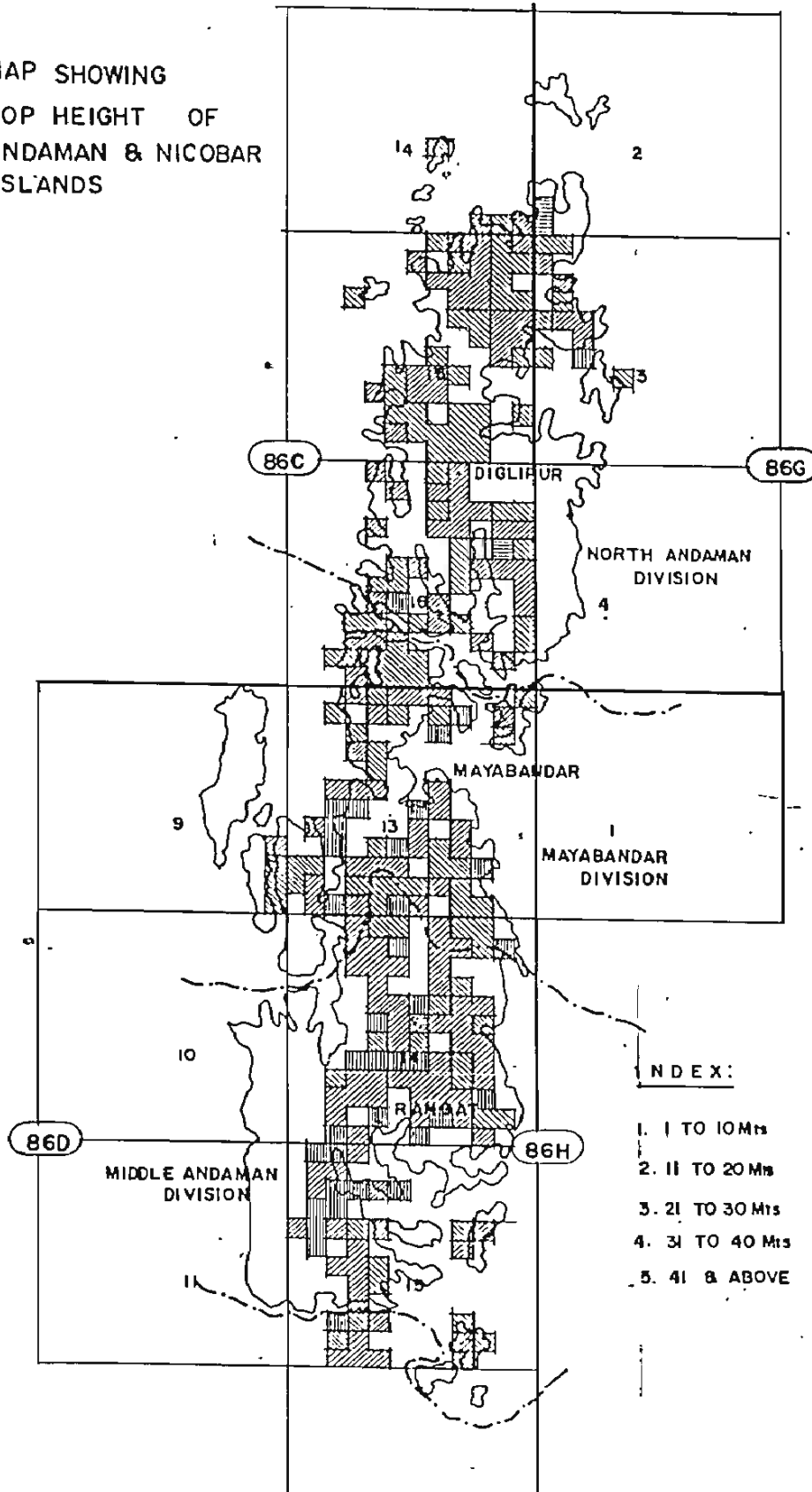
Table No. 5.5T shows area details by soil depth classes. It is at once clear from the table that soils in the Andaman Islands are mostly deep, 2913.38 km² out of 3148.82 km² i.e. 92.54% and medium and shallow soils are negligible. It is only in Diglipur Division that shallow soil cover of 6.45 km² was found under Evergreen stratum.

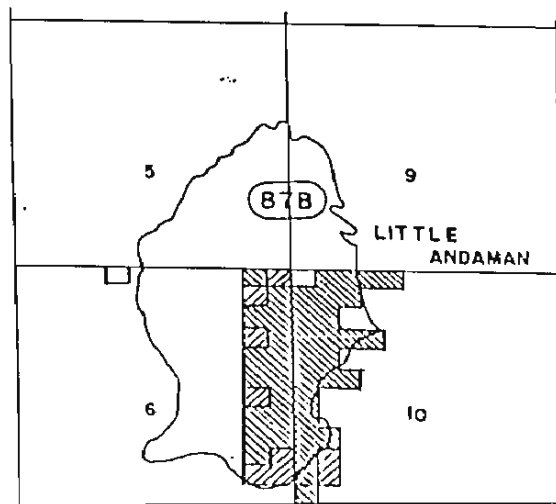
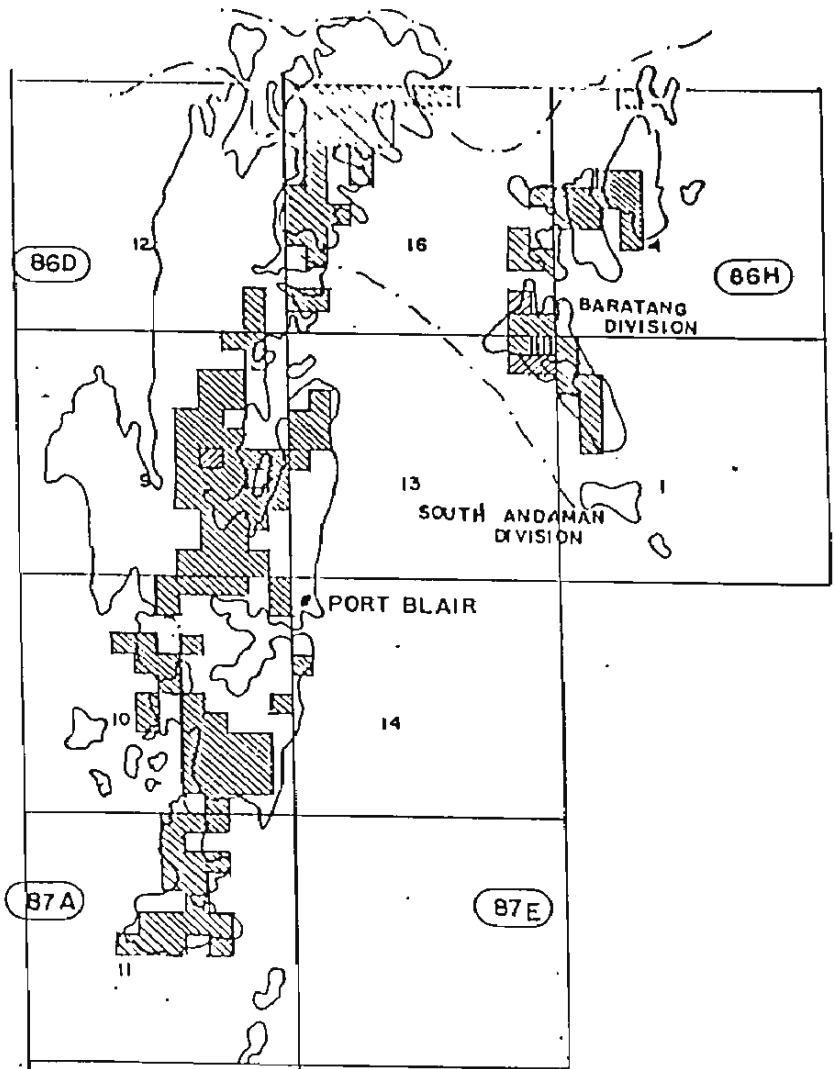
TABLE NO. 5.5T
BREAKUP OF FOREST VEGETATED AREA (KM²) BY CROP COMPOSITIONS AND SOIL DEPTH CLASSES IN ANDAMANS.

Forest type	No soil	Very shallow	Shallow	Medium	Deep	Total
EVERGREEN						
LA	-	-	-	10.82	43.30	54.12
SA	-	-	-	6.35	228.55	234.90
BT	-	-	-	8.19	114.68	122.87
MA	-	-	-	10.68	58.72	69.40
MB	-	-	-	19.43	106.87	126.30
DP	-	-	6.45	-	58.09	64.54
TOTAL	-	-	6.45	55.47	610.21	672.13

6

MAP SHOWING
TOP HEIGHT OF
ANDAMAN & NICOBAR
ISLANDS





SEMI-EVERGREEN

LA	-	-	-	32.47	135.30	167.77
SA	-	-	-	6.35	209.51	215.86
BT	-	-	-	8.19	212.96	221.15
MA	-	-	-	37.36	170.82	208.18
MB	-	-	-	19.44	378.92	398.36
DP	-	-	-	12.91	290.43	303.34
<hr/>						
TOTAL	-	-	-	116.72	1397.94	1514.66

MOIST DECIDUOUS

LA	-	-	-	-	-	-
SA	-	-	-	-	69.84	69.84
BT	-	-	-	-	131.06	131.06
MA	-	-	-	37.36	154.82	192.18
MB	-	-	-	19.44	252.62	272.06
DP	-	-	-	-	296.89	296.89
<hr/>						
TOTAL	-	-	-	56.80	905.23	962.03
<hr/>						
GRAND TOTAL	-	-	6.45	228.99	2913.38	3148.82

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5.6 FOREST VEGETATED AREA BY CROP COMPOSITIONS AND TOP HEIGHT CLASSES.

Table No.5.6T gives forest strata-wise and division-wise picture of forest area by top height classes. It can be seen from the table why the Andaman forests are considered one of the most luxuriant in the country. 1737.38 km² i.e. 55.17% of the Andaman's vegetated area has top height of more than 31m and 896.98 km² or 28.50% has top height between 26-30 m, i.e. 83.67% forests have top height more than 26m.

The Evergreen stratum has, by percentage, maximum area of 71.52% among the three forest types with top height 31 m and above, followed by 55.31% in Semi-evergreen forest and 43.55% in Moist Deciduous forest.

It is seen that distribution of area in the lower top height classes is found in Semi-evergreen stratum, though the extent of area is negligible.

It is seen that in Evergreen stratum, South Andaman Division has maximum area (within that Division), with top height more than 31m i.e. 196.80 km² out of 234.90 km², making up a percentage of 83.78%. In the Semi-evergreen stratum, Mayabandar Division has the maximum area of 233.18 km², in category of top height 31 m and above. However, within the Division as such, it is Baratang Division which has the maximum area of 70% with top height above 31m under Semi-evergreen forest. In the Moist Deciduous stratum, Diglipur has the most, i.e. 148.45 km², Baratang Division has the most by percentage i.e. 68.75 within that division.

It is also quite conspicuous that in Middle Andaman Division more area is in 26-30 m class than 31m and above in Semi-evergreen (101.43 to 48.04 km²) and also Moist Deciduous (96.09 km² to 32.02 km²). Similarly, Baratang Division has the most area, with all types combined under lofty trees having top height above 31 m by percentage i.e. 70.69%, 335.83 km² out of 475.06 km².

TABLE 5.6T

**BREAKUP OF FOREST VEGETATED AREA (IN KM²) BY CROP
COMPOSITIONS AND TOP HEIGHT CLASSES IN ANDAMANS**

Forest Type	1-5	6-10	11-15	16-20	21-25	26-30	31+	Total
EVERGREEN								
LA	-	-	5.41	-	-	16.24	32.47	54.12
SA	-	-	-	-	12.70	25.40	196.80	234.90
BT	-	-	-	-	16.38	16.38	90.10	122.86
MA	-	-	-	-	-	21.35	48.05	69.40
MB	-	-	-	-	9.72	29.15	87.45	126.32
DP	-	-	-	-	6.45	32.27	25.82	64.54
TOTAL	-	-	5.41	-	45.25	140.79	480.69	672.14
PERCENTAGE	-	-	0.80	-	6.73	20.95	71.52	
SEMI-EVERGREEN								
LA	-	-	5.41	10.82	16.24	16.24	119.06	167.77
SA	-	-	-	19.05	25.40	44.44	126.97	215.86
BT	-	-	-	16.38	8.19	40.95	155.63	221.15
MA	-	5.34	10.68	16.01	26.69	101.43	48.04	208.19
MB	9.72	-	-	38.86	38.87	77.73	233.18	398.36
DP	-	-	-	-	12.91	135.54	154.90	303.35
TOTAL	9.72	5.34	16.09	101.12	128.30	416.33	837.78	1514.68
PERCENTAGE	0.64	0.35	1.06	6.68	8.47	27.49	55.31	-

MOIST DECIDUOUS

LA	-	-	-	-	-	-	-	-
SA	-	-	-	6.35	12.70	19.05	31.75	69.85
BT	-	-	8.19	16.38	8.19	8.19	90.10	131.05
MA	-	-	10.68	32.02	21.35	96.09	32.02	192.16
MB	-	-	-	29.15	38.86	87.45	116.59	272.05
DP	-	-	-	-	19.36	29.08	148.45	296.89
TOTAL	-	-	18.87	83.90	100.46	339.86	418.91	962.00
PERCENTAGE	-	-	1.96	8.72	10.44	35.33	43.55	
GRAND TOTAL	9.72	5.34	40.37	185.02	274.01	896.98	1737.38	3148.82
PERCENTAGE	0.31	0.17	1.28	5.88	8.70	28.49	55.17	

5.7 PLANTATION POTENTIALITY:

Table No. 5.7T gives forest type and division wise breakup of plantable area. As can be seen, only 46.68 km² area is assessed as plantable out of the total vegetated inventoried area of 3148.81 km² i.e. only 1.48%. During inventory only such areas which have density lesser than 30% are considered for plantation. This can be directly linked with land use classes. For example, in Table No. 5.1(T) South Andaman division has 19.05 km² of open forest and the same area is denoted as plantable area. Similarly Baratang Division has 8.19 km² and Mayabander Division 19.44 km² area under this category. These areas can be enriched by planting suitable species.

TABLE 5.7T

BREAKUP OF FOREST VEGETATED AREA (IN KM²) BY DIFFERENT FOREST TYPE AND PLANTATION POTENTIALITY

Forest type	Plantable	Unplantable	Not applicable	Total
EVERGREEN				
LA	-	-	54.12	54.12
SA	-	-	234.90	234.90
BT	8.19	-	114.68	122.87
MA	-	-	69.40	69.40
MB	9.72	-	116.58	126.30
DP	-	-	64.54	64.54
TOTAL	17.91	-	654.22	672.13
SEMI-EVERGREEN				
LA	-	-	167.77	167.77
SA	6.35	-	209.51	215.86
BT	-	-	221.15	221.15
MA	-	-	208.20	208.20
MB	9.72	-	388.63	398.35
DP	-	-	303.34	303.34
TOTAL	16.07	-	1498.60	1514.67

MOIST DECIDUOUS

LA	-	-	-	-
SA	12.70	-	57.14	69.84
BT	-	-	131.06	131.06
MA	-	-	192.18	192.18
MB	-	-	272.04	272.04
DP	-	-	296.89	296.89
TOTAL	12.70	-	949.31	962.01
<hr/>				
GRAND TOTAL	46.68	-	3102.13	3148.81
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CHAPTER VI

GROWING STOCK

6.0. GENERAL:

This chapter deals with the results of growing stock obtained after the analysis of enumeration data collected from 484 vegetated sample plots. Sample plots in which plantations were found were not considered for analysis as most of them were bearing teak plantations.

The growing stock data have been presented as no. of stems per ha and volume per ha in two ways. Firstly, Table Nos. 6.2A and 6.3A show diameter class-wise, forest type-wise and division-wise no. of stems and volume per ha. These tables also show total stems and total volume. Because of the constraints of space and large no. of species, and strata, species wise no. of stems and volume cannot be given in the text and Volume II should be referred for that purpose. However, the second type of presentation of no. of stems and volume per ha, shown in Table Nos. 6.3A to 6.3F are not only forest type-wise but also as per the worked and unworked strata as well as utility categories.

Chapter VII separately deals with the utilizable growing stock as per utility classification depending upon the exploitable diameters.

The volume shown is in Hoppus (quarter girth) measure as the volume table used for analysis of data, prepared by the Andaman Forest Department, is in that measure and has not been converted into true volume to have easy comparison with field conditions and estimates. However, to convert quarter girth volume in true volume, the former may be multiplied by factor 1.2732.

In all, 53 important species are listed by the Andaman Forest Department. However, for the purpose of analysis species with infrequent occurrence or those which do not contribute much to the volume have been clubbed with miscellaneous species. This became necessary to make tables wieldy. This is the reason why species like Thitmin, Sea mahuwa, Ye padauk, Jangliam, Khataphal, Barabhilwa etc. have not been mentioned in Table Nos. 6.3A to 6.3 F.

In the write up per ha and percentage figures are generally given in rounded form, though table give these figures up to two digits.

6.1 ABSTRACT OF GROWING STOCK

Abstract of total stand and stock in the Andaman Islands is given below. The area shown is exclusive of plantation areas, inaccessible areas, areas under cultivation, water bodies, mangroves, scrub forest, non forestry plantation etc. Only forest vegetated area is considered. The abstract is presented in two ways: (i) division wise and (ii) Forest type wise.

Table No. 6.1A

(i) DIVISIONWISE ABSTRACT OF GROWING STOCK

S. No.	Division	Area in km ²	No. of stems per ha	Total no. of stems (lacs)	Volume per ha in m ³	Total volume in lacs m ³	SE% of volume per ha.
1.	Little Andaman	141.87	449.83	63.818	117.861	16.721	8.88
2.	South Andaman	520.60	460.26	239.614	97.985	51.011	6.9
3.	Baratang	475.07	368.35	174.992	93.357	44.351	8.43
4.	Middle Andaman	469.77	470.10	220.840	79.903	37.536	5.47

5.Mayabandar	796.70	452.63	360.609	74.95	59.710	5.71
6.Diglipur	664.77	530.26	352.502	77.928	51.804	6.09
<hr/>						
Total for Entire Andaman	3068.78	460.24	1412.375	85.093	261.133	

NOTE: In case of Little Andaman Division, vegetated area shown is 141.87 km² instead of 221.89 km² area calculated as per Table No. 5.2(T) of Chapter V. This is because the area leased to Corporation is 196 km², out of which 54.13 km² is non-vegetated. Hence, 196 - 54.13 = 141.87 km². For all further calculations this figure of 141.87 km² is reckoned to have correct assessment. In all 16 plots were laid in Tribal Reserve, outside of leased area, so as to have per ha. estimates with the least standard error and have been, of course, omitted for growing stock calculations.

Table No. 6.1B

ii) FOREST TYPEWISE ABSTRACT OF GROWING STOCK

S. No.	Forest type	Area in km ²	No. of stems per ha	Total no. of stems in (lacs)	Volume per ha in m ³	Total volume in lacs m ³
1)	Evergreen	645.06	486.32	313.711	102.544	66.056
2)	Semi-evergreen	1461.72	454.65	664.571	91.173	133.27
3)	Moist	962.00	451.24	434.093	64.248	61.807
<hr/>						
Total for entire Andaman Islands						
		3068.78	460.24	1412.375	85.093	261.133

NOTE: In case of Little Andaman Division, vegetated area shown is 141.87 km² instead of 221.89 km² area calculated as per Table No. 5.2(I) of Chapter V. This is because the area leased to Corporation is 196 km², out of which 54.13 km² is non-vegetated. Hence, 196 - 54.13 = 141.87 km². For all further calculations this figure of 141.87 km² is reckoned to have correct assessment. In all 16 plots were laid in Tribal Reserve,

outside of leased area, so as to have per ha. estimates with the least standard error and have been, of course, omitted for growing stock calculations.

It is, thus, seen from the table that for the Andaman Islands as a whole, per ha no. of stems are 460.24 with a volume of 85.093 m³ (True volume = 108.340 m³). Total no. of stems are 1412.375 lakhs and total volume in Hoppus measure quarter girth formula is 261.133 lakh m³ (True volume = 332.474 lakh m³).

The Evergreen forests, which are 21.35% of total area (Ref. Table No. 5.2T) are by far the richest, both in terms of no. of stems per ha as well as volume per ha, whereas the Semi-evergreen forests being 48.10% of the vegetated area are not far behind. However, the Moist Deciduous forests (30.55%) though more or less match the Evergreen and Semi-evergreen forests in no. of stems per ha show drastic fall in volume per ha. This is because of the presence of the giant Dipterocarpus and other plywood species in the former two types. Dipterocarpus is absent in the Moist Deciduous forests.

Division- wise abstract of growing stock shows that Diglipur Division, which at the time of the survey, was not worked at all has maximum no. of stems per ha. (530.26) but has lesser volume per ha. (77.928 m³). Again referring to table 5.2T in Chapter V, it can be seen that percentage of Moist Deciduous forest is most in the Diglipur Division i.e. 44.66%. Maximum growing Stock of 117.861 m³ ha is in Little Andaman where Moist Deciduous forests do not exist. Thus, it is generally seen that the richness in growing stock increases as the percentage of Moist Deciduous forest decreases.

The estimation of accuracy has been given by calculating standard error percentage. It is seen that the standard error percentage is within permissible limits, where both the worked and unworked forests are considered together as in the table of abstract above.

6.2 FOREST TYPE DIVISION AND DIAMETER CLASS-WISE DISTRIBUTION OF STAND AND STOCK (WORKED AND UNWORKED STRATA COMBINED)

Table Nos. 6.2A and 6.2B give per ha distribution of stand and stock respectively according to diameter classes for each forest type and division. The distribution is given per ha only so as to have a clear picture of comparative ground position in different types and divisions. These tables give the combined picture of worked and unworked strata together.

Table No. 6.2 A

NO. OF STEMS PER HA - EVERGREEN FOREST

S.No.	Dia.class	L.A	S.A	BT	MA	MB	DP
1.	10-20	321.00	306.91	242.70	377.35	287.30	453.00
	%	72.11	62.62	63.83	68.73	61.23	68.22
2.	20-30	57.00	85.17	53.67	81.56	71.88	102.50
	%	12.81	17.38	14.10	14.86	15.16	15.44
3.	30-40	25.51	40.939	27.01	39.637	40.00	52.00
	%	5.73	8.35	7.10	7.22	8.53	7.83
4.	40-50	10.51	22.46	20.33	20.02	17.31	26.00
	%	2.36	4.58	5.35	3.65	3.69	3.92
5.	50 and above	31.13	34.65	36.53	30.463	53.39	30.5
	%	6.99	7.7	9.61	5.55	11.38	4.59
Total		445.15	490.73	380.24	549.03	469.15	664.00

NO. OF STEMS PER HA -SEMIEVERGREEN FOREST

S.No.	Dia. class	L.A	S.A	BT	MA	MB	DP
1.	10-20	307.21	283.80	233.00	309.34	293.84	374.40
	%	68.49	63.61	64.25	68.93	66.27	68.01

2.	20-30 %	69.84 15.57	74.70 16.74	55.93 15.42	67.31 15.00	75.53 17.15	90.23 16.39
3.	30-40 %	28.55 6.36	33.82 7.58	24.63 6.79	29.61 6.60	30.12 6.84	38.09 6.92
4.	40-50 %	13.23 2.95	19.56 4.38	17.97 4.96	14.10 3.14	14.88 3.38	19.79 3.59
5.	50 & above %	29.72 6.63	34.23 7.67	31.12 8.58	28.39 6.33	28.01 6.36	28.04 5.09
Total		448.55	446.11	362.65	448.75	440.38	550.55

NO. OF STEMS PER HA MOIST DECIDUOUS FOREST

S.No.	Dia. class	L.A	S.A	BT	MA	MB	DP
1.	10-20 %	- -	287.30 71.18	260.00 70.88	333.78 71.82	347.00 74.97	345.20 71.88
2.	20-30 %	- -	57.27 14.19	51.57 14.06	65.70 14.14	58.39 12.61	65.99 13.74
3.	30-40 %	- -	23.18 5.74	26.25 7.16	29.18 6.28	22.68 4.90	30.32 6.31
	40-50 %	- -	15.45 3.83	9.38 2.55	15.56 3.35	13.04 2.82	14.66 3.05
5.	50 & above %	- -	20.40 5.06	19.64 5.35	13.08 2.86	21.77 4.70	24.09 5.02
Total		-	403.60	366.84	464.772	462.88	480.26

Table No. 6.2 B

PER HA VOLUME (IN M³) - EVERGREEN FOREST

S.No.	Dia class.	L.A	S.A	BT	MA	MB	DP
1.	10-20 %	0.382 0.33	0.651 0.61	0.208 0.18	0.533 0.56	0.382 0.40	0.487 0.61

2.	20-30	1.139	2.206	1.240	1.893	2.095	2.532
	%	0.99	2.06	1.09	1.98	2.15	3.2
3.	30-40	2.768	5.339	3.411	5.072	4.910	6.769
	%	2.41	4.98	3.00	5.31	5.13	8.55
4.	40-50	3.512	8.820	7.387	7.309	6.747	10.31
	%	3.05	8.24	6.51	7.65	7.04	13.02
5.	50 and above	107.305	90.074	101.334	80.731	81.632	59.092
	%	93.22	84.11	89.22	84.50	85.24	74.62

Total	115.106	107.090	113.580	95.538	95.766	79.190
%	100	100	100	100	100	100

STEM PER HA SEMI-EVERGREEN FOREST

S.No.	Dia class.	L.A	S.A	BT	MA	MB	DP
1.	10-20	0.299	0.576	0.334	0.368	0.387	0.567
	%	0.25	0.58	0.34	0.40	0.49	0.66
2.	20-30	1.260	1.084	1.431	1.269	1.470	2.254
	%	1.08	1.09	1.47	1.38	1.87	2.61
3.	30-40	3.075	4.344	2.749	3.540	3.680	4.78
	%	2.60	4.37	2.82	3.84	4.69	5.53
4.	40-50	4.202	6.627	6.257	5.258	5.294	7.723
	%	3.55	6.66	6.43	5.70	6.75	8.93
5.	50 & above	109.675	86.799	86.559	81.79	67.648	71.106
	%	92.54	87.30	88.94	88.68	86.20	82.27
Total		118.51	99.43	97.330	92.225	78.479	86.43
%		100	100	100	100	100	100

STEM PER HA MOIST DECIDUOUS FOREST

S.No.	Dia. class	L.A	S.A	BT	MA	MB	DP
1.	10-20 %	-	0.641 1.02	0.640 0.94	1.110 1.82	0.617 1.03	0.270 0.39
2.	20-30 %	-	1.009 1.61	1.346 1.99	1.979 3.25	1.362 2.26	1.418 2.06
3.	30-40 %	-	2.605 4.14	2.949 4.36	4.067 6.67	2.658 4.42	3.614 5.25
4.	40-50 %	-	4.706 7.49	3.258 4.81	5.588 9.16	4.433 7.37	5.264 7.64
5.	50 & above %	-	53.888 85.74	59.533 87.90	48.242 79.10	51.046 84.92	58.304 84.66
Total %		-	62.849 100	67.726 100	60.986 100	60.116 100	68.87 100

Note: Based on quarter girth measure.

6.2.1 EVERGREEN FORESTS

In case of stand distribution (Table No.6.2), it is seen that in Evergreen stratum 62% to 72% stems are in pole category i.e. 10-20 cm dia., 13% to 17% in 20 to 30 cm dia. 6% to 8% in 30-40 cm dia., 2% to 5% in 40-50 cm dia., and 5% to 14% in 50 cm and above dia. class. It is observed that no. of stems per ha in all the Divisions in dia. class 50 cm and above (exploitable diam.) are more than the previous class i.e. 40 to 50 cm dia., more than three times in case of Little Andman and Mayabandar Divisions and about one and a half times in rest of the Divisions except Diglipur. In Diglipur Division forests are not worked (upto 1993-94) and hence, perhaps the gap between the 40-50 and 50-60 is very little. It is also seen that Diglipur Division has the most no. of stems per ha and Baratang the least.

Volume distribution by dia. class (Table No. 6.3) shows that volume in exploitable dia. and above, i.e. 50 cm and above contributes between 85% to 93% in all Divisions except Diglipur where it is 74.62%.

It is seen that though no. of stems are the most in Diglipur (664), the volume is least i.e. 79.19 m³ whereas Baratang has least no. of stems but its volume per ha is very near to top i.e. 113.58 m³ and 96% of this volume is from trees above 40 cm dia. In the field, it was observed that the Evergreens of Baratang were majestic and matched only by a small area in the Little Andamans, in the northern part of the Island and by the famous Giant Evergreens of South Andaman Division.

6.2.2 SEMI-EVERGREEN FORESTS

In the semi-evergreen forests, distribution of stems in each dia. class is almost the same in all the divisions, 64 to 69% in 10-20 cm, 15 to 17% in 20-30 cm, 6.5 to 7.5% in 30-40 cm, 3 to 5% in 40-50 cm and 5 to 8.5% in 50 cm and above diameter class. No. of stems again are the least i.e. 362.65 per ha in Baratang, whereas they are the most in Diglipur i.e. 550 per ha. In all other divisions stems are between 440 to 450 per ha.

Per ha volume in exploitable class i.e. 50 cm and above is between 82% to 93% and in the preceding class of 40- 50 cm, it is 4% to 9%. 4% being in Little Andaman and 9% in Diglipur, whereas other divisions show between 6% to 7%. Total volume in semi-evergreen type does not deviate much from evergreen type, except in Mayabandar Division, which is the least at 78.479 m³. Maximum volume again is in Little Andaman Division which is almost the same in Evergreen Stratum at 118.511 m³.

6.2.3 MOIST DECIDUOUS FORESTS

In this type also, pole crop is between 71% to 75% in each division. No. of stems in 20-30 cm class are between 12.50 to 14%, in 30-40 cm they are 5 to 7% in 40-50 cm between 2.50 to 4% and in exploitable class and above they are 2.81 to 5.35%.

Maximum no. of trees per ha are in Diglipur Division i.e. 480.26 and minimum are again in Baratang Division i.e. 366.84 per ha.

In case of volume per ha, it is seen that the volume of all the Divisions for this forest type is between 60 to 69 m³. In Middle Andaman, volume per ha in exploitable class is the lowest i.e. 79.10% and no. of stems in this class are also the lowest i.e. 2.81% only. Volume per ha in this type is so uniform that even considering each division as a sample, i.e. taking only 5 observations, the SE% comes to only 3.97%, mean being 64.109 m³. In Baratang Division again the volume is second best at 67.726 m³, the first being Diglipur at 68.87m³.

6.3 DISTRIBUTION OF STAND AND STOCK ACCORDING TO FOREST TYPES, WORKED -UNWORKED STRATA AND UTILITY CLASSES:

In the following paragraphs and tables from 6.3A to 6.3F give division-wise details of stand and stock per ha. according to forest types, utilities and worked and unworked strata. In all 33, commercially important species have been listed and grouped according to utilities i.e. plywood, ornamental hardwood, constructional hardwood, commercial softwood, and non-commercial species which do fetch some price in the market these days. The grouping has been done as per the prevalent practice in the Andaman and Nicobar Forest Department. The forest types were recognised as per the occurrence of species. For finding out the worked and unworked areas, information gathered in the Divisions from their maps, a master map for the entire Islands by Shri B.K. Basu, Working Plan Officer, showing worked and unworked areas and local enquiry were considered. The stratification of forest types and worked-unworked status was done after the inventory was completed. Each sample plot was put in the respective category division-wise and then the analysis was done. The basic unit, therefore, is the division and hence stand and stock position as per different forest types and strata has been described for each division in succeeding paragraphs.

6.4 LITTLE ANDAMAN DIVISION:

Entire workable area in the Islands has been leased to Corporation. Area details have already been given in Chapter II. Average per ha as well as total stand and stock are shown in Tables 6.4A and 6.4B.

For all the strata and forest types, Average number of stems per ha and average volume per ha are 449.83 and 117.861 m³. Total no. of stems are 63.818 lakh and total volume in quarter girth measures is 16.721 lakh m³. Out of this share of Evergreen forest is only 18.42% and 18.50% respective, rest belong to Semi-evergreen forests. It may be mentioned that out of 141.87 km² vegetated area considered for growing stock estimation, 19.07% of the area is occupied by the Evergreen forests.

6.4.1 EVERGREEN TYPE:

In the Evergreen type, in worked stratum no. of stems per ha and volume per ha are 310 and 108 m³ respectively, whereas for the unworked stratum, the figures are 460 and 116 m³. Corresponding total stand and stock are 1.678 lakh and 0.586 lakh m³ in worked stratum and 9.963 lakh and 2.508 lakh m³ in unworked stratum. No. of stems and volume per ha for miscellaneous species has been reduced drastically, from 340 (out of 460 to 165)(out of 310) and 79 m³ (out of 116 m³) to 7.57 m³ (out of 108 m³) in worked than in unworked area. There is a consequent increase in the stems and volume of non-commercial species to a large extent. Plywood species show about 50% stand in worked than in unworked and 40% in volume, which means that these species are slightly overexploited. The two important ornamental species, Padauk and chooi, were not found in Little Andaman. Both, no. of stems and volume, have increased substantially (in case of volume - more than thrice) in constructional category in worked area than in unworked. No. of stems in softwood category have declined marginally in worked areas but volume per ha has increased. Dipterocarpus forms 3% of unworked stratum but there is no tree in worked stratum. Terminalia procera is 2% in unworked and has increased to 3% in worked stratum. It appears that Gurjan is either absent or exploited so heavily that

there is no tree over 10 cm dia. in worked stratum. Volume of *Terminalia procera* has increased from 1.88% to 5.42% in worked stratum.

6.4.2 SEMI-EVERGREEN TYPE:

The extent of semi-evergreen forests is about 81% of the total vegetated area in the Little Andaman. Stand and stock position by percentage to total area also matches the percentage of area of semi-evergreen forest as the total stand is 52.177 lakh i.e. 82% and stock is 13.607 lakh m³ i.e. 81.50% of the total. Out of this, growing stock in the semi-evergreen type, worked area has 13.828 lakh stems and 1.757 lakh m³ volume whereas unworked area supports 38.349 lakh stems and 11.305 lakh m³ of volume.

Stand and stock position per ha reveals that no. of stems are 511 in the worked stratum whereas the number is 437 in the unworked stratum. Volume per ha is estimated to be 65 m³ in worked to 129 m³ in unworked stratum. This shows that the no. of stems per ha have increased after working but the volume is about 50% of unworked area.

Percentage of miscellaneous species is 75% in unworked stratum and 69% in worked stratum in case of stems, whereas volume is 44% and 17% respectively which is a healthy trend. In commercial category plywood species have increased from 4% to 10% in stems and from 14% to 15% in volume from unworked stratum to worked stratum. Major contribution is *Dipterocarpus* being 4.7% in worked stratum to 0.84% in unworked stratum in numbers but volume is 6% in worked stratum to 8% in unworked stratum. *Terminalia procera* has 3.72% stems in worked stratum to 1.75% in unworked but volume is 8.54% to 4.19%, which accounts for the overall increase in plywood category.

Major ornamental wood is not found in Little Andaman. In case of constructional category, stems in worked stratum are 6.26% and in unworked stratum they are 3.51% but volume difference is substantial i.e 52.75% in worked stratum and 18.52% in unworked stratum. Major contribution is from *Artocarpus chaplasha*, *Lannea*

coromandelica and Planconia andamanica. The major difference in volume in worked and unworked stratum is from Artocarpus chaplasha 31.7% to 12.30%, Nauclea gagea from negligible to 13% and Planconia andamanica 2.56% to 5.25%. It is obvious that N.gagea trees wherever found are very large. In case of soft wood, percentage of no. of stems is almost equal i.e. 8.20%. However, volume in the worked stratum has decreased to 9.65% from 20.63% of unworked stratum. Major species which have declined in volume are Salmalia insignis from 16.54% to 7.42% and Pterocymbium tinctorium from 2.78% to 0.52%.

Non-commercial wood stems/ha have gone down from 9.37% in unworked stratum to 6.46% in worked stratum. However, volume has increased from 2.92% to 6.2%, all of which comes from Myristica species.

6.5 SOUTH ANDAMAN DIVISION:

Stems and volume per ha with all types and strata combined are 460.26 and 97.985 m³, total stems being 239.614 lakh and total volume being 51.011 lakh m³.

Total no. of stems in worked stratum and unworked stratum are 144.571 lakhs and 95.043 lakh respectively. Hence, per ha stems in worked stratum and unworked stratum are 446.50 and 482.89 respectively. Total volume is 28.955 lakh m³ in worked stratum and 22.056 lakh m³ in unworked stratum. Hence, volume per ha in worked stratum is 89.425m³ and 112.06m³ in unworked stratum.

In evergreen forests, per ha stems in worked stratum and unworked stratum are 472 and 517 and in moist deciduous forests they come to 447 and 328. In Semi-evergreen forests, they are 427 and 492. Volume per ha in Evergreen type in worked stratum and unworked stratum is 105.77 m³ and 109.05 m³ in Semi-evergreen type volume for these strata are 84.78 m³ and 126.30 and in Moist deciduous forest volume is 52.69 m³ and 80.65 m³.

Thus, it is seen that in Moist deciduous forest worked stratum has more no. of stems though volume is substantially more in unworked stratum. This means working areas has helped this stratum.

6.5.1 EVERGREEN TYPE:

In the evergreen forest no. of stems in miscellaneous species have gone down from 62.43% in unworked stratum to 38.62% in worked stratum, corresponding percentages in volume being 37.25% to 20.70%.

In plywood category, no. of stems have gone up in worked stratum, being 33.49% to 11.79% in unworked stratum while figures for volume are 54.94% and 43.16%. Major contribution is of *Dipterocarpus* species being 30% of total (and not for plywood category only) stems and 44% in volume in worked stratum. In unworked stratum stems of *Dipterocarpus* are 7.81% and 33.60%. It does seem, therefore, that in evergreen type of forests the silvicultural system being practiced has eminently suited this species, which is the pick of all the tree species found in the Islands.

In constructional category (ornamental category is negligible), worked stratum has 9.73% stems to unworked stratum 8.25%. Volume also does not show much variation, being 12.02% to 10.87%. Working has improved this category also. For stems, major species are *Planchonia andamanica* 7.96% in worked stratum and 1.61% in unworked stratum. *Artocarpus chaplasha* 9.20% in worked to 3.22% in unworked, *Lagerstroemia hypoleuca* 9.61% to 0.26% in unworked *Callophyllum inophyllum* 4.90% to 0.71%.

Volume percentage for *Planchonia andamanica* is almost constant in worked stratum at 3.55% to 3.40% in unworked stratum, for *Artocarpus chaplasha* it is 3.52% to 2.97%, for *Lagerstroemia hypoleuca*, worked stratum shows less volume at 0.71% to 1.84% in unworked stratum. *Callophyllum inophyllum* is 0.501% to 0.051%.

It is seen that *Lagerstroemia hypoleuca*, a deciduous species is on the increase in the worked stratum, so far as number of stems are concerned.

In softwood category worked stratum shows 7.27% stems of the total to 3.09% in unworked stratum. Volume also has substantially increased to 13.18% in worked stratum to 4.69% in unworked stratum. *Endospermum chinense* (Bakota) has gained maximum in volume in worked stratum with 7.16% to 2.64% of unworked stratum. *Canarium euphyllum* being 2.42% to 0.73% and *Anthocephalus kadamba*, being regenerated with 2.63% in worked stratum to nil in unworked stratum.

In non-commercial category *Myristica* species is 10.53% in worked stratum and 13.86% in unworked stratum in no. of stems and in volume percentages are 3.19 to 3.88%.

It is seen that the most frequently occurring species is Gurjan in worked area with 30% stems and Jaiphal in unworked area with 13.86% stems.

6.5.2 SEMI-EVERGREEN TYPE:

No. of stems in miscellaneous category are 59.60% in worked to 66.54% in unworked stratum. However, volume is substantially less in worked stratum at 38.40% to 54.98% in unworked stratum.

In plywood category, no. of stems per ha in worked stratum are 11.77% to 8.47% in unworked stratum whereas volume per ha is 24.44% to 20.95%. Major gainer in volume is Gurjan 14.32% to 7.8% in unworked stratum but volume in *Terminalia procera* has gone down to 5.18% from 7.83% in unworked stratum.

In ornamental category no. of stems of Padauk are 2.43% in worked stratum to 0.51% in unworked stratum and volume has also increased from 3.66% in unworked to 5.92% in worked stratum.

Constructional category also shows increase to 10% in worked stratum from 6.11% in unworked stratum in respect of stems and 13.13% in terms of volume from 8.29%. Major increase in stems is of *Lagerstroemia* from 0.76% in unworked to 5.13% in worked in stems and in volume from 2.47% to 4.62%. *Lannea*, a deciduous species has also found entry in worked forests, with 0.27% stems. In softwood category, no. of stems are 7.45% in worked stratum to 4.32% in unworked stratum and volume has also increased from 8.27% to 16.67% in worked stratum. Major contributors in volume are *Canarium euphyllum* 6.87% in worked stratum to 5.23% in unworked stratum. *Pterocymbium tinctorium* has doubled its volume in worked stratum at 5.18% as against 2.20% in unworked stratum. *Salmalia insignis* has also substantially increased volume at 3.15% in worked stratum to 0.33% in unworked stratum.

6.5.3 MOIST DECIDUOUS TYPE:

It is seen that no. of stems have decreased in Moist Deciduous stratum in worked stratum. However, there is gain in volume.

Miscellaneous species are as high as 89.69% in the unworked stratum and have been substantially reduced to 62.92% in worked stratum; volume showing still more and welcome decline being 89.51% in unworked and 36.62% in worked stratum.

In plywood category no. of stems have increased in worked stratum at 3.67% to 2.67% in unworked stratum. Though volume has gone down from 3.59% in unworked stratum to 1.96% in worked stratum. This means that no. of stems in lower diameter have increased due to working. Major contribution is from *Perishia* and the two *Terminalis* in this category.

In ornamental category, there is substantial increase in the only species i.e. *Padauk* in worked stratum at 2.71% stems in worked stratum to 0.38% in unworked stratum.

Volume increase is really noteworthy at 11.14% in worked stratum to 1.08% in unworked stratum. This is a major gain.

In constructional category also no. of stems have increased to 21.40% in worked stratum from 5.73% in unworked stratum and volume increase is 22.69% from 2.37%. Major species are Albizzia lebbek, being nil in unworked stratum but contributing 6.29% volume in worked stratum, Artocarpus chaplasha, 0.74% of volume in unworked stratum and 4.36% in worked stratum.

In softwood category, no. of stems have considerably increased from 1.53% in unworked stratum to 28.53% in worked and volume from 3.45% to 15.14%. Major contribution is from *Canarium euphyllum* with 4.47% stems in worked stratum to nil in unworked stratum with corresponding volume of 14.14% in worked stratum.

In non-commercial category, stems in worked stratum has increased slightly than nil in unworked stratum with Jungli lakooch having 0.64% stems and Jaiphal being 1.28%. However, volume increase in lakooch is the most, Jaiphal showing negligible volume.

6.6 BARATANG DIVISION

In Baratang Division per ha stems and volume for all types and strata combined are 368.35 and 93.357 m³ respectively. Total no. of stems are 174.992 lakhs and 44.351 lakh m³.

Total no. of stems and volume in worked stratum are 107.237 lakhs and 21.926 lakh m³ respectively whereas for the unworked stratum total no. of stems are 67.755 lakhs and total volume is 22.425 lakh m³.

No. of stems and volume per ha, therefore, in worked stratum is 385.08 and 78.735 m³ respectively whereas for unworked stratum the figures are 344.65 and 114 m³. Thus, no. of stems have increased in worked areas though volume has gone down.

In Evergreen forests, in worked stratum per ha no. of stems have increased to 463 per ha from 308 in unworked stratum, though volume has declined to 106.650 m³ from 119.572 m³. per ha. In semi-evergreen forests similar trend is seen with no. of stems per ha increasing from 344 in unworked stratum to 373 in worked stratum but volume going down from 112.394 m³ to 88.461 m³. However, in Moist Deciduous forests, both no. of stems as well as volume show decrease in worked stratum than unworked stratum at 350.5 stems per ha in worked stratum against 394 stems in unworked stratum whereas volume has also gone down substantially in worked area at 42.666 m³ per ha from 109.514 m³ in unworked stratum. This aspect needs attention from the Forest Department in Moist Deciduous forests of Baratang Division.

6.6.1 EVERGREEN TYPE:

Percentage of miscellaneous species in respect of no. of stems is 54.61% in worked stratum and 65.60% in unworked stratum, correspondingly percentage volume in worked stratum is 19.04% and in unworked stratum it is 37.79%. Consequently percentage of economically important species has gained both in numbers per ha and volume per ha after working.

In plywood category no. of stems have increased from 7.74% to 12.51% and volume from 26.28% to 33% in worked stratum in relation to unworked stratum. Major contribution being that of *Dipterocarpus* and *Amoora wallichii* whereas *Dipterocarpus* shows decline in volume to 12.35% in worked stratum from 23.32% in unworked stratum. *Amoora* shows substantial increase to 13% from only 0.05% in unworked stratum, though no. of stems in the former have increased from 16 to 44 per ha and in case of the latter declined from 3.75 to 2.88. This would indicate the size of giant *Amoora* trees.

Ornamental category has negligible stand and stock.

In constructional category no. of stems have increased to 7.11% of the total in worked stratum to 5.91% in unworked stratum and volume has also increased to 17.13% from 10.38%. Major contribution in stems is *Artocarpus chaplasha* - 2% both in worked and unworked stratum, *Mesua ferrea* - 1.85% in worked stratum and nil in unworked stratum, *Planchonia* - 0.41% in unworked to 1.24% in worked stratum. In volume *Artocarpus chaplasha* shares 4.87% in unworked stratum and 6.94% in worked stratum. *Bassia butyracea* has 4.13% in worked stratum and nil in unworked stratum. So this species has found way and growth after working. Same is the case with *Hopea odorata*. In the Evergreens of Baratang Division Pynma -(*Lagerstroemia*) has not come up at all in worked stratum. Similarly *Planchonia andamanica* has 3.39% share in worked stratum but nil in unworked stratum.

Thus, Evergreen structure of forest has not changed due to working.

In softwood category, no. of stems have declined to 5.57% in worked stratum from 8.96% in unworked stratum. Species improved are *Planchonella longipetiolatum* but *Pterocymbium tinctorium*, *Pterigota alata* have suffered. In volume, major contribution in worked stratum is of *Canarium euphyllum* 7.49% against 0.76% in unworked stratum, *Pterigota alata* - 4.24% in worked stratum from 9.12% in unworked stratum, *Pterocymbium tinctorium* 4.25% from 9.12% in unworked stratum.

In non-commercial wood *Myristica* species has increased to 18.82% in worked stratum from 10.36% in unworked stratum whereas its volume also has substantially increased to 10.70% from 0.66%.

6.6.2 SEMI-EVERGREEN TYPE:

In Semi-evergreen forests, percentage of stems in miscellaneous species has declined to 63.89% in worked stratum from 73.15% in unworked stratum, though volume has slightly more percentage i.e. 28.20% in worked stratum than in unworked stratum i.e. 27.56%. This is so because the decrease in total volume is substantial i.e. to 88 m³

from 112 m³ in unworked stratum and hence percentage volume of miscellaneous species shows increase though actually the volume per ha has declined in worked stratum to 24.950 m³ from 30980 m³.

In plywood category, no. of stems show improvement at 10.38% in worked stratum from 5.37% in unworked stratum, though in volume percentage is almost similar at 35.85% to 37.58% in unworked stratum. No. of stems of Gurjan have increased to 5.28% in worked stratum from 1.16% of unworked stratum. *Perishia insignis* has 1.81% in worked stratum and nil in unworked stratum. Volume of Gurjan has slightly increased to 14.67% from 13.36%. *Terminalia biolata* and *Terminalia procera* also share substantial volumes of 13.93% and 9.88% respectively in unworked stratum and 9.29% and 9.43% in worked stratum.

Ornamental category shows decline in no. of stems at 1.10% from 2.18% of worked stratum, Padauk being removed in 3/4 quantity which is very obvious from volume removed i.e. it has only 3.69% volume out of total volume in worked to 13.62% in unworked stratum. (In terms of quality, unworked stratum has 15.300 m³).

In constructional category stems have increased slightly at 7.85% in worked stratum than 6.97% of unworked stratum but volume has increased to 16.33% from 7.72%. Major species are *Artocarpus chaplasha* around 2% in stems, *Lagerstroemia* 1.65% in worked from 0.87% in unworked stratum, *Milinsa* species etc. In volume *Artocarpus chaplasha* shows 9.3% in worked stratum to 1.28% in unworked stratum, *Lagerstroemia* has decreased to 2.9% in worked stratum from 3.22% in unworked stratum.

In softwood category also stems have increased in worked stratum to 9.06% from 5.22%. Major species are *Pterocymbium tinctorium* - 4.18% stems in worked stratum to 2.32% in unworked stratum, *Canarium euphyllum* being 2.28% and 0.73%. Volume in softwood is slightly on the rise with 13.50% in worked stratum to 12.66% in unworked stratum. Major contribution is from *Pterocymbium tinctorium* 7.45% in worked stratum

and 7.02% in unworked stratum. *Canarium euphyllum* is 2.67% in worked stratum and 0.58% in unworked stratum. *Planchonella* has decreased to 1.39% in worked stratum from 3.91% in unworked stratum.

In non-commercial category *Myristica* has more share in no. of stems i.e. 6 to 5.50% in worked stratum and unworked stratum but in volume *Artocarpus lakoocha* has 2.25% in worked and 0.30% in unworked stratum and *Myristica* has declined to 0.16% from 0.57% in unworked stratum.

6.6.3 MOIST DECIDUOUS TYPE:

At the outset, one point needs clarification. Total no. of stems in commercial category have increased to 102 per ha in worked stratum to 75 in unworked stratum. However, volume has decreased to 30 m³ from 58 m³ in unworked stratum.

Percentage of miscellaneous species has gone down to 70.90% in worked stratum from 81% in unworked stratum in case of stems. In case of volume decrease is to 30.12% from 46.98%.

Plywood stems per ha in worked stratum contribute 3.28% whereas in unworked stratum contribution is 1.05% only, the two *Terminalias* being major species. However, 1.5, Gurjan tree per ha in worked stratum, a stray occurrence, has contributed to 8.6% in volume. *Perishia* contributes 5.99% volume in worked stratum whereas *Terminalia biolata* is only 0.56% and *Terminalia procera* is 4.80%.

In ornamental category, no. of stems of *Padauk* has increased to 4.42% from 0.63% in unworked stratum and *Sageraea* species is 2.57% in worked stratum to 1.27% in unworked stratum. There is phenomenal increase in percentage volume of *Padauk* at 31.90% in worked stratum to 13.67% in unworked stratum, the other species being negligible. Actually volume of *Padauk* has decreased to 13.61 m³ from 14.97 m³ in unworked stratum.

In constructional category stems in worked stratum are 15.41% to 9.93% in unworked stratum, major contribution, 9.27% in worked stratum is from *Lagerstroemia* which has increased from 2.54% in unworked stratum. Volume however, has decreased in worked stratum to 10.65% than 26.93% in unworked stratum. *Artocarpus chaplasha* is the major sufferer being 13.93% in unworked stratum and nil in worked stratum. Similarly *Terminalia manii* and *Planchonia andamanica* have been reduced to negligible volumes in worked stratum than 5.7% and 4.44% respectively in unworked stratum. This indicates rather heavy removal in this category of the named species.

In softwood category, percentage of stems is constant, slightly above 3% in worked and unworked strata and in volumes also show 6.7% to 6.9% in unworked stratum and worked stratum.

In non-commercial category volume of *Jungli lakooch* is less at 0.25% in worked stratum to 2.33% in unworked stratum. *Myristica* species is negligible in Baratang.

6.7 MIDDLE ANDAMAN DIVISION:

In Middle Andaman Division, per ha stems and volume for all strata and types combined are 469.77 and 79.903 m³, total stems being 220.840 lakhs and 37.536 m³ lakh.

Total no. of stems and volume in worked stratum are 99.948 lakh and 14.964 lakh m³ and for unworked stratum the figures are 120.892 lakh and 22.572 lakh m³ respectively.

No. of stems and volume per ha for worked stratum works out to 480.08 and 71.877 m³ and for unworked stratum 462.16 and 86.29 m³ respectively.

In the evergreen forest, no. of stems per ha are 596 in worked stratum and 519.88 in unworked stratum and volume is 63.598 m³ and 115.463 m³ whereas stems have increased in worked stratum, volume has almost halved. In semi-evergreen stratum, no. of stems have slightly increased at 452.01 nos. in worked stratum to 90.434 m³ from 93.222 m³. In Moist Deciduous stratum again no. of stems have gained i.e. 470.75 to 457.30 in unworked stratum but volume is almost unchanged at 60.9 m³. It appears that evergreen forests are worked heavily though its area is only 5.68% of the total.

6.7.1 EVERGREEN TYPE:

It is seen that miscellaneous species have declined in number 50.17% in worked stratum to 63.12% in unworked stratum though volume has increased to 45.50% in worked stratum to 28.38% in unworked stratum. This has not agreed well for commercial species - volume-wise, as will be seen.

No. of stems in plywood category have increased in worked stratum to 24.33% from 11.88%. Major contribution in worked stratum is of Dipterocarpus 20.30%. In unworked stratum it is 8.18%. In case of volume, however, the percentage is 22.144% in worked stratum to 37.065% i.e. there is a decrease. Gurjan has come down to 9.38% from 19.253 and Perishia has also come down to 5.56% from 6.5%.

In ornamental category stems have gone down to 6.38% in worked stratum from 7.63% in unworked stratum. Major species being Planchonia andamanica, its volume has more than doubled to 9.79% in worked stratum where total volume of constructional category is 17.67% to 16.05% of unworked stratum.

In softwood stems have gone down to 3.02% in worked stratum from 5.42% in unworked stratum. Volume has gone down to 4.28% from 6.73%. Species suffering is Pterocymbium tinctorium 0.03% in worked stratum to 3.17 in unworked stratum. Canarium has improved to 2.32% from 0.85%.

In non-commercial wood, no. of stems are 15.94% in worked stratum to 11.43% in unworked stratum, *Myristica* species being 14.43%. In volume, worked stratum shows 10.4% to 1.22% in unworked stratum. *Artocarpus* and *Myristica* species being almost equal.

6.7.2 SEMI-EVERGREEN TYPE:

It is to be noted that the percentage of stems in miscellaneous category have declined but marginally in worked stratum - 63.21% to 68.58% in unworked stratum, whereas volume has increased to 37.58% from 33.64%. However, total volume has also marginally decreased. This would mean that there has been little difference to miscellaneous crop due to working.

In plywood category percentage stems have increased to 7.67% in worked stratum to 5.06% in unworked stratum and corresponding volume also has increased to 27.45% from 24.580%. In stems, major gainer is *Dipterocarpus* with 4.19% from 2.60%, *Perishia* 1.66% from 1.12% and *Terminalia procera* 1.11% from 0.49%. In volume also *Gurjan* shows improvement to 13.32% in worked stratum from 12.65% in unworked stratum. *Perishia* has shot up to 9.45% from 2.18% and *Terminalia procera* has declined to 2.61% from 3.88%.

In ornamental category, there is insignificant increase in stems to 0.87% in worked stratum from 0.81% in unworked stratum,. *Perishia* has increased though its combination itself is negligible. Volume of *Padauk* has decreased to 8.27% of total in worked stratum from 12.12% in unworked stratum.

Constructional category shows decline to 6.88% in worked stratum from 8.42% of stems in unworked stratum and in volume to 13.77% from 16.77%. *Artocarpus chaplasha* has declined to 1.42% from 2.86% in stems in unworked stratum. *Pynma* has slightly gained and has 1.16% and 1.25%. *Planchonia* has gained in worked stratum with 1.98% stems and 1.39% in unworked stratum. In volume, *Artocarpus chaplasha* has

declined to 1.71% from 4.05%. Percentage volume of *Lannea coromandelica* is 2.26% in worked stratum and 0.23% in unworked stratum and *Planchonia* spp. has 5.10% and 3.85% respectively. *Terminalia manii* has also fared better in worked stratum with 3.04% volume and 1.73% in unworked stratum.

In softwood category, there is a slight decrease in respect of stems to 4.62% in worked stratum in comparison to 5.60% in unworked stratum. Major species are *Pterygota alata*, *Canarium cuphyllum*, *Pterocymbium tintorium*. In case of volume also there is corresponding decline to 9.51% from 10.18% in unworked stratum. *Canarium* has gained i.e. 4.78% in worked stratum as against 2.74% in unworked stratum. *Salmalia insignis*, a major softwood species, has negligible volume in worked stratum and 4.03% in unworked stratum showing its over exploitation.

In non-commercial category, stems have increased to 16.59% in worked stratum from 11.55% in unworked stratum, the crop being mostly of *Myristica* species. *Artocarpus lakoocha* has declined to 0.16% from 0.81%. In volume, *Myristica* has gained with 2.29% in worked stratum from 1.21% in unworked stratum but *A.lakoocha* has declined from 1.49% in unworked stratum to 0.20 in worked stratum.

6.7.3 MOIST DECIDUOUS TYPE:

As against Evergreen and Semi-evergreen type, this type shows substantial decline in miscellaneous crop to 52.04% of worked stratum from 76.68% of unworked stratum but in volume slight fall to 25.64% from 28.05%.

In plywood category, stems show very good improvement with 24.68% contribution in worked stratum to 13.15% in unworked stratum. Major gainers are *Terminalia manii*, *Terminalia biolata* and *Perishia insignis* and in volume also, these species show good improvement gaining 4.04% in worked stratum than being 0.41% in unworked stratum, 1.70% and 0.55%, 1.81% and 0.27% respectively.

In ornamental category there is good improvement to 8.82% in worked stratum from 5.06% in unworked stratum in respect of stems, gain being in case of Padauk. In volume, however, there is substantial decrease in worked stratum i.e. 19.70% in worked stratum and 33.33% in unworked stratum, almost all of it being of Padauk. This means that though no. of stems have increased, they are of smaller size since big sized trees have been removed disproportionately.

In constructional category, there is substantial increase in percentage stems in worked stratum being 20.66% than in unworked stratum being 8.55%. Major species being Lagerstroemia which has shot up to 13.70% in worked stratum being only 2.52% in unworked stratum. Milinsa has also increased to 3.29% from 2.25% and Nauclea gageana to 1.22% from 0.75%. In volume there is marginal increase to 23.22% in worked stratum from 20.53% in unworked stratum. Pynma (Lagerstroemia) has gained substantially by 5%.

Increase of Pynma and Milinsa shows that these forests are tending to be drier.

In softwood category stems have increased to 9.88% in worked stratum than 6.91% in unworked stratum and corresponding volume also has increased to 6.37% from 4.04%. Major gainers are Anthocephalus kadamba and Pterygota alata while loser is Lamba patti, an evergreen tree.

Non-commercial wood is negligible in Middle Andaman Division.

6.8 MAYABANDAR DIVISION:

In Mayabandar Division, per ha stem and volume, for all types and strata combined are 452.63 and 74.95 m³ (quarter girth) whereas total stems and volume are 360.61_lakh and 59.71 lakh m³ (quarter girth) respectively.

Total no. of stems and total volume for worked stratum are 87.01 lakh and 17.083 lakh m³ and for unworked stratum they are 273.60 lakh and 42.627 lakh m³ respectively.

Per hectare no. of stems and volume in worked stratum, therefore, are 447.79 and 87.916 m³ and for unworked stratum they are 454.20 and 70.76 m³ respectively. It is thus, seen that no. of stems have marginally declined in worked stratum than in unworked stratum but there is a little gain in volume in the worked stratum than in the unworked stratum.

In the evergreen forests, the situation in respect of Miscellaneous species tells its own story as the number of stems in worked stratum have gone down to 365 per ha from 488 in unworked stratum and there is substantial reduction in volume being 57.783 m³ in worked stratum to 102.693 m³ per ha in unworked stratum but the percentage increase in contribution of miscellaneous species has very substantially increased as will be seen in succeeding paragraphs, thereby suggesting heavy removal of commercially important species.

In Semi-evergreen type, no. of stems per ha have marginally increased in worked stratum at 452.55 to 434.07 m³ in unworked stratum whereas volume has increased to 94.595 m³ in worked stratum to 70.114m³ in unworked stratum.

In Moist Deciduous type no. of stems per ha have increased to 472.50 in worked stratum from 461.31 in unworked stratum whereas volume has increased to 79.589 m³ from 56.868 m³ in unworked stratum.

6.8.1 EVERGREEN TYPE:

As has been pointed out in the previous para, that the working has impoverished these forests, though fortunately the area is only 1943 ha.

The worked stratum shows 67.68% miscellaneous species as against 42.75% in unworked stratum in stems though total per ha stems have reduced substantially in worked stratum than in unworked stratum. Similarly, volume per ha. shows dismal picture of 69% of miscellaneous species in worked stratum to 22.13% in unworked stratum, though volume has gone down to almost half in worked stratum.

Plywood category shows that percentage of stems has gone down to 8.20% in worked stratum from 21.78% in unworked stratum. Dipterocarpus being the major sufferer (from 92 to 27.50 stems per ha). Volume in worked and unworked stratum shows how bad the situation is because whereas worked stratum has 4.13% volume, almost all of which is from Dipterocarpus, the unworked stratum shares 52.42% out of which 42.42% is alone from Dipterocarpus. Red dhup has also been extracted to leave its volume to almost naught in worked stratum as against 8.32% in unworked stratum.

The ornamental category is nil in the Evergreens of Mayabandar Division.

No. of stems in constructional category has gone down to 4.79% from 6.32% in unworked stratum whereas volume has gone up to 20.38% from 16.83 in unworked stratum, Whereas stems of Milinsa species have increased their volume contribution is negligible because of very small diameter - being mostly poles. Artocarpus chaplasha and Lannea coromandelica have been removed - wholehog as their percentage contribution in volume in unworked stratum is 7.43% and 2.06% respectively but in worked stratum it is negligible and naught. Volume contribution of Planchonia andamanica has substantially increased to 19.57% from 5.67%.

In softwood, contribution of no. of stems to total stems is more or less constant at 2.73% in worked stratum and 2.98% in unworked stratum major species being Planchonella longipetiolatum but volume-wise the contribution is negligible to 2.10% in unworked stratum signifying heavy removal.

In non-commercial wood, *Myristica* dominates with 16.41% stems in worked stratum to 26.06% stems out of 26.17% stems in unworked stratum. Its volume is similar in worked stratum with 6.20% as against 6.51% in unworked stratum.

6.8.2 SEMIEVERGREEN TYPE:

Percentage of miscellaneous species has remained more or less constant, with no. of stems in worked stratum and unworked stratum, being 65.26% in worked stratum and 62.29% in unworked stratum. However, volume in worked stratum has substantially increased but miscellaneous species have gone down to 14.60% in worked stratum to 24.06% in unworked stratum.

Plywood contribution in stems, mostly of *Gurjan* has declined to 6.23% from 7.87%. Volume, however, shows slight improvement with 35.81% in worked stratum to 31.72% in unworked stratum though *Dipterocarpus* volume has gone down a bit, volumes of *Perishia* and the two *Terminalias* have increased.

In ornamental category, things are better in the sense that volume has increased to 3.16% in worked stratum than 1.76% in unworked stratum which is through increase in *Padauk* stems entirely.

In construction category, percentage stems is almost the same at 8.21 and 8.06 in worked stratum and unworked stratum, major species being *Artocarpus chaplasha*, *A. hypoleuca*, *Planchonia andamanica* etc. Volume contribution also is almost similar around 15% with obviously bigger diameter trees of *Bassia* species in worked stratum.

In softwood, percentage contribution of softwood has gone down to 8.13% in worked stratum to 11.24% in unworked stratum. Major species being *Pterygota alata*, *Pterocymbium tinctorium* and *Endospermum chinense*. However in volume, worked stratum shows improvement at 17.96% contribution in worked stratum to 10.69% in

unworked stratum. Major gainers being *Canarium euphyllum* and *Salmaalina insignis*, showing their large size.

Non-commercial wood is around 9% in worked stratum and unworked stratum with almost entire contribution from *Myristica* species whose volume has increased from 0.60% to 1.33%

6.8.3 MOIST DECIDUOUS TYPE:

In this forest percentage of stems in miscellaneous species is constant but very high at 75.50% or so.

In plywood category volume has slightly decreased whereas *Terminalia biolata* has suffered heavily in worked stratum, *Terminalia procera* has increased its contribution. Percent volume in worked and unworked strata are 11.35% and 12.32% respectively.

Ornamental category is almost entirely consisting of Padauk, the stems of which have gone up in percentage to 3.44% in worked stratum from 2.71% in unworked stratum and whereas that of chooi to 8.20% from 2.76%. Volume figures show 25% of Padauk in worked stratum to 44% in unworked stratum, chooi contributing negligible volume. Thus, removal of Padauk seems to be heavy.

In constructional category, stems have gone down to 7.67% in worked stratum to 12.38% in unworked stratum. *Pynma* being the major species to suffer.

Softwood shows marginal decline in stems to 3.97% in worked stratum from 4.57% in unworked stratum. Major species being *Papita*, *Letkok* and *Didu*. Volume has increased in worked stratum to 13.44% from 10.11% in worked stratum. Main species being *Didu* (*Salmaalina insignis*), *White dhup* (*Canarium euphyllum*) has declined to 3.93% from 5.19%.

Non commercial species have negligible proportion.

6.9 DIGLIPUR DIVISION:

Till 1993-94 forests in charge of Forest Department were not worked in Diglipur Division as the Department was harvesting timber from revenue areas. Hence, entire forest at the time of survey was unworked.

The no. of stems and volume per ha are 530.26 per ha, highest naturally in the Andamans - and 77.928 m³ per ha where as total stems are 352.502 lakhs and volume is 51.804 lakh m³.

Evergreen stratum has 664 stems per ha and 79.18 m³ volume, semi-evergreen has 550 stems per ha and 86.43 m³ volume whereas figures for Moist Deciduous are 480.26 m³ and 68.97 m³ respectively. Volume per tree in Semi-evergreen forests is obviously more than Evergreen forest.

In no. of stems, plywood is more in evergreen i.e. 17.92% in Evergreen, followed by 9% in semi-evergreen and 3.73% in Moist Deciduous. Main species in evergreen and semi-evergreen is Gurjan and in Moist Deciduous it is Terminalia procera. Ornamental species are absent in evergreen, 2.15% in semi-evergreen being of Padauk and chooi in equal proportion and 6.43% in Moist Deciduous again almost equally distributed in these two species. Constructional wood is 8.36% in evergreen, 7.73% in semi-evergreen and 5.82% in Moist Deciduous. Main species in evergreen is Bassia 4.14% and A. chaplasha 1.81%. The last named is the most i.e 2.59% in Semi-evergreen whereas Pynma, Nabbe and Jungli sagwan are major species in Moist Deciduous areas. Softwood is less i.e. 3.01% in Evergreen, 7.44% in semi-evergreen and 5.52% in moist deciduous. Main species in Evergreen are Pterigota alata, and Planchonella longipetiolatum. In semi-evergreen main species are Pterigota alata, Pterocymbium tinctorium and Canarium euphyllum.

In non-commercial wood *Myristica* species dominates in evergreen and semi-evergreen which have got volumes of 17% and 9%, whereas in Moist Deciduous forest out of 3.05% wood 2.07% is of *Artocarpus lakoocha*. Percentage of miscellaneous species is the lowest in evergreen with 53.61% then semi-evergreen with 64.23% and highest in moist deciduous with 77.86%.

In case of volume in plywood category 51.9% volume is present in evergreen, 26.55% in semi-evergreen and 10% in Moist Deciduous.

In ornamental category evergreen has nil, semi-evergreen has 13.85% and moist deciduous 42%. Mainly of Padauk. Thus, Diglipur forests are very rich in Padauk, the most sought after species.

Constructional wood is 13.5%, 15.9% and 10.87% in Evergreen, Semi-evergreen and Moist Deciduous forests respectively.

Softwood percentage is low at 3.76% in evergreen but is 12.65% of total volume in semi-evergreen and most in moist deciduous i.e. 15.58%.

Non-commercial wood is most entirely of *Myristica* in evergreen i.e. 12.95% only. Its contribution is 20.59% in semi-evergreen and negligible in moist deciduous.

Thus, it is seen that hectare for hectare Diglipur forests are very rich, though volume per ha may be less, because of the presence of Gurjan and Padauk. It was a joy to work in these forests.

CHAPTER VII

UTILIZABLE GROWING STOCK

7.0 GENERAL:

In Chapter VI, details of total no. of stems and volume and their percentages, both by diameter class and by worked and unworked strata and by forest types have been given. However, for the forester in the field, estimation of utilizable volume which can be harvested and retained is very important. Rough estimates of how much has been extracted and the balance are necessary to have an idea as to how the forests should be worked so as to retain trees in various categories sufficiently to have yield in perpetuity. Hence, estimates of utilizable growing stock are given in this chapter as per forest types, divisions, worked and unworked strata.

Utility-wise important species have been listed in Chapter VI and the same sequence is maintained for calculations for the estimation of utilizable volume.

Harvestable diameter of different categories is as below:

- i) Hardwood plywood : DBHOB 50 cm and above
- ii) Hardwood ornamental : -do-
- iii) Hardwood constructional : -do-
- iv) Softwood commercial : DBHOB 40 cm and above
- v) Non-commercial : DBHOB 60 cm and above

7.1 DIVISION-WISE DISTRIBUTION OF UTILIZABLE VOLUME:

The utilizable growing stock in the exploitable class for Andaman and Nicobar Islands has been estimated division-wise as well as by Forest types for worked and unworked areas. Volume is by quarter girth measure.

The distribution of utilizable volume by various Forest Divisions is as follows.

WORKED STRATUM

Per ha utilizable volume for various divisions in all the categories has been presented at Annexure III. In the worked area Mayabandar Division shows a maximum of 76.357 m³/ha, followed by South Andaman with 74.524 m³/ha, Baratang 64.236 m³/ha, Little Andaman 58.901 m³/ha, while Middle Andaman shares 54.474 m³/ha. (Refer Table 7.1A).

The category-wise stock position is detailed below:

(i) PLYWOOD:

Amongst all the divisions, South Andaman contributes a maximum of 28.673 m³/ha, Mayabandar 24.329 m³, Baratang 22.829 m³, Middle Andaman 13.818 m³, while Little Andaman contributes the lowest of 7.683 m³/ha of plywood.

(ii) ORNAMENTAL:

Mayabandar contributes 12.430 m³ per ha of ornamental wood, Middle Andaman 8.353 m³, Baratang 5.615 m³, South Andamans 3.831 m³/ha whereas in Little Andaman ornamental category is absent.

(iii) CONSTRUCTIONAL:

Per ha contribution of constructional wood is maximum in Little Andaman at 29.472 m³, Mayabandar gives 12.897 m³ while in other divisions the contribution is more or less equal.

(iv) SOFTWOOD:

The contribution of softwood in Mayabandar Division is 13.201 m³/ha, South Andaman 12.538 m³/ha, Baratang 10.398 m³/ha, Little Andaman 8.650 m³/ha, while in Middle Andaman per ha Soft wood volume is 4.655 m³.

(v) NON-COMMERCIAL:

The position of utilizable non-commercial timber is not good except in Little Andaman where it is 9.532 m³/ha while in other divisions share of non-commercial timber is poor. In Mayabandar the category is almost absent.

(vi) MISCELLANEOUS:

Maximum stocking of 19.770 m³/ha is obtained in South Andaman, while Middle Andaman shows 17.651 m³/ha, Baratang 13.813 m³/ha, Mayabandar 13.500 m³/ha and Little Andaman accounting to 3.564 m³/ha. Per ha utilizable timber position in various categories for all the divisions for worked forests has been depicted in stacked graph at Annexure IV.

According to utility, the overall contribution of plywood in the worked stratum is maximum at 33.51% while the miscellaneous category has sizeable stock of 23.76%, and

constructional timber shows 15.92%, softwood sharing 15.36%, and ornamental timber being 9.93% and the representation of non-commercial class has a meager 1.5% amongst all categories (Refer Graph at Annexure V).

UNWORKED STRATUM

The distribution of utilizable volume per ha for various Forest Divisions and utilities has been presented in Table No. 7.1B.

Of all the divisions per ha volume in Little Andaman is the highest at 112.953 m³ whereas Baratang contributes 101.057 m³, South Andaman 94.473 m³, Middle Andaman 73.889 m³, Diglipur 63.169 m³ and Mayabandar 59.029 m³ per hectare.

The category-wise position is as follows:-

(i) PLYWOOD TIMBER:

The position in South Andaman is quite good being 30.803 m³/ha which is almost 1/3rd of the total per ha volume of the division. At the same time Baratang has also substantial stock of 28.163 m³ per ha while Mayabandar shows 20.134 m³, Middle Andaman 19.947 m³, Little Andaman 15.384 m³ and Diglipur has 14.571 m³ per ha volume.

(ii) ORNAMENTAL TIMBER:

In this category Diglipur Division contributes maximum of 17.980 m³/ha while Mayabandar and Middle Andamans' share is more or less equal at 14.578 m³ and 14.180 m³ per hectare respectively. Baratang shows 10.459 m³, but in South Andaman a paltry volume of 1.839 m³/ha is obtained.

(iii) CONSTRUCTIONAL TIMBER:

In the unworked forests, Little Andaman has a maximum of 19.398 m³ per ha, Baratang 13.116 m³, and Middle Andaman 12.282 m³ per hectare while other divisions contribute inadequately.

(iv) SOFTWOOD : •

Per ha volume position of softwood in Little Andaman is quite good being 24.914 m³, followed by Baratang with 16.444 m³/, Diglipur 9.222 m³, Middle Andamans 6.275 m³, South Andaman 6.135 m³ and Mayabandar 5.154 m³ per hectare.

(v) NON-COMMERCIAL TIMBER:

The representation of utilizable Non-commercial timber in the Islands is very poor.

(vi) MISCELLANEOUS:

Little Andaman has a maximum share of miscellaneous timber per hectare. Its contribution being 52.479 m³ while South Andaman contributes 46.607 m³, Baratang 32.600 m³, Middle Andaman 20.713 m³, Diglipur 13.324 m³ and Maya Bander shares 10.409 m³ per hectare.

The division-wise position of distribution of per ha volume by utility classes for unworked forests has been brought out in stacked graph at Annexure VII.

The distribution of utilizable volume per ha for all the divisions for unworked forests by utilities has been presented in graph at Annexure V.

7.2.3 MOIST DECIDUOUS TYPE:

I. WORKED STRATUM:

Total per ha yield in Moist Deciduous worked area is 44.122 m³. Plywood contributes 7.546 m³, ornamental 12.778 m³, constructional 7.959 m³, softwood 4.701 m³, non-commercial being absent, while miscellaneous shows 11.138 m³/ha.

II. UNWORKED STRATUM :

Per ha stock is 56.995 m³ out of which the share of plywood is 5.368 m³, ornamental 24.163 m³, constructional 7.434 m³, softwood 6.854 m³, non-commercial 0.129 m³, and miscellaneous being 13.046 m³/ha.

A comparative position of Evergreen worked and Unworked area reveals slight fall in plywood, ornamental, constructional and miscellaneous category in worked area while there is a little increase in softwood and non-commercial timber.

In Semi-evergreen type, plywood, constructional, softwood and non-commercial categories have shown slight improvement in worked area whereas ornamental and miscellaneous categories have decreased.

The Moist Deciduous type shows slight improvement in plywood and constructional category while there is slight fall in softwood in worked area but there has been a substantial decrease of nearly 50% of ornamental wood in worked area, besides the non-commercial has been totally eliminated in this stratum. In miscellaneous category there is slight decrease.

7.2.1 EVERGREEN TYPE:

I. WORKED STRATUM::

In Evergreen type, worked area shows 75.406 m³/ha volume of which the share of plywood is substantial at 34.2m³, ornamental 0.418 m³, constructional timber 10.369 m³, softwood 12.244 m³, non-commercial 3.035 m³ while miscellaneous contributes 15.138 m³ per hectare.

II. UNWORKED STRATUM:

Per ha volume in Evergreen unworked area is 87.132 m³/ha out of which plywood constitutes 39.098 m³, ornamental wood 1.482 m³, constructional 11.603 m³, softwood 8.242 m³, non-commercial 0.734 m³ while miscellaneous accounts for 25.973 m³.

7.2.2 SEMI-EVERGREEN TYPE :

I. WORKED STRATUM: :

A stock of 76.187 m³/ha has been estimated in worked area wherein plywood accounts for 25.046 m³, ornamental 6.54 m³, constructional 12.424 m³, Soft wood 12.48 m³, non-commercial 0.595 m³ whereas miscellaneous yields 19.102 m³/ha.

II. UNWORKED STRATUM :

Per ha stock in unworked area of semi-evergreen type is estimated at 78.115 m³. In this stratum plywood is to the tune of 22.336 m³, ornamental 10.16 m³, constructional 10.773 m³, softwood 10.629 m³, non-commercial 0.337 m³ and miscellaneous accounting to 23.881 m³/ha.

7.2.3 MOIST DECIDUOUS TYPE:

I. WORKED STRATUM:

Total per ha yield in Moist Deciduous worked area is 44.122 m³. Plywood contributes 7.546 m³, ornamental 12.778m³, constructional 7.959 m³, softwood 4.701 m³, non-commercial being absent, while miscellaneous shows 11.138 m³/ha.

II. UNWORKED STRATUM :

Per ha stock is 56.995 m³ out of which the share of plywood is 5.368 m³, ornamental 24.163 m³, constructional 7.434 m³, softwood 6.854 m³, non-commercial 0.129 m³, and miscellaneous being 13.046 m³/ha. (Ref. Graph at Annexure XIII).

A comparative position of Evergreen worked and Unworked area reveals slight fall in plywood, ornamental, constructional and miscellaneous category in worked area while there is a little increase in softwood and non-commercial timber.

In Semi-evergreen type, plywood, constructional, softwood and non-commercial categories have shown slight improvement in worked area whereas ornamental and miscellaneous categories have decreased.

The Moist Deciduous type shows slight improvement in plywood and constructional category while there is slight fall in softwood in worked area but there has been a substantial decrease of nearly 50% of ornamental wood in worked area, besides the non-commercial has been totally eliminated in this stratum. In miscellaneous category there is slight decrease (Annexure XIII).

7.3 CRITICAL ASPECTS

The commercial harvesting of trees in Andaman and Nicobar Islands is restricted to only commercial species viz. plywood, ornamental, constructional and softwood. The non-commercial and miscellaneous tree species are not reckoned for the purpose of commercial harvesting. Annual yield in Andaman and Nicobar Islands is prescribed in the Working Plan as follows:

$$\text{Annual Yield} = V/P$$

Where V = volume of the growing stock in the area of conversion of plan period down to exploitable size (50 cm dbh and above for ply, ornamental and constructional wood and 40 cm dbh and above for softwood)

P = Plan period which is normally 10 years in the Working Plan.

In the present survey, for computing the annual availability, all the worked forests i.e. already converted areas have been excluded and the balance area to be converted have been divided by the remaining years of conversion period (i.e. out of 75 years) and the annual cut area accordingly has been worked out for each Forest Division and Forest Corporation areas. The details of already converted area and balance area for conversion has been worked out on the basis of information collected from the respective Working Plans of the Andaman & Nicobar Forest Department as well as from the information supplied by the Department and Forest Corporation Table No. 7.3T.

According to the practice being followed in Andaman and Nicobar Islands at present the yield has been restricted to 50% of the exploitable growing stock in accordance with the guidelines of the Government of India. Accordingly, the annual

availability of timber has been worked out by various Forest Divisions and for Forest Corporation areas as shown below:

STATEMENT SHOWING ANNUAL AVAILABILITY OF UTILIZABLE TIMBER IN M³ IN ANDAMAN ISLANDS FROM 1997-98 (BY QUARTER GIRTH MEASURE)

Division	Balance area of CWC ha	Remaining con. period from 97-98	Area per year ha	Yield per ha ÷ 2	Total yield figures per
1	2	3	4	5	6
1. L.Andaman	13193	67	196 (800)	29.848 (37.500)	5850 5.78 %
2. S.Andaman	23755	48	495 (500)	23.374 (30.875)	11570 11.43 %
3. Baratang	28808	48	600 (600)	34.090 (25.62)	20454 20.20 %
4. M.Andaman	24675	47	525 (525)	26.342 (25.890)	13830 13.66 %
5. Mayabandar					
Forest Deptt.	55782	56	996	24.235	24138 23.84 %
ANIFPDC	7057	56	126	24.235 (16.83)	3054 3.02 %
6. Diglipur	65677	73	900	24.832 (19.335)	22349 22.07 %
Total	185947		3838		1,01,245

NOTE: Figures in bracket in col. 4 and 5 are W.P. and scheme figures.

It is seen from the above that an area of 185947 ha is the balance conversion area (col.no.2) out of which annually an area of 3838 ha only would be available for commercial harvesting (col. no. 4). Per ha yield of commercial species for various

divisions has been shown at col. no. 5. On the basis of balance conversion area for each division and remaining conversion period, annual cut area for each division has been worked out and per ha annual yield and total yield for each division has been reflected in col. no. 6. Thus, it is seen that the annual yield for Little Andaman is 5850 m³, South Andaman 11570 m³, Baratang 20454 m³, Middle Andaman 13830 m³, Mayabandar 24138 m³, ANIFPDC Mayabandar Project 3054 m³ and Diglipur 22349 m³. The total annual availability has been estimated to 1,01,245 m³, out of which contribution of Mayabandar is maximum at 23.84%, Diglipur 22.07%, Baratang 20.20%, Middle Andaman 13.66%, South Andaman 11.43%, Little Andaman 5.787% and ANIFPDC Mayabandar 3.02%.

Further, the annual availability of utilizable timber for various categories has been worked out and shown below for each division.

AVAILABILITY OF UTILIZABLE TIMBER (CATEGORIWISE) IN 000 m³.

	Ply	Orn.	Const.	Soft	Total	Non comm. per ha	Misc. per ha
1. L.Andaman	25.77	-	32.49	41.74	100%	0.389	26.24
E.A.Y.	1507	-	1901	2442	5850	76	5143
2. S.Andaman	65.89	3.93	17.05	13.13	100%	0.559	23.30
E.A.Y	7623	455	1973	1519	11570	280	1165
3. Baratang	41.31	15.34	19.24	24.11	100%	0.138	16.30
E.A.Y	8450	3138	3935	4931	20454	82	9780
4. M.Andaman	37.86	26.92	23.31	11.91	100%	0.246	10.365
E.A.Y	5236	3723	3224	1647	13830	129	5442
5. Mayabandar							
Forest Dept.	41.54	30.08	17.75	10.63	100%	0.075	5.20

E.A.Y	10027	7261	4285	2565	24138	75	5179
ANIFPDC	1269	919	542	324	3054	10	655
<hr/>							
6. Diglipur	29.34	36.20	15.89	18.57	100 %	0.09	
E.A.Y	6557	8090	3551	4151	22349	81	5994
<hr/>							
Total	40669	23586	19411	17579	1,01,245	733	3364
%	40.17	23.39	19.17	17.36			

E.A.Y. -Estimated Annual Yield m³

From the above statement it is seen that out of 1,01,245 m³ of annual yield for A & N Islands, the share of plywood is fairly high at 40.17% while ornamental is 23.39%, constructional 19.17% and softwood 17.36% respectively.

Amongst various divisions category-wise estimated annual yield as per annual cut for various divisions is as follows:

i) Plywood :

Out of 40,669 m³ Mayabandar has a maximum availability of 10027 m³ (24.66%), Baratang 8450 m³ (20.78%), South Andaman 7623 m³ (18.74%), Diglipur 6557 m³ (16.12%), Middle Andaman 5236 m³ (12.87%), Little Andaman 1507 m³ (3.71%) and ANIFPDC Mayabandar 1269 m³ 3.12%)

ii) Ornamental wood:

Out of annual available ornamental wood of 23586 m³ in the Islands, Diglipur Division has maximum quantity of 8090 m³ (34.30%), Mayabandar contributes 7261 m³ (30.79%), Middle Andaman 3723 m³ (15.78%), Baratang 3138 m³ (13.30%), ANIFPDC

Mayabandar 919 m³ (3.90%) and the lowest is in South Andaman being 455 m³ (1.93%) while ornamental timber is not found in Little Andamans.

iii) Constructional timber:

Total available constructional timber is 19411 m³ annually of which Mayabandar has 4285 m³ (4.30%), Baratang 3935 m³ (20.27%), Diglipur 3551 m³ (18.29%), Middle Andaman 3224 m³ (16.61%), South Andaman 1973 m³ (10.16%), Little Andaman 1901 m³ (9.79%) while in ANIFPDC Mayabandar the available constructional wood is 542 m³ (2.79%).

iv) Softwood:

Total annual availability of softwood in the Islands is 17579 m³ out of which maximum quantity is available in Baratang Division being 4931 m³ (28.05%), Diglipur Division contributing 4151 m³ (23.61%), Mayabandar 2565 m³ (14.59%), Little Andaman 2442 m³ (13.89%), Middle Andaman 1647 m³ (9.37%), South Andaman 1519 m³ (8.64%) while ANIFPDC Mayabandar has 324 m³ (1.84%).

7.4 CONCLUSIONS:

From the forest inventory results with regard to utilizable volume of Andaman Islands it is observed that general trend indicates improvement in growing stock in worked forest particularly the plywood, constructional and softwood categories while the ornamental category has been adversely affected with drastic decline in comparison to unworked forests. Further the forest type-wise scenario in Evergreen presents no significant increase in plywood, ornamental and constructional category, but there is slight increase in softwood timber, whereas Semi-evergreen type shows marginal gain in plywood, constructional and softwood category but shows fall in ornamental wood. In Moist Deciduous stratum slight improvement in plywood, constructional and softwood category is observed but there is sharp decline in ornamental category, this situation is

presumably due to over exploitation of ornamental species particularly the Paduak which is in great demand in the Islands for furniture, constructional work and decorative purpose.

In the case of Little Andamans the present annual cut of 800 ha needs to be reviewed in the light of balance conversion area under the control of ANIFPDC. At the rate of 800 ha annual cut the balance conversion area would be covered in just 16 years' time.

Hitherto before most of the creamy areas with easy access have been harvested and that the unworked areas are remotely located with difficult terrain. As such an overall position about the total availability needs to be considered for working out annual availability instead of considering the annual cut areas based on 10 year plan period. The present Silvicultural system of conversion to uniform and Group shelter wood system (Andaman canopy lifting system) and the actual working thereof, needs to be examined in detail vis-a-vis sustained productivity principle for management of tropical forests in Andaman.

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CHAPTER VIII

REGENERATION SURVEY

8.0 GENERAL:

One of the objectives of the inventory of Andaman group of Islands was to find out the status of regeneration. Hence, along with forest inventory regeneration survey was simultaneously carried out. While for Pilot Survey, enumeration data was collected from the entire 0.2 ha sample plot, for regeneration survey the North-west quadrant alone was selected for counting the seedlings for the reason that in the heterogeneous forests of Andaman having rich diversity of species, full count in 0.2 ha plot would have been time consuming and cumbersome. For the purpose of regeneration survey the methodology prescribed by Chacko in his Book "A manual on sampling techniques for Forest Surveys" dealing with sample survey of Natural Regeneration was followed with minor modifications. The sampling size in the current survey was 0.2 ha plot instead of 2m x 2m plot size prescribed by Chacko. Further, the sampling intensity adopted in the current survey was 25% against minimum of 20% recommended by Chacko. In the regeneration survey, the plywood species, ornamental, constructional, softwood and miscellaneous were counted and the Establishment Index as well as Stocking Percentage of Regeneration were worked out as per the formula prescribed by Chacko. Further, the data were analysed according to important forest types viz; Evergreen, Semi Evergreen and Moist Deciduous according to species composition of respective samples.

The data were collected from the North-west quadrant of sample plots each of 0.05 ha in a grid of 1 1/4' x 1 1/4' with an intensity of 0.01%

Following data were collected from the North- western quadrant of all sample plots:

- i) Established seedlings - Poles and saplings having a height of 3 m and above but below 10 cm dia.
- ii) Unestablished seedlings - Saplings with less than 3m height and below 10 cm dia.
- iii) Recruitment - Seedlings with one season's growth.
- iv) Height measurements of 10 unestablished seedlings were recorded according to preponderance of species and the average height of unestablished seedlings worked out.
- v) Stocking Index 1 = 2500 seedlings per ha.
 - Profuse - 2500 and above per ha
 - Adequate - 1250 to 2500 per ha
 - Inadequate - up to 1250 per ha.
- vi) Four unestablished seedlings were considered equal to one established seedling. Thus, if number of established seedlings are 1000 and unestablished seedlings are 2600, the stocking index would be :

$$\frac{1000 + 2600/4}{2500} = \frac{1650}{2500} = 0.66$$

vii) Established stocking percent is obtained by multiplying stocking index by establishment index. Establishment index is obtained by dividing wt. average height by establishment height i.e. 3 m.

viii) The recruitment is not considered important in assessment but recording the number provides the factual position.

In Chacko's formula for assessment of natural regeneration, following notations are used. The plot-wise and utility-wise seedlings were totaled up and converted to seedlings per ha.

n = The number of sampling units.

$e1$ = Total number of established plants per ha.

$u1$ = Total number of unestablished plants per ha

$h1$ = Average height of unestablished plants in the
ith sampling unit.

= The sum of record heights in the ith sampling unit divided
by the number of plants measured.

H = Establishment height i.e. 3 meters

$$\text{Weighted av. height } h = H \frac{\sum_{i=1}^n e1}{n} + \frac{\sum_{i=1}^n h1 u1}{n}$$

$$\frac{\sum_{i=1}^n e1 + \sum_{i=1}^n u1}{n}$$

Weighted av. height

$$\text{i) Establishment Index } II = \frac{\text{Weighted av. height}}{\text{Establishment height}}$$

$$= h/H$$

$$\text{ii) Stocking Index per ha} \quad I_2 = \frac{1}{2500} \sum_{i=1}^n u_{1/4+} \sum_{i=1}^n c_i$$

$$\text{iii) Established stocking percent per ha} = 100 I_1 I_2$$

The distribution of sample plots according to Forest Divisions and Forest types are as follows:-

DIVISION	STRATUM			
	Evergreen	Semi evergreen	Moist Deciduous	Total
Little Andaman	8	28	-	36
South Andaman	34	27	10	71
Baratang	13	26	15	54
Middle Andaman	12	37	34	83
Mayabandar	12	38	27	77
Diglipur	10	44	44	98
Total	89	200	130	419
Percentage	21.36%	48.24%	30.4%	

8.1 RESULTS OF THE SURVEY:

The position of regeneration for various forest types and divisions according to utility species has been presented in Table No.8.1 A.

In Evergreen stratum, established stocking of plywood species is 49.51%, while in Semi-evergreen it is 21.07% and in Moist Deciduous a low of 5.92% is obtained. Further, amongst divisions, South Andaman has a sizeable 44.57% of plywood regeneration whereas in Little Andaman the stocking is 21.48%, Baratang 20.26%, Middle Andaman 18.31%, Diglipur 16.48% and in Mayabandar established stocking is 11.82%.

Constructional category shows 34.63% of established stocking in Evergreen type, 33.93% in Semi-evergreen while it is 23.70% in Moist Deciduous type. Amongst various divisions, Middle Andaman has a maximum of 43.66% of established stocking, South Andaman presenting 39.52%, Little Andaman 38.73%, Baratang 36.39%, Mayabandar 26.69% while Diglipur shows 14.25%.

In ornamental category Moist Deciduous type has a maximum of 60.43% of established stocking, Semi-evergreen 21.07%, Evergreen showing a low of 6.35%. In the divisions Diglipur presents an adequate 54.57%, Mayabandar 36.15%, Middle Andaman 33.80%, Baratang 27.53% whereas the position in South Andaman and Little Andaman is not satisfactory being 6.99% and 2.47% respectively.

In softwood category Semi-evergreen type shows 23.93% of establishment stocking. Moist Deciduous 9.95%, while Evergreen presents 9.51%. In respect of divisions Little Andaman has a maximum of 37.32% stocking, Mayabandar 25.34%, Baratang 15.82%, Diglipur 14.70%, South Andaman 9.92% and Middle Andaman 4.23%.

The established stocking of regeneration in miscellaneous species is highest at 87.32% in Semi-evergreen, 83.56% in Evergreen and 82.53% in Moist Deciduous. Amongst divisions also percentage of established stocking is very high between 82% to 90.51%.

The standard error percentage of established stocking by forest types shows 8.69% in Evergreen, 4.92% in Semi-evergreen and 5.16% in Moist Deciduous type. Amongst divisions standard error percentage obtained for Little Andaman is 10.49, South Andaman 10.04, Baratang 9.10, Middle Andaman 6.98, Mayabandar 6.34 while Diglipur shows 6.18. For the entire Island standard error is 3.41%.

The position of recruits has been shown at Table No.8.1 B. In plywood category Evergreen stratum has a maximum of 46.78% to the total commercial species, in Semi-evergreen 20.39% and in Moist Deciduous it is 22.96%. In the case of divisions Mayabandar, Diglipur and South Andaman have fairly good stocking of 36.23%, 35.40% and 34.08% respectively whereas other divisions show inadequate regeneration in recruit category. As regards constructional category, Ever-green type shows 39.99%, Semi Evergreen 35.35% while Moist Deciduous has poor stocking of 14.80%. In the ornamental category moist Deciduous shows maximum of 52.39%, Semi-evergreen 16.01%, while Evergreen presents 6.00%. The division-wise position reveals 51.74% in Baratang, 37.99% in Middle Andaman, 36.78% in Diglipur while Mayabandar, South Andaman and Little Andaman present poor scenario. softwood recruit position in Andaman Islands is not at all happy which is only 15.92% of the total commercial species regeneration. As regards Forest types, Semi Evergreen stratum shows 28.25%, stocking of recruits while the population is very low in Evergreen and Moist Deciduous forests. Amongst divisions, Little Andaman has fairly good proportion of recruits in the region of 36.78%, while Mayabandar has 20.81%, Diglipur 17.40% but in other divisions the position is extremely poor.

The ratio of stocking of recruits between commercial and miscellaneous is also maintained at 20:80 more or less with the same trend as in established regeneration.

Division-wise regeneration status has been presented at Table No.8.1C. In the commercial category, Diglipur Division has 0.18% of stocking index, South Andaman 0.166%, Mayabandar 0.119%, Middle Andaman 0.114%, Little Andaman 0.114% and Baratang 0.126%. In the miscellaneous category the range is very high between 0.567 to

1.083%. The total establishment stocking index has not much significance as the proportion of miscellaneous species is very high.

Forest type-wise regeneration status depicted in Table No.8.1 D reveals 0.169 of Establishment stocking index in Moist Deciduous type for commercial species, 0.164 in Evergreen type while 0.112 in Semi-evergreen type. In the miscellaneous category establishment stocking percentage is very high ranging between 0.772 to 0.833. The status for total in Forest types is 1.00 in Evergreen, 0.964 in Moist Deciduous and 0.884 in Semi-evergreen type.

8.2 REGENERATION STATUS IN WORKED AND UNWORKED AREAS:

In order to project a realistic picture of regeneration the data has been analysed for worked forest and unworked forests separately and presented in Table Nos. 8.2 A and 8.2 B.

A comparative position for worked and unworked forests according to utilities by divisions has been discussed below:-

PLYWOOD SPECIES:

In Little Andaman proportion of established seedlings of plywood species has increased in Worked area which is 33.33% against 20.873% in unworked areas. In respect of South Andaman, there has been significant increase of plywood species in worked area to the tune of 50.14% while unworked shows 39.86%. In the case of Baratang and Mayabandar there has been marginal increase of plywood species in worked area. However, in Middle Andaman the position of plywood species in established regeneration is not happy. Diglipur being a newly created division, the information in worked area has not been reflected.

In case of unestablished seedlings Little Andaman has 20.83% in worked while 18.63% in unworked area. South Andaman has better stocking of 40.64% in worked whereas in unworked it is 29.57%, Baratang shows decrease in stocking at 18.48% in worked and 37.00% in unworked. In Middle Andamans, both in worked and unworked, stocking is more or less same i.e. 13.28% and 12.70% respectively whereas Mayabandar shows improvement of 34.52% in worked while in unworked it is 17.56%, Diglipur has about 20% unestablished regeneration in unworked area.

The position of recruits in Little Andaman is not good as in worked area only 14.53% of regeneration exists against 7% in unworked in plywood category. South Andaman shows 40% in worked while 26.47% in unworked. Baratang Division has 26.86% in worked but unworked is poor at 6%. In Middle Andaman, worked forest has very low 6% as against 13.75% in unworked area, Mayabandar presents 23.68% in worked while in unworked it is 38.24% whereas in Diglipur unworked areas show 35% of recruits.

Constructional species:

In Little Andaman a significant improvement in worked area is seen. The established regeneration is 46.66% against 29.61% in unworked, whereas in South Andaman, Middle Andaman and Mayabandar Divisions worked stratum shows decrease in established regeneration. However, in Baratang Division there is slight improvement being 46.99% against 33.73% in unworked.

The unestablished category reveals encouraging trend of 75% regeneration in Little Andaman in worked area while in unworked the position is at 50.33%, Baratang Division has shown marginal increase in unestablished population which is 30.90% in worked compared to 20.04% of unworked areas.

Position of recruits shows marked improvement in worked areas in Little Andaman (82% against 50.27%), Middle Andaman (40.17% against 33.60%) and

Mayabandar Divisions (35.96% against 24.94%). There is fall in percentage representation in South Andaman (42.65% against 62.13%) and Baratang (12.25% against 23.94%).

Ornamental

Little Andaman presents poor picture for established, Unestablished and recruits category. In the case of South Andaman, Middle Andaman and Mayabandar Divisions there has been slight improvement in established category. While in unestablished category South Andaman, Baratang and Middle Andaman show marginal increase in worked area. In Mayabandar Division the position has slightly fallen from 33.63% in unworked to 28.38% in worked area. As regards recruits Middle Andaman presents satisfactory picture of 53.15% in worked against 28.11% in unworked area. In South Andaman and Baratang Divisions, there is slight improvement but in Mayabandar Division population has decreased.

Softwood

The softwood regeneration in established category is not satisfactory in Little Andaman, South Andaman, Middle Andaman and Mayabandar Divisions. But in Baratang Division the position is slightly better in worked area. The regeneration of unestablished seedlings shows drastic fall from 30.71% in unworked to 4.17% in worked forests in Little Andaman while in South Andaman and Mayabandar also the position is not satisfactory. In Middle Andaman unestablished category in worked forests is almost absent. In Baratang Division the position is slightly better. As regards, recruits Little Andaman shows drastic fall from 41.06% of unworked to 4.27% in worked forests. Similarly in Baratang and Middle Andaman the position of recruits is not happy while in South Andaman and Mayabandar there is slight increase in recruit population. In Diglipur Division unworked forest has high population of 58.31% established regeneration in ornamental category, 47.17% in unestablished and 36.77% in recruit category.

In Evergreen Forests the worked stratum shows slight improvement of plywood species in established regeneration which is 59.96% in worked against 46.60% in unworked. Similarly, in unestablished category the increase is 46.50% from 32.8% in unworked whereas recruits have fallen from 48.29% to 45.03%. However, in constructional species regeneration position has improved marginally but in ornamental and softwood category the position is not satisfactory. In Semi-evergreen type, plywood species and constructional species have shown improvement but in softwood category established, unestablished and recruits position is not satisfactory. In case of Moist Deciduous forests established seedlings for plywood species show a little improvement but in other two categories the position is poor. In Moist Deciduous stratum, constructional species have shown definite increase in all categories of regeneration. The ornamental category shows decreasing trend in established seedlings but unestablished and recruits position is slightly better. As regards softwood the regeneration position is poor in Moist Deciduous forests in worked area.

8.3 CONCLUSION:

The regeneration in the forests of Andaman Group of Islands has been found to be adequate with established stocking of 2333 seedlings per hectare. However, proportion of commercial species is 15% only. This entails a thorough review of the working of the Andaman Forests under appropriate silvicultural system to meet the desired objectives set out in the Working Plan for Scientific Management of Tropical Forests.

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TABLE NO. 6.3 A LITTLE ANDAMAN

STEMS PER HA. ACCORDING TO FOREST TYPES

S.NO	EVERGREEN				SEMIEVERGREEN			
	UW	%	W	%	UW	%	W	%
	4870.530		541.170		14070.400		2705.65	
				Wt.avg.				Wt.avg
				5411.700				16776.050
1. HARDWOOD (PLYWOOD)								
Amora wallichii	0	0	0	0	0	0.174	0	0
Dipterocarpus spp	14.46	3.142	0	0	13.01	0.836	24	4.697
Panshia insignis	2.28	0.495	0	0	2.05	0.703	4	0.783
Terminalia biolata	0	0	0	0	0	0	4	0.783
Terminalia procera	8.9	1.934	10.02	3.231	9.01	7.66	19	3.718
TOTAL	25.64	5.571	10.02	3.231	24.08	17.27	51	9.98
2. HARDWOOD (ORNAMENTAL)								
Pterocarpus dalbergioides	0	0	0	0	0	0	0	0
Sageraea elliptica	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0
3. HARDWOOD (CONSTRUCTION)								
Adenanthera pavonica	0.56	0.122	0	0	0.5	0.96	0	0
Albizia lebbek	0	0	0	0	0	0	0	0
Artocarpus Chaplasha	13.34	2.899	0	0	12.01	4.61	8	1.586
Artocarpus gomeziana	0	0	0	0	0	0	0	0
Bassia butyracea	2.23	0.485	20	6.449	4.01	0.76	0	0
Calophyllum inophyllum	11.12	2.416	20	9.671	13.01	2.11	0.483	2
Hopea odorata	0	0	0	0	0	0	0	0
Lagerstroemia hypoleuca	0.56	0.122	0	0	0.5	0.19	0.043	3
Lanea coromandelica	0	0	0	0	0	0.95	0.217	6
Mesua ferrea	0	0	0	0	0	0	0	0
Mimosa species	0	0	0	0	0	0.57	0.13	0
Naucea gageana	0	0	0	0	0	0.19	0.043	1
Planckonia andamanica	4.45	0.967	10.02	3.231	5.01	4.22	0.966	10
Padocarpus nerifolia	9.44	2.051	0	0	8.5	0	0	0
Terminalia manii	0	0	0	0	0	0.76	0.174	2
TOTAL	41.7	9.061	60.01	19.351	43.53	15.32	32	6.262
4. SOFTWOOD (COMMERCIAL)								
Allanthus excelsa	0	0	0	0	0	0	0	0
Anthocephalus cadamba	2.23	0.485	0	0	2.01	4.81	1.055	2
Canarium euphyllum	3.9	0.847	0	0	3.51	4.42	1.012	14
Endospermum chinense	0	0	0	0	0	0.19	0.043	4
Planckonia longipetiolatum	13.89	3.018	20.02	6.456	14.5	3.64	0.833	2
Pterocarpus tuncionum	10.02	2.177	10.02	3.231	10.02	21.15	4.84	15
Pterygota alata	0	0	0	0	0	0	0	0
Salnalia insignis	4.46	0.969	0	0	4.01	2.87	0.657	5
Xanthoxylum theisa	0	0	0	0	0	0	0	0
TOTAL	34.5	7.497	30.04	9.687	34.05	36.88	8.44	42
5. NON COMMERCIAL								
Artocarpus lakoocha	1.12	0.243	0	0	1.01	0.57	0.13	0
Mynsica species	17.22	3.742	45.02	14.517	20	40.37	9.239	33
TOTAL	18.34	3.985	45.02	14.517	21.01	40.94	9.369	33
6. MISCELLANEOUS								
Rest of species	340.02	73.885	165.02	53.213	322.52	326.54	74.732	353
TOTAL	340.02	73.885	165.02	53.213	322.52	326.54	74.732	353
G TOTAL	460.2	100	310.11	100	445.19	436.54	100	100

STEMS PER HA. ACCORDING TO FOREST TYPES

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BARATANG DIVISION

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Table No. 6.3 D

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TABLE NO. 6.3 E

MAYABANDAR DIVISION

STEMS PER HA. ACCORDING TO FOREST TYPES

S.NO	EVERGREEN			SEMI-EVERGREEN			MOIST DECIDUOUS		
	UW	%	W	UW	%	W	UW	%	W
	10687.5		1943.17	12630.67		26232.90	23318		3886.4
				Wt. avg.					Wt. avg.
					%			%	
1. HARDWOOD (PLYWOOD)									
Amoora wallichii	2.72	0.56	0	0	2.3	2.6	0.63	2.69	0
Dipterocarpus spp	82.26	18.9	27.5	7.52	82.3	25.2	5.81	16.8	3.71
Parishia insignis	10.9	2.23	2.5	0.68	9.61	3.9	0.86	3.9	0.84
Terminalia biolata	0	0	0	0	0	0.94	0.22	0.72	0.16
Terminalia procera	0.45	0.09	0	0	0.38	1.5	0.35	3.92	0.87
TOTAL	106.33	21.78	30	8.2	94.59	34.14	7.87	28.21	6.23
2. HARDWOOD (ORNAMENTAL)									
Pterocarpus dalbergioides	0	0	0	0	0	5.6	1.29	11.8	2.61
Sageraea elliptica	0	0	0	0	0	2.04	0.47	2.5	0.55
TOTAL	0	0	0	0	0	7.64	1.76	14.3	3.16
3. HARDWOOD (CONSTRUCTION)									
Adenanthera pavonica	0.91	0.19	0	0	0.77	2.8	0.65	1.07	0.24
Albizia lebbek	0	0	0	0	0	1.5	0.35	1.43	0.32
Artocarpus chaplasha	9.98	2.04	2.5	0.68	8.83	6.85	1.58	5.72	1.26
Artocarpus gomeziana	1.36	0.28	2.5	0.68	1.54	4.09	0.94	4.29	0.95
Bassia butyacea	0	0	0	0.68	0.38	2.05	0.47	3.57	0.79
Calophyllum nophyllum	0	0	0	0	0	0	0	0	0
Hopea odorata	0	0	0	0	0	0	0	0	0
Lagerstroemia hypoleuca	6.36	1.3	0	0	5.38	9.84	2.27	7.87	1.74
Lannea coromandelica	1.36	0.28	0	0	1.15	0.94	0.22	1.78	0.39
Mesua ferra	0	0	0	0	0	0	0	0	0
Millettia speciosa	2.27	0.47	7.5	2.05	3.07	1.87	0.43	2.5	0.55
Nuclea gageana	0	0	0	0	0	0.38	0.09	0.72	0.16
Planchonia andamanica	7.72	1.58	2.5	0.68	6.92	3.34	0.77	8.22	1.82
Podocarpus nerifolia	0	0	0	0	0	0	0	0	0
Terminalia mahii	0.9	0.18	0	0	0.76	1.31	0.3	0	0.86
TOTAL	30.86	6.32	17.5	4.79	28.8	34.97	8.06	37.17	8.21
4. SOFTWOOD (COMMERCIAL)									
Alanthus excelsa	0	0	0	0	0	0	0	0	0
Anthocephalus cadamba	0.45	0.09	0	0	0.38	0	0	0	0
Canarium euphyllum	0	0	0	0	0	3.91	0.9	2.15	0.48
Endospermum chinense	0	0	0	0	0	0.19	0.04	5.72	1.26
Planchonella longipetiolatum	5.45	1.12	10	2.73	6.15	0.57	0.13	1.07	0.24
Pterocarpus tinctorum	2.27	0.47	0	0	1.92	6.31	1.45	7.14	1.58
Pterygota alata	6.36	1.3	0	0	5.38	38.86	8.49	15.72	3.47
Salimalla insignis	0	0	0	0	0	0.94	0.22	5.01	1.11
Xanthoxylum rhetsa	0	0	0	0	0	0	0	0	0
TOTAL	14.53	2.98	10	2.73	13.83	48.78	11.24	36.81	8.13
5. NON COMMERCIAL									
Artocarpus lakoocha	0.45	0.09	0	0	0.38	0.38	0.09	1.43	0.32
Myristica species	127.28	26.08	60	16.41	115.93	37.77	8.7	39.28	8.68
TOTAL	127.73	26.17	60	16.41	117.31	38.15	8.79	40.71	9
6. MISCELLANEOUS									
Rest of species	208.64	42.75	247.5	67.68	214.62	270.39	62.29	295.35	65.26
TOTAL	208.64	42.75	247.5	67.68	214.62	270.39	62.29	295.35	65.26
G. TOTAL	488.09	100	365	99.81	469.15	434.07	100	452.55	100

Table No. 6.3 F

DIGLIPUR DIVISION

STEMS PER HA, ACCORDING TO FOREST TYPES

S NO	EVERGREEN			SEMI-EVERGREEN			MOIST DECIDUOUS		
	UW 6454.1	%	W	UW 6454.1303	%	W	UW 29688	%	W %
1. HARDWOOD (PLYWOOD)									
Amora wallichii	3	0.452	0	3.94	0.715	0	3.94	1.63	0.339
Dipterocarpus spp	95	14.307	0	25.85	4.694	0	25.85	0.22	0.046
Panshia insignis	12.5	1.883	0	6.27	1.138	0	6.27	1.53	0.319
Terminalia biolata	0	0	0	2.78	0.505	0	2.78	3.15	0.656
Terminalia procera	8.5	1.28	0	10.75	1.952	0	10.75	11.4	2.374
TOTAL	119	17.922	0	49.59	9.004	0	49.59	17.93	3.733
2. HARDWOOD (ORNAMENTAL)									
Pterocarpus dalbergioides	0	0	0	5.98	1.086	0	5.98	15.98	3.327
Sageraea elliptica	0	0	0	5.85	1.062	0	5.85	14.9	3.102
TOTAL	0	0	0	11.83	2.148	0	11.83	30.88	6.43
3. HARDWOOD (CONSTRUCTIONAL)									
Adonanthra pavonica	0	0	0	0.54	0.098	0	0.54	1.3	0.271
Albizia lebbek	0	0	0	2.67	0.485	0	2.67	3.16	0.658
Artocarpus chaplasha	12	1.807	0	14.25	2.587	0	14.25	0.44	0.092
Artocarpus gomeziana	4	0.602	0	1.18	0.214	0	1.18	0.33	0.069
Bassia butyracea	27.5	4.142	0	4.58	0.832	0	4.58	0.44	0.092
Calophyllum inophyllum	1.5	0.226	0	0	0	0	0	0	0
Hopea odorata	0	0	0	0.75	0.136	0	0.75	0.33	0.069
Lagerstroemia hypoleuca	0	0	0	2.35	0.427	0	2.35	5.66	1.179
Lannea coromandelica	1	0.151	0	3.82	0.694	0	3.82	8.81	1.834
Mesua ferrea	0	0	0	0	0	0	0	0	0
Millettia species	3	0.452	0	4.79	0.87	0	4.79	4.77	0.993
Nauclaea gageana	0	0	0	1.17	0.212	0	1.17	0.11	0.023
Planchonia andamanica	4.5	0.678	0	3.3	0.599	0	3.3	0.88	0.183
Podocarpus neriifolia	1.5	0.226	0	0.21	0.038	0	0.21	0	0
Terminalia manii	0.5	0.075	0	2.98	0.541	0	2.98	1.74	0.362
TOTAL	55.5	8.358	0	42.59	7.733	0	42.59	27.97	5.824
4. SOFTWOOD (COMMERCIAL)									
Ailanthus excelsa	0	0	0	0	0	0	0	0	0
Anthocephalus cadamba	0	0	0	0.32	0.058	0	0.32	0.22	0.046
Canarium euphyllum	2	0.301	0	4.89	0.888	0	4.89	1.96	0.408
Endospermum chinense	0	0	0	0.22	0.04	0	0.22	0.11	0.023
Planchonella longipetiolatum	7	1.054	0	1.38	0.251	0	1.38	0.11	0.023
Pterocarpus tritonum	3.5	0.527	0	16.07	2.918	0	16.07	18.47	3.846
Pterygota alata	7.5	1.13	0	16.93	3.074	0	16.93	3.15	0.656
Salmalia insignis	0	0	0	1.19	0.216	0	1.19	2.5	0.521
Xanthoxylum thelsa	0	0	0	0	0	0	0	0	0
TOTAL	20	3.012	0	41	7.444	0	41	26.52	5.522
5. NON COMMERCIAL									
Artocarpus lakoocha	5.5	0.828	0	13.3	2.415	0	13.3	2.07	0.431
Myrsine species	108	16.265	0	38.72	7.03	0	38.72	0.98	0.204
Total	113.5	17.093	0	52	9.445	0	52	3.05	0.635
6. MISCELLANEOUS									
Rest of species	356	53.614	0	353.72	64.225	0	353.72	373.91	77.856
TOTAL	356	53.614	0	353.72	64.225	0	353.72	373.91	77.856
G. total	664	100	0	550.75	100	0	550.75	480.26	100

TABLE NO. 6.4A

LITTLE ANDAMAN

VOLUME PER HA. ACCORDING TO FOREST TYPES

S.NO	NAME OF SPECIES	EVERGREEN			SEMIEVERGREEN			Wt. avg.	%	Wt. avg.	%	Wt. avg.
		UW	%	W	UW	%	W					
		4870.53		541.170	5411.7		14070.4			2705.65		
1. HARDWOOD (PLYWOOD)												
	Amoora wallichii	0	0	0	0	0	1.319	1.024	0	0	0	1.106
	Dipterocarpus spp	4.882	4.215	0	0	0	4.394	7.942	3.884	5.981	0	9.207
	Parishia insignis	2.435	2.102	0	0	0	2.192	0.832	0.046	0.048	0.074	0.706
	Terminalia biolata	0	0	0	0	0	0.028	0.022	0.008	0.012	0.025	0.025
	Terminalia procera	2.172	1.875	5.871	5.42	2.542	5.398	4.191	5.547	8.541	5.422	5.422
	TOTAL	9.489	8.193	5.871	5.42	9.127	17.807	13.824	9.487	14.608	16.465	16.465
2. HARDWOOD (ORNAMENTAL)												
	Pterocarpus dalbergioides	0	0	0	0	0	0	0	0	0	0	0
	Sageraea elliptica	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0
3. HARDWOOD (CONSTRUCTIONAL)												
	Adenanthera pavonica	0.002	0.002	0	0	0.002	0.087	0.052	0	0	0	0
	Albizia lebbek	0	0	0	0	0	0	0	0	0	0	0
	Artocarpus chaplasha	4.417	3.814	0	0	3.975	15.83	12.289	20.59	31.705	16.598	16.598
	Artocarpus gomeziana	0	0	0	0	0	0	0	0	0	0	0
	Bassia butyrosa	0.15	0.13	0.087	0.08	0.144	1.615	1.254	0	0	0	1.355
	Calophyllum inophyllum	0.556	0.48	0.172	0.159	0.518	0.002	0.002	0.017	0.026	0.004	0.004
	Hopea odorata	0	0	0	0	0	0	0	0	0	0	0
	Lagerstroemia hypoleuca	0.016	0.014	0	0	0.014	0.006	0.005	0.087	0.134	0.019	0.019
	Larnea coromandelica	0	0	0	0	0	0.267	0.207	1.611	2.481	0.484	0.484
	Mesua ferrea	0	0	0	0	0	0	0	0	0	0	0
	Mimosa species	0	0	0	0	0	0.003	0.002	0	0	0	0.003
	Nauclea gageana	0	0	0	0	0	0	0	8.533	13.139	1.376	1.376
	Planchonia andamanica	0.505	0.436	19.03	17.568	2.358	3.298	2.56	3.409	5.249	3.316	3.316
	Podocarpus nerifolia	0.001	0.001	0	0	0.001	0	0	0	0	0	0
	Terminalia manii	0	0	0	0	0	2.771	2.151	0.011	0.017	2.326	2.326
	TOTAL	5.647	4.875	19.289	17.807	7.011	23.859	18.522	34.258	52.751	25.536	25.536
4. SOFTWOOD (COMMERCIAL+B15)												
	Allanthurus excelsa	0	0	0	0	0	0	0	0	0	0	0
	Anthocephalus cadamba	0.202	0.174	0	0	0.162	0.38	0.295	0.295	0.059	0.325	0.325
	Canarium euphyllum	0.494	0.427	0	0	0.445	0.219	0.17	0.17	1.584	0.35	0.35
	Endospermum chinense	0	0	0	0	0	0.014	0.011	0.011	0.088	0.019	0.019
	Planchonella longipetiolatum	0.696	0.601	4.529	4.181	1.079	1.129	0.876	0.876	0.002	0.947	0.947
	Pterocarpus tinctorium	7.944	6.859	25.14	23.208	9.684	3.578	2.778	2.778	0.522	3.056	3.056
	Prunus alata	0	0	0	0	0	0	0	0	0	0	0
	Salinia insignis	12	10.36	0	0	10.8	21.31	16.543	16.543	7.416	18.65	18.65
	Xanthoxylum thesta	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	21.336	18.421	29.669	27.389	22.169	26.63	20.673	20.673	9.65	23.346	23.346
5. Non commercial												
	Artocarpus lakoocha	0.121	0.104	0	0	0.109	0.297	0.231	0.231	0	0.249	0.249
	Myristica species	0.182	0.157	45.93	42.401	4.757	3.47	2.694	2.694	6.207	3.56	3.56
	TOTAL	0.303	0.262	45.93	42.401	4.866	3.767	2.924	2.924	6.207	3.81	3.81
6. Misc.												
	Rest of species	79.05	68.25	7.565	6.984	71.902	56.75	44.056	10.9	16.784	49.355	49.355
	TOTAL	79.05	68.25	7.565	6.984	71.902	56.75	44.056	10.9	16.784	49.355	49.355
	G. TOTAL	115.825	100	108.6	100	115.075	128.813	100	64.943	100	118.51	118.51

VOLUME PER HA. ACCORDING TO FOREST TYPES

S.NO	EVERGREEN				SEMI-EVERGREEN				MOIST DECIDUOUS			
	UW	%	W	Wt. avg.	UW	%	W	Wt. avg.	UW	%	W	Wt. avg.
1. HARDWOOD (PLYWOOD)												
Amora wallichii				6.113	0.46	0.409	0.158	0.179	0.27	0	0	0
Dipterocarpus spp	27.88	23.316	13.17	12.349	15	13.364	12.98	14.673	13.736	0	0	3.706
Parishia insignis	1.497	1.252	1.341	1.424	0	0	2.015	2.278	1.269	0	0	2.553
Terminalia biolata	0.002	0.002	3.333	3.125	15.66	13.933	8.222	9.294	10.977	2.53	2.31	0.237
Terminalia procera	1.99	1.664	4.125	3.868	11.1	9.876	8.343	9.364	0.959	0.976	2.051	4.807
TOTAL	31.429	26.285	34.999	32.817	42.24	37.582	31.718	35.855	35.615	3.489	3.186	8.547
2. HARDWOOD (ORNAMENTAL)												
Pterocarpus dalbergioides	1.489	1.245	0.858	0.805	15.3	13.613	3.262	3.688	7.721	14.97	13.669	13.61
Sageraea elliptica	0	0	0	0	0	0	0	0	0	0.001	0.001	0.096
TOTAL	1.489	1.245	0.858	0.805	15.3	13.613	3.262	3.688	7.721	14.971	13.671	13.651
3. HARDWOOD (CONSTRUCTIONAL)												
Adenanthera pavonica	0	0	0.243	0.228	0.113	0	0	0.472	0.534	0.297	0	0.033
Albizia lebbek	0	0	0	0	0	0	0.124	0.14	0.078	0	0	0
Artocarpus chaplasha	5.822	4.869	6.943	6.51	6.345	1.439	1.28	8.23	8.304	5.715	15.26	13.934
Artocarpus gomeziana	0.436	0.365	0	0.233	0	0	0	0	0	0	0	0.004
Bassia buriacea	0	0	4.131	3.873	1.928	0	0	0.292	0.33	0.184	0	0.13
Calophyllum inophyllum	0	0	0	0	0	0	0	0.003	0.003	0.002	0	0
Hopea odorata	0	0	2.189	2.053	1.022	0	0	0	0	0	0	0.065
Lagerstroemia hypoleuca	0.688	0.575	0	0.367	3.627	3.277	2.581	2.918	2.968	1.219	1.113	2.513
Lannea coromandelica	0.125	0.105	0	0.067	2.519	2.241	1.451	1.64	1.847	1.511	1.38	1.45
Mesua ferrea	0	0	0.001	0	0	0	0	0	0	0	0	0
Millettia species	0	0	0.012	0.011	0.006	0.13	0.116	0.61	0.69	0.432	0.358	0.327
Nuclea gagea	0	0	0	0	0	0	0.047	0.053	0.03	0	0	0.034
Planchonia andamanica	0.102	0.085	3.611	3.386	1.74	0.704	0.626	0.638	0.721	0.662	4.872	4.449
Podocarpus nerifolia	0	0	0	0	0	0	0	0	0	0	0	0
Terminalia manii	5.237	4.38	0	2.793	0.255	0.227	0.003	0.003	0.096	6.273	5.728	0.165
TOTAL	12.41	10.379	17.13	16.062	14.613	8.674	7.717	14.451	16.336	12.311	29.493	26.931
4. SOFTWOOD (COMMERCIAL)												
Alanthus excelsa	0	0	0	0	0	0	0	0	0	0	0	0
Anthocephalus cadamba	0.613	0.513	0	0.327	0.069	0.061	0.103	0.116	0	0	0	0.147
Canarium euphyllum	0.907	0.759	7.966	7.488	4.211	0.658	0.585	2.36	2.668	0	4.057	3.705
Endospermum chinense	0	0	0	0	0	0	0	0	0	0	0	0
Planchonella longepetiolatum	3.428	2.867	2.051	1.923	2.785	4.395	3.91	1.232	1.393	0	0.17	0.155
Pterocarpus tinctorum	10.9	9.118	4.518	4.236	7.922	7.884	7.015	6.587	7.446	0	1.953	1.783
Pterygota alata	7.588	6.346	4.29	4.023	6.049	0.522	0.464	0.65	0.735	0	0	0
Salmalia insignis	4.205	3.517	2.446	2.293	3.384	0.696	0.619	1.012	1.144	0	1.167	1.066

TABLE NO. 6.4 D

MIDDLE ANDAMAN

VOLUME PER HA. ACCORDING TO FOREST TYPES

S.NO.	UW	%	W	%	Wt. avg.	UW	%	W	%	Wt. avg.	UW	%	W	%	Wt. avg.
1.HARDWOOD(PLYWOOD)															
Amorea wallichii	0.283	0.245	0.378	0.594	0.33	0.087	0.093	0.883	0.755	0.301	0.096	0.158	0.001	0.002	0.043
Dipterocarpus spp	22.23	19.253	5.953	9.36	15.97	11.79	12.647	12.05	13.325	11.884	0.633	1.039	0.066	0.108	0.318
Parishia insignis	13.31	11.528	4.217	6.631	9.813	2.028	2.175	9.451	10.451	4.693	0.787	1.292	4.2	6.89	2.683
Terminalia biolata	0.136	0.118	0	0	0.084	5.396	5.788	0.028	0.031	3.469	3.85	6.318	4.516	7.408	4.22
Terminalia procera	7.509	6.503	3.535	5.558	5.981	3.613	3.876	2.609	2.885	3.253	2.645	4.341	6.26	10.289	4.653
TOTAL	43.468	37.647	14.083	22.144	32.166	22.914	24.58	24.821	27.447	23.599	8.011	13.147	15.043	24.677	11.918
2.HARDWOOD(ORNAMENTAL)															
Pterocarpus dalbergioides	11.52	9.977	0.003	0.005	7.09	11.3	12.122	8.266	9.14	10.211	20.29	33.297	11.975	19.644	15.67
Sageraea elliptica	0	0	0	0	0	0	0	0	0	0	0.021	0.034	0.037	0.061	0.03
TOTAL	11.52	9.977	0.003	0.005	7.09	11.3	12.122	8.266	9.14	10.211	20.311	33.332	12.012	19.705	15.7
3.HARDWOOD (CONSTRUCTIONAL)															
Adenanthra pavonica	3.858	3.341	0	0	2.374	0.001	0.001	0.75	0.829	0.27	1.063	1.744	0.261	0.428	0.617
Albizia lebbek	2.333	2.021	2.101	3.304	2.244	1.572	1.686	0	0	1.006	0.6	0.985	0.139	0.228	0.344
Artocarpus chaplasha	3.457	2.994	0.925	1.454	2.483	3.775	4.049	1.55	1.714	2.976	0.549	0.901	1.027	1.685	0.815
Artocarpus gomeziana	0	0	0	0	0	0.346	0.371	0.032	0.035	0.233	0	0	0	0	0
Bassia bulyracea	0.116	0.1	0	0	0.071	0	0	0.003	0.003	0.001	0.538	0.883	0.065	0.107	0.275
Calophyllum inophyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hopea odorata	0.081	0.07	0	0	0.05	1.221	1.31	0	0	0.783	0.967	1.587	0.158	0.259	0.518
Lagerstroemia hypoleuca	3.312	2.868	0.2	0.314	2.115	1.225	1.315	0.716	0.792	1.043	6.56	10.765	9.593	15.737	8.245
Lannea coromandelica	0	0	0.065	0.102	0.025	0.216	0.232	2.041	2.257	0.871	0.359	0.589	0.325	0.533	0.34
Mesua ferra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Millettia species	0.005	0.004	0	0	0.003	0.089	0.095	0.006	0.007	0.059	0.039	0.064	0.841	1.38	0.485
Nauclaea gagea	0.121	0.105	0	0	0.074	1.989	2.134	0	0	1.275	0.08	0.131	0.406	0.666	0.261
Planchonia andamanica	5.249	4.546	6.224	9.786	5.624	3.586	3.847	4.611	5.099	3.954	1.72	2.823	0.597	0.979	1.096
Podocarpus nerifolia	0	0	1.72	2.704	0.662	0	0	0	0	0	0	0	0	0	0
Terminalia manii	0	0	0	0	1.612	1.729	2.747	3.038	3.038	2.018	0.037	0.061	0.743	1.219	0.429
TOTAL	18.532	16.05	11.235	17.666	15.725	15.633	16.77	12.456	13.774	14.493	12.512	20.533	14.155	23.22	13.425
4.SOFTWOOD(COMMERCIAL)															
Ailanthus excelsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anthocephalus cadamba	0	0	0.527	0.829	0.203	0.008	0.009	0.125	0.138	0.05	0	0	0.069	0.113	0.038
Canarium euphyllum	0.982	0.85	1.473	2.316	1.171	2.55	2.735	4.326	4.784	3.188	0.525	0.852	1.741	2.856	1.201
Endospermum chinense	1.234	1.069	0	0	0.759	0.174	0.187	0	0	0.112	0.03	0.048	0	0	0.013
Planchonella longipetiolatum	1.413	1.224	0.579	0.91	1.092	0.666	0.714	1.19	1.316	0.854	0	0	0	0	0
Pterocarpus litorum	3.664	3.173	0.019	0.03	2.262	1.708	1.832	1.916	2.119	1.783	1.362	2.235	1.096	1.798	1.214
Pterygota alata	0.477	0.413	0.122	0.192	0.34	0.626	0.672	1.086	1.201	0.791	0.24	0.394	0.04	0.066	0.129
Salmalia insignis	0	0	0	0	0	3.759	4.032	0	0	2.41	0.307	0.504	0.939	1.54	0.658
Xanthoxylum rhoisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	7.77	6.729	2.72	4.277	5.828	9.491	10.181	8.643	9.557	9.187	2.464	4.044	3.885	6.373	3.253
5.NON COMMERCIAL															
Artocarpus lakoocha	0.33	0.286	3.017	4.744	1.363	1.395	1.496	0.183	0.202	0.96	0.519	0.652	0.703	0.333	0.343
Mynsica species	1.073	0.929	3.6	5.661	2.045	1.129	1.211	2.075	2.294	1.469	0.029	0.048	0.029	0.048	0.029
TOTAL	1.403	1.215	6.617	10.404	3.408	2.524	2.708	2.258	2.497	2.429	0.548	0.899	0.232	0.381	0.372
6.MISCELLANEOUS															
Rest of species	32.77	28.381	28.94	45.505	31.297	31.36	33.64	33.99	37.585	32.305	17.09	28.046	15.633	25.645	16.281
TOTAL	32.77	28.381	28.94	45.505	31.297	31.36	33.64	33.99	37.585	32.305	17.09	28.046	15.633	25.645	16.281
G.TOTAL	115.463	100	63.598	100	95.504	93.222	100	90.434	100	92.223	60.936	100	60.96	100	60.986

TABLE NO. 6.4E

MAYABANDAR DIVISION

VOLUME PER HA. ACCORDING TO FOREST TYPES

S.NO	EVERGREEN				SEMI-EVERGREEN				MOIST DECIDUOUS			
	UW	%	W	Wt. avg.	UW	%	W	Wt. avg.	UW	%	W	Wt. avg.
1. HARDWOOD (PLYWOOD)												
Amora wallichii	1.199	1.168	0	0	0.059	0.084	0	1.22	0.433	0	0	0
Dipterocarpus spp	43.56	42.418	2.286	3.956	16.8	23.961	20.51	21.682	18.067	0.1	0.018	0
Panshia insignis	8.547	8.323	0.098	0.17	2.253	3.213	4.804	5.076	3.124	0.827	1.454	2.989
Terminalia biclata	0	0	0	0	2.355	3.359	4.055	4.287	2.935	5.18	9.109	0.044
Terminalia procera	0.523	0.509	0	0	0.443	0.778	1.11	3.353	1.657	0.968	1.737	6.002
TOTAL	53.829	52.417	2.384	4.126	22.245	31.727	33.876	35.812	26.217	7.005	12.318	9.035
2. HARDWOOD (ORNAMENTAL)												
Pterocarpus dalbergoides	0	0	0	0	11.83	16.873	13.07	13.817	12.253	25.15	44.225	19.982
Sageraea elliptica	0	0	0	0	0	0	0.003	0.003	0.001	0.042	0.074	0.016
TOTAL	0	0	0	0	11.83	16.873	13.073	13.82	12.254	25.192	44.299	19.998
3. HARDWOOD (CONSTRUCTURAL)												
Adenanthera pavonica	0.182	0.177	0	0	0.154	2.212	0.501	0.53	1.192	1.579	2.777	0
Albizia lebbek	0	0	0	0	0.103	0.147	0.622	0.658	0.28	0.671	1.18	2.921
Artocarpus chaplasha	7.634	7.434	0.046	0	6.467	2.628	3.748	1.915	2.024	2.385	0.167	0.294
Artocarpus gomeziana	0.008	0.008	0.2	0.346	0.038	0.359	1.07	1.131	0.536	0.017	0.08	0
Bassia butyacea	0	0	0.2	0.346	0.031	1.067	2.883	3.048	1.486	0	0	0
Calophyllum inophyllum	0	0	0	0	0	0	0	0	0	0	0	0
Hopea odorata	0	0	0	0	0	0	0	0	0	0	0	0
Lagerstroemia hypoleuca	0.441	0.429	0	0	0.373	3.955	0.996	1.053	2.166	2.971	5.224	8.638
Lannea coromandelica	2.119	2.063	0	0	1.793	0.305	0.435	0.744	0.455	1.633	2.872	2.624
Mesua ferrea	0	0	0	0	0	0	0	0	0	0	0	0
Mitras species	0	0	0.022	0.038	0.008	0.065	0.093	0.328	0.347	0.155	0.017	0.08
Nuclea gagera	0	0	0	0	0	0.167	0.238	0.029	0.031	0.12	0.125	0.22
Planchonia andamanica	5.816	5.663	11.31	19.573	6.661	1.517	2.164	5.345	5.65	2.824	0.168	0.295
Podocarpus neriifolia	0	0	0	0	0	0	0	0	0	0	0	0
Terminalia manii	1.084	1.056	0	0	0.917	0.901	1.285	0	0.593	1.671	2.938	4.968
TOTAL	17.284	16.831	11.778	20.383	16.437	11.031	15.733	14.433	12.193	9.019	15.86	19.281
4. SOFTWOOD (COMMERCIAL)												
Ailanthus excelsa	0	0	0	0	0	0	0	0	0	0	0	0
Artrocephalus cadamba	0.782	0.751	0	0	0.662	0	0	0	0	0.001	0.002	0
Ganarium euphyllum	0	0	0	0	2.884	4.113	7.818	8.265	4.569	2.95	5.187	3.126
Endospermum chinense	0	0	0	0	0.191	0.272	1.982	2.095	0.803	0	0	0
Planchonella longipetiolatum	0.574	0.559	0.138	0.239	0.507	0.39	0.556	0.01	0.012	0.261	0	0
Pterocarpus tinctorum	0.283	0.276	0	0	0.239	2.218	3.163	0.898	0.949	1.767	1.31	2.304
Pterygola alida	0.521	0.507	0	0	0.441	1.719	2.452	0.342	0.362	1.249	0.239	0.42
Salmalia insignis	0	0	0	0	0.094	0.134	5.936	6.275	2.089	1.251	2.2	6.116
Xanthoxylum metisa	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2.16	2.103	0.138	0.239	1.89	7.496	16.987	17.958	10.737	5.751	10.113	10.697
5. NON COMMERCIAL												
Artocarpus lakoocha	0.036	0.035	0	0	0.03	0	0.057	0.368	0.152	0.008	0.014	0
Mystica species	6.654	6.48	3.583	6.201	6.182	0.602	0.859	1.258	0.826	0.002	0.004	0
TOTAL	6.69	6.515	3.583	6.201	6.212	0.642	0.916	1.626	0.978	0.01	0.018	0
6. MISCELLANEOUS												
Rest of species	22.73	22.134	39.9	69.051	25.372	16.87	24.061	14.6	15.434	9.891	17.393	20.578
TOTAL	22.73	22.134	39.9	69.051	25.372	16.87	24.061	14.6	15.434	9.891	17.393	20.578
G. TOTAL	102.693	100	57.783	100	95.766	70.114	100	94.595	78.473	56.868	100	79.589

TABLE NO. 6.4F

DIGLIPUR DIVISION

VOLUME PER HA. ACCORDING TO FOREST TYPES

S.NO	EVERGREEN		SEMIEVERGREEN		MOIST DECIDUOUS	
	UW	%	UW	%	UW	%
1. HARDWOOD (PLYWOOD)						
Anoora wallichii	2.898	3.66	0	0.074	0.064	0.014
Dipterocarpus spp	30.26	38.218	13.9	16.082	0	0.004
Panshia insignis	3.38	4.269	0	0	0.927	0.95
Terminalia biolata	0	0	2.566	2.969	0	1.327
Terminalia procera	4.615	5.829	0	0	5.493	6.765
TOTAL	41.153	51.975	0	0	22.952	10.086
2. HARDWOOD (ORNAMENTAL)						
Pterocarpus dalbergioides	0	0	11.94	13.814	0	0
Sageraea elliptica	0	0	0.037	0.043	0.037	0.071
TOTAL	0	0	11.977	13.857	0	0
3. HARDWOOD (CONSTRUCTIONAL)						
Adenanthera pavonica	0	0	0.219	0.253	0.219	0.104
Albizia lebbek	0	0	0.686	0.794	0.686	0.09
Artocarpus chaplasha	4.107	5.187	6.644	7.687	0.035	0.051
Artocarpus gomeziana	0.04	0.051	0	0.01	0.01	0.014
Bassia butyracea	2.015	2.545	0.2015	0.582	0.503	0.415
Calophyllum inophyllum	0	0	0	0	0	0
Hopea odorata	0	0	0.463	0.536	0.463	0.093
Lagerstroemia hypoleuca	0	0	0.733	0.848	0.733	4.721
Lannea coromandelica	0.899	1.135	1.742	2.015	1.742	4.099
Mesua ferra	0	0	0	0	0	0
Millettia species	0	0	0.076	0.088	0.076	0.155
Naudia pagasana	0	0	0.256	0.296	0.256	0.009
Planchonia andamanica	3.418	4.317	1.147	1.327	1.147	0.164
Podocarpus neriolia	0.13	0.164	0	0	0	0
Terminalia maritima	0.1	0.126	1.278	1.479	1.278	0.526
TOTAL	10.709	13.525	10.709	15.917	13.757	10.871
4. SOFTWOOD (COMMERCIAL)						
Alnus excelsa	0	0	0	0	0	0
Anthocephalus cadamba	0	0	0.029	0.034	0.029	0.028
Canarium euphyllum	0.902	1.139	1.905	2.204	1.905	2.864
Endospermum chinense	0	0	0.061	0.071	0.061	0.001
Planchonella longipetiolatum	0.956	1.207	0.956	0.007	0.007	0.136
Pterocarpus tinctorum	0.932	1.177	0.932	6.84	6.84	9.923
Pterygota alata	0.183	0.231	0.183	0.833	0.833	0.109
Salimalla insignis	0	0	1.262	1.46	1.262	2.459
Xanthoxylum rhetsa	0	0	0	0	0	0
TOTAL	2.973	3.755	2.973	12.654	10.937	15.581
5. NON COMMERCIAL						
Artocarpus lakoocha	0.344	0.434	0.344	0.882	0.344	0.206
Mystic species	9.909	12.515	9.909	1.708	1.476	0.009
TOTAL	10.253	12.949	10.253	2.589	2.238	0.151
6. MISCELLANEOUS						
Rest of species	14.09	17.795	14.09	28.427	24.57	20.719
TOTAL	14.09	17.795	14.09	28.427	24.57	20.719
G. TOTAL	79.178	100	79.178	100	86.431	100

Table No. 7.1A										
UTILIZABLE GROWING STOCK PER HA IN M ³ (BY STRATA AND UTILITIES)										
WORKED										
	L.A	S.A.	BTG	M.A	MAYA	DIGL	TOTAL OF ALL DIVISIONS	% TO TOTAL COMM.	% TO GRAND TOTAL	
AREA IN HA	3246.11	32378.96	27848.48	20819.35	19431.52	0	103724.41			
PLY	7.683	28.673	22.829	13.818	24.329	0	22.651	43.96	33.51	
%	13.4	38.47	35.54	25.37	31.86	0				
ORN	0	3.831	5.615	8.353	12.43	0	6.709	13.02	9.93	
%	0	5.14	8.74	15.33	16.28	0				
CONST.	29.472	9.218	9.581	9.828	12.897	0	10.761	20.88	15.92	
%	50.04	12.37	14.91	18.04	16.89	0				
T.HARDWOOD	37.155	41.722	38.025	31.999	49.656	0	40.121	77.86	59.36	
%	63.08	55.98	58.19	58.74	65.03	0				
SOFTWOOD	8.65	12.538	10.398	4.655	13.201	0	10.384	20.15	15.36	
%	14.69	16.83	16.19	8.54	17.29	0				
NON COMM.	9.532	0.494	2	0.169	0	0	1.023	1.97	1.51	
%	16.18	0.66	3.12	0.31	0	0				
TOTAL	55.337	54.754	50.423	36.823	62.857	0	51.528	100%	76.24	
%	93.95	73.47	78.5	67.59	82.32	0				
MISC	3.564	19.77	13.813	17.651	13.5	0	16.064		23.76	
%	6.05	26.53	21.5	32.41	17.68	0				
G.TOTAL	58.901	74.524	64.236	54.474	76.357	0	67.592		100%	

Table No. 7.1B										
UTILIZABLE GROWING STOCK PER HA IN M ³ (BY STRATA AND UTILITIES)										
UNWORKED										
	L.A	S.A.	BTG	M.A	MAYA	DIGL	TOTAL OF ALL DIVISIONS	% TO TOTAL COMM.	% TO GRAND TOTAL	
AREA IN HA	10940.9	19681.32	19658.07	26157.94	60238.5	66477.26	203153.99			
PLY	15.384	30.803	28.163	19.947	20.134	14.571	19.844	38.09	27.2	
%	13.62	32.6	27.87	27	34.1	23.07				
ORN	0	1.839	10.459	14.18	14.578	17.98	13.222	25.38	18.1	
%	0	1.95	10.35	19.19	24.7	28.46				
CONST.	19.398	7.971	13.116	12.282	8.604	7.892	9.801	18.82	13.4	
%	17.17	8.44	12.98	16.62	14.58	12.49				
T.HARDWOOD	34.782	40.613	51.737	46.409	43.316	40.443	42.867	82.29	58.9	
%	30.79	42.99	51.2	62.61	73.38	64.02				
SOFTWOOD	24.914	6.135	16.444	6.275	5.154	9.222	8.881	17.05	12.2	
%	22.06	6.5	16.27	8.49	8.73	14.6				
NON COMM.	0.778	1.118	0.275	0.492	0.15	0.18	0.344	0.66	0.4	
%	0.69	1.18	0.27	0.67	0.26	0.29				
TOTAL	60.474	47.866	68.456	53.176	48.62	49.845	52.092	100%	71.6	
%	53.54	50.67	67.74	71.97	82.37	78.91				
MISC	52.479	46.607	32.6	20.713	10.409	13.324	20.61		28.3	
%	46.46	49.33	32.26	28.03	17.63	21.09				
G.TOTAL	112.953	94.473	101.057	73.889	59.029	63.169	72.702		100%	

Table No. 7.1C											
UTILIZABLE GROWING STOCK PER HA IN M ³ (BY STRATA AND UTILITIES)											
WORKED + UNWORKED											
	L.A	S.A.	BTG	M.A	MAYA	DIGL	TOTAL OF ALL DIVISIONS	% TO TOTAL COMM.	% TO GRAND TOTAL		
AREA IN HA	14187	52060	47507	46977	79670	66477	306878				
PLY	13.622	29.478	25.036	17.231	21.157	14.571	20.793	40.06	29.3		
%	13.2	35.92	31.5	26.39	33.45	23.07					
ORN	0	3.078	7.619	11.598	14.054	17.98	11.021	21.23	15.53		
%	0	3.75	9.59	17.17	22.22	28.46					
CONST.	21.703	8.747	11.044	11.194	9.651	7.892	10.124	*19.51	14.27		
%	20.82	10.66	13.9	17.15	15.26	12.49					
T.HARDWOOD	35.325	41.303	43.699	40.023	44.862	40.443	41.938	80.8	59.1		
%	34.02	50.33	54.99	61.31	70.93	64.02					
SOFTWOOD	21.193	10.117	12.9	5.557	7.116	9.222	9.388	18.09	13.23		
%	20.92	12.33	16.23	8.51	11.25	14.6					
NON COMM.	2.781	0.73	1.286	0.349	0.11	0.18	0.574	1.11	0.8		
%	2.74	0.89	1.62	0.53	0.17	0.28					
TOTAL	59.299	52.15	57.885	45.929	52.088	49.845	51.9	100%	73.13		
%	57.68	63.55	72.84	70.35	82.35	78.91					
MISC	41.287	29.916	21.587	19.356	11.163	13.324	19.073		26.87		
%	42.32	36.45	27.16	29.65	17.65	21.09					
G.TOTAL	100.586	82.066	79.472	65.285	63.251	63.169	70.975		100%		

Table No. 7.2A														
ABSTRACT OF UTILIZABLE GROWING STOCK PER HA IN M ³ IN DIFFERENT FOREST TYPES - STRATA AND UTILITIES ANDAMAN ISLANDS														
	EVERGREEN			SEMIEVERGREEN			MOIST DECIDUOUS			TOTAL			TOTAL	
	WORKED	UNWORKED	TOTAL	WORKED	UNWORKED	TOTAL	WORKED	UNWORKED	TOTAL	WORKED	UNWORKED	TOTAL	WORKED	UNWORKED
AREA	24853	39652.92	64506.45	51672.9	94498.79	146171.69	27197.98	69002.28	96200.26	103724.41	203513.99	306878.4		
PLY PER HA	34.2	39.098	37.211	25.046	22.336	23.294	7.546	5.368	5.984	22.651	19.844	20.793		
%	45.35	44.87	45.04	32.87	28.59	30.08	17.1	9.41	11.21	33.51	27.29	29.28		
ORN PER HA	0.418	1.482	1.072	6.54	10.16	8.88	12.778	24.163	20.944	6.709	13.222	11.021		
%	0.55	1.7	1.3	8.58	13	11.46	28.95	42.39	39.25	9.92	18.18	15.52		
CONST. PER HA	10.369	11.603	11.128	12.424	10.773	11.357	7.959	7.434	7.583	10.761	9.801	10.124		
%	13.75	13.32	13.47	16.3	13.79	14.66	18.03	13.04	14.21	15.92	13.48	14.25		
SOFT WOOD PER HA	12.244	8.242	9.784	12.48	10.629	11.283	4.701	6.854	6.246	10.384	8.881	9.388		
%	16.23	9.46	11.84	16.38	13.6	14.57	10.65	12.02	11.7	15.36	12.21	13.22		
TOTAL PER HA	57.233	60.425	59.195	56.49	53.898	54.814	32.985	43.819	40.756	50.505	51.748	51.328		
%	75.9	69.35	71.65	74.14	68.99	70.78	74.75	76.88	76.38	74.71	71.17	72.31		
NON COMM. PER HA	3.035	0.734	1.62	0.595	0.337	0.428	0	0.129	0.093	1.024	0.344	0.574		
%	4.02	0.84	1.96	0.78	0.43	0.55	0	0.22	0.17	1.51	0.47	0.8		
TOTAL	75.43	29.09	104.52	30.74	31.81	62.55	0	8.93	8.93	106.17	69.83	176		
MISC PER HA	15.138	25.973	21.798	19.102	23.881	22.192	11.138	13.016	12.507	16.064	20.61	19.073		
%	20.07	29.81	26.39	25.07	30.57	28.65	25.24	22.89	23.44	23.76	28.34	26.87		
G.TOTAL PER HA	75.406	87.132	82.614	76.187	78.115	77.434	44.122	56.995	53.356	67.592	72.702	70.975		
	1874.11	3455.04	5329.14	3936.81	7381.81	11318.62	1200.04	3932.8	5132.84	7010.95	14769.65	21780.6		

Table No. 7.3T

**STATEMENT SHOWING THE BALANCE CONVERSION AREA AND
CONVERSION PERIOD BY DIVISIONS.**

1) LITTLE ANDAMAN

Area : 73439 ha

Forest area - 19,600 ha (leased to Corporation)

i	Deduct plantations area	1614 ha
ii	Deduct NRAS upto 93-94	3193 ha
iii	Deduct app. NRA for 94-95 & 95-96 @ 800 per year	1600 ha
iv	Balance unworked area from 97	13193 ha
v	Remaining conversion period 67 years	

2) SOUTH ANDAMAN

i	C W C area	47500 ha
ii	Area converted	20245 ha (upto 1989)
iii	Approximate area converted in 7 years @ 500 ha per year from 1990-1996	3500
iv	Balance area from 1997	23755 ha
v	Remaining conversion period	48 years

3. BARATANG DIVISION

i	C W C area	43556 ha
ii	Area converted	8748ha (upto 1986-87)
iii	Approximate area converted in 10 years upto 1996 @ 600 ha from 1990-96	6000 ha
iv	Balance area	28808 ha
v	Remaining conversion period	48 years

4. MIDDLE ANDAMAN

i	C W C area	59923 ha
ii	Area converted upto 1992-93	32623 ha
iii	Approximate area converted from 1992-93 to 1996-97 i.e. 5 years @ 525 ha per year	2625 ha
iv	Balance area from 1997-98	24675 ha
v	Remaining conversion period	47 years

5. MAYABANDAR DIVISION

		Forest Divin.	ANIFPDC
i	C W C area	68288 ha	11188 ha
ii	App. area converted up to 1995-96	12081ha	3706 ha
iii	Area to be converted in 96-97 on average from 1990-1996.	425ha	425 ha
iv	Balance area (a - b + c)	55782 ha	7057 ha
v	Remaining conversion period	56 years	

6. DIGLIPUR DIVISION

i	C W C area	91556 ha
ii	Area converted	400 ha (up to 95-96)
iii	Estimated (conversion in 96-97)	400 ha
iv	Balance	90756 ha
v	Conversion period	73 years

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TABLE NO. 8.1A													
NO. OF SEEDLINGS PER HA IN COMMERCIAL CATEGORY ACCORDING TO UTILITY FOR ESTT. STOCKING.													
ESTT. STOCKING PER HA = ESTABLISHED SEEDLINGS PER HA + UNESTT. SEEDLINGS PER HA/4													
	ANDAMAN	EVERGREEN	SEMI- EVERGREEN	MOIST DECIDUOUS	LITTLE ANDAMAN	SOUTH ANDAMAN	BARATANG	MIDDLE ANDAMAN	MAYABAND AR	DIGLIPUR			
No. of sample plots	419	89	200	130	36	71	54	83	77	98			
Ply wood	79	203	59	25	61	185	64	52	35	74			
%	22.45	49.51	21.07	5.92	21.48	44.57	20.26	18.31	11.82	16.48			
Constructional	106	142	95	99	110	164	115	124	79	64			
%	30.11	34.63	33.93	23.7	38.73	39.52	36.39	43.66	26.69	14.25			
Ornamental	113	26	59	255	7	29	87	96	107	245			
%	32.1	6.35	21.07	60.43	2.47	6.99	27.53	33.8	36.15	54.57			
Soft	54	39	67	42	106	37	50	12	75	66			
%	15.34	9.51	23.93	9.95	37.32	9.92	15.82	4.23	25.34	14.7			
Total Commercial	352	410	280	421	284	415	316	284	296	449			
%	15.09	16.44	12.68	17.47	13.14	18	16.66	9.49	17.27	17.41			
Miscellaneous	1981	2084	1929	1989	1877	1891	1581	2707	1418	2130			
%	84.91	83.56	87.32	82.53	86.86	82	83.34	90.51	82.73	82.59			
Grand Total	2333	2494	2209	2410	2161	2306	1897	2991	1714	2579			
SE%	3.41	8.69	4.92	5.16	10.49	10.04	9.1	6.98	6.34	6.18			

TABLE NO. 8.1B											
NO. OF RECRUITS PER HA IN COMMERCIAL CATEGORY ACCORDING TO UTILITY FOR EST. STOCKING.											
ESTT. STOCKING PER HA = ESTABLISHED SEEDLINGS PER HA + UNESTT. SEEDLINGS PER HA/4											
	ANDAMAN	EVERGREEN	SEMI- EVERGREEN	MOIST DECIDUOUS	LITTLE ANDAMAN	SOUTH ANDAMAN	BARATANG	MIDDLE ANDAMAN	MAYABAND AR	DIGLIPUR	
Ply wood	239	443	135	259	44	333	137	73	272	408	
% to total comm.	27.57	46.78	20.39	22.96	7.97	34.08	16.36	10.96	36.23	35.4	
Constructional	244	379	234	167	297	499	152	240	200	124	
%	28.14	39.99	35.35	14.8	53.8	51.07	18.09	36.04	26.58	10.68	
Ornamental	246	57	106	591	8	89	435	253	123	427	
%	28.37	6	16.01	52.39	1.45	9.11	51.74	37.99	16.38	36.78	
Soft	138	68	187	111	203	56	116	100	156	202	
%	15.92	7.23	28.25	9.85	36.78	5.74	13.8	15.01	20.81	17.4	
Total Commercial	867	947	662	1128	552	977	840	666	751	1161	
% to grand total	16.99	17.23	14.01	20.83	18.99	18.74	21.4	10	17.69	17.59	
Miscellaenous	4235	4551	4062	4286	2355	4236	3085	4997	3498	5439	
% to grand total	83.01	82.77	85.99	79.17	81.01	81.26	81.26	78.6	90	82.41	
Grand Total	5102	5498	4724	5404	2907	5213	3925	6663	4249	6600	

TABLE NO. 8.1C													
DIVISIONWISE ABSTRACT OF REGENERATION STATUS PER HA IN ANDAMAN													
IRRESPECTIVE OF FOREST TYPES (Assumption - Fully stocked area - 1 = 2500 seedlings per ha)													
DIVISION	AV.HT. OF UNESTT. SEEDLINGS (M)	COMMERCIAL				MISCELLANEOUS				TOTAL			
		Wt.AV. Height of seedlings (m)	KI	SI	KSP	Wt.AV. Height of seedlings (m)	KI	SI	KSP	Wt.AV. Height of seedlings (m)	KI	SI	KSP
LANDAMAN	1.6	2.14	0.71	0.114	8.09	2.29	0.76	0.751	57	2.27	0.76	0.86	65.69
(NO. OF PLOTS-36)													
S.ANDAMAN	1.6	2.09	0.7	0.166	11.63	2.1	0.7	0.756	52.94	2.1	0.7	0.922	64.57
(NO. OF PLOTS-71)													
BARATANG	1.5	1.87	0.62	0.126	7.81	1.89	0.63	0.632	39.85	1.88	0.63	0.759	47.82
(NO. OF PLOTS -54)													
M.ANDAMAN	1.8	2.18	0.73	0.114	8.32	2.03	0.68	1.083	73.63	2.04	0.68	1.196	81.35
(NO. OF PLOTS =83)													
MAYABANDER	1.6	2.15	0.72	0.119	8.57	2.05	0.68	0.567	38.56	2.07	0.69	0.686	47
(NO. OF PLOTS = 77)													
DIGLIPUR	1.7	2.12	0.71	0.18	12.78	2.03	0.68	0.852	57.92	2.04	0.68	1.032	70.14
(NO. OF PLOTS = 98)													
TOTAL (NO. OF PLOTS=419)													

TABLE NO. 8.1 D													
ABSTRACT OF REGENERATION STATUS PER HA FOR THE ENTIRE ANDAMAN ISLANDS AND ACCORDING TO FOREST TYPES (ASSUMPTION - FULLY STOCKED AREA - 1=2500 SEEDLINGS)													
Particulars	Av.Ht. Of Unestt. Seedlings (m)	COMMERCIAL				MISCELLANEOUS				TOTAL			
		Wt. Av. Height of seedlings	KI	SI	KSP	Wt. Av. Height of seedling (m)	KI	SI	KSP	Wt. Av. Height of seedling (m)	KI	SI	KSP%
Evergreen Stratum (No. of plots = 89)	1.72	2.12	0.71	0.164	11.6	2.06	0.69	0.833	57.48	2.07	0.69	1	68.9
Semi-Evergreen Stratum (No. of plots = 200)	1.63	2.09	0.7	0.112	7.84	2.02	0.67	0.772	51.72	2.03	0.68	0.884	60.11
Moist Deciduous stratum (No. of plots = 130)	1.56	2.04	0.68	0.169	11.49	1.93	0.64	0.796	50.94	1.95	0.65	0.964	62.66
Total for Andaman (No. of plots = 419)	1.63	2.08	0.69	0.14	9.66	1.98	0.66	0.792	52.27	2.01	0.67	0.933	62.51

TABLE NO. 8.2A NO. OF SEEDLINGS PER HA FOR WORKED AND UNWORKED AREAS AT FOREST DIVISIONS																																									
PLYWOOD						CONSTRUCTIONAL						ORNAMENTAL						SOFTWOOD						TOTAL						MISCELLANEOUS						GRAND TOTAL					
E	IUE	IR	E	IUE	R	E	IUE	R	E	IUE	R	E	IUE	R	E	IUE	R	E	IUE	R	E	IUE	R	E	IUE	R	E	IUE	R												
L Andaman																																									
Worked (5)	60	100	68	84	360	380	0	0	0	36	20	20	180	480	468	620	596	424	800	1076	8920																				
% Comm.	33.333	20.833	14.529	46.66	75	81.196	0	0	0	20	4.166	4.273	100	100	100																										
% Total													22.5	44.6	52.466	77.5	55.39	47.533	100	100	100																				
Un worked (31)	43	57	40	61	154	284	8	2	8	94	232	206	306	306	565	1607	1793	2667	1813	2100	3232																				
% Comm.	20.873	18.627	7.0796	29.61	50.327	50.265	3.8834	0.6535	1.415	45.6	30.71	41.06	100	100	100	100	100	100																							
% Total													11.362	14.57	17.481	88.637	85.38	82.518	100	99.952	100																				
S Andaman																																									
Worked (44)	183	243	382	122	275	386	24	60	85	36	72	365	598	905	1348	3017	3838	1713	3615	4744																					
% Comm.	50.136	40.635	40	33.42	45.987	42.651	6.5753	10.033	9.392	9.86	3.344	7.955	100	100	100																										
% Total													21.307	16.54	19.076	78.692	83.457	80.902	100	100	99.978																				
Unworked (27)	59	123	288	61	233	676	5	33	94	23	27	30	148	416	1088	1112	17391	4861	1260	2155	5949																				
% Comm.	39.864	29.567	26.47	41.21	56.01	62.132	3.3783	7.9326	8.639	15.5	6.49	2.757	100	100	100																										
% Total													11.746	19.3	18.288	88.253	80.696	81.711	100	100	100																				
Baratang																																									
Worked (28)	46	119	217	125	199	99	42	239	424	53	87	69	266	644	808	891	2180	2592	1157	2824	3401																				
% Comm.	17.293	18.478	26.856	46.99	30.901	12.252	15.789	37.111	52.47	19.9	13.5	8.539	100	100	100																										
% Total													22.99	22.8	23.757	77.009	77.195	76.212	100	100	99.97																				
Un worked (26)	10	168	52	28	91	209	32	151	445	13	44	167	83	454	873	950	3153	3616	1033	3608	4489																				
% Comm.	12.048	37.004	5.9564	33.73	20.044	23.94	38.554	33.259	50.97	15.6	9.691	19.12	100	100	100																										
% Total													8.0348	12.58	19.447	91.965	87.389	80.552	100	99.972	100																				
M Andaman																																									
Worked (28)	54	47	37	102	151	229	106	156	0.303	4	1	1	265	354	570	1447	5001	5946	1712	5355	6516																				
% Comm.	20.377	13.276	6.4912	38.49	42.655	40.175	40	44.067	53.15	1.5	0.282	0.175	100	100	100																										
% Total													15.478	6.611	8.7476	84.521	93.389	91.252	100	100	100																				
Un worked (45)	28	54	103	57	209	251	31	96	210	3	66	183	118	425	747	1223	5973	4196	1341	6398	4944																				
% Comm.	23.728	12.705	13.788	48.3	49.176	33.601	26.271	22.588	28.11	2.54	15.52	24.49	100	100	100																										
% Total													8.7994	6.642	15.109	91.2	93.357	84.87	100	100	99.979																				
Mayabandar																																									
Worked (18)	17	107	108	33	40	164	82	88	32	14	76	151	147	310	456	737	2237	3288	883	2457	3743																				
% Comm.	11.584	34.516	23.684	22.44	12.903	35.964	55.782	28.387	7.017	9.52	24.51	33.11	100	100	100																										
Un worked (59)	18	59	322	74	65	210	79	113	151	63	98	158	235	235	842	987	1677	3563	1221	2212	4404																				
% Comm.	7.6595	17.559	38.242	31.48	19.345	24.94	33.617	33.63	17.93	26.8	29.16	18.76	100	100	100																										
% Total													19.246	19.246	19.118	80.835	84.855	80.903	100	100	100																				
Diglipur																																									
Worked (Nil)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																				
Un worked (98)	43	124	408	40	98	124	172	292	427	40	104	202	295	295	1161	1218	3645	5439	1513	4264	6600																				
% Comm.	14.576	20.032	35.142	13.55	15.832	10.68	58.305	47.172	36.77	13.5	16.8	17.39	100	100	100																										
% Total													19.497	19.497	17.59	80.502	85.483	82.409	100	100	100																				

ANNEXURE I																
LOCAL VOLUME TABLE ADOPTED BY THE FOREST DEPARTMENT OF ANDAMAN AND NICOBAR ISLANDS IN M ³ IN QUARTER GIRTH MEASURE (Girth in cm)																
Species	30-59	60-89	90-119	120-149	150-179	180-209	210-239	240-269	270-299	300-329	330-359	360-389	390-409	410-449	450 & over	465
Mid point of girth	45	75	105	135	165	195	229	255	285	315	345	375	405	435	465	465
Padauk	0	0	0.2	0.34	0.7	1.2	1.73	2.38	3	3.7	4.38	5.25	6.17	7.04	0	0
Gurjan	0	0	0.12	0.4	1.05	2	3.25	4.65	6.1	7.4	9	10.6	12.4	14.3	18.65	0
Black Chuglam	0	0	0.2	0.51	1.08	1.83	2.57	3.32	4.15	5.05	6.1	7.12	8.1	9.1	0	0
White Chuglam	0	0	0.18	0.42	1	1.72	2.63	3.6	4.48	5.98	6.38	7.75	8.5	9.65	11	0
Badam	0	0	0.2	0.46	1.15	1.83	2.7	3.65	4.8	5.95	7.22	9.72	110.5	0	0	0
Pyinma	0	0	0.24	0.38	0.64	1	1.47	2	2.63	3.26	4.08	4.87	5.72	6.7	0	0
Red Dhup	0	0	0.15	0.59	1.17	1.75	2.39	3.2	4.2	5.5	7	8.8	11.13	11.2	0	0
Koko	0	0	0.12	0.42	0.9	1.48	2.1	2.98	4	5.03	6.32	0	0	0	0	0
Taungpeing	0	0	0.2	0.43	0.8	1.32	1.97	2.7	3.5	4.8	6.58	8.1	0	0	0	0
Mohwa	0	0	0.08	0.26	0.9	1.72	2.55	3.6	4.78	5.9	7.15	8.52	9.88	0	0	0
Red Bombway	0	0	0.13	0.38	0.8	1.32	1.98	2.65	3.42	4.52	5.78	7	0	0	0	0
White Dhup	0	0	0.33	0.65	1.12	1.68	2.5	3.37	4.42	5.63	6.88	8.45	10.77	12.07	14.23	0
Papita	0	0	0.1	0.42	0.98	1.72	2.78	3.85	5.02	6.32	7.8	9.34	0	0	0	0
Didu	0	0	0.1	0.39	1	1.72	2.52	3.42	4.4	5.44	6.62	8	9.5	10.34	0	0
Bakota	0	0	0.24	0.5	1.03	1.75	2.42	3.18	4.08	5.15	6.28	7.6	0	0	0	0
Lal Thingam & Safed Thingam	0	0	0.63	1.05	1.54	2.17	2.96	3.83	4.86	6.18	0	0	0	0	0	0
Jaiphal	0	0	0	0.58	1.2	1.86	2.54	3.4	0	0	0	0	0	0	0	0
Lalchini	0	0	0	0.37	0.88	1.54	2.25	3.05	3.93	4.8	5.7	6.68	7.72	8.8	0	0
Lambapathi	0	0	0	0.55	1.25	2.08	2.95	3.83	4.73	5.65	0	0	0	0	0	0
Kadam	0	0	0	0.35	0.98	1.72	2.6	3.55	4.58	0	0	0	0	0	0	0
Note: As volume tables have not been made available for all listed species, the following values will be adopted for the calculation of volume for the species mentioned below.																
1. Lakuch													Same volume table as Tongpoing			
2. Nabba and Ywogi													Same volume table as Padauk			
3. Lotkok													Same volume table as Papita			
4. Yonanin and Ailanthus													Same volume table as Bakota			
5. Gyrocharpus													Same volume table as White Dhup			
6. Chobi, Kala lakhri, Jungli sagwan, Hinkala, Thitmin, Poon, Gangew, Thitkandu and other hardwoods and softwoods													Same volume table as Mohwa			

ANNEXURE II

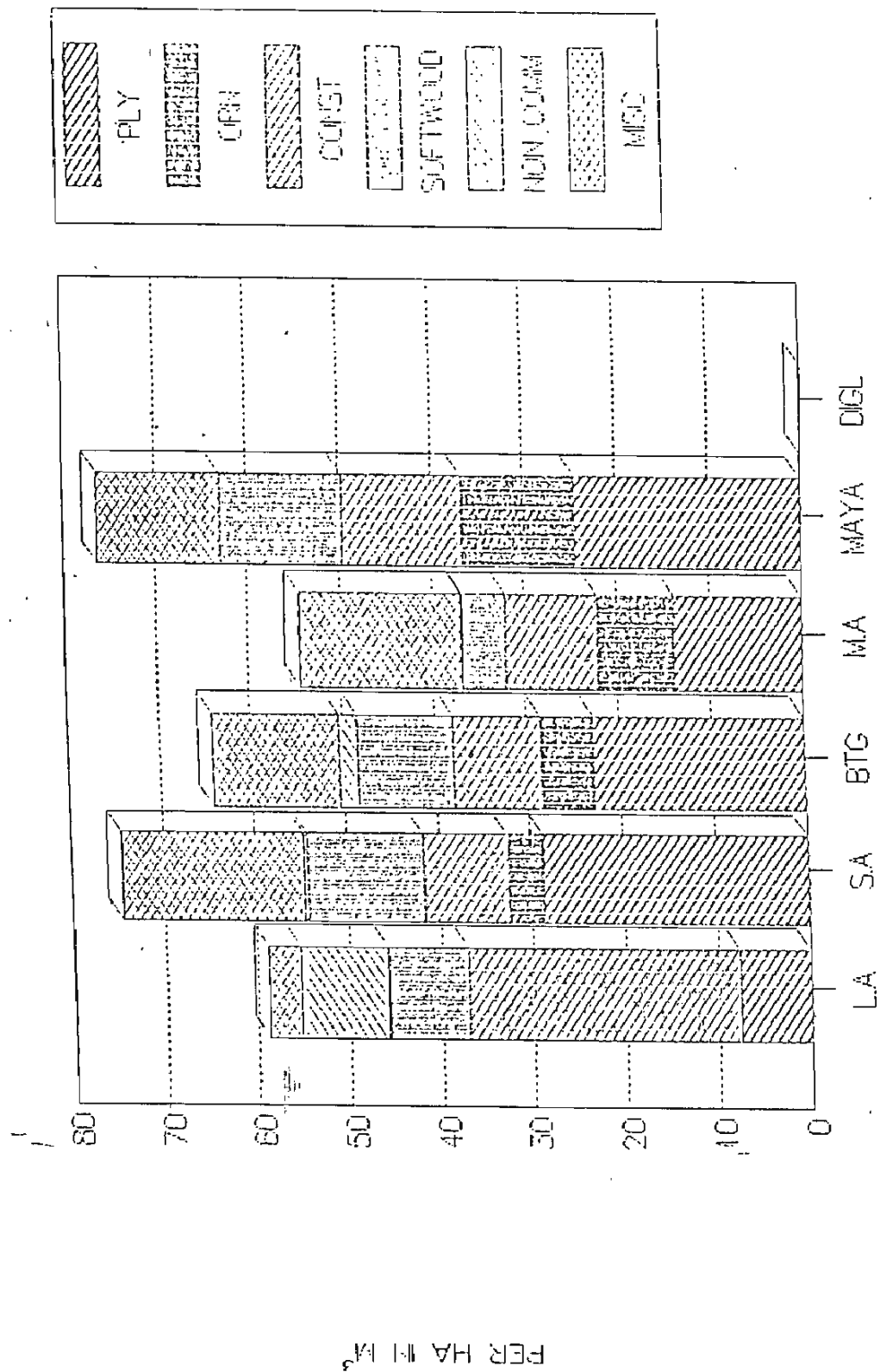
UTILITY WISE CLASSIFICATION OF TREE SPECIES IN ANDAMANS

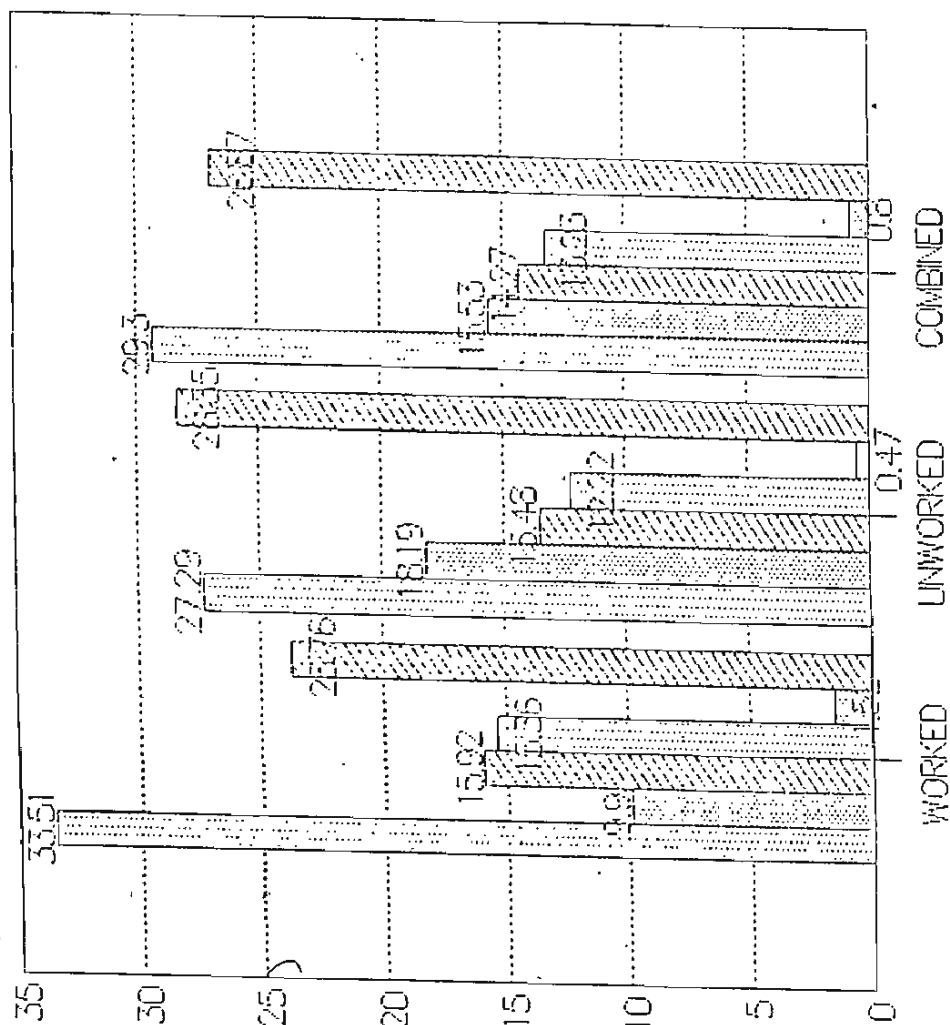
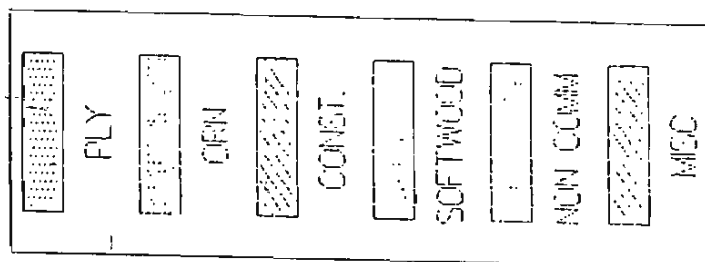
UTILITY	S. SPECIES No.	MANUAL CODE NO.	SCIENTIFIC NAME
I. Hard wood Ply - wood (Exploitable diam. at BH 50 cm and above)	1. Gurjan	298	Dipterocarpus spp.
	2. Badam	870	Terminalia procera
	3. White Chuglam	862	Terminalia bialata
	4. Lalchini	064	Amoora wallichii
	5. Red Dhup	664	Perishia insignis
II. Hardwood Ornamental (Exploitable dia. at BH 50 cm and above)	1. Padauk	721	Pterocarpus dalbergioides
	2. Satinwood (Malai lakdi)	621	Murraya paniculata
	3. Marble wood	284	Diospyros marmorata
	Chooi	771	Sageraea elliptica.

III. Hardwood Constructional (Exploitable dia. at BH 50 cm and above)	1. Koko	046	<i>Albizia lebbek</i>
	2. Pyinma	502	<i>Lagerstroemia hypoleuca</i>
	3. Taungpeing	089	<i>Artocarpus chaplasha</i>
	4. Thinganlal	717	<i>Prunus martabanica</i>
	5. Thingan safed	459	<i>Hopea odorata</i>
	6. Black chuglam	867	<i>Terminalia manii</i>
	7. Jungli Am	568	<i>Mangifera andamanica</i>
	8. Mohwa	110	<i>Bassia butyracea</i>
	9. Ye padauk	248	<i>Cratoxylon formosum</i>
	10. Nabbe	509	<i>Lannea coromandelica</i>
	11. Thitmin	695	<i>Podocarpus neriifolia</i>
	12. Jungli sagwan	604	<i>Milinsa species</i>
	13. Gangaw	593	<i>Mesua ferrea</i>
	14. Kalalakuch	090	<i>Artocarpus gomeziana</i>
	15. Sea Mahuwa (Khara mahuwa)	610	<i>Mimusops littoralis</i>
	16. Red Bombwa		
	17. Chakrassy (Bongipoma)	692 208	<i>Planchonia andamanica</i> <i>Chukrasis vellutina</i>
	18. Thinkla (Teinkla)	631	<i>Nauclea gageana</i> -
	19. Yewgi		
	20. Poon	027 156	<i>Adenanthera pavonica</i> <i>Callophyllum inophyllum</i>

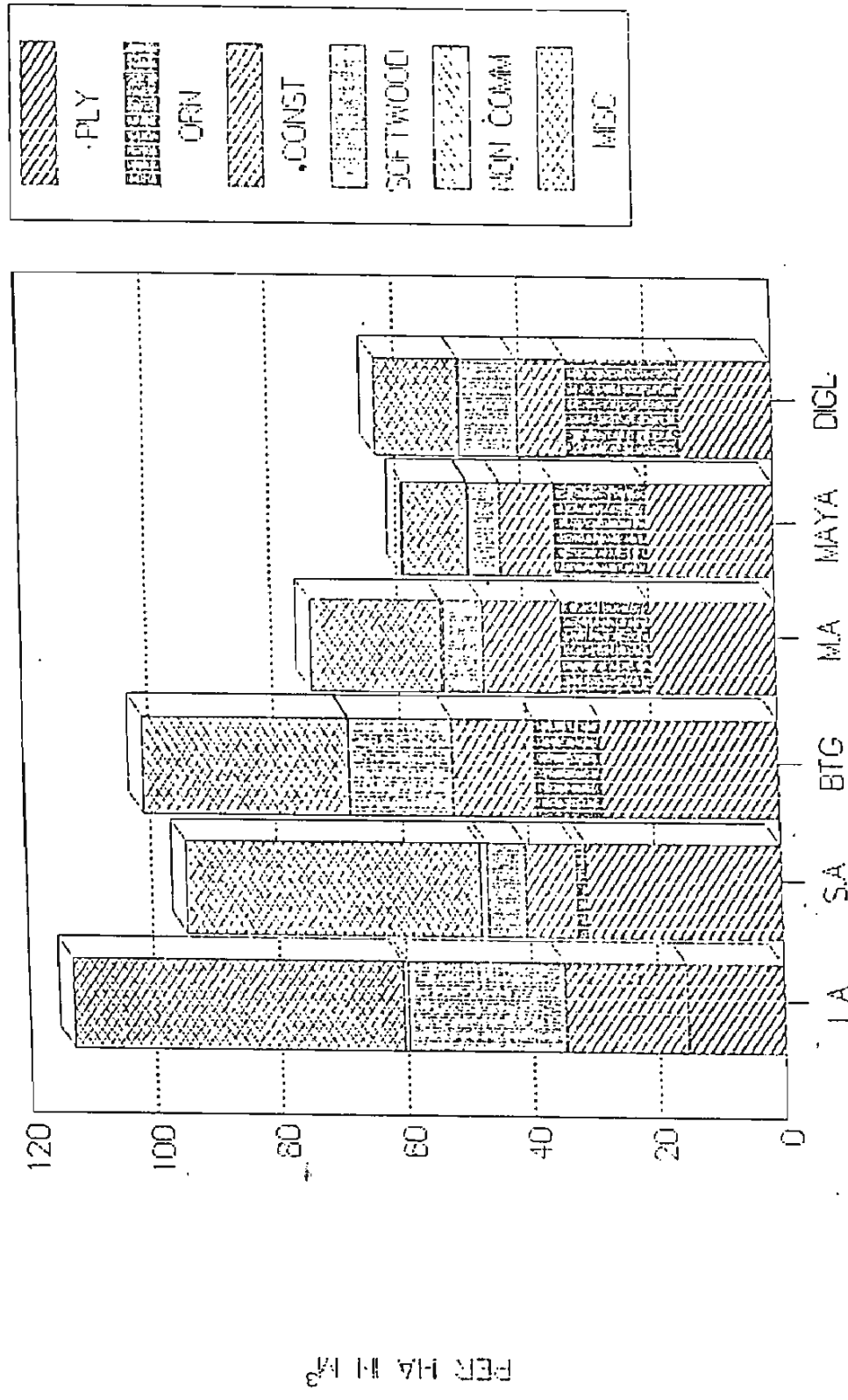
IV. Hardwood Commercial (Exploitable dia. at BH 40 cm and above)	1. White Dhup	165	Canarium euphyllum
	2. Bakota	326	Endospermum chinense
	3. Kandam	074	Anthocephalus cadamba
	4. Papita	724	Pterocymbium tinctorium
	5. Lamba patti	691	Planchonella longipetiolatum
	6. Thitpok	873	Tetrameles nudiflora
	7. Didu	778	Salmaia insignis
	8. Evodia	370	Evodia spp.
	9. Maharukh (Ailanthus)	040	Ailanthus excelsa -
	10. Bombeza (Bonmeza)	044	Albizia chinensis
	11. Letkok	732	Pterygota alata
	12. Mayanin	914	Xanthoxylum rhetsa
Non-commercial species (Exploitable dia. at BH 60 cm and above)	1. Jungli lakuch	093	Artocarpus lakoocha
	2. Jungli neem	944	Ganophyllum falcatum (Not given in the manual. Hence code 944).
	3. Khataphal	104	Baccaurea sapida
	4. Siris (Rain tree)	329	Enterolobium saman
	5. Jungli marian (Marian)	134	Bouea burmica
	6. White chilka	451	Hibiscus tiliaceus
	7. Karkot	277	Dillenia spp
	8. Jungli lataw	035	Agalia andamanica
	9. Jungli chilka (Red chilka)	821	Sterculia villosa
	10. Jungli kaju (Bara bhillwa)	799	Semicarpus kurzii
	11. Jaiphal	630	Myristica spp
	12. Gular	385	Ficus spp.
Miscellaneous species (Exploitable dia. at BH 60 cm and above)	All other species are categorized under Miscellaneous species.		

UTILIZABLE GROWING STOCK PER HA IN M ³ (BY STRATA AND UTILITIES)										ANNEXURE III
WORKED										
	L.A.	S.A.	BTG	M.A.	MAYA	DIGL	TOTAL OF ALL DIVN.	% TO TOTAL COMM.	% TO GRAND TOTAL	
AREA IN HA	3246.1	32378.96	27848.48	20819.4	19431.5	0	103724.41			
Ply wood	7.683	28.673	22.829	13.818	24.329	0	22.651	43.96	33.51	
%	13.4	38.47	35.54	25.37	31.86	0				
Ornamental	0	3.831	5.615	8.353	12.43	0	6.709	13.02	9.93	
%	0	5.14	8.74	15.33	16.28	0		•		
Constructional	29.472	9.218	9.581	9.828	12.897	0	10.761	20.88	15.92	
%	50.04	12.37	14.91	18.04	16.89	0				
T.Hardwood	37.155	41.722	38.025	31.999	49.656	0	40.121	77.86	59.36	
%	63.08	55.98	58.19	58.74	65.03	0				
Softwood	8.65	12.538	10.398	4.655	13.201	0	10.384	20.15	15.36	
%	14.69	16.83	16.19	8.54	17.29	0				
Non Commercial	9.532	0.494	2	0.169	0	0	1.023	1.97	1.51	
%	16.18	0.66	3.12	0.31	0	0				
Total	55.337	54.754	50.423	36.823	62.857	0	51.528	100%	76.24	
%	93.95	73.47	78.5	67.59	82.32	0				
Miscellaenous	3.564	19.77	13.813	17.651	13.5	0	16.064		23.76	
%	6.05	26.53	21.5	32.41	17.68	0				
G.Total	58.901	74.524	64.236	54.474	76.357	0	67.592		100%	



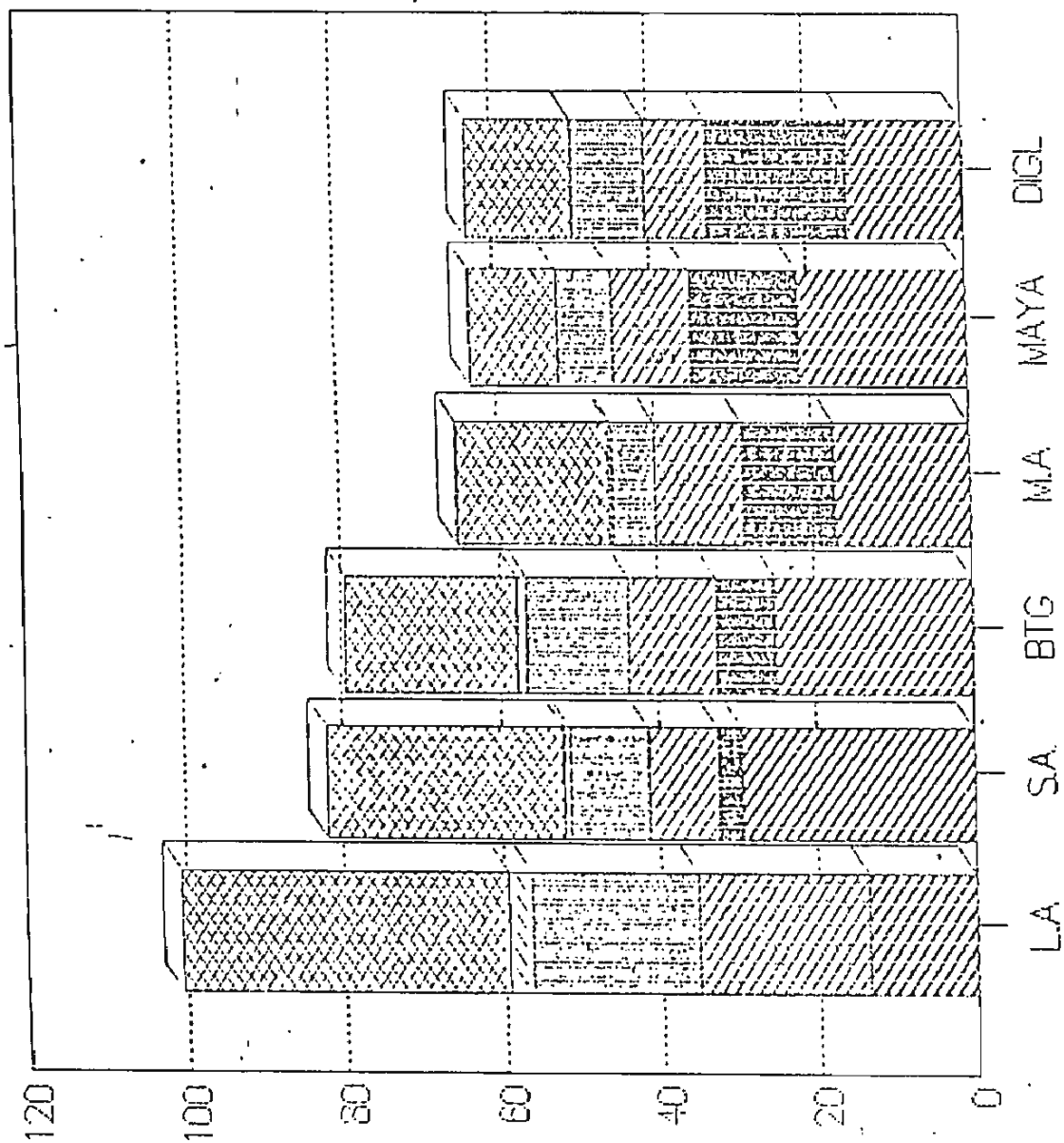
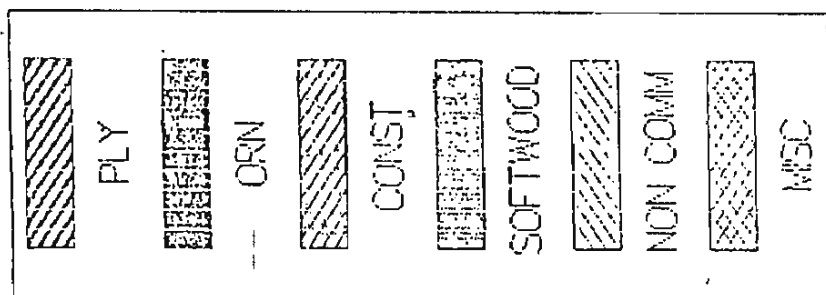


UTILIZABLE GROWING STOCK IN PERCENTAGES



DIVISIONWISE UTILIZABLE G-STOCK/HA-(UW)

ANNEXURE VIII										
TOTAL VOLUME PER HA IN WORKED AND UNWORKED STRATUM										
WORKED + UNWORKED										
	L.A.	S.A.	BTG	M.A.	MAYA	DIGL	TOTAL OF ALL DIVN.	% TO TOTAL COMM.	% TO GRAND TOTAL	
AREA IN HA	14187	52060	47507	46977	79670	66477	306878			
Ply wood	13.622	29.478	25.036	17.231	21.157	14.571	20.793	40.06	29.3	
%	13.2	35.92	31.5	26.39	33.45	23.07				
Ornamental	0	3.078	7.619	11.598	14.054	17.98	11.021	21.23	15.53	
%	0	3.75	9.59	17.17	22.22	28.46				
Construction	21.703	8.747	11.044	11.194	9.651	7.892	10.124	19.51	14.27	
%	20.82	10.66	13.9	17.15	15.26	12.49				
T.Hardwood	35.325	41.303	43.699	40.023	44.862	40.443	41.938	80.8	59.1	
%	34.02	50.33	54.99	61.31	70.93	64.02				
Softwood	21.193	10.117	12.9	5.557	7.116	9.222	9.388	18.09	13.23	
%	20.92	12.33	16.23	8.51	11.25	14.6				
Non Commercial	2.781	0.73	1.286	0.349	0.11	0.18	0.574	1.11	0.8	
%	2.74	0.89	1.62	0.53	0.17	0.28				
Total	59.299	52.15	57.885	45.929	52.088	49.845	51.9	100%	73.13	
%	57.68	63.55	72.84	70.35	82.35	78.91				
Miscellaenous	41.287	29.916	21.587	19.356	11.163	13.324	19.073		26.87	
%	42.32	36.45	27.16	29.65	17.65	21.09				
G.Total	100.586	82.066	79.472	65.285	63.251	63.169	70.975		100%	



DIVNWISE UTILIZABLE G.STOCK/HA - TOTAL

LIST OF OFFICERS AND STAFF ASSOCIATED WITH SURVEY
WORK IN ANDAMAN AND NICOBAR ISLANDS.

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