

SHIFTING CULTIVATION IN MANIPUR: LAND, LABOUR AND ENVIRONMENT

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ABSTRACT

Shifting cultivation is the main source of livelihood system in the hill areas of Manipur, one of the north-eastern States in India. It is widely prevalent due to lack of alternative farm employment. Its inputs are crude and traditional in nature resulting in subsistence income. Shifting cultivation is labour-intensive and has a traditional character. Empirical evidence shows that rapid population growth has increased the use of forest land for shifting cultivation in Manipur. The system's cycle has substantially declined due to population pressure on land thereby reducing the productivity. It has resulted in environmental degradation and problems of forest land re-vegetation. It has also led to a huge loss of forest resources every year. Its production is mostly organic due to sparingly use of inorganic fertilisers. Institutional changes in the form of private ownership of land have resulted in commercialisation of forest products like timber and firewood. Land use and forest laws need to be strengthened to safeguard and protect forest land. Ensuring food security and restructuring of land ownership system from community to private may reduce the practice of shifting cultivation and conserve forest cover.

Introduction

Shifting cultivation, commonly known as jhumming, is largely confined to the North Eastern Region (NER) of India (Report of Task Force on Shifting Cultivation, Ministry of Agriculture, 1983). Ministry of Agriculture (1983), as cited in the Forest Survey of India (FSI) (1987) estimated that shifting cultivation was

practised in 13 States of India: extensively in Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura in the North Eastern Region and Odisha and restrictedly in Andhra Pradesh, Bihar, Kerala, Karnataka, Madhya Pradesh, Maharashtra, Sikkim and West Bengal. Shifting cultivation, an age-old agricultural system, has been a way of

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life for a large number of indigenous ethnic groups. Ministry of Development of North Eastern Region (MODONER) and North East Council (NEC) in North Eastern Region's Vision 2020 published in 2008 remarked that shifting cultivation is widely practised in the hills by the ethnic tribal people. Its practice is contentious due to its harmful environmental costs. It is commonly practised in the hill areas of Manipur, one of the north-eastern States of India. It is "operative chiefly in the regions where more technologically advanced systems of agriculture have not become economically or culturally possible or in regions where the land has not yet been appropriated by people with greater political or cultural power" (Sachchidananda, 1989:5). Nevertheless, it leads to loss of forest cover causing land degradation and deforestation that is one of the forest issues in Manipur.

People living in hill areas of the State are recognised as Scheduled Tribes (STs) by the Government of India. In 2011, 36.44 per cent of the total 2.6 million people of Manipur lived in the five hill districts. STs comprise 35.12 per cent of the State population. They largely practise shifting cultivation as the permanent terrace cultivation is limited in the foothills. Shifting cultivation is a labour-intensive mode of agricultural activity. It has a traditional characteristic that is similarly stretched by Mellor (1962) concerning traditional agriculture where land and labour are highly complementary to each other. Productivity is low, multi-cropping method is adopted and use of human labour is the main input and

labour is reciprocal in nature under the system (Gupta, 2006). MODONER and NEC (2008) also noted that the productivity under shifting cultivation is low. According to FSI (2011), the loss of forest cover was by 190 km² during December 2006/January 2007 to January/February 2009 (satellite data) in Manipur. Such loss in the forest cover is mainly because of extensive practice of shifting cultivation (FSI, 1987, 1995, 2005, 2011 and 2013). Shifting cultivation contributed to soil erosion, deforestation and destabilisation of the ecology (FSI, 1987 and MODONER and NEC, 2008). However, under it the use of chemical fertilisers and pesticides is insignificant (Kerkhoff and Sharma, 2006). Directorate of Economics and Statistics (2014) data on fertiliser usage in the hills of Manipur show an insignificant amount, implying organic agricultural production under shifting cultivation. With this backdrop the present paper¹ evaluates the changing patterns of shifting cultivation under the forest environment and growing labour force in the hills of Manipur. It also studies the patterns and trends of land use, forest cover, agriculture, forest income and agricultural productivity with special reference to shifting cultivation in recent times.

Methodology

The paper evaluates the changing patterns of shifting cultivation arising due to population growth and development linking it with the environmental issues in the hills of Manipur in recent decades, using secondary data of agricultural statistics, crop estimation

survey and statistical abstracts published by the Directorate of Economics and Statistics (DES), Government of Manipur, Forest Survey of India (FSI) and Population Census. On the basis of the practice of shifting cultivation the hill districts of Manipur are classified into hill areas covering the districts of Senapati, Tamenglong, Chandel, Churachandpur and Ukhru; and the valley areas consisting of the districts of Imphal East, Imphal West, Thoubal and Bishnupur. The study examines the status, type and density of forest cover emphasising on the hill areas. It assesses the contribution of agriculture and forestry and logging, that affects the forest cover largely by the system of shifting cultivation, in the gross state domestic product (at constant prices). Moreover, the land use pattern of Manipur is analysed in comparison with the national pattern. Next, the system of shifting cultivation is elaborated. It is followed by an examination of the nature and extent of practice of shifting cultivation by considering the area under rice classified by types (shifting or permanent including terrace) of cultivation particularly in hill areas. Further, the share of combined cultivators and agricultural labourers as workers in agriculture is briefly analysed along with an examination of extent of economic participation of population measured by Workers' Population Ratio (WPR). Number of shifting cultivators is being estimated based on census data on agricultural workers due to non-availability of data on it. The number and size of shifting cultivators in the hills is estimated by assuming 60 per cent of the

agricultural workers (cultivators and agricultural labourers) as shifting cultivators since the system is more labour-intensive than permanent/terrace cultivation. It further, evaluates the shifting cultivation environment emphasising on the cycle, fertility and productivity of shifting cultivation. The overall agricultural production and yield of Manipur is being examined; later the hill specific agricultural production and yield is analysed in order to assess the difference in productivity in the hills where shifting cultivation is predominant and use of chemical fertilisers is insignificant and the valley that is predominant by stable wet land cultivation using improved seeds and chemical fertilisers.

Land and Forest

About 90 per cent of the total geographical area of Manipur (22327 km²) is located in the hill districts and the rest is in the valleys. Forest cover shows a gradual improvement in the State from below 17,000 to over 17,000 km² from 2001 to 2011 despite wide practice of shifting cultivation in the hills. In 2013, the FSI recorded a decline in the forest area by about 100km² from the previous record. Moreover, the area of forest cover in the hills, in particular, remains almost unchanged over the recent years. Almost all (98 per cent) forest cover in Manipur is concentrated in the hills.

In terms of the share of forest cover in geographical areas of the State, Manipur ranked 7th among the Indian States and UTs (FSI, 2013). The forest cover is slightly more than three-fourths of the total geographical area of

Manipur. The hills of Manipur (20089 km²) are mostly covered by forest with a whopping share of about 83 per cent in 2013. Forest cover in the hills hovers at this proportion due to an extension of human settlement, developmental activities like road or dam construction besides the practice of shifting cultivation affecting the land rejuvenation and re-vegetation process. In the valleys, forest cover stood at about 16 per cent of the entire geographical area of 2238 km².

FSI (2005) defined 'reserved forest' as 'an area so constituted under the provision of the Indian Forest Act or other State Forest Acts having full degree of protection'. In reserved forests all activities are prohibited unless permitted. Protected forest is an area notified under the provisions of the Indian Forest Act or other State Forest Acts having limited degree of protection. In protected forest all activities are permitted unless prohibited. The State's forest is mostly unclassified type of forest with a share of close to 68 per cent of the total forest area. The State's total forest area

was 15154 km² in 1991. Out of which about 10, 27 and 63 per cent were categorised as reserved, protected and unclassified forest, respectively. It has increased to 17418 km² in 2001 and remains unchanged till 2013. Reserved and protected forests' share has declined to 8 and 24 per cent, respectively; however, unclassified forest share grew to 68 per cent in 2013. Data of reserved, protected or unclassified forests figures remains unchanged from 2001 till 2013 which raises a serious question about its authenticity for data users. Nevertheless, the protected forest forms the second largest type of forest with close to one quarter of the entire forest area. The decline of reserved forest is due to land encroachment (Hueiyen News Service, 2011). Same reason could explain the declining share of protected forest. With an increase of population the protected forest that is not well defined and safeguarded is being cleared for human settlement (example: house construction) thereby reducing the protected forest area.

Table 1: Share (%) of Density of Forest Cover Area, Manipur

Assessment Year	Very Dense	Moderately Dense	Dense	Open	Total forest (km ²)	Forest % Geographical Area*
1987	—	—	26.42	73.58	17679	79.18
2005	5.40	32.43	37.83	62.17	17086	76.53
2013	4.28	35.87	40.15	59.85	16990	76.10

Note: *Geographical Area: 22327 km².

Source: Calculated by the author based on FSI data.

Prior to 2005, the dense forest was not subdivided into very or moderately dense. FSI (1987) defined dense forest as all lands covered with tree of crown density >40 per cent and open as crown density between 10 and 40 per cent. Both classifications were used up to 2001. In addition, scrub is also defined as crown density <10 per cent. However, FSI (2013) similar to FSI (2005) classified forest into very dense forest i.e., all lands with tree canopy density of >70 per cent, moderately dense forest i.e. canopy density between 40 to 70 per cent and open forest i.e., canopy density between 10 and 40 per cent. Besides these a scrub was classified as a degraded forest land of canopy density <10 per cent. Canopy density is the percentage area of land covered by the canopy, i.e. cover of branches and foliage formed by the crowns of trees.

The conditions of forest keep on changing due to human intervention. The share of dense forest including very dense and moderately dense forests is always lesser than the open forest. However, the share of dense forest has increased due to the improvement i.e., re-vegetation and afforestation in the open forest. In 1987, just about a quarter of the forest was classified as dense forest and the rest three quarters were in the form of open forest (Table 1). After more than two decades in 2013 the share of dense forest has substantially increased to about 40 per cent. The definition for dense forest remains the same in all the years of assessment. The increase of dense forest is largely contributed by the moderately dense forest. The share (and also absolute) of a

very dense forest has declined by slightly more than one percentage point in 2013 (4.28 per cent) from 2005 (5.40 per cent). This is largely due to the practice of shifting cultivation especially in the hill areas of Manipur. The degradation of dense forest is due to the practice of shifting cultivation (IBCN, 2011). Overall, the size of forest area has gradually declined; as a result, the share of forest cover in the total geographical area has also declined over the years. The decrease in forest cover is due to shifting cultivation practices besides harvesting of short rotational plantations, clearances in encroached areas, biotic pressures, developmental activities and so on and so forth (FSI, 2013). Specific reasons of decrease in the forest cover in Manipur are practice of shifting cultivation and biotic pressure in major parts of the State (FSI, 2013). However, Sastry et al., (2007:28) pointed out that in Manipur like in other north-eastern States "there is no simple relationship between shifting cultivation and forest loss, implying dynamic changes in forest cover due to interacting effects of various factors".

Table 2 shows the share of density of forest cover in the hills and valleys of Manipur. The forest cover in the hills was improving during 2001-2005, however, thereafter it declined. The improvement was due to conservation measures such as afforestation activities and participation of locals for better protection measures in plantation and traditional forest areas, etc (FSI, 2013). The combined share of very and moderately dense forest area has increased. However, the share

of very dense forest, which is recorded only in the hills, has declined due to shifting cultivation, practised only in hill areas. In the valleys, the share of dense forest is dwindling resulting in rise of open forest over the recent years. Loss of forest is a major environmental concern in the State irrespective of whether degradation or deforestation is mostly taking place in the hills or valleys. Deforestation and degradation of land and forest management challenges such as indigenous people enjoying

their traditional or customary rights/privileges on land, lack of institutional support to communities, etc., are major issues of forest in Manipur (Sastry et al., 2007). Moreover, deforestation is caused by expansion of residential area, forest conversion for permanent pasture and agriculture, intensive shifting cultivation, infrastructure expansion, etc., and forest degradation due to selective logging, shifting cultivation, mining, deterioration of regeneration processes, etc.

Table 2: Share (%) of Density of Forest Cover Area in Hills and Valleys, Manipur

Forest type	Hills			Valleys			Manipur		
	2001	2005	2013	2001	2005	2013	2001	2005	2013
Very dense (a)	—	5.51	4.38	—	—	—	—	5.40	4.28
Moderately dense (b)	—	32.50	36.13	—	28.82	23.36	—	32.43	35.87
Dense (a + b)	33.86	38.02	40.51	24.79	28.82	23.36	33.74	37.83	40.15
Open	66.14	61.98	59.49	75.21	71.18	76.64	66.26	62.17	59.85
Total forest (km ²)	16688	16746	16639	238	340	351	16926	17086	16990

Note: Prior to 2005, the dense forest was not sub-divided into very or moderately dense. — Data not available.

Source: Calculated by the author based on FSI data.

Forest exploitation for shifting cultivation and other forest products is significant in the State. Majority (71 per cent) of the forest products were from timber (teak and others), firewood, charcoal and post and pole and the rest (29 per cent) was from minor forest products such as cane, stone, sand, bamboo, etc., in the total forest production value of ₹13.53 million in 2007-08 (DES, 2014). As per the CSO (2013), forestry and logging contribution to Gross State Domestic

Product (GSDP) was ₹49.3 million in 1980-81 (at 1980-81 prices) that increased to ₹1907.9 million in 2012-13 (at 2004-05 prices). It constituted 2.26 per cent of the GSDP in 1980-81; however, in 2012-13, with a slight improvement, it contributed to 2.36 per cent of GSDP. Moreover, contribution of agriculture to GSDP has substantially declined, particularly due to improvement in industrial sector, to about 22 per cent in 2012-13 from 43 per cent in 1980-81.

Land Use Pattern

In Manipur, land use is administered through the Manipur Land Revenue and Land Reforms Act, 1960. The Act is applicable in the entire State of Manipur except the hill areas (MLR & LR Act 1960). Land in the hills of Manipur is owned by the community; however, private/individual land ownership also prevails in certain areas. Usually land is owned by the community through the shifting cultivators; however, gradually private ownership of land has emerged (Maithani, 2005). Sachchidananda (1989:37) wrote that "in most of the hill areas of north-east India, land is owned by the community as a whole. Individual ownership of land recognised in certain areas is usually confined to homestead and settled farm land". Land ownership system differs across ethnic groups and villages in the State. Some ethnic groups or villages follow community, clan or kinship and private or individual land ownership systems. Private land is owned by an individual for housing, permanent cultivation, farming, etc. Community lands are controlled and managed by the villagers as a whole. Community land ownership system could partially be hindering development, investment and adoption of modern technology in shifting cultivation system. Further, lands of tribal people cannot be sold to the non-tribal people. In Manipur, agricultural land is used for various reasons including shifting, terrace and permanent cultivation. DES (2014) ascertained that permanent cultivation is mostly practised in the valley, whereas shifting and terrace

cultivation is generally practised in the hills. Forest areas are also clear for temporary land use such as plantations and permanent land use like construction of road or terrace farming. The land classified for different uses in Manipur vis-à-vis India is presented in Table 3. Over 90 per cent of the entire geographical area of land is reported for land utilisation in the State as well as in the country. Out of the total reporting land for utilisation, over 80 per cent is forest land in Manipur against only 23 per cent for India and the remaining is distributed for various other land use classifications. Out of the total reporting area for land utilisation, about 11 per cent was under net area shown in 1996-97 in Manipur. It remains at the same level till 2009-10; however, in 2010-11, it has increased to slightly over 16 per cent, that has reduced the forest area. It indicates that land use pattern is not uniformly distributed across the years. In other words, a change in the forest area is occasionally due to intensity of shifting cultivation. In India, the net area remains high at about 46 per cent. A comparison of the share of net area sown between the State and the country highlights that there is scope to extend agriculture or agricultural land in the State.

In Manipur, lands under permanent pasture and other grazing, lands under miscellaneous tree crops and groves, cultivable wasteland, current fallow lands and fallow lands other than current fallows constituted less than one per cent of the entire reporting land for utilisation. Moreover, about one per cent of the reporting land is not available for cultivation. On the contrary, at the country level these lands

constitute about 31 per cent of the total reporting land for utilisation. It portrays that Manipur has a potential in exploiting the forest land prudently for various kinds of land development for sustainable agriculture as well as other suitable developmental activities. Sustainable agriculture refers to enhancing

agricultural food production without destroying the environment (Srinivas, 1996). In the development of sustainable agriculture, the three sustainable development dimensions, namely environmental, economic and social are included and interrelated (Bowler, 2002).

Table 3: Distribution (%) of Land Use Pattern, Manipur (India)

Land classification	Manipur			India		
	1996-97	2000-01	2010-11	1996-97	2000-01	2010-11
Forests	86.91	87.45	81.98	22.68	22.78	22.88
Not available for cultivation	1.39	1.39	1.27	13.30	13.59	14.24
Permanent pastures & other grazing lands	0.05	0.07	0.06	3.57	3.49	3.37
Land under misc. tree crops & groves (not incl. in net area sown)	0.31	0.31	0.28	1.20	1.13	1.05
Culturable wasteland	0.05	0.04	0.03	4.60	4.46	4.14
Fallow lands other than current fallows	0.00	0.00	0.00	3.35	3.38	3.37
Current fallows	0.00	0.01	0.01	4.37	4.84	4.66
Net area sown	11.29	10.80	16.39	46.92	46.34	46.28
Reporting area for land utilisation	<i>1948</i>	<i>1936</i>	<i>2125</i>	<i>304621</i>	<i>305174</i>	<i>305903</i>
Geographical area	<i>2233</i>	<i>2233</i>	<i>2233</i>	<i>328726</i>	<i>328726</i>	<i>328726</i>

Note: Figures in italic are in thousand ('000) hectares.

Source: Land Use Statistics at a Glance, 1996-97 to 2005-06 (2007) and 2001-02 to 2010-11 (2013), DES (Manipur), Department of Agriculture & Cooperation, Ministry of Agriculture, GoI, Delhi.

Table 4: Distribution (%) of ST/All Social Groups Households by Size and Class of Land Possessed and Cultivated in Rural Areas, Manipur (India), 2009-10

Land Size Class (Hectares)	Manipur				India			
	ST		All		ST		All	
	P	C	P	C	P	C	P	C
0.000	16.2	21.4	21.6	24.5	10.1	37.2	8.3	45.4
0.001-0.004	0.0	0.0	0.4	0.4	13.8	1.0	11.7	0.8
0.005-0.40	24.7	20.7	30.9	25.8	32.8	18.6	44.8	20.3
0.41-1.00	36.6	36.3	31.7	34.8	19.8	20.8	16.1	15.5
1.01-2.00	17.1	16.2	12.2	11.7	13.0	12.7	9.7	9.5
2.01-4.00	4.5	4.0	2.5	2.1	8.3	7.6	6.5	6.1
>4.01	0.8	1.4	0.7	0.8	2.2	2.0	3.0	2.5

Note: Figures given per 1000 in NSSO Reports are converted into percentage. ST – Scheduled Tribes, P – Possessed and C – Cultivated.

Source: NSSO (Report No.543).

The distribution of households cross-classified by the size of land possessed and cultivated, as per the National Sample Survey Organisation (NSSO), is given in Table 4 for Manipur and India for 2009-10 in rural areas. Most of the households in the State, like in India, possessed land of size of less than one hectare. Similar is the case with STs of the State. Landlessness is less evident for STs (16.2 per cent households) when compared to overall (21.6 per cent households) in the State. It is also true for the country. Despite the prevalence of landless households, as much as 24 per cent, against 21 per cent landless ST households of the State they reported to have cultivated, possibly as agricultural labourers or tenants. The share of landless households who have cultivated some land is much greater for the country than the State of Manipur. The share of households who possessed and cultivated

land between one and four hectares was considerably larger for STs than overall especially for Manipur. There are not many households who owned and cultivated big land of more than four hectares in Manipur, unlike in India, among all-social groups and STs.

System of Shifting Cultivation

People, categorised as Scheduled Tribes (STs) by the Government of India, living in the hills of Manipur largely depend on land and forest for their livelihood through agriculture, food gathering and hunting. Jhum or "jhum cultivation" (Gupta, 2000:605) or "shifting cultivation or slash and burn" (Seavoy, 1973:522) or "swidden cultivation" (Eden, 1993:146) or simply jhumming or "jooming" (Peale, 1874:476) has been practised as a way of life within the tribal communities and hill people from time immemorial. Seavoy

(1973:522) defined shifting cultivation as "clearing a patch of forest by felling and burning trees and then cultivating this land for one or more years before abandoning it in favour of other patches". After cropping each patch is allowed to revert to secondary growth for a number of years before it is re-cleared and re-cultivated. The shifting cultivation system, according to Payn (1892), as quoted in Hodson (1911:15) cited in Shimray (2004:1699) is the "primitive mode of agriculture all over the world and widely practiced, even yet, where virgin forest land is abundant, for in such circumstances it is the most economical method, because it produces the largest net return." Ninan (1992) noted that shifting cultivation is an agricultural system which is characterised by a rotation of field rather than of crops, by short period of cropping alternating with long fallow periods and by clearing by means of slash and burn. Burning under shifting cultivation reduces labour input for physical clearance, produces ash for valuable fertilisers, leaching effect increases the availability of soil nutrients to plants and may kill fungal diseases and noxious insects (Forestry Department, 1985). The ashes produced from burning were used as manures (DES, 2007). The "system of cultivation is mainly by what is called jooming [jhumming] where forest trees are felled and the site used for two years only, when, in consequence of the growth of rank weeds, fresh forest is again joomed [jhumed], and a system of permanent culture of one spot is impossible" (Peale, 1874:476-477). It is both a labour-intensive and land-extensive

process of cultivation. Shifting cultivation occupies a distinct place in the tribal economy and constitutes a vital part of the lifestyle and socio-economic set-up of hill and tribal regions. Spencer (1966) as cited in Thomas (1968) regards shifting cultivation as one form of tropical agriculture and brings together data derived from many different approaches: area, commodity, economy, culture, technology, history, and government. "Policymakers, governments and analysts have often assumed that shifting cultivation is universally unsustainable and destructive of forests and wildlife" (Kerkhoff and Sharma, 2006:6). Moreover, they have failed to recognise the varied land use types involved in it and also failed to understand the cultural knowledge of the shifting cultivators in particular and indigenous people in general.

Practice of Shifting Cultivation

Shifting cultivation takes place in an earmarked forest area for cultivation and then the forest is cleared by slashing trees, etc., using traditional tools, then slashed trees are dried and subsequently burnt to enhance soil fertility. It uses traditional and unscientific tools like dagger, sword, axe, hoe, digging, sickle, etc. Earlier, the fallow period between the two shifting cultivation cycles was considerable, for regeneration of vegetations and soil fertility, which has reduced significantly due to the population pressure. The system is practised among the indigenous people. Roy, Xavier and William (2012) noted that ILO Convention No.169 Article No.14 specifically recognised the rights of ownership and possession of the

people concerned over the lands which they traditionally occupy including the rights of shifting cultivators. Further, ILO Convention No.107 safeguards land and resource rights of the indigenous people. ILO Convention No.111 guaranteed that shifting cultivators may exercise the right to practise a traditional occupation. Moreover, the United Nations Declaration on the Rights of Indigenous People recognises several rights for the communities practising shifting cultivation.

In Manipur, shifting cultivation is prominently practised by the ethnic groups of Nagas, Kukis, Mizos, Zhomis, etc. Few STs also practise terrace cultivation on the slope of the hills. Under the system a land is usually tilled for one year and then allowed to lie fallow for some seven to ten years. The same land is tilled for two or three years. At present under the system land is tilled for a year due to decline in fertility of soil, then keep it fallow for some years. For example in Nagaland, jhum fields are deserted after the first year mainly due to labour constraints and / or decline in soil fertility (Jamir and Lianchawii, 2013). The years of keeping fallow land depend on variation on population pressure in different areas. The "Kukis removed their villages to fresh sites when the land was used, but the Nagas, who showed great attachment to their village sites, would proceed to great distances to cultivate, notwithstanding the labour of carrying back their harvests" (Godden, 1898:7). Nagas burn their field and grow rice, millets, corns, taro potatoes and so on. Some fields are terrace-styled for growing rice and taros. "Naga

cultivation is said to have included rice, pea, several varieties of small grain, Indian corn, yams, chillies, ginger, garlic, pumpkins and other vegetables, and cotton; gardens with sugarcane, almonds and wild raspberries are mentioned for North Kachar" (Godden, 1898:10). Shakespear (1909:371-372) observed that "(Kuki) clans practice jhum cultivation, that is, they fell a piece of jungle and when sufficiently dry, burn it and then dibble in the seed, and seldom cultivate the same piece of land for more than two years in succession."

Shimray (2004) has remarked that some Nagas such as Tangkhul, Mao, Zeliangrong and Maring practise both shifting cultivation as well as sedentary terraced cultivation. A large proportion of Naga population is engaged in shifting cultivation. Ramakrishnan (1980) as cited in Shimray (2004) points out that shifting cultivation constituted the earliest form of agriculture and provided the basic needs of man. It also placed him in harmony with nature, of which he was an integral part and on which was dependent for survival. Shifting cultivation is deeply rooted and linked with indigenous ethnic culture (MEF and GBPIHED, 2009). Terraced cultivation is also practised in Naga society but it is confined to the lower gradient of the mountain ranges and to narrow river banks and valleys.

In Manipur, 1.13 per cent of the total geographical area (22327 km²) was under shifting cultivation, cultivating rice in 1992-93 that has increased to 1.78 per cent in 2000-01 that further increased to 2.04 per cent in 2005-

06. Specifically, 1.26, 1.98 and 2.27 per cent of the total hill areas (20089 km²) was under shifting cultivation in the respective years. It clearly shows an ever-increasing practice of shifting cultivation. This trend is caused by population growth coupled with underdevelopment in the hills. Non-availability of suitable employment in non-agricultural sector for the unemployed living in the hills is forcing them to engage in farm activity in the predominant system of shifting cultivation. Non-agricultural employment is mostly available and concentrated in the urban centres. Specifically formal non-farm jobs are concentrated in the valley areas in Manipur. It implies that shifting cultivation can be reduced by generating and delivering non-farm jobs in construction, transportation, services, etc., in the hill areas. Mellor (1962) mentioned that lack of non-farm employment opportunities keeps the rural labour in agriculture.

Rice is the staple food both in the hills and the valleys of Manipur. Rice continues to dominate acreage of all the crops in the State (DES, 2014). Rice is mainly cultivated under the system of permanent, terrace and jhum (shifting) cultivations. Table 5 gives a share of area under rice by type of cultivation in the State. The State records only 17 per cent under shifting cultivation and the rest under permanent including terrace cultivation in the total cultivated area in 1992-93. The share of area under shifting cultivation has increased to about 27 per cent in 2005-06. It implies that increasingly more forest land is brought under shifting cultivation. This is due to the rapid population growth and pressure on land. The population density, according to Census of India, in the State has increased dramatically from 82 in 1991 to 115 in 2011. Population pressure has induced extension of agricultural land. Area under rice has increased by about 15 thousand hectares, due to increase of land for shifting cultivation, from 1992-93 to 2005-06.

Table 5: Share (%) of Area under Rice by Type of Cultivation, Manipur

Year	Hills			Valleys			Manipur		
	Perma- nent*	Jhum	Total (‘000 He- ctares)	Perma- nent*	Jhum	Total (‘000 He- ctares)	Perma- nent*	Jhum	Total (‘000 He- ctares)
1992-93	60.44	39.56	63.80	100.00	-	87.39	83.31	16.69	151.19
2005-06	44.84	55.16	82.67	100.00	-	83.59	72.57	27.43	166.26

Note: - Not available. *includes terrace cultivation.

Source: Statistical Abstract of Manipur (2001 and 2007), DES, Government of Manipur.

In the hill areas, people are largely depending on cultivation for their livelihood. Cultivated area has increased by close to 20,000 hectares from the early 1990s to the mid-2000s. Shifting cultivation is practised only in the hills,

as there is no data record of it in the valleys. Presently, it formed most of the rice cultivation in the hills. In 1992-93, shifting cultivation accounted for about 40 per cent of the 64000 hectares of cultivated land. Later in 2005-06,

about 55 per cent of rice cultivated land is under it. Permanent and terrace cultivation occupies and plays an important role in rice cultivation in the hills. However, due to difficulties arising from financial and technological constraints and irrigational problems in establishing, it has forced the growing population into shifting cultivation. In the hills, permanent and terrace cultivation areas in absolute figures declined marginally by about 2000 hectares from about 39000 hectares in 1992-93 to about 37000 hectares in 2005-06. However, shifting cultivation has contributed to a major change in cultivation. Area under shifting cultivation has almost doubled in 2005-06 (about 45000 hectares) from 1992-93 (about 25000 hectares). This has a serious implication on land and environment in the State specifically in the hill areas requiring the attention of policy makers to make shifting cultivation sustainable.

Labour in Shifting Cultivation

In an economy with a labour surplus due to population booming and a scarce capital there is a greater tendency of labour absorption in agriculture in general and shifting cultivation in particular in the hill areas. Bhattacharya and Nanda (2005) mentioned that all works in shifting cultivation are performed by the manual labour without using plough or animal power. Moreover, family labour is the main source of labour supply in it. Frequently labour are pooled together among the cultivators from other households on reciprocal basis to perform a huge work, by

engaging large number of workers, that needs to be completed in a day like harvesting. Similarly, Sachchidananda (1989) pointed out that human labour is mainly operative and labour patterns are frequently cooperative in shifting cultivation. Further, he wrote that 73.5 per cent of the tribal population of Manipur were shifting cultivators. In Manipur, labour under shifting cultivation is mainly used in underbrushing, felling, burning, secondary clearing, dibbling (i.e. planting with a tool), sowing, hand weeding, spraying weeds, harvesting, transporting, threshing, winnowing, drying and harvesting. Secondary crop labour is also used for construction of hut (farm house) or farmstead and wooden fencing and for farm guarding from potential attack of wild animals and birds. The use of labour in the State under shifting cultivation is similar with the labour used for the hill shifting cultivation in Malaysia described by Cramb (1988). In Malaysia, the average labour input per hectare from underbrushing, felling to harvesting of secondary crops and miscellaneous activities (including visiting farm) is 209 days per hectare (Cramb, 1988). Similar number of labour days is expected to prevail for Manipur since the labour requirement in shifting cultivation is intensive.

In Manipur, more than half of the population (excluding 0-6 years of age) participated in economic activities, measured by workers' population ratio (WPR), in recent years (Table 6). The rate of economic participation was greater in the hills by few percentage points than in the valleys. In the

hills, employment in agriculture continues to dominate with about 68 per cent in 2011 which declined by about three percentage points from the previous decade. In the valleys the share of agriculturists is less than half of the total employment. The share of agriculturists in both hills, where shifting cultivation is predominant and in valleys, where permanent cultivation dominates, has declined, as people are increasingly employed in non-agriculture sectors. It implies that with an improvement in educational attainment in particular and development in general the level of withdrawal from agricultural activities in order to accommodate non-farm activities is increasing. An individual who has acquired certain level of education has set a goal, aspiration and preference of modern formal or non-agricultural jobs. Yet, due to severe unemployment issues the new labour entrants are pressed in the shifting cultivation. This widens the scope to adopt and practise

modern agricultural methods among the literates and educated to raise agricultural production and sustainable approach of agricultural practices.

Moreover, the declines are evident among both the cultivators and agricultural labourers. As regards agriculturists, most of them are cultivators. Importantly, the share of farm labourers in hills is lesser than the valleys simply because everybody has a share of community land in the hills unlike the privately owned land in the valleys. The nature of agricultural activities, particularly shifting cultivation in the State is seasonal that solely depends on monsoons for irrigation. It depicts that shifting cultivators engage in secondary non-agricultural activities such as construction work or engage as agricultural labourers in permanent wet land cultivation during off shifting cultivation.

Table 6: Share (%) of Agricultural Workers and WPR, Manipur

Area/ State	Year	Workers (main + marginal)				WPR	
		All Workers (Nos.)	Cultivators (C)	Agri. Labours (AL)	Agri. Workers (C+ AL)		Others
Hills	2001*	343174	64.05	7.20	71.25	28.75	52.84
	2011	445562	61.21	6.67	67.88	32.12	54.86
Valleys	2001	602039	26.56	14.77	41.33	58.67	49.81
	2011	713491	25.95	11.40	37.35	62.65	50.25
Manipur	2001*	945213	40.17	12.02	52.19	47.81	50.87
	2011	1159053	39.51	9.58	49.09	50.91	51.93

Note: Excludes three sub-divisions namely, Mao-Maram, Paomata and Purul of Senapati districts. WPR: Ratio between workers and population (excluding 0-6 years of age) in percentage.

Source: Calculated by the author based on Census data.

A large number of people continue to engage in shifting cultivation in the hills of Manipur (Table 7). It is ever-increasing due to population growth and without sufficient employment alternatives. There are no clear and exact records on shifting cultivators. Limited estimates are available which require validation. Nevertheless, there are some estimates on shifting cultivators. For instance, NEC (1974) estimated that about 50000 families were shifting cultivators in Manipur. Later in 1983, the Task Force Report on Shifting Cultivation in India estimated 70000 shifting cultivators in the State. Furthermore, using census data and assuming that 60 per cent of the agriculturists (cultivators plus agricultural labourers) were engaged in shifting cultivation where labour was intensive in nature gives a huge size of close to 0.158 million shifting cultivators in the hill districts of Manipur in 1991. In the following decade in 2001, the number of persons working under shifting cultivation has reduced to 0.147 million partially due to the exclusion of three subdivisions of Senapati district located in the hill area of the State. Later in 2006, the number of shifting cultivators rose marginally to 0.163 million. Similar estimates show that 0.181 million workers were engaged as shifting cultivators in the hills of the State in 2011. Overall, the size of shifting cultivators has systematically increased due to rapid population growth and lack of adequate job opportunities outside agriculture. In recent decades, the growth of population in the State has been moderately slowing down as the level

of literacy has improved, birth and death rates have declined, living cost has become dearer, etc. The rate of literacy in the State has improved substantially from about 5 per cent in 1941 in the period of pre-merger with the Indian Union to about 11 per cent in 1951 just after the princely Manipur kingdom merged with the Indian Union in 1949. At present, Manipur has attained over 79 per cent literacy rate. Education has mainly contributed in reducing population growth as people are better informed, more knowledgeable, more responsible or sensible for economic implications specifically employment. Despite of it, large portion of rural labour is depending on farm activities more specifically shifting cultivation in the hill areas of the State.

The shifting cultivators cultivated 2.04 per cent of the total geographical area of Manipur in 2006. More precisely, 2.27 per cent of the hill areas were under shifting cultivation in the same year that increased from 1.26 per cent in 1992. Concurrently, the number of shifting cultivators also increased. This does not reduce the per capita availability of land area under shifting cultivation. For instance, the average per family land availability rose from 1.20 hectares in 1974 to 1.29 hectares in 1983 (data relatively comparable). Similarly, the per capita availability of land rose from 0.16 hectare in 1992 to 0.28 hectare in 2006. It implies that when the fertility of land has declined, each cultivator is attempting to produce targeted subsistence production, and the cycle of jhum cultivation has further reduced.

Table 7: Extent of Shifting Cultivation in the Hills, Manipur

Year	Geographical area, Manipur (km ²)	Geographical Area, Hills (km ²)	Shifting Cultivation Area (SCA) (km ²)	No. of Families/ Agriculturists Engaged in SC	SCA % Total Geo.	SCA % Hills Geo.	Average SCA per Family or Agriculturist in SC (Hectare)
(1)	(2)	(3)	(4)	(5)	(6 = 4/2)	(7 = 4/3)	(8 = 4/5)
1974	22327	20089	600.0	50000	2.69	2.99	1.20
1983	22327	20089	900.0	70000	4.03	4.48	1.29
1992	22327	20089	252.4	158569*	1.13	1.26	0.16
2001	22327	20089	397.9	146699*#	1.78	1.98	0.27
2006	22327	20089	456.0	163165*®	2.04	2.27	0.28

Notes: Figures for 1974 and 1983 from North Eastern Council (NEC); figures for 1992 onwards are from Statistical Abstract of Manipur; geographical areas figures are from the Census of India (2011). For 1992 onwards from column 6 to 8 are calculated by the author. *Agriculturists: Number of agriculture workers (cultivators + agricultural labourers) in the hills. The figures of agriculturists of 1992, 2001 and 2006 are 60 per cent of total agriculturists (cultivators + AL) in 1991, 2001 and 2006 (®Interpolated figure) censuses, respectively. It is assumed that 60 per cent of the agriculturists are engaged in shifting cultivation since the system is more labour-intensive than the permanent or terrace cultivation system. #Figure excludes three sub-divisions namely Mao-Maram, Paomata and Purul of Senapati district (Hill) of Manipur. ®Interpolated figure that is estimated using exponential growth model as follows: $P_t = P_o e^{rt}$; where P_t is the population at current year (2011), P_o is the population at previous year (2001), e is a statistical constant (2.7183), t is the desired interpolated time interval (in 2006, $t=5$ years) and r is the growth rate $\{LN(P_t/P_o)/t\}$ (here $t=10$ years).

Sources: Calculated based on NEC Secretariat, Shillong (1974), Basic Statistics of North Eastern Region (1995) based on Task Force Report on Shifting Cultivation in India, MOA, New Delhi (1983), DES, Manipur and Census of India.

Environment, Farm Inputs and Agriculture Production

Kerkhoff and Sharma (2006) emphasised that shifting cultivation is a good system when properly practised using hill and mountain lands, while ensuring conservation of forest, soil and water resources. The system encounters huge obstacles from development and policy aspects. An attempt to change and replace it by different agricultural and horticultural systems has shown a failure. It

requires viewing the system in a positive aspect to change shifting cultivation in a sustainable manner. Further, Kerkhoff and Sharma (2006:73) noted that "shifting cultivators have the knowledge and skills to provide many environmental services such as conservation of soil and water, biodiversity and gene pools, and also carbon sequestration". Sachchidananda (1989) accounted that soil depletion and erosion is not greater under shifting cultivation system than other systems of agriculture when both systems are operated efficiently.

The cycle of shifting cultivation has shortened in recent years due to booming of population pressure. It has been reduced to 4-5 years in most of the places (Bhattacharya and Nanda, 2005). The shortening of shifting cultivation cycle from around 20 to 30 years to about four to five years or even less, owing to the population pressure on land and other factors is held responsible for the land degradation in areas affected by shifting cultivation (Ninan, 1992). As "population

pressure increases, the shading [shifting] cycle is progressively shortened" (Seavoy, 1973:528). The "exponential population growth and shifting cultivation are causally linked to deforestation and environmental degradation" (Jarosz, 1993:366). Shifting cultivation erodes soil and destabilises the ecosystem (FSI, 1987). It can sustain with longer cycles at about 15-20 years (Bhattacharya and Nanda, 2005). The change in the cycle alters the fertility of soil and productivity of agricultural production.

Table 8: Estimates of Area, Production and Yield of Total Foodgrains, Manipur (India)

Year	Area (lakh Hectares)		Production (lakh Tonnes)		Yield (Kg./Hectare)		Population (No. in million)*		Per Capita Production# (Kg)	
	Manipur	India	Manipur	India	Manipur	India	Manipur	India	Manipur	India
1990-91	1.62	1404.28	2.86	1824.93	1763	1300	1.84	838.6	155	218
2000-01	1.68	1210.48	3.96	1968.14	2359	1626	2.17	1028.6	183	191
2011-12	2.79	1247.55	6.69	2593.23	2397	2079	2.86	1210.9	234	214

Note: *Census years; 2011 population figure is used for 2011-12; 1991 population of India excludes J&K; 2001 population of Manipur excludes three sub-divisions. #Production divided by population.

Source: Author's calculation based on State-wise Area Production and Yield Statistics (1996-97 to 2005-06) and (Major Crops-1996-97 to 2011-12), DES (Manipur), Department of Agriculture & Cooperation, MoA (Delhi).

In Manipur, the overall production of foodgrains has dramatically increased along with an increase in the area of cultivation and more specifically due to the increase in yield (Table 8). Yield of foodgrains is much greater in the State than at the country level, that is mostly contributed by the permanent wet land cultivation. Interestingly, the per capita foodgrain production has systematically increased from 155 kg in 1990-91 to 234 kg in 2011-12 in Manipur, following the country level,

particularly after the turn of new millennium. The per capita consumption rate of foodgrains (cereals plus pulses) per annum is approximately 197 kg (DES, 2014). DES (2014) pointed out that rice is the staple food in the State. Rice is grown extensively both in the hill and valley areas. It accounts for about 95 per cent of the State's total foodgrain production in 2009-10. DES (2007) estimated that based on per capita rice consumption of 193.38 kg per annum, Manipur has a shortage of rice

production by 62000 tonnes in 2001-02 that has substantially increased to 108000 tonnes in 2006-07. The increase of per capita foodgrain production in the State is contributed by use of high-yielding variety (HYV) and improved variety (IV) of seeds. For instance, in Manipur 49.24 per cent of the total area under paddy was under HYVs and IVs in 2000-01 that has increased to 54.71 per cent in 2011-12 (DES, 2014).

According to DES (2014), the adoption of HYV of paddy in the hill districts is negligible while that of improved varieties is quite encouraging. A share of 7.22 per cent in 2011-12 which has declined from 9.37 per cent in 2000-01 of the total area under paddy was cultivated with HYV and IV in the hills and rest of the areas were under other local varieties. In the valleys, HYV and IV paddy cultivation comprised about 80 per cent in 2000-01 and 92 per cent in 2011-12. It indicates that increase in foodgrain production is largely contributed by the use of HYV and IV foodgrains and also successful adoption of double cropping with an improved irrigation facility in the State's valley. Moreover, use of fertilisers [urea, diammonium phosphate (DAP), muriate of potash (MOP), mussoorie rock phosphate (M.Phos), single super phosphate (SSP)] in agriculture has substantially declined from 56.70 to 23.40 thousand tonnes during 2002-03 to 2012-13 in the State. In 2012-13, out of the total 23395 tonnes of fertilisers (urea, DAP, etc.) 3.85 per cent was used in the hill districts

and the rest 96.15 per cent in the valley districts. Similarly, out of the 10844 tonnes of chemical fertilisers (nitrogenous, phosphate and potassium i.e. NPK), 3.95 per cent was used in the hill districts and the rest 96.05 per cent in the valley districts. In the hills, use of fertilisers is very low and insignificant corroborating with the less use of HYV and IV seeds. Fertilisers are usually used in the wet land or permanent cultivation suggesting that shifting cultivation system did not use chemical fertilisers as farm inputs. It indicates that agriculture produce under the system of shifting cultivation in the hills of the State are organic in nature.

The decline in the cycle of shifting cultivation degrades land and reduces the soil nutrients and soil fertility due to inadequate re-vegetation effects on the agriculture productivity. Literature shows that under shifting cultivation the produce is in diversity ranging from cereals, pulses, tubers to spices. Moreover, the cropping pattern as well as the productivity of crops depend primarily on inputs (seeds, plant protection chemicals and plant nutrients like fertilisers and manures), soils and climatic conditions such as rainfall, temperature, wind, dew, hailstorm, sunshine and radiation (DES, 2007).

A multi-cropping is usually practised under shifting cultivation system from time immemorial to meet the need of household consumption in traditional society. More than a century ago, Godden (1898) remarked that, crops under shifting cultivation, for example

among the Nagas, included rice, pea, varieties of small grain, corn, yams (taro), spices, vegetables, cotton, etc. Even in the present century a multiple cropping system is being practised under shifting cultivation in Manipur as under any other shifting cultivation in north-east. For example, in Ukhrul district of Manipur, as many as 28 crops including cereals, legumes, tubers, rhizomes, bulbs, spices, vegetables, oilseeds, and others were grown under shifting cultivation (Kerkhoff and Sharma, 2006). The productivity of agriculture in north-eastern States including the hills of Manipur is low. It is due to the practice of shifting cultivation, among other reasons (Mukherji, 2010).

Bhattacharya and Nanda (2005) noted that the productivity of shifting cultivation is low where demand for jhum land has increased as a consequence of rapidly increased population. Productivity declines due to the shortening of jhum cycle whereby it declines the soil fertility. Jamir and Lianchawii (2013) noted that jhum cultivation is no longer productive in Nagaland, which would be true for Manipur and the produce is mostly for household consumption. Nevertheless, the produce under shifting cultivation is essentially organic i.e., little or no chemical pesticides or fertilisers are used in it (Kerkhoff and Sharma, 2006).

Table 9: Area, Production and Yield of Rice, Manipur

Year	APY	Hills		Valley		Manipur
		No.	%	No.	%	No.
2004-05	A	75.48	42.81	100.83	57.19	176.31
	P	151.20	34.68	284.73	65.32	435.93
	Y	2003.18	—	2823.86	—	2472.52
2006-07	A	79.83	48.27	85.54	51.73	165.37
	P	156.90	40.32	232.27	59.68	389.17
	Y	1965.43	—	2715.34	—	2353.33
2011	Population	936718	36.44	1633672	63.56	2570390
2011	Rice prod./ person (kg)*	167		142		151

Note: Areas (A): '000 hectares; production (P): '000 tonnes; and yield (Y): kg/hectare. —not available. Author's calculation: %share to total Manipur; and *Per capita rice production. In Manipur, rice production level does not change much over the years. Therefore, present per capita rice production can be computed using rice production of 2006-07 and population of 2011.

Source: DES and Author's calculation based on DES and Census data.

Table 9 shows that close to half of the total area under rice is cultivated in the hill areas but the larger share of production is produced in the valley areas. For example, in 2006-07 in the State, about 48 per cent of the

total rice cultivated area was in the hills while only 40 per cent of rice was produced in it. Rice production in the hill areas is more than its population composition in the State indicating that hill people are more self-reliant than the

valley counterpart in terms of rice production and availability. The per capita rice production at present is more in the hills at 167 kg against the valley's 142 kg per annum. Both the hills and the valleys face a shortage of rice when compared with the DES (2007) estimates of 193.38 kg of per capita rice consumption annually. Further, it's not surprising that the yield of rice production in the hills, where larger share of rice cultivated area was under shifting cultivation, was lower by almost one-third of the yield in the valley, where only permanent cultivation is practised. The yield has declined over the years in the hills as well as in the valleys resulting in overall fall in the yield in the State, that is becoming a matter of concern.

Conclusion

The practice of shifting cultivation has resulted in the reduction of the forest area in the hills of Manipur. Population growth which mainly supplies the rural agricultural labour has raised the demand for tillable agriculture land thereby reducing the forest cover. Moreover, in Manipur the reserved and protected forest has eventually declined due to land encroachment for development and human settlement. Forest land re-vegetation is also taking place as dense forest improves particularly in the hills. Concurrently, contribution from agriculture in the State's revenue has declined substantially; however, income from forestry and logging has improved in recent times. The actual cultivated land (i.e. net sown area) in Manipur has

increased remarkably as more and more rural labour is pressed into shifting cultivation. In the hills more than half of the rice cultivated area was under shifting cultivation. The system's nature of intensive labour activity has absorbed majority of the agriculture workers in it in the hills where majority of the workers are engaged as agricultural workers unlike in the valleys. It is to be noted that about 2 per cent of the entire hills' geographical areas was under shifting cultivation. Therefore, it requires adoption of appropriate land-use planning to avoid land degradation and deforestation in the hills. The per capita shifting cultivation land has increased due to the decline in productivity and soil fertility. Agriculture productivity is considerably lower in the hills due to the practice of shifting cultivation where traditional inputs including seeds are used; but chemical fertilisers and HYV seeds are not used. Interestingly, hill people are self-sustaining in terms of rice production as per capita rice production is greater in the hills than in the valley. The pressure of shifting cultivators on land has eventually reduced the fallow period resulting in poor land rejuvenation and replenishment of soil fertility. It is crucial to set a minimum of five years for one complete cycle for shifting cultivation in order to adequately re-vegetate and regenerate soil fertility. Arrangement of alternative to shifting cultivation is needed with a provision of sufficient working capital to ensure cultivators to adopt and use inputs efficiently. Ensuring

food security and restructuring of land ownership system from community to individual or private may reduce the practice of shifting cultivation and conserve forest cover. Shifting cultivation cannot be completely removed since it has linkages with indigenous ethnic culture.

Notes

- 1 A revised paper that was presented in the International Seminar on "Natural Resource and National Accounts in South Asia" organised by CEENR-ISEC, Bengaluru (India), during 5-6 February, 2015.

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