UNIT 2

LAND USE AND STATUS OF FORESTS IN NORTH-EAST INDIA

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2.0 INTRODUCTION

The north-east region has a geographical area of 25,509 sq. km and shares international border with four countries viz., Bhutan, China, Myanmar and Bangladesh. North-east is connected to the rest of the country by 22 km long Siliguri corridor. According to 2001 census, the total population of the region is 38,495,000. The region is predominantly mountainous interspersed with valleys and river plains. The altitudinal variation ranges from flood plains of Brahmaputra to high Himalayan peaks attaining a height of more than 7,200 m above sea level. Associated with altitudinal variation, a wide range of climatic condition is experienced in the region. Based on edaphic and climatic conditions the region is divided into five major agro-climatic zones. In general, the region may be characterised by heavy precipitation, rich forest cover and biodiversity, fragile mountain ecosystems, high seismicity, a drainage pattern marked by valleys dissected by two major rivers viz., Brahmaputra and Barak and their tributaries, and low population density.

2.1 LAND USE

The land use pattern among different north-eastern states varies widely. Except in Brahmaputra and Barak valleys of Assam where substantial areas are under agriculture, major portion of north-east is under forests and little area is available for settled cultivation. Shifting cultivation is the main form of agriculture in these hills. On an average, 3,869 sq. km area is put under shifting cultivation every year and an estimated 4,43,336 households earn their livelihood from shifting cultivation. The land use in the seven states is shown in Table 2.1 and data on shifting cultivation are presented in Table 2.2.

Table 2.1 : Land use classification (Area in sq. km) in North-Eastern states (1994-95)

State	Geo-graphical area	Reported area of land utilisation	Area not available for cultivation			Other uncultivated land excluding fallow land			Fallow land		Net area sown
			Forest area	Area put to non-agricultural uses	Barren and uncultivable land	Permanent pastures and other grazing land	Cultivable waste-land	Others	Current fallows	Fallow land other than current fallow	
Arunachal Pradesh	8374	5495	5154	a	48	b	b	44	28	36	185
Assam	7844	7850	2012	1022	1429	158	91	214	74	70	2780
Manipur	2233	2211	602	26	1419	b	b	24	–	–	140
Meghalaya	2243	2241	938	84	142	–	484	160	66	166	201
Mizoram	2108	2085	1599	–	47	–	174	–	–	162	109
Nagaland	1658	1549	863	47	–	–	82	137	117	97	206
Tripura	1049	1049	606	133	c	b	1	27	4	1	277
Total	**25,509**	**22,480**	**11,774**								**3898**

Note : (a) included under 'Barren and uncultivable land'.

(b) included under 'Miscellaneous tree crops and groves etc.'

(c) included under 'Area put to non-agricultural uses.'

Source : Modified from North-Eastern Council Statistics, 2000.

Table 2.2 : Shifting cultivation in North-Eastern region

State	Annual area under shifting cultivation (sq. km)	Fallow period (in years)	Minimum area under shifting cultivation one time or other (sq. km)	No. of families practising shifting cultivation
Arunachal Pradesh	700	3–10	2,100	54,000
Assam	696	2–10	1,392	58,000
Manipur	900	4–7	3,600	70,000
Meghalaya	530	5–7	2,650	52,290
Mizoram	630	3–4	1,890	50,000
Nagaland	190	5–8	1,913	1,16,046
Tripura	223	5–9	1,115	43,000
Total	3,869			4,43,336

Source : Task Force on Shifting cultivation, Ministry of Agriculture (1983).

2.2 FOREST

As per recorded forest area, forests constitute about 54% of the total geographical area of the region. However, as per Forest Survey of India report 2001, the forest cover of the region is more than 65%. Because of wide altitudinal, climatic and edaphic variations, a variety of forest ecosystems ranging from tropical evergreen to alpine scrub are found in north-eastern region.

2.2.1 Forest Types of North-Eastern States

Major portion of each north-eastern state is characterised by mountainous terrain and altitudinal variation is an important determinant of the local climate and soil characteristics. Therefore, it is possible to consider altitudinal variation as a factor for classifying forests in the region in a broader sense. Such a classification scheme along with the important species found in each broad forest type is given in Table 2.3.

Table 2.3 : Forest types of north-east based on altitudinal range

Forest Type	Altitudinal range (in m)	Important Species
Alpine	Above 3500	*Rhododendron* spp., *Arenaria, Saxifraga*
Temperate	1800–3500	*Acer, Castanopsis, Populus, Tsuga, Abies, Cupressus, Pinus*
Subtropical Pine	1000–3500	*Pinus roxburghii, P. merkusii, P. wallichiana*
Subtropical broad leaved	900–1900	*Castanopsis, Quercus, Michelia, Alnus, Schima*
Tropical wet evergreen	Up to 900	South bank : *Dipterocarpus macrocarpus, Shorea assamica* North bank : *Mesua ferrea, Altingia excelsa*
Tropical semi-evergreen	Up to 600	*Terminalia myriocarpa, Bombax ceiba, Canarium strictum, Ailanthus grandis*

However, depending upon the local climatic and edaphic conditions, forest types of a state vary. Wide variation in these factors among different north-eastern states results in formation of a large number of forest types each differing in species composition and forest structure (Champion and Seth, 1968). Therefore, it is desirable to discuss separately different forest types found in each of the north-eastern state.

Arunachal Pradesh

The following types of forests are found in Arunachal Pradesh :

1. Tropical Forests

These forests occur up to an elevation of 900 m above sea level. They are present in all the districts along the foothills. These forests can further be classified into two main types viz., tropical evergreen forests and tropical semi evergreen forests.

1.1. Tropical Evergreen Forests

These Forests can further be divided into two distinct sub-types characteristically differing with each other in species composition and distribution. They are termed as South bank tropical wet evergreen dipterocarp forests and North bank tropical evergreen *Mesua ferrae – Altingia excelsa* forests.

(i) South Bank Tropical Wet Evergreen Dipterocarpus Forests

This type of forest occurs in Tirap, Changlang and part of Lohit district on the south bank of Brahmaputra and is found between 150–600 m altitude. This forest type is characterised by its unique structure and composition with important commercial timber species like *Dipterocarpus macrocarpus* (Hollong), *Shorea assamica* (Mekai), *Terminalia myriocarpa* (Hollock), *Mesua ferrae* (Nahar) etc. Other dominant trees of this sub-type are *Altingia excelsa, Tetrameles nudiflora* and *Ailanthes grandis.* These forests are rich in climbers, lianas and epiphytes.

(ii) North Bank Tropical Evergreen Nahar-Jutuli Forests

This type occurs along the semi-evergreen forest belt up to an elevation of 900 m in West Kameng, East Kameng, Papum Pare, Lower Subansiri, Upper Subansiri, West Siang and East Siang districts on the northern bank of Brahmaputra. The trees in these forests attain height up to 40 m and the girths range from 1·5 to 3·5 m. Many trees in this forest are buttressed or fluted. Though no single species is dominant throughout, the following associations are observed : *Mesua-Altingia, Altingia-Engelhardtia, Altingia-Syzygium, Mesua-Syzygium-Echinocarpus, Canarium-Syzygium-Quercus* etc. *Gnetum scandens,* climbers like *Hodgsorica macrocarpa,* and a variety of ferns, orchids and other epiphytes are common in these forests.

1.2. Tropical Semi-Evergreen Forest

This forest type occurs all along the foothills and river banks up to an elevation of 600 m in all the districts. The emergents in this type of forest are mainly deciduous, whereas the evergreens predominate in the lower canopy. Lianas, climbers and a thick undergrowth of shrubs are common. This type contains some of the commercially important timber species such as, *Terminalia myriocarpa, Bombax ceiba, Canarium strictum* and *Ailanthes grandis.* Depending upon floristic composition, this forest type can be subdivided into two distinct subtypes.

(i) Low Hills and Plains Semi-Evergreen Forest

The dominant tree species in these forests are *Terminalia myriocarpa, Stereospermum chelonoides, Elaeocarpus aristatus, Artocarpus lakoocha, Canarium strictum, Tetrameles nudiflora, Sterculia villosa, Acrocarpus fraxinifolius.*

(ii) Riverine Semi-Evergreen Forests

This class of forests occur along river banks, riverine plains and swamps. The trees in these forests are mostly deciduous and lack a dense closed canopy. The trees are generally buttressed. *Terminalia myriocarpa, Duabanga grandiflora, Bischofia javanica, Bombax ceiba, Dillenia indica, Radermachera gigantea, Lagerstroemia speciosa* and *Albizia* spp. are the dominant trees of this subtype.

2. Sub-tropical Forests

This type of forests occurs in all the districts between 800 m and 1900 m altitudes. These are essentially evergreen and dense in nature. The trees attain large dimensions (25—40 m high). The forests are rich in species diversity and dominated by Fagaceae members. *Castanopsis indica, C. hystrix, C. armata, Quercus lamellosa, Q. griffithii, Q. spicata, Q. semiserrata, Q. fensestrata, Michelia oblonga, Manglietia insignis, Ostodes paniculata, Ulmus lancifolium, Engelhardtia spicata, Ficus* spp., *Acer oblongum, Schima wallichii* and *S. khasiana* are the dominant tree species. Luxurius growth of climbers, orchids and ferns occurs in these forests.

3. Pine Forests

These forests extend both in the subtropical and temperate belt in between 1000 m to 1800 m elevation. These are generally found in rain shadow areas and are represented by three different species viz., *Pinus roxburghii, P. wallichiana* and *P. merkusii. P. roxburghii* is found in Rupa and Dirang valley of Kameng district and forms either pure stands or occasionally mixed with *P. wallichiana, Quercus* spp., *Prunus* sp., etc. *P. wallichiana* is widely distributed in Rupa, Dirang valley (Kameng district), Hapoli (Lower Subansiri district), Mechuka (West Siang district), Anini (Dibang valley districts), and Melinja (Lohit district). In Kameng, Siang and Lower Subansiri districts, it is found in nearly pure stands or less frequently mixed with *P. roxburghii, Quercus* spp., *Lyonia* sp. etc. In Dibang valley they are found in association with *Betula alnoids, Alnus nepalensis, Lyonia ovalifolia,* etc. In Lohit district it is less extensive and is associated with *Tsuga dimosa. Pinus merkusii* occurs in Lohit district along the Lohit valley extending from Kharang (Hawai) to Dichu.

4. Temperate Forests

These forests occur in all the districts as a continuous belt and can be divided into two subtypes viz., Temperate broad-leaved forests and Temperate conifer forests. These forests extend between altitudes 1800 m to 2800 m. Contrary to common belief, these are dense forests and are two tiered type. The main associations found are *Quercus lamellosa - Michelia - Acer, Castanopsis - Acer - Magnolia, Magnolia - Quercus - Exbucklandia, Populus ciliata* (usually in patches of pure stands in Rupa, Anini etc.), *Populus gamblei - Castanopsis - Michelia, Rhododendron - Quercus - Magnolia, Rhododendron - Quercus - Euonymus,* and *Rhododendron - Acer.*

5. Alpine Forests

These forests occurs on the peaks of higher hills at an altitude of 4000 m and continue up to 5500 m i.e., till timber line. For most of the year, these areas are covered with snow and growth of plants is restricted to a few months when snow melts. As a rule, there exist dwarf bushes and shrubs and mainly herbs with deep roots and cushioned leaves and branches. The profusion of bright coloured flowers which is purely seasonal for a brief period makes the area highly attractive. Plants like *Rhododendron nivale, R. anthopogon, R. thomsonii, Sedum* sp., *Festuca* sp., *Rhodiola* sp., *Saxifraga* sp., *Saussaurea* sp., *Arenaria* sp., *Rheum* sp., etc. form the major constituent of this vegetation. The common trees seen are *Macaranga denticulata, Mallotus tetracoccus, Callicarpa arborea, C. vestita, Bauhinia* sp., *Glochidion* spp. Dominant shrubs are *Clerodendrum* spp., *Randia* sp. *Rubus* sp., *Viburnum* sp., *Croton caudatus, Capparis* spp., *Eurya acuminata, Dalbergia* sp., etc.

6. Bamboo Brakes

Bamboo brakes are seen up to 2000 m altitude throughout the state. Bamboos grow mostly in pure stands with very less associate species. Normally bamboo appears in areas abandoned after shifting cultivation, where they colonise fast. Bamboos are often present as undergrowth in tropical evergreen forests. The common bamboos of Arunachal Pradesh are *Bambusa tulda, B. pallida, Dendrocalamus hamiltonii, D. giganteus, D. hookeri, Pseudostachyum polymorphum, Chimonobambusa* sp., *Cephalostachyum* sp. and *Arundinaria* spp., *Phyllostachys* sp. (both single stem bamboos) occur in higher elevation of 1000–2000 m.

7. Savanna/Grasslands

Grasslands form a main feature of vegetation in riverine plains and at higher elevations. The seral type is maintained through recurring annual fires at higher elevations and excessive grazing at lower elevations. In lower elevation grasslands, *Saccharum spontaneum, S. arundinaceum, Neyraudia reynaudiana, Thysanolaena maxima, Chyrsopogon aciculatus, Imperata cylindrica* etc. are important grass species often associated with a few sedges like *Cyperus* sp., *Scirpus* sp. and *Firmbristylis* sp. Presence of a few tree species like *Macaranga denticulata, Bombax ceiba* and *Duabanga grandiflora* in very low density often makes the lower elevation grassland a savanna. Grasslands in upper reaches are prominent in pine belt. Such grasslands support gregarious tall grasses viz., *Thysanolaena maxima, Imperata cylindrica, Sporobolus* sp., *Paspalum* sp. etc.

ASSAM

The following three types of forests are found in Assam :

1. Evergreen Forests
2. Deciduous Forests
3. Swamp Forests.

1. Evergreen Forests

Evergreen forests occupy the major part of the frontier districts viz., Lakhimpur, Sibsagar and Cachar in a more or less continuous narrow belt along the foot of the Himalayas. These forests extend from the extreme north-east corner of the state to as far west as Panch Nadi in Darang district. It also occurs in the south-eastern portion of Naogaon district. The evergreen forests consist of a large number of species belonging to the families : Dilleniaceae, Anonaceae, Magnoliaceae, Guttiferaceae, Leguminoceae, Myrtaceae, Styraceae, Ebenaceae, Myristicaceae, Lauraceae, Euphorbiaceae, Fagaceae, Palmae, Graminae, Vacciniaceae, Ericaceae, Fagaceae and Termstroemiaceae. Different species of the above families occur in different tract in varying proportions so that a particular species may form gregarious forests in some localities and at the same time could be totally absent in adjoining parts.

The forests generally present a three storeyed appearance of which the top storey is very often constituted by one or two deciduous species of enormous size such as *Dipterocarpus pilosus, Artocarpus chaplasha, Tetrameles nudiflora.* The middle storey is formed either by a gregarious species such as *Mesua ferrea,* or by a large number of mixed species of the families mentioned above. This storey determines the economic value of the forest. *Terminalia myriocarpa, Amoora wallichii, Duabanga grandiflora* are other well-known timber trees found in these forests. The third or lower storey consists of small trees and shrubs, generally of no great economic value. These forests are also characterised by a number of climbers notably the climbing *Acacia* and *Bauhinia,* several species of *Vitis, Anona, Uraria, Mezoneurum, Calamus, Tapiria hissuta, Entada scandens, Dalhousiea bracteata, Gnetum gnemon* and many others.

Dipterocarpus macrocarpus, Mesua ferrea, cane, grass, shrubs and bamboo spp. are predominant in the evergreen forests of Lakhimpur district, while Golaghat and Jorhat districts of upper Assam are rich in the deciduous species like, *Lagerstroemia* spp. *Shorea robusta, Dalbergia sissoo, Acacia* sp., *Toona ciliata, Albizzia* sp. etc. Bamboo and cane species are predominantly present in these evergreen forests.

2. Deciduous Forests

This type of forests are found in Goalpara, Kamrup, Naogaon, North Cachar Hills and also in the western half of Darang district. In sal areas, the species like *Lagerstroemia parviflora, Lydia celycina, Schima wallichii* and *Careya arborea* occur with *Shorea robusta. Gmelina arborea, Cassia fistula, Albizzia lucida, Melissa velutina* and *Stereospermum chelonoides* occur in some localities.

Where there is no sal as in North Cachar Hills, and in the drier parts of Cachar, the forest is mixed and consists of *Bombax malabaricum, Adina cordifolia, Stephegyne diversifolia, Cassia nodosa* and several species of *Ficus*. The differentiation of storeys is not so clear in deciduous forests as in the evergreen forests.

3. Swamp Forests

This type includes undrained depressions, generally known as '*Bils*'. Swamps and *Bils* abound in the plains of Cachar, some of these are so large that they can be called lakes. The following trees and shrubs are found on the border of the large *Bils*, particularly in hills : *Cratoeva lophosperma, Eugenia cuneata, Duabanga grandiflora, Terminalia myriocarpa, Lagerstroemia flos-reginae, Hyptianthera stricta, Symplocos pealii, Ardisia khasiana, Rhabdia lycioides, Litsea xeylonnica, L. angustifolia, Hominoid riparir, Antidesma bunius, Trewia nudiflora, Ficus pyriformis, Engelhardtia polystachya, Dracaena spicata* and *Clinogyne dicholoma.* Besides, grass species like *Hygrorhiza aristarta, Vossia procera, Pannium proliferum, Phragmites communis* and *Arundinella AVENACEA* are also found in these forests. Some of the above grasses viz., *Hygorhiza* and *Vossia* float on the surface and cover considerable parts of the water along the borders.

The aquatic families such as Nymphaceae, Aravae, Larmnaceae, Alismaceae, Naiadaceae, Eriocauloceae and Cyperaceae are also well represented in these forests.

MANIPUR

The forest types of Manipur fall under the following major forest types according to classification of Forest types by Champion and Seth (1968).

1. Montane sub-tropical

   Northern sub-tropical broad-leaved hill forests

   East Himalayan sub-tropical wet hill forests

2. Wet temperate forests
3. Pine forests
4. Wet hill forests
5. Semi-evergreen forests
6. Teak-gurjan forests
7. Bamboo brakes.

MEGHALAYA

The natural forests of Meghalaya can be broadly grouped into 3 types viz., tropical forests, sub-tropical forests and temperate forests. This grouping is based on altitude, rainfall and species composition.

Tropical Forests

These forests occur up to an elevation of about 1000 m along the southern, eastern and northern slopes of the state. The forest shows a distinct stratification with a dense ground flora. The upper storey is composed of *Acrocarpus froxinifolius, Bischofia javanica, Dillenia indica, D. pentagyna, Dysoxylum binectariferum, Elaeocarpus*

floribunda, E. robusta, E. rugosus, Gynocardis odorata, Lannea coromandelica, Lithocarpus fenestratus, Mesua ferrae, Sapium baccatum, Terminalia spp., *Vitex penduncularis,* etc. *Antidesma acuminata, Aoprusa dioica, Dalbergia assamica, Ficus racemosa, Garcinia* spp., *Heritiera macrophylla, Mangifera sylvatica, Pterospermum lancifolius, Sterculia* spp. etc. form the middle storey of the forest while the lower most layer is made up of *Alchornea tiliaefolia, Antidesma bunius, Greqia disperma, Premna barabata* etc. Besides tree species, shrubs, herbs, lianas and epiphytes are also prominent in these forests. Several species of bamboo are also found growing in these forests. The epiphytic component of these forests includes orchids, ferns and fern-allies, bryophytes and lichens.

Sub-tropical Forests

The sub-tropical forests occur between 1000 and 1350 m above mean sea level and in deep valleys along the river banks. They are composed mainly of evergreen forests and show abundant growth of mosses and epiphytes. The upper canopy of the forest is occupied by *Alcimandra cathcartii, Betula alnoides, Castanopsis* sp., *Lithocarpus elegans, Manglietia insignis, Talauma phellocarpa, Vitex* spp. etc. and the lower layer is composed of *Adina cordifolia, Daphne involucrata, Ehretia acuminata, Garuga pinnata, Milletia prainii, Symplocos ferruginea, Syzygium macrocarpus* etc. The shrub layer comprises mostly of *Antistrophe oxyantha, Blumea balsamifera, Boechmeria platyphylla, Lyonia ovalifolia, Rauvolfia serpentina, Sarcococca saligna* etc.

The upper slopes of Khasi and Jaintia hills are occupied by sub-tropical pine forests which presumably have developed on sites which have undergone repeated shifting cultivation and felling and burning of broad-leaved trees in past. These forests are dominated by *Pinus kesiya,* but some broad-leaved tree species like *Acacia dealbata, Elaeocarpus lancifolius, Erythrina arborescens, Quercus griffithii, Schima wallichii, S. khasiana* etc. also grow in the pine forests.

Temperate forests

They are found in small pockets along the southern slopes of Khasi and Jaintia hills above 1350 m altitude where rainfall is very high (2000—5000 mm per year) and winter is severe. The height of the trees in the temperate forest is usually short. At lower elevations an intermixing of tropical and sub-tropical elements is observed in these forests. *Castanopsis kurzii, C. armata, Elaeocarpus prunifolius, Ficus nemoris, Lithocarpus fenestratus, Myrica esculenta, Manglietia insignis, Eurya japonica, Schima wallichi* etc. are the main tree species of these forests. The shrub and herb layers are well-developed in open places and along streams. The herb layer mostly comprises of the members of *Commenlinaceae* and *Araceae.*

MIZORAM

Forests of Mizoram can be broadly divided into

1. Tropical wet evergreen forests
2. Tropical semi-evergreen forests
3. Montane sub-tropical forests
4. Sub-tropical pine forests.

Most forests in Mizoram are tropical wet evergreen and tropical semi-evergreen except at the higher reaches in the north and north-eastern region (e.g. Champhai area), where montane sub-tropical and sub-tropical pine forests are seen. Exact distinction between the first two types is difficult to discern as they occur in areas of similar characteristics where rainfall is heavy averaging 200 cm to 250 cm annually and temperature 20° to 22°C and where the soil is fairly retentive of moisture. In the ideal sites, forest vegetation consists of several species. The upper storey is composed of *Dipterocarpus turbinatus, D. macrocarpus, Terminalia myriocarpa, T. chebula, T. bellerica, Artocarpus chaplasha, Amoora wallichii, Sterculia colorata* etc. Towards the east, *Michelia champaca, Duabanga grandiflora, Schima wallichii, Syzygium cuminii, Cinamomum* spp., *Adina cordifolia, Chukrasia tabularis, Tetrameles nudiflora, Protium* spp., *Bombax ceiba* etc. are dominant in the upper storey. In the lower storey, *Mesua ferrae, Dillenia indica* and different species of Bamboos and Canes are predominant.

In the drier areas where the soil is shallower, deciduous trees predominate of which the common species are *Juglans regiae, Emblica officinalis, Macaranga* spp., *Castanopsis* spp., *Sapium* spp., *Gmelina arborea, G. oblongifolia, Albizzia procera, Toona ciliata, Acrocarpus fraxinifolius, Sterculia* spp., *Albizia lebbek, Lagerstroemia speciosa, Bischofia javanica, Anthocephalus chinensis* etc.

Among the bamboos, *Bambusa* spp., *Dendrocalamus* spp. and *Melocanna bamboo-soides* are common.

The montane sub-tropical forests and sub-tropical pine forests occur in the higher altitude along the eastern fringes adjacent to Myanmar border where the climate is cooler. The dominant species are, *Pinus kesiya* and *Podocarpus neriifolia,* and other associated species are, *Quercus* spp., *Castanopsis* spp., *Engelhardtia spicata, Lyonia* spp., *Myristica* spp., *Prunus* spp., *Rhus* spp., *Schima* wallichii, *Juglans* regia etc. *Rhododendron* spp. and *Arundinaria callosa* form the lower storey. In the under-growth, *Clerodendron* spp., *Rubus* spp., and *Eupatorium* spp. are abundant along with grasses.

TRIPURA

Low alluvial Savannah woodland and moist mixed deciduous forests constitute the major portion of forest area in the state. Different forest types in the state as per the classification by Champion and Seth (1968) are

1. Eastern Himalayan Bhabar Sal
2. Cachar Tropical Evergreen Forest
3. Moist-Mixed Deciduous Forest
4. Low Alluvial Savannah Wood Land
5. Moist-Mixed Deciduous Forests Dry
6. Secondary Moist Bamboo Brakes.

2.2.2 Forest Cover

Forest cover of different north-eastern states as assessed by Forest Survey of India (FSI) every two years is given in Table 2.4. Except in Assam and Tripura, the forest cover in all the states has declined since 1989 assessment. However, the forest cover reported by FSI is much higher than the recorded forest area in the region.

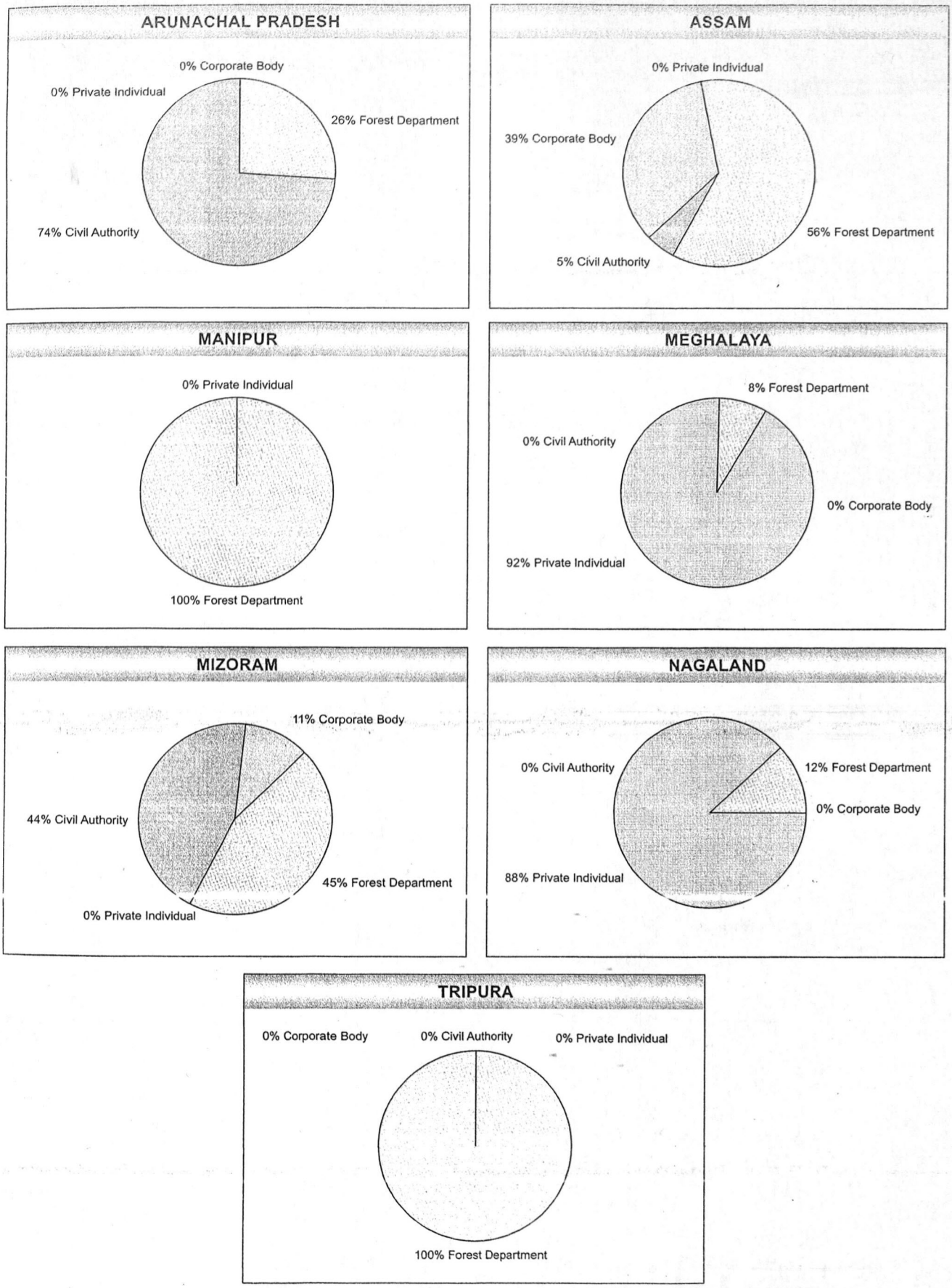


Figure 2.1 : Classification of forests of north-eastern states (% value) based on ownership.

Table 2.4 : Change of forest cover (in sq. km) in north-eastern states since 1989 FSI assessment							
State	1989	1991	1993	1995	1997	1999	2001
Arunachal Pradesh	69,002	68,757	68,661	68,621	68,602	68,847	68,045
Assam	24,832	24,751	24,508	24,061	23,824	23,688	27,714
Manipur	17,685	17,685	17,621	17,558	17,418	17,384	16,926
Meghalaya	15,645	15,875	15,769	15,714	15,657	15,633	15,584
Mizoram	18,170	18,153	18,697	18,576	18,775	18,338	17,494
Nagaland	14,339	14,321	14,348	14,291	14,221	14,164	13,345
Tripura	5,535	5,535	5,538	5,538	5,546	5,745	7,065
Total	1,65,268	1,65,777	1,65,142	1,64,359	1,64,043	1,63,799	1,66,173

2.2.3 Ownership of Forests

The ownership of forests in the states of north-eastern region is shown in Table 2.5 and Figure 2.1. It is seen from the figure that unlike in other states, private individuals own substantial forest areas in Meghalaya and Nagaland. In Arunachal Pradesh, Assam and Mizoram large portion of forest areas are owned by civil authorities and other bodies like district councils and traditional community institutions.

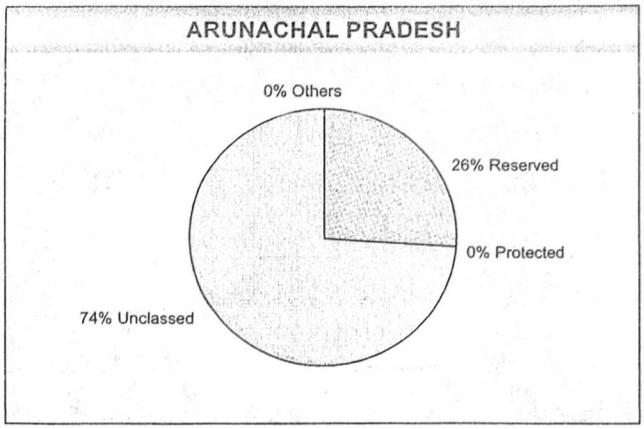
Table 2.5 : Classification of forests of north-eastern states based on ownership
(Area in thousand ha)

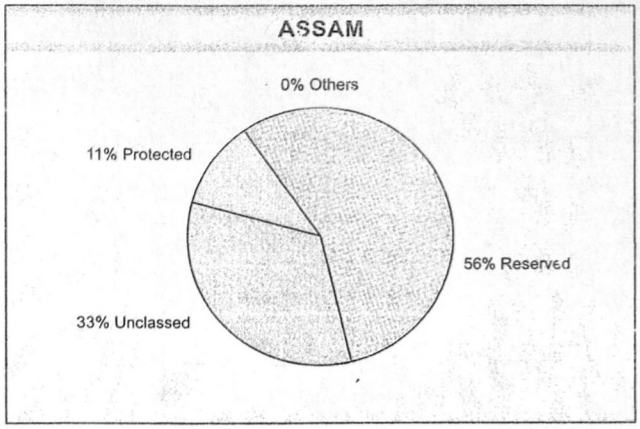
State	Forest department	Civil authority	Corporate bodies	Private individuals
Arunachal Pradesh	1323·1	3790·9	25·3	14·7
Assam	1745·9	138·9	1186·0	–
Manipur	1515·4	–	–	–
Meghalaya	72·2	–	–	779·2
Mizoram	712·7	702·2	178·6	–
Nagaland	100·4	–	–	762·1
Tripura	630·9	–	–	–

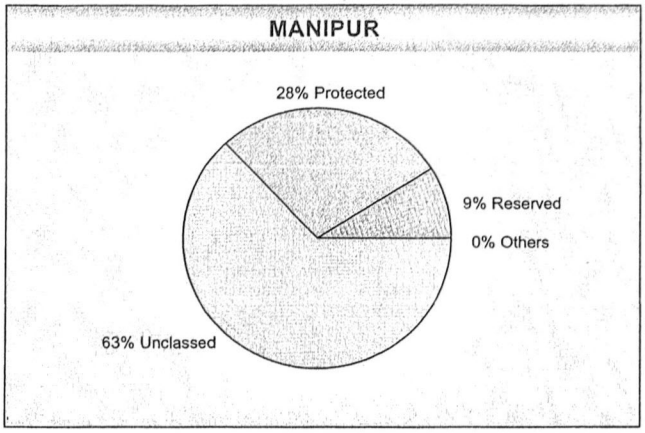
Source : North-Eastern Council, 2000.

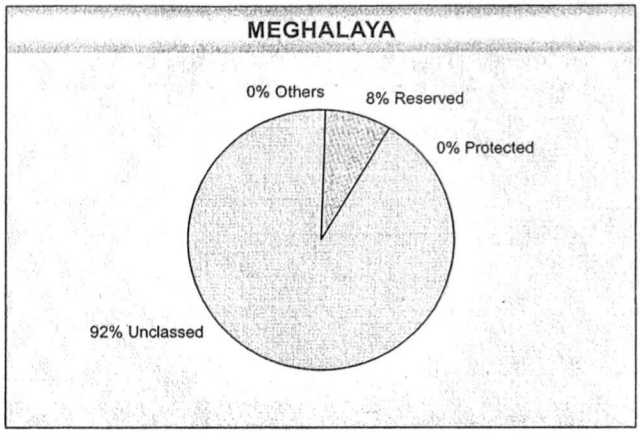
2.2.4 Legal Classification of Forests

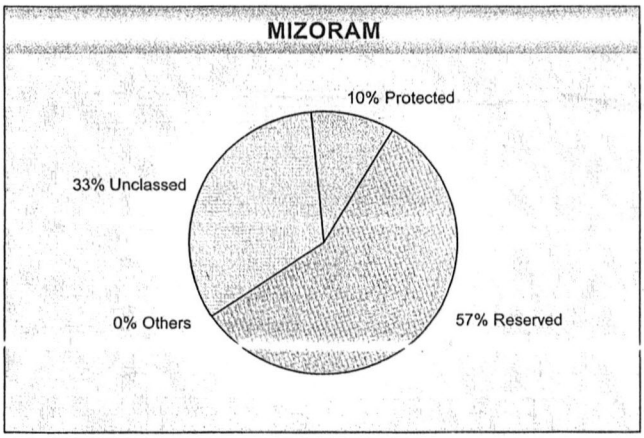
Legal classification of forests in different north-eastern states is shown in Table 2.6 and Figure 2.2. It can be seen from the figure that major chunk of forests in the region are under the category of the unclassed forests. These forests are either owned by the communities, village durbars and individual families or the ownership is not clear where the people enjoy traditional usage rights and the government has adequate control over the land.

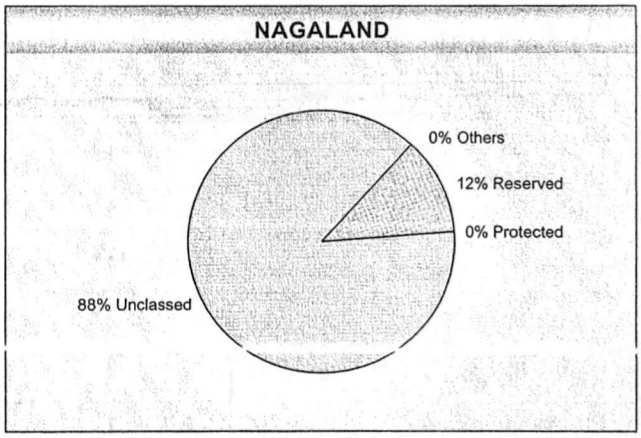












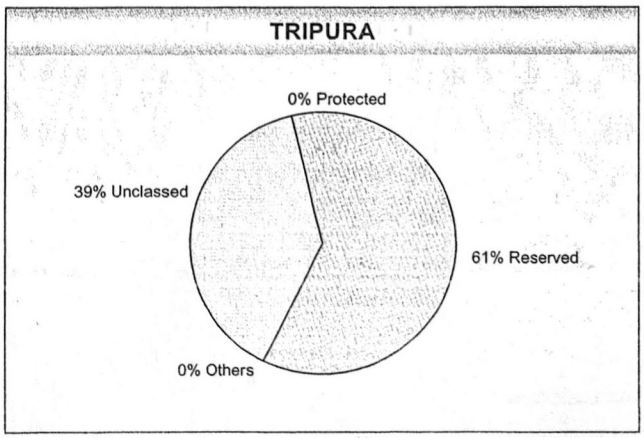


Figure 2.2 : Classification of forest areas in north-eastern states (% value) based on legal status.

Table 2.6 : Classification of forest areas in north-eastern states based on legal status
(Area in sq. km)

State	Total Forest	Reserved	Protected	Unclassed	Other
Arunachal Pradesh	5154·0	1337·0	0·8	3790·9	25·3
Assam	3070·8	1727·7	337·3	1005·8	–
Manipur	1515·4	137·7	417·1	960·6	–
Meghalaya	851·4	71·0	1·2	779·2	–
Mizoram	7593·5	904·8	164·7	524·0	–
Nagaland	862·5	100·4	–	762·1	–
Tripura	630·9	386·3	–	244·6	–
Total	19,678·5	4,664·9	921·1	8,067·2	25·3

2.2.5 Forest Resources

The north-eastern states have vast natural forest resources. Besides timber, a number of non-timber forest produces including cane, bamboos, broomgrass, mush-rooms, orchids, commercially important grass species, oil yielding trees, honey and wax are extracted from the forests every year in large quantities. Important medicinal plants such as *Taxus baccata, Tinospara cordifolia, Vinca rosea, Strychnos nux-vomica, Dichora febrifuga, Hodgsoni heteroclia, Sentelaria discolour, Smilax* sp., *Solanum khasianam, Dioscorea deltoides, Dioscorea prazerai, Discorea bulbifera, Hollarrhena antidysenterica* etc. are also found in these forests. Gums, resins, edible wild fruits and tubers and a number of spices such as Cinnamomum, Lichi *(Illicium griffithii)*, large cardamum are other important non-timber forest resources of the region contributing substantially to the livelihood and economy of the people.

2.3 REFERENCES

Champion, H. G. and Seth, S. K. 1968. Revised *Forest types of India*. Govt. of India, Dehradun.

Ministry of Agriculture 1983. Task Force on shifting cultivation, Govt. of India. New Delhi.

North-Eastern Council Statistics 2000. North-Eastern Council, Shillong.

State of Forest Report 1989-2001. Forest Survey of India, Govt. of India, Dehradun.