MANIPUR

JHUM AND ECO-DEGRADATION

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Dedicated

To

MY LOVING PARENTS

who stimulated me to visualize
the changing social milieu

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Foreword

The tropical countries of Africa, Latin America and South-east Asia accounts for over 98 per cent of the total area under shifting cultivation. More than 525 million people live and farm on tropical hillsides, which covers 12.9 million sq. km. and forms 9 per cent of the earth's landmass, out of which Africa has 40 per cent. In Asia about 53 per cent of the total landmass is in the upper watershed, which is home to 65 per cent of the 1.6 million rural populations. In India about 4.9 million hectares in the 11 states (Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Orissa, Madhya Pradesh and Andhra Pradesh) is affected by the problem of *jhum* and about 4.44 million families are engaged in this. In India more than 90 per cent of the area under *jhum* is in Northeastern region of the country (Assam, Arunachal Pradesh, Manipur, Mizoram, Nagaland and Tripura). About 0.45 million families annually cultivate 10,000 sq. km. of forest. With the phenomenal increase in population, the *jhum* cycle has decreased from 20 to 30 years to about 5 years and even up to 3 years.

Shifting cultivation otherwise called *jhum* in Northeast India may be defined as an agricultural system which is characterized by rotation of fields rather than by crops, short period of cropping alternating with long fallow period and clearing by means of slash and burn. It involves slashing down of trees and bushes, burning them and then showing crops. This method of cultivation is solely responsible for degradation of the ecosystem, depletion of land resources, leaching, soil erosion, loss of soil fertility, loss of pernicious biomass, siltation of lakes, water bodies, reservoir and flood.

This is a pioneer work done by a geographer Dr. Bahar-Ud-Din Shah. The study is based on remotely sensed data, village surveys and household surveys with the help of questionnaire interviews. Data for assessing the socio-economic conditions *of jhumias* were drawn from a comprehensive survey of 5 villages and nearly 100 per cent sampling of *jhumia* households. Conducting field survey and gathering information from the tribal dominated villages with no accessibility, bad roads, and steep terrain was difficult task. For accessing the loss of soil fertility soil samples were collected from the *jhum* fields.

The author has very aptly concluded that the physico-socio-cultural environment of Manipur has compelled the tribal to adopt *jhuming*. The mountainous topography, undulating slopes and wet weather conditions almost all the year round provides ideal conditions for people to practice jhuming. It is a way of life for the tribal. Their needs, food habits, folklores, festivals and overall cultural ethos has a say to *jhum*. The life of the *jhumias* is that of a desperate struggle for survival in such harsh conditions. With the increase of population the *jhum* cycle has decreased and this has resulted in the degradation of ecosystem.

Abha Lakshmi Singh

Preface

'*Jhum*', though the term is old, it is not exaggerated to say that any solution of *jhum* is yet to find. This outdated method of cultivation system exists from the very beginning of agricultural history. Much has been written, much has been told and many hue and cries has been made over the degradation of ecosystem due to *jhum*. Yet *jhum* continues but how long...?

The tropical countries of Africa, Latin America and South East Asia accounts for over 98 per cent of the total area under shifting cultivation (*jhum*) in the world. More than 525 million people live and farm on the tropical hillsides which covers 12.9 million sq. km. and forms 9 per cent of the earth's land-mass, out of which Africa has 40 per cent. In Asia, about 53 per cent of the total landmass is in upper watersheds, which is home to 65 per cent of the 1.6 million rural population. In India, 4.9 million hectares in 11 states (i.e., seven north-east states plus Sikkim, Orissa, Madhya Pradesh and Andhra Pradesh) is affected by the problem of *jhum* and about 4.44 million families are engaged in this.

In India, more than 90 per cent of the total area under *jhum* is in the north-eastern region of the country. Out of total geographical area of north-eastern region (i.e., 25.5 million hectares), 2.7 million hectares is under *jhum*, of which 17 per cent is in use at any given time.

Logically, *jhum* is an agricultural problem which creates forest and soil erosion. This cultivation system involves slashing down of trees and bushes over the forest area, drying and burning, sowing of seeds of host of crops by using stick,

dibbler or by hand before the onset of monsoon. Leaching, erosion and loss of fertility takes place rapidly in practicing *jhum* and the field per unit of land becomes progressively lower. Land-water system which is basic life supporting factor and a prime mover of socio-economic development has already fallen into the clutches of law of diminishing returns with the reduction of productivity.

The pernicious effect of *jhum* has been increasing and have now assumed a devastating proportion. Several hill sides of Manipur have become barren—slopes with rills and gullies without vegetation. The eroded soil from the upper reaches/fills up the streams and reservoirs where siltation takes place. Due to decrease in the water depth in the lakes/ reservoirs, life of hydro-electric projects like Loktak Hydro-Electric Project is going to be shortened. Drying up of many perennial sources of water also takes place. On the other hand, floods occur more often now than before and quality of environment is being seriously affected. Ecological balance of the whole region is being endangered with denudation of invaluable flora and fauna and finally eco-degradation.

On the other hand, high hills offer low returns and restrict alternatives. Difficult terrain encourages isolation of small communities. To such isolated communities, *jhum* satisfies their minimum food and other basic requirements. In fact, *jhum* in Manipur occupies a distinct place in the tribal economy and contributes a vital part of the socio-economic network of tribal life. They clearly do it for their food requirements. The hill man of the state has to bear with steep slope, poor soils, mosquito infested and less invigorating climate, poor means of transport and communication and a life of isolation and relative isolation. Under such an adverse physico-socio-cultural environment his life is a desperate struggle for survival. Consequently he seems to be compelled to adopt *jhum*.

The present study was conducted with keeping in mind the significant background of two schools of thought. The practice of *jhum* has been severely attacked by the first school of thought as it disturbs the ecosystem causing ecological imbalance while the second school of thought has been supported the continuance of *jhum* with necessary and effective reforms. The study suggests various alternatives and

modifications to *jhum* as measures to minimize the negative impact of *jhum* on ecosystem and to bring better socio-politico-economic conditions of the *jhum*ias.

I wish to express my sincere and heartfelt thanks and deep sense of gratitude to my revered and learned teacher and guide Prof. (Mrs.) Abha Lakshmi Singh, Department of Geography, for her omniscient guidance rightly from its inception to its culmination in the present work. Without her unceasing encouragement and cooperation this work would not have been completed. Words are not enough to express my debt of gratitude.

I am also indebted to Prof. Mohd. Shafi, Professor Emeritus, Department of Geography, Prof. R.J. Singh, Department of Physics, for their invaluable suggestions and encouragement. I would be remiss in my gratitude if I do not express my heart-felt thanks to my parents and other family members for their intrinsic love, support and encouragement.

Md. Bahar-Ud-Din Shah

Glossary

Local words	English equivalent
Purvanchal	A local name of the eastern arm of Himalaya
Jhuming/jhum/jum	Shifting cultivation
Ladang, Caingin, Milpa, Ray, Conuco, Roca, Masole, Podu, Dadi, Koman, Bringa, Kumari, Watra, Penda, Bewar, Dahia, Deppa	
Kumari	Local or regional name of shifting cultivation
Yoke	A traditional agricultural implement
Dao	A traditional agricultural implement (machetes)
Kharif	Summer (a term used in agricultural practices)
Rabi	Winter (a term used in agricultural practices)
Jungle	Forest
Pakhangba	The first mythological king of Manipur
Sidaba Mapu	Supreme God
Jhumia/jhumias	Shifting cultivators/farmers
Kuccha	Which is not cemented
Pucca	Which is cemented
Tin	A container (mustard oil tin) which is used to measure the quantity of paddy/rice
Sangam	A local land unit system which is roughly equal to 0.62 acre.

Introduction

As the pressure of population increased, the hunters-cum-cultivators of the Neolithic period started clearing more patches in forests to bring them under cultivation. At the depletion of fertility, the cultivators used to migrate to new tracts to burn and clear forests for sowing of crops. This type of cultivation is termed as 'slash and burn agriculture' or 'shifting cultivation' or 'bush fallow agriculture' or 'swidden agriculture'.

Shifting cultivation is called by different names in different parts of the world. It is variously termed as *Ladang* in Indonesia, *Caingin* in Philippines, *Milpa* in Central America and Mexico, *Ray* in Vietnam, *Conuco* in Venezuela, *Roca* in Brazil and *Masole* in Congo and Central Africa. It is also practised in highland areas of Manchuria, Korea and South West China. In North East India it is known as *Jhum* or *Jum*, in Orissa as *Podu*, *Dabi*, *Koman* or *Bringa*, in Western Ghats as *Kumari*, in Rajasthan as *Watra*, in Madhya Pradesh as *Penda*, *Bewar* or *Dahia* and in Chattisgarh as *Deppa* and *Kumari*.

Jhum cultivation otherwise called *'Pamlou'* in Manipur may be defined as an agricultural system which is characterised by rotation of fields rather than crops, by short period of cropping alternating with long fallow periods and clearing by means of slash and burn. The operation of *jhum* cultivation is associated with systematic processes like selecting the forested hilly land, clearing the forested tract by cutting down the *jungles*, burning the dried forest into ashes, worship and sacrifice, dibbling and sowing of seeds, weeding, watching and protecting the crops, harvesting, threshing and storing,

merry making and fallowing. This practise of raising agri-cultural crops does not involve cultivation of land using agricultural implements or drought animals or any mechanical power. The inputs are human labour and seeds. Crops raised for a few seasons and areas are abandoned once in 2 or 3 years which are affected by serious erosion. The farmers called *jhumias*, then shift over to other lands and resort to similar practise (but the villages do not shift). Leaching, erosion and loss of fertility takes place rapidly. Land-water system which is basic life supporting factor and a prime mover of socio-economic development has already fallen into the clutches of the law of diminishing returns with reduction of productivity vis-a-vis inputs and gross physical degradation of the system. All this further aggravates the situation and makes the *jhumias* increasingly poor inspite of his putting much greater labour.

Jhum cultivation, generally in Manipur and particularly in Ukhrul district occupies a distinct place in the tribal economy and contributes a vital part of the socio-economic network of tribal life. They clearly do it for their food requirements. The land around the village within certain fixed bounds is usually the property of the village, though the system of ownership of land differs from village to village particularly in Ukhrul district. In the midst of sharp relief, gentle slopes are used for terracing, in the absence of which, the land is put under *jhum*. According to the prevailing customs in the hills, all land adjoining the village belongs to the community as a whole or to the village headman and exclusive right of an individual is not entertained. The site of *jhum* is selected by the headmen or priest with the help of other aged experienced *jhumias* in advance and individual families are allotted their share if there is no any already marked particular field of particular family. In some Tangkhul Naga villages of Ukhrul district, the roughly marked permanent *jhum* fields are available for particular families. In such situations, there is no new allotment of land in the particular *jhum* year, if the land is enough to feed the family otherwise one could demand for more *jhum* land. *Jhumias* start, after selection of *jhum* site, the labour intensive processes of *jhum* with cutting down the trees in the month of December with

Dao and Axe. After felling the forest, the wood and twigs are allowed to dry, so that it may be fired in the month of March when the weather is sunny and overcast skies are rare. The uncontrolled fire, in many cases spreads beyond the *jhum* area and does great damage to the valuable virgin forests of the region. The soil for a depth of one or two inches gets completely burnt. The soil is, thereafter, scratched up with little hoe and in this process the soil and the ash gets mixed up together.

Logically, *jhum* cultivation is an agricultural problem which creates forest and soil erosion problems. Soil erosion takes place due to dynamic processes of nature and other natural factors. This has been further aggravated by human interference by way of *jhum* cultivation, indiscriminate cutting and felling of trees for fuel and timber, free grazing of cattles, unscientific cultivation of crops on the steep slopes, etc. leading to destruction of flora and fauna and finally eco-degradation.

The pernicious effect of *jhuming* has been increasing and have now assumed a devastating proportion. Several hill sides of Manipur have become barren-slopes with rills and gullies without vegetation. The eroded soil from the upper reaches fills up the streams and reservoirs where siltation takes place. Due to decrease in the water depth in the lakes/ reservoirs, life of hydro-electric projects like Loktak Hydro Electric Project is going to be shortened. Drying up of many of the perennial sources of water also takes place. On the other hand, floods occur more often now than before and the quality of environment is being seriously affected. Ecological balance of the whole region is being endangered.

The mountainous topography, undulating slope surrounding the Manipur valley and wet weather for over seven months (April to October) provides ideal conditions in which people practise *jhum* cultivation. The people who are scattered over the mountains depend for their sustenance on *jhum*ing and food gathering from the forest. All the hill districts are most sparsely populated having a density of about 49 persons per sq. km. as against the density of 628 persons per sq. km. in the central valley. The hill man has to bear with steep slope, poor soils, mosquito infested and less invigorating

climate, poor means of transport and communication and a life of isolation and relative isolation. Under such an adverse physico-socio-cultural environment his life is that of a desperate struggle for survival. Consequently, he is compelled to adopt a primitive mode of cultivation on the undulating slopes of the surrounding hills of Manipur.

On the other hand, the practise of *jhum* cultivation has been severely attacked by the ecologists, environmentalists and planners as it disturbs the ecosystem causing ecological imbalances. There are, however, some people who support the continuance of *jhum*ing with necessary and effective reforms.

Keeping this significant background of *jhum* cultivation in mind, it was decided to study the impact of *jhum* cultivation on the ecosystem of Manipur. Ukhrul district of Manipur is selected for this study because of its mountainous topography, undulating slopes and wet weather conditions that provides ideal conditions for *jhum* cultivation; the predominant tribal population mainly Nagas and Kukis who are the main *jhum* cultivators in Manipur and they have been practising *jhum* cultivation for centuries; absence of industries and minimum urbanization (whole district came under the rural category both in 1991 and 2001 Census), abject of poverty, unemployment, economic exploitation, social deprivation, poor health, illiteracy and lack of infrastructure.

Conclusion

The main conclusion which arise from the foregoing analysis is that:

- The physico-socio-cultural environment of Ukhrul district has compelled the local people to adopt *jhuming.*
- The mountainous topography, undulating slopes and wet weather conditions almost all the year round provides ideal condition for people to practise *jhuming.*
- *Jhuming* is a way of life for the tribals. Their needs, food habits, folklores, festivals and the overall cultural ethos has a say in *jhum.*
- The life of the *jhumias* is that of a desperate struggle for survival in such harsh conditions.
- With the increase of population the *jhum* cycle has decreased and this has resulted in the degradation of the ecosystem.

In the hill tracts of Manipur inhabited by the tribals, *jhum* cultivation has been and is even today traditionally practised. A hill slope is cleared of its natural vegetation by cutting and burning, seeds are broadcast and the crop is harvested on maturity. The slope is then left fallow for the rest of the *jhum* cycle. The *jhumias* move to another slope. This has been the principal mode of livelihood in this remote district of Manipur.

The adverse physical and environmental consequences of *jhum* cultivation have been well accepted. It destroys the ecological balance, results in substantial soil erosion which subsequently leads to flooding of rivers, dries up hill springs and destroys valuable forests. As population increases, a

vicious circle starts. The *jhum* cycle becomes shortened and soil fertility is not fully restored, yields decline and further areas are brought under *jhum*, so that the *jhum* cycle is further shortened. It was reported that in some parts of Manipur, *jhum* cycle have been reduced to 2 to 4 years.

Opinion is divided on the economic and social desirability of *jhuming*. One section of respondents thought that in a situation of inadequacy of other resources for earning livelihood, *jhuming* represents the only source of income generation in the hilly regions. It has now been deeply embedded in the social and cultural patterns of those dependant on it so that the control of *jhuming* becomes a socio-cultural traumatic experience. The other section of respondents are given the idea of the damaging consequences for the natural resources. It is a matter of time before *jhuming* can totally damage the social and economic fabric of life.

Manipur is an isolated hill grit state in the North-Eastern corner of India. This state is subdivided into nine districts namely, Imphal East, Imphal West, Bishnupur, Thoubal which lies in the central valley and Senapati, Ukhrul, Chandel, Churachandpur and Tamenglong districts which lies in the hill areas. Ukhrul district was chosen as the study area because:

- of its location in the hill areas, its mountainous topography, undulating slopes and wet weather conditions which provides suitable conditions for *jhuming*.
- More than 93 per cent of the population of Ukhrul district are tribals mainly Nagas and Kukis who are the main *jhum* cultivators in Manipur. These tribes have been practising *jhum* for centuries. It is a way of life for them.
- Earlier work on various aspects of *jhuming* has been conducted in different areas of North-East India and a little attention has been paid of Ukhrul district, where nearly 40 per cent of the total area is under *jhum*.

The author has made extensive use of primary data which was drawn from a comprehensive survey of 5 villages. The sampled village were located in different tribal development blocks (Ukhrul district is divided into 5 tribal development

blocks) and were a good representation of *jhumias* belonging to different tribes. The two predominant tribes living in Ukhrul district are the Tangkhul Naga and Kukis. Of the 5 sampled villages Lungphu, Yeasom, and Nungbi Khullen are dominated by Tangkhul Naga tribes while Mongkot Chepu and Maku Kuki villages are dominated by Kuki tribes. About 55 households (13.25 per cent) were sampled from these 5 villages. From the village Lungphu situated in Phungyar-Phaisat Tribal development block, 8 *jhumia* households were sampled. From the village Yeasom situated in Kasom Khullen tribal development block, 8 *jhumia* households were sampled. From the village Nungbi Khullen situated in Chingai tribal development block, 21 *jhumia* households were sampled. From the village Mongkot Chepu situated in Ukhrul tribal development block, 12 *jhumia* households were sampled and from the village Maku Kuki situated in Kamjong-Chassad tribal development block, 6 *jhumia* households were sampled.

In the foregoing chapters we have tried to analyse our data to test the hypothesis that we had set before us while undertaking this work. The following general conclusion may be drawn from the study:

1. Due to hilly nature of the terrain, undulating slopes and wet weather conditions, people practise *jhum*. Ukhrul district lies in the hilly area of Manipur. It is located at an elevation ranging between 388 and 2,834 meters above mean sea level. The district is divided into three hilly regions. The northern hilly region spreads over the north western parts and covers more than half of central subdivision. It has three hill ranges with a maximum height of 2,568 m. and minimum height of 1,155 m. above mean sea level. The eastern hilly region spreads over the eastern part. It has one hill range with a maximum height of 2,834 m. and minimum height of 453 m. above mean sea level. The southern hilly region extends over the south western part and occupies more than half of the Ukhrul district. The region has five hill ranges. The district has monsoon type of climate and it receives heavy rainfall for at least

seven months (April to October). Thus the whole of Ukhrul district is mountainous with undulating slopes and wet weather conditions. In such physical conditions people are compelled to practise *jhum*.

2. Ukhrul district is a land of beautiful mountains interspersed by numerous tribal habitats. Of the total population of this district, nearly 94 per cent comprises of tribal population. The most predominant tribal community living here on the basis of population is the Tangkhul Naga followed by the *Thadou* and the *Vaiphei*. The *Thadous* and the *Vaiphei* are the major sub-clans of Kuki tribes. The tribals are traditionally bound and they practise primitive agriculture. *Jhum* is a way of life for them. It has deeply embedded in their lifestyle. They practised it for their livelihood. Thus, their needs, food habits, self reliance, folklores, festivals and overall cultural ethos have a say in *jhum*.
3. The tribals have to face difficulties of mountainous terrain, steep slopes (98 per cent of the total area), poor soils, heavy rains, less invigorating climate, mosquito infestations, poor means of transport and communication and a life of isolation. Under such an adverse physico-socio-cultural environment his life is that of a desperate struggle for survival. As a result he is compelled to adopt a primitive mode of cultivation that is *jhuming*.
4. Recent figures for area under *jhum* is not available. So the figures which are available have been considered. In 1986-87, 99,162 hectares and in 1993-94, 162,547 hectares were under *jhum* (Manipur Remote Sensing Application Centre, Imphal, 1995). This shows that Ukhrul district has recorded an increase of 13.95 per cent area under *jhum* during the last eight years (till 1993-94). The area under secondary forest has decreased by 13.94 per cent. This shows that the amount of increase in area under *jhum* is the amount of decrease in area under forests. Thus, *jhuming* is still a way of life for the tribals of Ukhrul district.
5. Increasing or decreasing of area under current *jhum*,

abandoned *jhum* and forest differs from watershed to watershed in Ukhrul district. These changes were monitored with the help of satellite imagery based data and maps of 1986-87 and 1993-94 (Manipur Remote Sensing Application Centre, Imphal, 1995).

In Thoubal river watershed, 24 per cent of total area was covered by *jhum* with 1.55 per cent under current *jhum*, while 67.87 per cent was covered by mixed forest in 1986-87. The area under mixed forest has decreased by 44.37 per cent of the total area in 1994 and so the percentage of *jhum* increased by 47.51. Interestingly, the percentage of area under current *jhum* decreased from 1.55 to 0.83 in 1994.

Iril river watershed had only 26.89 per cent area under *jhum* with 1.72 per cent area under current *jhum* in 1994. It had 54.63 per cent area under forest, 37.66 per cent area under *jhum* and 4.35 per cent area under current *jhum* in 1987. It recorded a decrease of 27.74 per cent area under forest while an increase of 27.73 per cent area under *jhum*. But the area under current *jhum* decreased from 4.34 per cent in 1987 to 1.72 per cent in 1994.

In Chingai river watershed, 72.34 per cent area was under forests while 21.73 per cent area was under *jhum* and 1.85 per cent area under current *jhum* in 1986-87. Forest area decreased to 48.84 per cent in 1994 while the area under *jhum* increased to 45.26 per cent. Current *jhum* area had decreased from 1.85 per cent to 1.09 per cent.

In Chamu river watershed 65.16 per cent area was covered by forest while 32.06 per cent area was under *jhum* in 1986-87. The forest area had decreased to 34.15 per cent while area under *jhum* increased to 63.07 per cent. Area under current *jhum* increased from 2.29 per cent in 1986-87 to 3.28 per cent in 1993-94.

In other four watersheds i.e., Taret river watershed, Tuyungbi-Maklang river watershed, Maklang Nagayal river watershed and Khunukhong Sanalok river watershed, 78.73 per cent, 75.79 per cent, 83.81 per cent and 91.86 per cent of the total area of the watersheds were under forest cover in 1987 whereas, in 1994 the area under forest had changed to 83.17 per cent, 74.00 per cent, 87.23 per cent and 85.98

per cent respectively. This shows that where the percentage of forest area increased, the percentage of *jhum* area decreased and vice-versa.

Thus, in Ukhrul district, 75.00 per cent of the total area was under forest while 21.82 per cent area was under *jhum* with only 3.13 per cent area under current *jhum* in 1986-87. But in 1993-94, the area under mixed forest and *jhum* were 61.06 per cent and 35.77 per cent respectively with 1.86 per cent area under current *jhum*. Though the area under total *jhum* category has increased from 21.82 per cent in 1986-87 to 35.77 per cent in 1993-94, the area under current *jhum* decreased from 3.13 per cent in 1986-87 to 1.86 per cent in 1993-94.

6. Results of slope analysis of the different micro-watersheds showed that 81.58 per cent of the area falls in the very steep slope category, 16.28 per cent falls in the moderately steep to steep slope category and 1.43 per cent lies in the strongly sloping slope category. Human activities are affected by slope aspects. The slope of any area determines the type and possibility of cultivation. In spite of this fact that Ukhrul district is characterized by hilly terrain and very steep slopes where soil erosion intensity is very high, *jhuming* is still practised and it is a way of life for the tribals.
7. The results of comprehensive survey of the 5 villages namely, Lungphu, Yeasom, Nungbi Khullen, Mongkot Chepu and Maku Kuki situated in the five tribal development blocks of Ukhrul district and inhabited by Tangkbul Naga and Kuki tribes throws light on the following facts:
   (a) *Land Tenure:* Field surveys have shown that both the village community and individual *jhumias* have separate rights on the *jhum* fields. In the sampled Tangkhul Naga inhabited villages namely, Lungphu, Yeasom and Nungbi Khullen, *jhum* land were owned by individual *jhumias* and they could make any changes in their fields. But the *jhumias* are bound to move together at one

site for *jhum*. The selection of *jhum* site is done by the whole community under the leadership of village headman. In every selected *jhum* site, individual households have their own *jhum* fields. Whereas in the sampled Kuki inhabited villages namely, Mongkot Chepu and Maku Kuki, all land belongs to the village headman. He is the sole authority and can utilize any land. Individual households have no right to use any piece of land without prior permission of the village headman. Headman, with the help of aged experienced *jhumias*, selects a *jhum* site and allots the land to the individual *jhumias* for three years. In return, the *jhumias* have to pay foodgrains to the headman for utilizing his land. Thus, the land tenurial system differs from the Tangkhul Naga inhabited villages to the Kuki inhabited villages. In the Tangkhul Naga inhabited villages the individual *jhumias* have partially their own rights while in Kuki inhabited villages the headman has a say in all the matters.

(b) *Cropping Period and* Jhum *Cycle:* Cropping period and *jhum* cycle differs from village to village. Field survey have shown that in the 5 sampled villages, cropping period is of one year in the Tangkhul Naga inhabited villages and 3 years in Kuki inhabited villages. Long *jhum* cycle i.e. of 15 years is prevailing in Lungphu village. In Yeasom village, *jhum* cycle is of 9 to 10 years. While in Nungbi Khullen village, *jhum* cycle ranges between 5 to 10 years. All these three villages are inhabited by Tangkhul Nagas. Whereas, in Kuki inhabited villages, the *jhum* cycle is of 7 years in Maku Kuki village and 5 years in Mongkot Chepu village. This clearly shows that Tangkhul Naga inhabited villages have short cropping period but long *jhum* cycle while Kuki inhabited villages have long cropping period but short *jhum* cycle.

(c) *Man-Land Ratio:* Man-land ratio is one important

indicator of development. Results obtained from the survey of the five sampled villages shows that the man-land ratio in Tangkhul Naga inhabited villages are 1:0.32 in Yeasom village, 1:0.28 in Lungphu village and 1:0.28 in Nungbi Khullen village. Whereas, in Kuki inhabited villages it is 1:0.24 in Maku Kuki village and 1:0.16 in Mongkot Chepu village. Again, man-*jhum* land ratio are 1:0.26 in Lungphu, 1:0.25 in Yeasom, and 1:0.13 in Nungbi Khullen village. Whereas, in Maku Kuki and Mongkot Chepu, it is 1:0.24 and 1:0.16 respectively.

(d) *Labour-Production Ratio:* Results of field survey showed that in the Tangkhul Naga villages the labour-production ratio was 1:6,000 in Yeasom, 1:4,514 in Lungphu and 1:2,166 in Nungbi Khullen village while in Kuki inhabited villages it was 1:5,414 in Maku Kuki and 1:2,051 in Mongkot Chepu village. Thus, average labour-production ratio in the Tangkhul Naga inhabited villages is about 1:4,227 whereas, in the Kuki inhabited villages it is about 1:3733.

8. Indiscriminate cutting and destruction of trees and vegetation for the purpose of *jhum* has caused loss of forest cover. *Jhuming* has been considered destructive to the ecology. With an increase in population the pressure on these ecologically fragile areas have worsened. Field surveys revealed that in the 7 sampled households of Lungphu village, a total of 14.86 acres of forest have been degraded for *jhuming*. On an average one household has degraded 2.12 acres of forest. Thus the 67 households which are practising *jhum* in this village have degraded about 142 acres of forest. In Yeasom village, 40 households are practising *jhum*, a total of about 62 acres of forest area has been degraded for *jhum* purpose. In Nungbi Khullen village, 176 households are practising *jhum*, about 144 acres of forest has been cut down. In Mongkot Chepu village, a total of about 95 acres of forest has been degraded for *jhum* purpose by 95

jhum practising households. In Maku Kuki village, about 9.58 acres of forest has been degraded in the current year for *jhum* purpose by 6 households.

Thus, in the five sampled villages of Ukhrul district, a total of about 452.51 acres of forest has been lost. Average area of forest lost in these five villages is 90.51 acres. In the whole Ukhrul district where 222 villages are practising *jhum*, a total of about 20,093 acres or 8,135 hectares of forest is being cut down per year for the purpose of *jhum*.

9. It is obviously true that high rainfall and steep slopes is associated with problems of severe soil erosion, particularly when the landuse system have biotic interference. *Jungle* cutting, burning, clearing and dibbling of seeds in *jhum* accounts for a considerable amount of loose soil material, ashes, earthworm casting and detached soil clods/stones to roll down the foothills. Through this process 3.7 tonnes of soil materials per hectare was reported to slide down the foothills. It was also reported that soil erosion from hill slopes (60-70 per cent) under first year, second year, abandoned *jhum* (first year fallow) and bamboo forest were estimated to be 146.6, 170.2, 30.2 and 8.2 tonnes per hectare per year respectively. Moreover, high production rate of crops like paddy in one year cropping *jhum* fields mainly in Tangkhul Naga inhabited villages and low rate of production of paddy in 3 years continuous cropping fields in Kuki inhabited villages shows maximum loss of soil in the fields where intensive cropping is done.
10. The practise of *jhuming* affects the soil properties. Burning causes changes in the soil properties. Burning chemically alters a portion of the plant nutrients supply from an organic form to a mineral form in ash which is often readily soluble. When water runs over or passes through this ash, the soluble components are flushed out and lost from the site in the run off.

Soil samples were collected from each of the five sampled villages before and after burning and tested to assess the

fertility status. More or less same results were observed in all the soil samples which were tested from different *jhum* sites. pH value of the soil increased slightly in all the sampled soils after burning. Percentage of organic carbon in the soils decreased after burning. The quantity of potassium (K_2O) increased substantially after burning. While the amount of phosphorus in Kg. per hectare is more or less same before and after burning.

11. Field surveys have shown the following changes in flora of the study area which is attributable primarily to *jhuming*.
    (a) In some spots certain trees and shrubs are scarce and may become further rare or even eliminated from the flora of the region, e.g. Phoebe hainesiana, Alder, Pinus Kerya and Parkia Javanica etc. are becoming scarce in most of the areas of Ukhrul district where *jhum* is practised.
    (b) In the process of cutting trees and burning the site, many parasites and epiphytes gets depleted or eliminated from the flora e.g., unique species of orchids, epiphytic ferns and various species of shrubs were collected from Ukhrul district but in subsequent visits it could not be located from the same area, as the area had been under *jhum*.
    (c) After the tree cover is removed many components of the ground find the habitats no more suitable for their survival or reproduction.
12. The age old practise of *jhuming* at present has become very harmful due to shorter *jhum* cycles, shrinkage of forest area etc. This has resulted in destruction of habitat and the survival of wild life. The tropical forest of Ukhrul district is the habitat of many valued species of birds and animals. Respondents from the five sampled villages reported of disappearance of many wild life from their area and neighbouring areas. The Javan Rhinoceros and Wild Ox of Myanmar known as '*Santhou*' in Manipuri have vanished from Manipur forever. The Hoolock Gibbon, Stump Tailed Macaque, Slow Loris, Clouded Leopard, Golden Cat,

Marbled Cat, Binturong, Spotted Linsang, Malayan Sun Bear, Smoth Indian Otter, Hog Badger, Malayan Giant squirrel, Serow (Sabeng) etc. are making precarious existence and all of them are on the verge of extinction. Similar is the case of birds. A number of birds also have become rare and many are probably extinct.

13. *Jhum* cultivation is a major cause of forest loss in the hill areas where it is practised. This leads to the reversal in the pattern of precipitation. Regularity of rainfall has been adversely affected. As a result, floods and droughts are becoming a regular phenomena. Magnitude of these phenomena is also increasing. Floods which occurred in 2001 and 2002 were among the most hazardous one which affected almost the whole valley districts of the state. Drought, on the other hand, had never been a frequent phenomena, but severe drought was experienced in 1999 resulting in scarcity of water and drying up of many rivers like Thoubal, Iril and Imphal. Moreover, soil erosion and landslides on the deforested hill slopes leads to siltation and sedimentation on the river beds causing shallowness in river depth. Sediments brought down by rivers has led to the sedimentation of the floor of rivers and Loktak Lake. Due to decrease in the depth of Loktak Lake the life style of the people living in and around the Lake has been changing. If steps are not taken to save the Loktak Lake by stopping degradation of forests on the hill slopes, a very severe predictable condition will prevail with the drying up of Loktak Lake (which is also a source of hydro-electric power in North East India).

Much has been written, much has been told and much hue and cry has been made over the degradation of the ecosystem due to *jhuming*. Yet, *jhuming* continues because of the mountainous topography, undulating slopes, wet weather conditions and the tribal population for whom *jhuming* is a way of life.

The government, environmentalists and agricultural

scientists have made several attempts to convince the *jhumias* about the serious impacts of *jhum* not only on the ecosystem but also on their socio-economic conditions. The scientists suggested many alternate measures for *jhuming* but their pleas have failed perhaps due to adverse physico-socio-cultural environment in which the tribals are compelled to practise *jhuming*. In coming years, with higher growth of population the demand of food crops will increase. This will intensify *jhuming* if no alternate measures are undertaken.

To minimize the existing problems in connection with *jhum*, the author has suggested the following measures:

- In depth field studies in *jhum* areas is the need of the hour. The problems should be thoroughly investigated and tackled at the grassroot level.
- To control soil erosion, traditional soil erosion control measures should be adopted like construction of mechanical barriers using logs and poles, bamboos and trash, earthen bunds, vegetative barriers etc. The tribals are well acquainted with these measures and they could use them easily.
- Cash crop cultivation, irrigated rice cultivation and livestock production should be intensified.
- Land ownership system particularly in Kuki tribal villages should be changed or improved because the existing system has adverse effect on production as well as on the soil conditions. There should be a fully implementable law so that the lands are directly under *jhumias* and not under the headman. If *jhumias* are the owners of their land they will look after their land more properly.
- Marketing facilities, transport and communication facilities should be improved.
- Agro-based and forest based industries, bee-keeping, piggery, pisciculture, sericulture, horticulture, forestry and cottage industry are already proved approachable alternatives to *jhum*. This should be implemented gradually.
- Modifications are more applicable than alternatives. Emphasis should be given to modifications of *jhum* like

Alder-based *jhum*. Alder-based *jhum* is found to be most suitable modified *jhum*. Alder tree has root nodules which improve soil fertility by fixing atmospheric nitrogen into the soil. It has the capacity to store, conserve and enrich the soil properties. It also enhances crop yields and reduces soil erosion. This tree is widely available in Ukhrul district.

This sustainable productive system has the potential to be adopted on a wider scale. Villages which are having very limited land areas, alder-based *jhum* is found to be suitable to increase food production and to maintain the ecological balance. In addition, it also provides good qualities of timber and firewood from which money can be earned easily.

Thus, any transformation in *jhum* area should be socially acceptable, economically profitable and ecologically sustainable. Any delay in implementation of better techniques will lead to converting the whole area under *jhum* into an ecologically slum.

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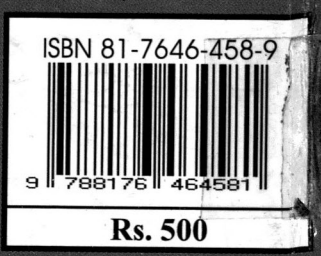

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