CHAPTER XI
SUMMARY AND CONCLUSION

In the foregoing chapters, an attempt has been made to present a picture of the evolution of land utilization pattern in the State of Assam in the background of geo-physical and socio-economic conditions and the historical process of land tenure and tenancy systems. In connection with the discussion of various aspects of land utilization, some indications have been given on different problems connected with land utilization and certain conclusions have been drawn here and there. In this chapter, we propose to summarise the main findings and draw final conclusions on them.

The land utilization pattern of a country or a region evolves through a historical process based on geo-physical background and socio-economic structures. The present land use pattern in the State of Assam is not an exception. The topography and relief, structure and texture of soils, natural vegetation and wild life influence, to a large extent, the availability of land for economic use by a society.

The topography of Assam is uneven dominated by the hills and the plains. One of the greatest rivers of the world, the mighty Brahmaputra flows through the
valley with a length of about 450 kilometres and the breadth extends in 15 kilometres in the season of high flood. The State can be divided into three distinct physiographic divisions with their peculiar land use patterns. The hills comprising of two districts of Karbi Anglong and North Cachar Hills have peculiar land systems based on communal ownership and land utilization based on jhumming and horticulture. As no cadastral survey has yet been made in the hills, data on all nine-fold classifications of land are not available. Only data on area under forests, net area sown and total gross cropped area are reported. Even data on net area sown and gross cropped area may not be reliable as jhumming is the predominant form of agriculture in which a mixture of several crops is grown in the same field. A plot of land once cultivated is kept fallow under forests for a number of years only to return to the plot again in a jhum cycle. It would be proper for the State Government to undertake a cadastral survey and also have a soil map based on land capability for proper utilization of land in the hills.

There are two valleys - the Valley of the Brahmaputra in the north and the Valley of the Barak in the south of the hill division. Though there are certain distinct agro-climatic features of these valleys, they have similar land utilization patterns evolved through similar historical
The most important factor bearing on the land utilization pattern in the State is the high pressure of population, particularly in the two valleys. The density of population in Assam has risen phenomenally during the last three decades, due not only to high natural growth of population but also to a considerable inflow of population from outside, even from foreign countries. The density of population in Assam rose from 102 persons per square kilometre in 1951 to 186 persons per square kilometre in 1971 with decennial growth rate of 35.70 per cent in 1951-61 and 34.95 per cent in 1961-71. But the population density in the plains districts is as high as 224 persons per square kilometre in 1971 with concentration of population in certain districts like Nowgong and Kamrup where population density is around 300 persons per square kilometre.

In the face of the high density in the State, the process of urbanisation and industrialisation is comparatively slow. Only about 5 per cent of the total population were urban in 1951 and 9 per cent in 1971. This high pressure of population in the rural areas has made an impact on the land utilization pattern of the State. Further with the decline of traditional cottage industries and handicrafts, the people who earn their living from such
Industries, have fallen on already over-burdened land resources. This process has created a situation in which more and more people have fallen back on agriculture, by creating many socio-economic problems like unemployment and underemployment.

In spite of the fact that the State Government have enacted many legislations for land reforms, the land ownership pattern and tenancy systems have remained, more or less, exploitative. With the process of alienation and subdivision of holdings, about 27 per cent of the rural people have become landless and half the total farm holdings has become less than 1 hectare. About 80 per cent of the holdings are below 2 hectares which is generally regarded as an 'economic holding' under the traditional system of agriculture. As such 80 per cent of the farms are either small or marginal farms in the State. The resources of this large number of farmers are meagre and investment for improvement and adoption of improved technology is non-existent. This low resource-base of the farmers is one of the most important factors inhibiting intensive cultivation of land. The intensity of cropping has remained as low as 122 per cent in 1975-76 against 116 per cent in 1951-52. It has been found in the sample survey of Nowgong and Sibsagar that some of the farms have attained more than
150 per cent intensity of cropping.

In Assam plains 40.70 per cent of the total area are under plough, 38.93 per cent as net area sown and 1.77 per cent under current fallow in 1975-76. In between 1951-52 to 1975-76, an additional area of 591 thousand hectares has been brought under cultivation. A major portion of additional land has come from deforestation and encroachment or settlement on pastures and grazing land. In this connection, it may be mentioned that the proportion of land under forests in the State has come down from 45.00 per cent in 1951-52 to 25.8 per cent in 1975-76. The importance of preservation of forests cannot be exaggerated not only as the sources of timber, fuel and raw-materials for different industries, but also for maintaining an ecological balance, maintenance of wild life and protection of soil from erosion. But in spite of the fact that Assam is rich in natural vegetation, there is less proportion of land under forests than prescribed by the National Forest Policy Resolution of 1952. In this connection it may be pointed out that it will not be difficult for the State to keep one-third of the geographical area under forests, if the marginal land brought under cultivation can be released for afforestation. The loss of arable land can be made up by intensification of
cultivation in the remaining land through provisions of
irrigation and maintenance of appropriate extension services
and input supply system.

In respect of irrigation Assam lags much behind
other States in the country. Only about 8 per cent of the
net cropped area were found provided with controlled water
supply in 1970-71. The sample survey of two irrigated
villages—one in Howragh and the other in Sibsagar shows
that irrigation is the most important single factor to bring
about high intensity of cropping. There are reports on the
impact of irrigation on cropping pattern which show that
the farmers have attained 200 per cent intensity of cropping
where there is provision of irrigation and a favourable
input supply system. Arrangement of credit at a reasonable
rate of interest and timely distribution may also encourage
the farmers particularly the small and marginal in collecting
necessary modern inputs for better operations of agricultural
land. But there are certain bottlenecks in the development
of irrigation by individual efforts of farmers, particularly
when the farms are small in size and divided into several
fragments scattered over a large area. Without the consoli-
dation of holdings, farm-level irrigation development
with tanks or ponds and deep or shallow tubewells
will not be possible in a large scale. Assam is rich both in surface and ground water, but well and tank irrigation has not yet been developed to the desired extent. Irrigation facilities now available are either lift irrigation or canal irrigation developed by the public agencies of the State or Central Government. Out of total villages in the State about 7 per cent is electrified against 8 per cent in Punjab and Haryana. For development of irrigation or so to say for bringing more land under controlled water, electricity is a must.

Assam has remained, by and large, a mono-cropped area - rice occupying more than 73 per cent of gross cropped area. The climatic and soil conditions in the State is quite favourable for cultivation of rice. There are three crop seasons for rice - Aha (Autumn), Sali (Winter) and Baro (Summer), though Sali is the most important rice crop occupying 52 per cent of gross cropped area and 74 per cent of total area under rice. It will not be strange if the farmers put more area under rice when there are irrigation facilities. It has been found that HYV rice crop has not disturbed very much the traditional cultivation of Sali in the State. Most of the additional area under rice has been cultivated with HYV seeds particularly during Aha and Baro seasons.
The second most important kharif crop is juto cultivated mainly in Lower and Central Assam districts though it can be extended to other areas of the State. Jute and Ahu rice are generally competitive crops and the area under juto is very much influenced by parity price of rice and juto being a cash crop. Wheat has attracted the attention of the farmers in Assam and area under wheat has risen phenomenally. Being a new crop, the entire area under wheat is covered with HYV seeds. But wheat is cultivated in lands generally suitable for rape and mustard in which Assam is still deficient. The comparative advantages of wheat and mustard cultivation are to be studied and the farmers should be guided in this respect. Assam is also deficit in pulses which can be grown almost in all agro-climatic zones. The cultivation of pulses will not only help the State to cover the deficit, but also it will enrich the soil being leguminous crops. A variety of pulses like blackgram or matikalai (Phaseolus radiatus), moong (Phaseolus aureus), pea (Pisum sativum), tur or arhar (Cajanus indicus) and bangal gram is cultivated in different parts of the State. Soybean can also be cultivated in suitable area in both kharif and rabi seasons. The Department of Agriculture and the Assam Agricultural University have already recommended certain crop rotations in different agro-climatic zones. But the farmers, in
general, could not accept those recommendations in a considerable scale for various reasons. If the extension services can provide the farmers with crop plans and see that the farmers can get supply of improved seeds, fertilizers and pesticides in right place and right time, the cropping pattern and crop intensity in Assam can be changed within a short time.

The State is endowed with favourable soil and climatic conditions for cultivation of different kinds of fruits and vegetables. Banana, pine-apple, orange, lemon, and lime, jack-fruit, guava and even mango are produced in the State. But absence of marketing facilities and processing and canning plants have stood in the way of commercial cultivation of fruits. In respect of vegetables also the difficulties of marketing and low price during the producing season have discouraged the farmers for cultivation of vegetables on a commercial scale. Considering the high potential of fruits and vegetable cultivation, some marketing organizations with facilities of cold storage and processing facilities should be organized. In this respect, it may be mentioned that potato is cultivated in a very small scale due mainly to the incidence of diseases like late blight. It is reported from different parts of the State that orange
gardens are now declining due to a deadly disease called 'die back' of citrus. Assam is traditionally rich in sericulture. *Endi, Muga and Pat* are the three important silk produced in the State. But due to many socio-economic factors and some neglect on the part of the community, the production of *Endi, Muga and Pat* has been declining. *Endi* is fed with leaves of castor, the cultivation of which can also produce castor seeds for the market. Sericulture may provide additional employment and income to the farm families. Recently the Government Spun Silk Mill at Jagiroad, has been blending *Endi* fibres with polyester for suiting and shirting. But a sustained effort is to be made to popularise cultivation of castor and rearing of *Endi* worms. *Muga* silk worms are reared in *gom* (mulberry) plants. With the decline of operational holdings, some of the areas cultivated with mulberry have been brought under plough. But considering the high value of *muga* silk, some areas in the village may be earmarked for the mulberry plantation by the Government.

Assam provides congenial conditions for fish rearing particularly in the low-lying areas of the state. A farming system with crop-fish combination may be evolved in those areas to augment some income from fish culture. But till today no systematic attempt has been made to integrate fish farming with crop farming. It has been
found that with a hunger for land for crop cultivation, much of pastures and grazing lands have been brought under plough. But fodder as a crop can be integrated with other field crops and instead of letting loose cattle for grazing in the fields, a system of stall feeding can be encouraged both for draught and dairy cattle. Besides, some marginal lands can be put under perennial high-yielding nutritious grass species, like dinanath, para, napier, guinea and rhodo grass. Besides, the system of hay making may be introduced in areas where crop cultivation is difficult.

Mixed farming has high potentiality in the State, particularly due to high price of milk and low yield of milk obtained from local dairy cattle. A scheme of cross-breeding of cows is in operation in the State.

The tea industry is the backbone of the economy of Assam. Tea not only earns a considerable foreign exchange but also provides employment to about 4 lakh workers. Besides the ancillary industries, transport and marketing of tea provide employment to equal number. According to an estimate, 597 thousand hectares of land were under the management of tea estates in 1951. Since then, no new areas have been settled with the tea estates, rather some surplus areas of tea estates have been acquired and settled with landless agricultural workers by the State Government.
Taking into consideration the goal of the country to produce more tea, productivity of land under tea should further be increased. Emphasis should be given for uprooting and replanting of old and uneconomic tea bushes with high yielding planting materials and with more bushes per unit of land as recommended by the Boklai Experimental Station.

It has been found that the costs of production of tea are higher in smaller tea gardens, the optimum size being 300 to 800 hectares. The uneconomic tea gardens should be amalgamated to make them viable units either through cooperative or corporate management. At present, lands under the management of the tea gardens has been found to have been used for several purposes besides tea cultivation and processing. About 50 per cent of the holdings are under tea, 30 per cent under rice and other field crops in some of the tea estates. A study on the alternative uses of land under tea estates will be helpful in using the land optimally. It has been found that the average yield per hectare of the land declines after 31st year of planting. But some economic production can be obtained by better management up to 50 years. Tea bushes above 50 years of planting, therefore, should be uprooted and replanted so that quality tea with quantity can be obtained. In view of exhorbitant rise of cost of production of tea, the
present rate of replanting subsidy of Rs.4000.00 and Rs.5000.00 per hectare of land for the gardens in the plains and hill areas respectively should be increased by taking into account in actual cost involved in replanting a hectare of tea land. For the development of the health of the industry, necessary finance both short and long-term are to be offered at a liberal rate of interest and a separate Tea Finance Corporation is to be set up to provide medium and long-term finance considering tea industry's special nature of financial requirements as recommended by the Tea Finance Committee in 1964.

The State of Assam is endowed with rich natural resources - mineral, forest and agricultural resources. The State should get priority in organizing different industries based on mineral, forest and agricultural raw materials. Except a small oil refinery at Digboi and the tea industry, Assam did not have many industries before independence. After independence the Noonmati Refinery (Gauhati), the Fertilizer Factory and Petro-Chemical Complex at Numaligar based on natural gas and crude available in the State were established. A Cement Factory was established at Bokajan in the district of Karbi Anglong. In Bongaigaon, another oil refinery and a petro-chemical complex have been set up.
The Oil Refinery at Daraun in Bihar is fed with the crude from Assam. Taking into account the availability of natural gas and crude oil, there is enough scope for establishment of more industries based on natural gas and crude.

At present there is a Sugar Mill at Barua Barangaon which has encouraged farmers to cultivate sugarcane. Another sugar mill is being established in Cachar, Assam. Assam may have more sugar mills in sugarcane growing areas with advantage. The establishment of a paper mill at Jogihaop is has encouraged farmers to cultivate bamboos. The completion of Jagiroad Paper Mill in Nowgong district will definitely encourage the farmers in planting bamboos. The establishment of a few paper mills in suitable areas may utilise forest raw materials and bamboos in an economic way.

Forest-based industries, rayon mills and plywood factories can be organized for better utilization of forest resources. At present the supplies to the paper mills and plywood factories are coming from natural forests. A systematic effort is necessary to plant bamboos and different economic species of timber in the State to cover up the deficiency of forests. For industrialization and consequent urbanization land will have to be set apart. This can be done by way of releasing certain areas from cultivation and
developing land under miscellaneous tree crops and groves. This again points the necessity of maximum utilization of arable land through intensification of cultivation.

The land under miscellaneous tree crops and groves in the State is actually degenerated forests in the rural areas. These lands can be utilized for afforestation by the forest department or may be handed over to the village community to raise community forest for the supply of timber, for house-building and fuel. Suitable areas may be identified for industrial centres and urban development. The Government has undertaken several schemes for development of net area sown and other forest land. No development schemes are so far undertaken to develop land belonging to miscellaneous tree crops and groves. Various incentive or the development schemes may be introduced by the Government to fruitfully utilize this pattern considering the present scarcity of bamboo bushes, thatching grass and other groves and casurina trees in the State.

It has been found that the extent of under-utilization of available land is very high in the State. The traditional system of cultivation, absence of protective measures for soil and consequent erosion have created a problem of rapid loss of fertility. In the face of high
pressure of population, the extent of fallowing is considerable in the State. If soil protective measures are taken and fertilizers and manures are adequately used such fallowing will not be necessary. In the hills, the destructive method of jhum cultivation has made certain areas barren and unculturable waste with degenerated forests and tall grasses dominating the landscape. Soil conservation, therefore, should receive due priority in the management of soil both in the hills and the plains. The recurring floods sometimes become devastating causing loss of both human and animal lives. It has been estimated that about 15 per cent of the cropped area are flood-affected. Before this floods can be controlled, some cropping pattern should be evolved to suit such flood-affected areas. Some short-duration cold-tolerant varieties of rice shall have to be evolved to fit in such areas to utilize land at 200 per cent intensity after the flood water recedes. It should be mentioned however that flood-affected areas are comparatively more fertile than lands in higher elevation.
Increase of land under 'land put to non-agricultural uses' has been experienced, besides other uses, by river-bank erosion in some of the plains districts in the state also, which needs immediate attention of the Government. Present erosion-controlled devices taken by the Government proves inadequate in controlling annual ravage of flood and erosion.

Taking into account the present declining trend of arable land per capita and food shortages in the state, the existing class of land under 'net area sown' may further be reclassified into (i) area sown with annual crops, (ii) area sown with orchard and (iii) area sown with plantation crops, under the broad head 'net area sown'. This may help in identifying the various problems affecting land use under annual crops, orchard crops and plantation crops separately in the state. This will help not only the users but also the Government and the other public bodies interested in development of the land resources for better production and productivity.

For optimal use of land, besides a set of data on land utilization pattern, other important types of statistical information will be necessary. Maintenance of actual and accurate records and coordination among various Departments
of the State Government particularly, Departments of Agriculture, Economics and Statistics, Soil Conservation, Forestry, Irrigation and Embankments, Public Works Department, Embankment and Drainage, the Brahmaputra Flood Control, etc. are, therefore, vital keeping in view of the better use of land resources in the State. For planning of land utilization, there should be a complete study of land capability and complete soil map of different classes of land. It has emerged from the study that the present pattern of land utilization is based on blind forces of nature and society. To rectify the haphazard use, attempts should be made to have a complete picture of land resources of the State. The sooner it is done better for the State and the country as a whole.