CHAPTER IX

FINDINGS, SUGGESTIONS AND CONCLUSION
Findings of the study:

Socio-economic profile of the respondents:

Socio economic analysis helps in determining not only the size and quality of labour force and resources available in different categories, of households but also the type of crops and other economic activities that can be taken up so as to improve their socio-economic well being.

A great majority (78.00 per cent) of the respondent belonged to joint family only 22.00 percent respondents belonged to nuclear family. Academic attainment of an individual is an important factor, which attests the standard of living 35.33 per cent head of households illiterate. More illiteracy (40.78 per cent) was found in the Karbi respondents. 44.00 per cent respondents have two male members followed by 33.00 per cent respondents have 3 and above male members, on the other hand 36.67 per cent respondents have 2 female members. Ethnicity wise shows that 43.69 per cent Karbi respondents have two male members. Numbers of family members is a very important variable in tribal economy, because most of the labours come from family members.

Relating to the employment status of the respondents, majority (85.00 per cent) worked as agricultural labour, 11.63 per cent have their own business that means they are self employed. 29.00 per cent of the respondents belonged to the age group of 20-30 years, 9.00 per cent of the respondents were 60 and above group. Regarding religion of the respondents Hinduism dominated the other religion; pertaining to martial status of the respondent great majorities (66.67 per cent) of the respondent was married. Language is a medium of communication, each tribal community has its own language but most of the respondents also speak Assamese languages. Concentration of male population was slightly higher than the female population, 59.00 per cent respondent was male, and on the other hand 41.00 per cent respondent was female.

Shifting cultivation - Global and national perspectives:

The total area covered and the number of family involved in shifting cultivation in the South East Asian countries showed an increasing trend over the last thirty years (1970-2000). In case of area under shifting cultivation in South East Asian countries, Nepal-Bhutan, Ceylon, Thailand, Cambodia maintaining an increased growth rate over the base year, on the other hand Pakistan, India, Burma, Laos, Philippines and Indonesia maintaining a steady moderate growth rate. The countries, which shows lowest growth rate in area were Indonesia and New Guinea. Highest percent of Indonesian families
followed by India and China families involved in age old cultivation practices. India, Nepal-Bhutan, Ceylon, Thailand, Laos, Cambodia, South Vietnam, China and Formosa show an increasing growth rate. The countries, which showed steady growth rate were Pakistan, Burma, North Vietnam and New Guinea, Indonesia showed decreased growth rate.

In terms of growth rate of area among the Indian states, Orissa showed increasing rate at first than decreasing rate. Assam and Mizoram maintains an increasing trend over the years. Nagaland, Tripura, Andhra Pradesh and Bihar maintain a fluctuating rate. Manipur shows decreasing rate over the years, on the other hand Meghalaya maintains a stable growth rate over the years. Regarding growth of population dependent on shifting cultivation, Manipur, Bihar, Kerala and Madhya Pradesh shows an upward increasing trend while Nagaland the rate is fluctuating, on the other hand Orissa, Arunachal Pradesh and Assam shows a decreasing trend. In case of growth of household dependent on shifting cultivation Mizoram, Andhra Pradesh, Bihar, Kerala and Madhya Pradesh maintain an upward increasing trend. Arunachal Pradesh, Meghalaya and Tripura maintain a fluctuating trend. On the other hand Manipur and Assam shows decreasing trend. In comparison to population and household dependent on shifting cultivation, both were at increasing trend with the base year. The state, which shows increased in population, also shows increased in households shifting cultivators' population.

In Assam, the area under shifting cultivation shows a fluctuating rate. In Karbi Anglong district in the Year 1978 shows highest area under shifting cultivation but in N.C. Hills in the year 1985, shows highest area. In Karbi Anglong and N.C. Hills district total Jhumias population, total scheduled tribe and total population are increasing with base year.

**Economics of Shifting cultivation:**

Karbi Anglong district has got good forest coverage (26.5 per cent) but N. C. Hills district has only 12.9 per cent forest area to total area of the state. In Karbi Anglong 20,000 families cultivated Shifting cultivation in 21,853 ha of land where as 7,000 families cultivated Shifting cultivation in 6,475 ha land in N.C.Hills district. Fertilizer consumption is less in both the district; this may be due to unavailability of fertilizer in time and proper demonstration and training by government department. Rice crop dominated in both the districts. The average yield of maize, wheat, pulse, sugarcane, turmeric and pineapple is more in Karbi Anglong than N.C. Hills. On the other hand the average yield of total rice, other cereals, oilseed, banana, arecanut and coconut is more in N.C. Hills. The average yield of most of the crops like cereals, pulse, potato, sugarcane, turmeric and banana is
more in two hill districts than the state of Assam. 38.97 percent respondent households' possessed below 2 bigha of permanent cultivation land and on the other hand majority of farmers (49.67 per cent) possess below 2 bigha of shifting cultivation land. Regarding input used by households under the survey, majority of respondents were not familiar with pesticides, 10.33 per cent respondents received pesticides from government sources. 40.00 per cent of the respondents' farmer not aware about organic fertilizer, only 4.33 per cent used more than 100 kg of organic fertilizer. Regarding labour used by the respondents, majority (75.33 per cent) of the farmers used 1-3 numbers own labour on the other hand majority of the farmers (68.33 per cent) not engaged hired labour. More than one third of the respondent (41.33 per cent) farmers cultivated cereal crops in 1-2 bigha of land. Pulse crop is an important crop, 38.00 per cent of the respondents cultivated pulse crop in 1-2 bigha of land, where as 33.00 per cent respondents not familiar with these types of crop. As regards area under vegetable crops, 35.33 per cent of the respondent farmers cultivated vegetables crop in 1-2 bigha land. Whereas, vegetables crop was not cultivated by 32.67 per cent of the respondents. On the other hand 31.67 per cent respondent farmers cultivated tuber crop in 1-2 bigha of land, only 2.00 per cent cultivated more than 8 and above bigha of land, 37.07 per cent farmers not cultivated tuber crop. Fruit crops plays an important role in human health and economy, 39.33 per cent respondent cultivated fruit crop in 1-2 bigha of land, only 1.33 per cent cultivated 8 and above bigha of land, it is interesting to note that 45.67 per cent respondent cultivators not cultivated fruit crop. Respondents were interviewed to learn about yield of crops. Majority of farmers' (52.34 per cent) getting cereal yields 100 kg/bigha. On the other hand 4.00 per cent farmers received more than 300 kg/bigha. The performance of oilseed crop yield was not very good, 26.67 per cent farmers received 40-100 kg oilseed per bigha and only 11.34 per cent farmers received 200-300 kg/bigha. Regarding the yield of pulse crops, 35.00 per cent of the respondents’ farmers received 40-100 kg/bigha only. Dimasa household respondents' (8.47) received more than 300 kg/bigha. 32.67 per cent respondents' farmers received vegetable yields between 40-100 kg/bigha, only 3.33 per cent received more than 300 kg/bigha. Regarding the yield of tuber crop, it appears that 26.67 per cent farmers received yield 40-100 kg/bigha; only 6.00 per cent received more than 300 kg per bigha. As per yield of fruit crops, 23.67 per cent respondent farmers getting yield 40-100 kg/bigha only 7.33 per cent getting yield 200-300 kg/bigha.
**Subsidiary economic activities:**

Livestock plays an important role in rural economy. It is interesting to note that majority of the respondents farmers have no cows, 31.33 per cent respondents have 1-2 numbers of cows, only 4.33 per cent respondents have 5 and above numbers of cow. Goat is poor man friend. Goats are reared by most of the respondents except 21.33 per cent, 37.33 per cent respondents reared below 3 number, only 12.67 per cent reared 7 and above number of goats. Poultry is a popular livestock in tribal society, majority (55.00 per cent) of the respondents have below 4 number of poultry bird, only 4.33 per cent have 9 and above poultry bird. Pig rearing is common in tribal society. 30.67 per cent of the respondents have 2-4 numbers of Pig, only 12.00 per cent respondent have 5 and above number pigs. 27.66 per cent respondents have no pigs. It is interesting to note that 49.33 per cent of the respondents' farmers generated Rs.5,000.00 to Rs.10,000.00 per year from Agriculture. Regarding income generation from dairy farming it is seen from the survey that 33.66 per cent of the respondents earned Rs.1000.00 to Rs.2000.00. Regarding income from goatery farming, 41.33 per cent farmers received below Rs.500.00 only 2.67 per cent received above Rs.2000.00. 34.67 per cent of the respondents received income between Rs.500.00 to Rs.1000.00 from Piggery farming. On the other hand 47.00 per cent respondents have income below Rs.500.00 from poultry farming, it is interesting to note that 23.33 per cent farmers have no income from poultry farming. Regarding utilization of production for home consumption by the respondents, 38.33 per cent respondents consumed 60.00 per cent to 70.00 per cent, only 15.67 per cent of the respondents consumed 50 per cent to 60 per cent. 47.66 per cent of the respondents kept 1 to 5 per cent of production for seed, 13.67 per cent of respondents kept 10 per cent to 20 per cent of production for seed, only 9.34 per cent kept more than 20 per cent of production for seed. 45.00 per cent of the respondent farmers gave 1 per cent to 5 per cent as wages; only 18.00 per cent gave 10 per cent to 20 per cent as wages. Regarding marketing of produce, 38.67 per cent of the respondents sold one per cent to five per cent of produce in the market, 16.33 per cent sold more than 20 per cent of produce in the respective local markets. Input-output relationship reveals that low yield and less income from shifting cultivation. After meeting all home consumption and religious needs, the marketable surplus is sold. Income generation from agriculture and allied activities is not sufficient to meet changing needs. As most of the farmers are below poverty line, they are compelled to clear and burn more forestland for cultivation.
Environment Degradation and Shifting cultivation:

Soil erosion in Karbi Anglong district shows a fluctuation level, although high in some years and no erosion in some years. Highest erosion found in the year 1993, moderate soil erosion in 1999 and lowest soil erosion found in the year 1991, soil erosion in N.C. Hills shows higher than Karbi Anglong district. Highest soil erosion was found in N.C Hills in the year 1989, moderate soil erosion was found in the year 1987, and lowest soil erosion was found in 1999. P$_2$O$_5$ and K$_2$O$_5$ content in the shifting cultivation period is decreasing trend in both the district. Regarding the pH of the soil, it shows a fluctuating trend through out the period of shifting cultivation period in both the district. The runoff behaviour also shows a fluctuating trend in the Karbi Anglong district, which was highest in the year 1987. As regards soil loss it shows a fluctuating level through out the year. It was found highest in the 1996. In the N.C. Hills as regards pH of the soil, it was found more in 1993, runoff show highest in the year 1987, soil loss was highest in 1978. Observation on runoff and Soil loss in two districts showed that N. C. Hills district has more soil loss and runoff than Karbi Anglong. In hilly areas shifting cultivation operation is carried out community wise or in group, and sometimes independently. 78.00 per cent respondent informed that they carried out shifting cultivation independently, 83.33 per cent non-tribal respondents carried out shifting cultivation independently. Regarding selection of site/land 56.66 per cent respondents cultivated their crops in community land, 66.67 per cent non-tribal respondents selected community land. 44.33 per cent respondents selected 1-2 year fallow land; community wise shows that majority (69.44 per cent) of the non-tribe respondents selected 1-2 year fallow. Regarding period of cultivation in a particular plot, 41.00 per cent of the respondents cultivated 2-3 year in a plot and only 12.33 per cent cultivation continuously more than 5 year in a plot. 44.6 per cent Karbi respondents cultivated 2-3 year in a plot. Majority of the respondent (92.00 per cent) only shifted their plot and on the other hand ethnicity wise 94.00 per cent non-tribe shifted only their agricultural plot. 48.33 per cent of the farmers cut only branches and twigs, 67.44 per cent minor tribe cut only branches and twigs. Regarding preparation of land. 47.33 per cent respondent households kept tress during shifting cultivation. 55.81 per cent minor tribe kept trees. Regarding involvement of farmers in shifting cultivation 29.67 per cent respondents cultivated 4 to 5 years in the same plot. On the other hand 21.33 per cent cultivated more than 10 years in the same plot. 52.78 per cent non-tribe involved 1 to 3 years in shifting cultivation on the other hand 29.66 per cent Dimasa involved more than 10 years. 27.67 per cent respondent
households shifted the land more than 8 times in their life, 39.53 per cent minor tribe shifted 1 to 3 times. Respondent experience in case of shifting cultivation, (35.67 per cent) of the respondent experiences labour intensive. 41.67 per cent non-tribe has experienced low yield. Regarding erosion, as per 45.00 per cent respondent view erosion was moderate after ploughing. Respondents' views on environment reveals that 54.33 per cent respondents maintained long fallow period for regeneration, 63.11 per cent Karbi tribe maintained long fallow period for regeneration. 54.33 per cent respondents agreed that long fallow period and rain create regeneration. Majority (61.00 per cent) of the respondents maintaining natural method for regeneration. 72.82 per cent Karbi tribe maintained natural method for regeneration. Respondents were asked what steps they have taken to control environment degradation, 41.67 per cent respondents applied nutrients to the soil to control environmental degradation, 21.00 per cent respondents have not given their response in this regard. High majority (72.10 per cent) of minor-tribe applied nutrients. Regarding steps taken to control soil erosion 42.00 per cent Karbi planted trees, 30.56 per cent non-tribe constructed bunds, 27.91 per cent minor tribe have taken any other method to control soil erosion. Regarding maintaining floral bio diversity by the respondents 46.00 per cent planted new tress, majority (50.00 per cent) Dimasa respondents planted new tress. Regarding maintaining fauna bio-diversity by the respondent households, high majority of (81.67 per cent) the respondents not killed the animals, 18.33 per cent of respondents adopted other methods. A high majority (93.02 per cent) of minor tribe not killed any animal and 30.55 per cent adopted any other method to conserve fauna bio-diversity.

Effectiveness of Various Schemes: The government of India and the concerned state Governments has embarked upon a good number of schemes under the different five-year plans to regulate and control the Shifting cultivation practices in the highly affected areas of the country. The amount target for Jhumias and actual achievement and number of beneficiaries is not uniform for every year in the two hill districts. The negative growth rates shown in the Karbi Anglong district in the year 1983 and 1991. In the Karbi Anglong district highest amount sanctioned in the year 1991 and 1992. It is seen that target amount is more than achievement amount. It is observed that achievement is less than the target amount. As regards target beneficiaries, it is also an increasing trend except 1984 and 1985. As regards N.C. Hills target amount slowly increasing over the years except 1984. In 1985 target amount more than achievement. Target beneficiaries were increasing except 1984 and 1982. Overall, Karbi Anglong district has got more Target beneficiary and per
unit than N.C. Hills. The Government has given seed, fertilizer, animal, machine, money and any other assistance to householders Jhumias. 22.89 per cent respondents received fertilizer, 19.28 per cent respondents received seed, 14.06 per cent respondents received animal, 12.05 per cent respondents received machine and 17.67 per cent respondents received other things from Government for not going to the Shifting cultivation. Majorities of the (69.70 per cent) respondents have not received assistance and materials in time. Ethnicity wise shows that a high (85.44 per cent) majority of Karbi tribe received assistance in times. Regarding training received by the respondents; majority (57.58 per cent) percent of respondents have undergone training for new methods of cultivation.

Regarding impact of training on not going for shifting cultivation, 38.64 percent admitted change in income. Majority of the respondent (66.67 per cent) reported schemes did not make them busy on the other hand 27.65 percent respondents admitted schemes make them busy. Majority of (85.61 per cent) the respondents reported that income from scheme is not sufficient on the other hand 14.39 per cent reported that income is sufficient. 58.47 per cent Dimasa respondents reported supervision done by officials in a month.

**Benefit – cost (B:C) ratio analysis of different activities:**

An in-depth examination of different cost and corresponding income for different farming systems is very much necessary for the viability of the particular farming system.

The benefit –cost ratio analysis showed that among livestock farming minor tribe is efficient in pig farming (B:C ratio 1.39), Dimasa tribe is efficient in poultry farming (B:C ratio 2.48), Karbi tribe is efficient in Goat farming (B:C ratio 2.25)

Regarding horticultural activities Karbi-tribe is efficient in Mandarin cultivation (B:C ratio 1.80), Minor tribe is efficient in pineapple cultivation (B:C ratio 1.57). Shifting cultivation shows lower B:C ratio (1.07 to 1.12) among all other activities like livestock and horticultural farming.
**Other findings from the study:**

a) Agriculture was the dominant form of primary and secondary occupation in the area.
b) Rice was the major crop accounting about 64 per cent. Staple food Rice is grown on Shifting cultivation.
c) There was scope to increase cropping intensity in all the size groups under Shifting cultivation even with existing resources. Thus, it revealed that the existing resources were not properly distributed.
d) The farmers were used less input like fertilizers, pesticides etc in the production programme.
e) Some crops like ginger, cotton, hill jute etc. are grown only in the plots of Shifting cultivation and such crops given them a steady source of cash income.
f) A number of traditional vegetables can be grown in Shifting cultivation, which supplements their nutrient requirements in daily food.
g) As labour in the shifting plot is supplied both by males and females (rather in some respects females work more) Women's labour can be fruitfully utilized if Shifting cultivation is practiced side by side with settled agriculture.
h) In the Shifting cultivation, farmers cultivate cotton, which is used in handloom industry for making cloths, spinning of yarn from home grown cotton is a common sight in the interior hill areas.
i) Bamboo required for house construction and day to day domestic use is taken from Shifting cultivation fields.
j) Other housing materials, timber, cane are also collected from Shifting cultivation field.
k) The village council decides if the village is to be shifted to new Shifting cultivation sites and it distributes Shifting cultivation lands to be cultivated in a particular year to be families of the village.
l) Rongker festival and Hacha festival is related to Shifting cultivation. In these festival rice beer is used which is a produced from rice, cultivated in Shifting cultivation.
Model: An economic, sociological and environmental interaction model is constructed to explain the dynamics of shifting cultivation system. In the shifting cultivation system interconnection exists between production economics, social and cultural force, environmental degradation and government and non-government organizations intervention. In the shifting cultivation system production practices are associated with the use of indigenous tools and implements, low intercultural management, lack of pest and diseases control and lack of fertility management. On the other hand social and cultural forces involved in shifting cultivation are production for consumption, population growth, and low level of literacy and lack of awareness on environment. Production practices and social factors compelled hill people to cut and burnt the trees and leading to the deforestation. Deforestation causes environmental degradation. The environmental degradations due to the shifting cultivation are soil erosion, proliferation of weed, loss of bio-diversity and loss of fauna. Environmental degradation resulted less output and food production, which lead them vicious cycle of poverty. Poverty brings social unrest. To overcome this problem, government and non-government organization takes intervention. Farmers also themselves takes some own intervention. People mindset becomes change due to the government and non-government organization intervention and they involved in other allied activities which helps them to rise in their income and employment.
Figure: 9.1 ECONOMIC, SOCIOLOGICAL & ENVIRONMENTAL INTERACTION MODEL
I INPUTS

Low level of Technology

Indigenous tools and implements

Low interculture management

Lack of pest and diseases management

Lack of fertility management

Lack of suitable marketing

Production for consumption

Short Jhum Cycle/fallow period

Low YIELD,

Figure: 9.1 ECONOMIC, SOCIOLOGICAL & ENVIRONMENTAL INTERACTION MODEL.
SOCIAL AND CULTURAL FORCE

Puja, Festivals, Marriage all are related to Jhum

Rice production for rice beer for festivals

Population growth

Low level of education

Lack of awareness on environment

Low migration to other sector

Figure: 9.1 ECONOMIC, SOCIOLOGICAL & ENVIRONMENTAL INTERACTION MODEL
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**JHUM CULTIVATION**

**CUTTING AND BURNING OF TREES**

**ENVIRONMENTAL DEGRADATION**

**DEFORESTATION**

**SOIL EROSION**
- Open Soil Surface
- Stream and reservoir silting
- Floods in Plains
- Loss of Crop & lives
- Increase family size
- Increase Runoff
- Removal of nutrients
- Low level of organic matter
- Less output / Food production
- Low level of Income
- Poverty — Pressure of land
- Migration of people
- Social Unrest

**Proliferation of weed**

**Loss of Bio Diversity**

**Loss of Agri-Diversity**
- Effect on Micro / Macro Climate
- Temperature Rise
- Less Timber
- Less fire wood
- Less food items such as fruit vegetables
- Less food
- Loss of beneficial insect / animal

**Loss of Fauna**
- Disruption of natural chain
- Loss of beneficial insect / animal
Conclusion:

Agriculture is an important economic activity for a large population of the developing world. The view that industrialization is the main hope of the developing countries has undergone remarkable changes in more recent times. Today, agriculture and rural development are viewed as the *sine qua non* of national development. A reorientation wherein rural development is well balanced with industrial growth is now considered essential to correct serious imbalances in the economy, for equitable distribution of wealth and for social justice. It is against this background that increases in agricultural production in the developing world need to be viewed and evaluated.

The various adverse effects of Shifting cultivation, the need for its replacement have been widely discussed at various levels. It has been a matter of concern not only for the Government of India and the Planning Commission but also to the various state governments and the union territories of the region. Although considerable data on the extent of Shifting cultivation and its various adverse effects including its effect on agricultural production have been discussed in various forums, yet detailed scientific studies on shifting cultivation from various angles were not taken up until recently. The prevalence of shifting cultivation is so extensive in the region that it would not be possible to tackle the problem within a short period of time whatever, large the efforts may be. It will, thus, be necessary to approach the problem so that alternative systems of farming can be introduced in areas where the cycle of rotation has been greatly reduced.

It may be necessary to adopt an improvement approach to Shifting cultivation in the other areas with the ultimate objective of weaning away the farmers to alternative system of settled farming. Thus it is necessary also to study the various aspects of improving the existing system so as to temporarily minimize soil erosion and increase productivity. The developmental agencies of the various states and union territories as well as North Eastern Council have taken up various schemes of Jhum control in order to wean away the farmers from shifting cultivation. These programmes have met with success in some areas while in others it has not been able to evoke the required favourable response from the farmers. Although, various studies have been made as well as developmental efforts are being made, yet there is so far no compilation where all information are readily available. It was, therefore, considered necessary to compile a comprehensive review on shifting cultivation. Conservation and sustainable development are closely interlinked; in that one cannot be achieved at the expense of the other. From a human angle, such an integrated approach
demands satisfying basic human needs in an equitable manner, maintenance and promotion of social, cultural and biological diversity, and ecological integrity of the system. Harmony with Nature implies that development cannot be sectoral; it has to be holistic.

In the context of rural development, land use, animal husbandry and the domestic sectors have to be looked at as an integrated whole for a given village. Holistic approach also implies that all the actors concerned with development, namely, the governmental agencies, non-governmental organizations, scientists and indeed the beneficiary local communities, all have to work together through appropriate institutional mechanisms. Further, sustainable development demands efficiency in resource use in such a manner that contributes to equity with social justice, at the same time avoiding social disruptions. This implies strong community participation.

The following problems were identified from the research:

1. **Low benefit cost ratio**: It has been observed from the study that some activities show lower B:C ratio that means these activities are not remunerative.

2. **Low use of input**: Respondents use very less input in their production programmes.

3. **Target and achievement different**: Government unable to disburse target amount to the beneficiaries.

4. **Improper infrastructure**: It has been observed during the survey that roads, primary health care, power etc. are not proper in the two hill districts of Assam.

5. **Resources availability and improper utilization of resources**: The two hill districts are very much rich in natural resources but there is lack of proper harvesting plan.

6. **Low marketing surplus**: Most of the respondents do not get proper price for their produce due to lack of market and they produce only for their consumption purpose only.
Recommendations:
Based on the above problems recommendations are given below:

1. **Adoption of activities with high benefit cost ratio**: N.G.O and Government department should motivate people through training to adopt activities with high B.C ratio, for example poultry farming, goat farming and mandarin farming.

2. **Use of input**: Department of Agriculture and Animal Husbandry of Karbi Anglong district and N.C. Hills district should come forward and organize field level demonstration like other district regarding benefit of use of modern input like high yielding seed, organic and inorganic fertilizers, pest and diseases control measures.

3. **Bridge the gap between target and achievement**: Whole hearted approach of Government machinery is very much essential to bridge the gap between target and achievement.

4. **Development of infrastructure**: Government should allocate fund for infrastructure development.

5. **Proper utilization of resources**: Resources like bamboo, forest available in the two hill districts should be properly surveyed and make plan for proper utilization.

6. **Emphasis on marketing of tribal products**: Government should come forward and arranged for markeing of tribal produce. N.G.O.s can help farmers to formed self-help groups and marketing co-operative for marketing of tribal produce. This will help farmers to get better price for their produce.