IC Value 2016 : 61.33| SJIF Impact Factor(2017) : 7.144| ISI Impact Factor (2013): 1.259(Dubai)|UGC J No :47335

Research Paper | Volume - 6, Issue- 2,February 2018|e-ISSN : 2347 - 9671| p- ISSN : 2349 - 0187

EPRA International Journal of Economic and Business Review

AGRICULTURAL PRACTICES AND ENVIRONMENT IN NORTH-EAST INDIA

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KEYWORDS:

North Eastern Region, Jhum agriculture, Tribal population, Fallow land, Jhum cycle

ABSTRACT

The hills of North Eastern Region of India constitute about 70 per cent of the total land area, where jhum agriculture, locally called "jhum" is the chief land use. There are hundreds of different major tribes in the region differing linguistically and culturally. The entire region is more or less geographically isolated from the rest of the country. Due to lack of plain land for agriculture, the farmer in the humid tropics has practiced for centuries the method of "jhum agriculture" or popularly known in India as "jhum". This is the simplest method of cultivation available to the tribal population living in the hilly region. The jhum cultivation is the natural way of life to the tribal people in the hill areas. In jhum agriculture, cultivator cultivates in a particular area for one or two years and then moves into other areas. Again he returns to the first area for cultivation. The time to keep the land as fallow to regenerate the fertility is called a 'jhum cycle'.

INTRODUCTION

The forest farmer in the humid tropics has practiced for centuries the method of "jhum agriculture" or popularly known in India as "jhum". This is the simplest method of cultivation available to the tribal population living in the hilly region. There is no other alternative way of cultivating the land in the hill areas. The jhum cultivation is the natural way of life to the tribal people in the hill areas. The Brahmaputra and the Barak Valley in Assam is the largest valley land where settled agriculture is confined. The region is 2, 63,179 sq. km. covering 7.76 per cent of the geographical area of the country having a total population about 3.8 per cent of the total population of India. The ethnical, linguistics and cultural diversities of the region make it a mini-modal for representing the country as a whole. There are hundreds of different major tribes in the region differing linguistically and culturally.

Conservation of forest has become the primary responsibility of the present generation so that the generations to come in future are not deprived from the utility of the valuable resources gifted by the nature. The practice of jhum cultivation is considered as detrimental to the forest conditions as it cleans and burns of virgin forests lands. Loss of forest means lost of a number of economic goods and environmental services for ever, but most of the jhumias do not find any alternative of this self-destructive mode of crop production. Perhaps, alternative cultivation may be a viable. In economic analysis we consider the private cost and private benefit of any economic activity. If jhum cultivation is responsible for deforestation then it involves certain other cost known as environmental cost or social cost because of its negative externalities. Similarly, the benefit of tree is not only the economic value it accrues in the market but also the environmental benefit or social benefit. Therefore, social cost includes the private cost and environmental cost as social benefit is the sum of private benefit and environmental benefit. A comparison of net private benefits between jhum and alternative cultivations may be calculated and compared of net social cost and net social benefit between alternative farming. The return from the alternative farming extends for a longer period and if the farmers find the present value of the net return from the alternative farming higher than the jhum operation, the farmers will obviously opt for the alternative farming subject to good market for the alternative farming and availability of food crops from the market as demanded.

OBJECTIVES OF THE STUDY

The main objectives of the study are as follows:

1. To explore the method of jhum cultivation in the region.
2. To examine the factors which are lying behind the practice of jhum cultivation?
3. To search the impact of jhum cultivation in the region on Sustainability of Environment.

METHODOLOGY

This research paper is based on explanatory study in scrutinizing the potentiality of favourable agricultural practices so as to sustain the environment of the region which will maintain a vivid prospect of economic development

through agricultural sector. The present study is based on secondary data collected from various published sources like books, journal, magazine, reports, and government institutions like Directorate of Agriculture, Directorate of Economics and Statistics, etc.

RESULTS AND DISCUSSION

Agriculture practices in the region depending on the variation of rainfall and gradient of terrain falls into three categories:

1. Permanent cultivation,
2. Shifting cultivation i.e, jhum cultivation and
3. Mixed type cultivation.

The permanent cultivation is usually followed in valley and foot hills. Shifting cultivation is followed on steep hill sides. Mixed type cultivation is followed in sheltered valleys. The economy of the region is largely agrarian. Agriculture occupies the most dominant position in the economy as the main occupation of majority of the people is agriculture practice. Agriculture provides direct employment. It is the mainstay of the people. Almost entire tribal populations depend mainly on agriculture. Agriculture is the vital source of livelihood on which tribal economy is based. Here we give attention on jhum cultivation which is the most responsible for the degradation of environment in the region.

Method of Jhum Cultivation:

The forest farmer in the humid tropics has practiced for centuries the method of "jhum agriculture" or popularly known in India as "jhum" (Ramakrishnan, 1996). This is the simplest method of cultivation available to the tribal population living in the hilly region. There is no other alternative way of cultivating the land in the hill areas. The jhum cultivation is the natural way of life to the tribal people in the hill areas. In fact man nature relationship of a community is reflected in its mode of resource use across ideological axis. At a given level of ideology man's material requirements and his perception of nature and natural phenomena determines his interaction with nature and characterises ideal type of the mode of resource use. At this level, ideology acts as determinant variable of mode of resource use and is external to the system. The ideological base of a community, for example, governs production relations forces of production and exploitation of natural resources as well. (Gadgil and Guha, 1992). Use of land resources for jhum cultivation by the different tribes is, however, not indiscriminate, rather it follows certain norms even at ideological level.

The system of jhum cultivation involves a number of operations. First, forest bushes are cut up to the stump level in the months of December-January and small trees and bamboos are felled. Short tree stumps and large tree boles are left intact. The under ground organs of different species are not disturbed. Next, the stumps are allowed to dry, after which they are set on fire. After the burning is completed, the land is cleared and digging stick and seeds of different crops as required are scattered into the holes before the onset of the rains. The cultivation is confined to the area close to the village. After the every crop season of two, the area is left for 25 or 30 years and the cultivator moves to another area to slash and burn and cultivate (Lekhi and Choudhury, 1994). This laborious process often completed by the men from two or three families. Such a joint effort is one of the essential ingredients of a well-knit social organisation. This effort along with the process of allotment of sites for jhum by the village head man who is incharge of overall control of the village community (known as Gaonbura) helps to promote kinship among the members of the village (Ramakrishnan, 1996). However, the system of allotment of lands differs from tribes to tribes.

Paddy is the main crop in jhuming. Among the other crops cultivated are maize, millet, sweet potatoes, leafy vegetables etc. Each family chooses its own cropping pattern according to what it consumes and in quantities enough to meet its own needs. The crops are all rainfed and harvesting starts from August The paddy grown in jhum fields matures earlier than the paddy grown in plain (Lekhi and Choudhury, 1994). The area under shifting cultivation and number of families are engaged are shown in Table-1.

Table-1: Shifting cultivation in the North East Region

State	Annual Area under Shifting cultivation (Sq.Kms)	Fallow Period (in years)	Minimum Area under Shifting cultivation one time or other (Sq.Kms)	No. of families practicing shifting cultivation
Arunachal Pradesh	700	3 -10	2,100	54,000
Assam	696	2 – 10	1,392	58,000
Manipur	900	4 – 7	3,600	70,000
Meghalaya	530	5 – 7	2,650	52,290
Mizoram	630	3 – 4	1,890	50,000
Nagaland	190	5 – 8	1,913	1,16,046
Tripura	223	5 – 9	1,115	43,000
Total	3869		14,660	4,43,336

Sources: *The Task Force Report on Shifting Cultivation, Ministry of Agriculture, 1983.*

The following Table-2 shows the position of different States of North East India in respect of only shifting, shifting combined with permanent, permanent and not doing any cultivation.

Table-2: Shifting, Permanent and Combined Cultivation in the Tribal Society

State	Percentage of tribal households in respect of cultivation			
	Shifting cultivation	Shifting combined with permanent cultivation	Permanent cultivation	Not doing any cultivation
Arunachal Pradesh	33.50	24.20	29.60	12.70
Assam	18.60	24.00	29.50	07.70
Manipur	46.10	24.50	15.40	04.10
Meghalaya	15.40	38.20	21.60	14.80
Tripura	12.10	11.60	53.20	23.10

Source: Patnaik, 1984

Factors Lying behind the Practice of Jhum Cultivation

There are so many factors which compel the cultivators to practice the jhum cultivation. These are discussed below.

a.Land Tenure System in Tribal Areas: Communal system of landownership is most suitable for jhum cultivations. Unless there is private ownership of land or cooperative farming, permanent cultivation in the existing economic order is difficult under communal ownership.

b.Law of Inheritance: It makes reparation from joint family early. As there is not much immovable property to inherit, no adult member is required to cling to the family poverty. Because of the free gift of labour under jhum cultivation, a married young man is assisted by the co-villagers to construct separate dwelling house. Villagers also give a young couple some share in the jhume land for cultivation.

c.Religious Belief: Many religions' customs, ceremonies and festivals amongst the tribal people are linked with jhum cultivation. There are special ceremonies at the time of clearance of jhume land, harvesting of products; even in case of illness spirit gods are to satisfied in Jhum fields. When jhumming is replaced the rural people must have some alternative mass pooealing ceremonies. It is noticeable amongst the goros converted to Christianity, that althougth they have changed their religion, their habits associated with jhumming still prevails.

d.Hill top Dwelling: Because of their age –old preference to have dwelling house on the hill tops, it will be difficult to have such suitable hill top near the valley area suitable for permanent cultivation.

e.Mixed Cropping: Mixed cropping gives the jhumias their daily requirements of food grains and vegetables, in addition to providing in suravce against shortage of one crop by another crop. If only one crop is grown under settled farming, the jhumias will have to depend for their requirements on outsiders. But in the absence of marketing facilities it will be difficult for the jhumias to get their requirements easily.

f.Food Habits: Jhumias have special attachment to the rice varieties and vegetable grown in jhum land. Encouraging permanent cultivation will have to be associated with change of taste.

g.Crop Production: As jhum cultivation is undertaken by whole village in a compact plot of land and as each homestead gets its requirement within the compact block, it becomes easier in the consolidated field to product crop from wild animals (eg. Elephant, monkey, boars, wild buffaloes) and fires compared to scattered permanent plots in hilly terrain.

h.Capital Investment: Jhuming requires very little capital. If land and human labour is available, cultivation is possible. In permanent cultivation, a pair of bullocks, irrigation, land preparation by manual labour become essential (Goswami, 1980).

In spirit of all these favourable factors for jhum cultivation, because of the pressure of population and progressive deterioration of soil in the hill slopes, it has become invariably difficult to get suitable jhum land on hill slopes. Extension of jhum cultivation in steep slopes will aggravate the problems of soil erosion and the agricultural prospect in hill and plains will be jeopardized. Hence jhuming as practiced now connot continue owing mainly to the absence of suitable land. Some alternative to jhuming either by fild rotation or improved system of jhuming or by combinations of both settled farming and jhuming must be found out (Goswami, 1980).

i.Jhum Cycle: In jhum agriculture, the cultivator cultivates in a particular area for one or two years and then moves into other areas and again returns to the first area for cultivation completing a 'cycle'. The cycle is the number of years during which an area is kept under forest fallow for a number of years to regenerate the fertility in the soil to fit for cultivation again. Previously the fallow period was 25 years to 30 years, but it has now come down to 4 to 5 years (Dhar, 1995). Long cycles were possible earlier because population pressures were not heavy and land availability did not limit the cycle. In NER, the average size of a jhum plot varies from 1.0 to 2.5 ha. The average family consists of two adults and three .to four children (Ramakrishna, 1996).

IMPACT OF JHUM CULTIVATION ON SUSTAINABILITY OF ENVIRONMENT

Beyond upland and other less favoured regions, the role of agriculture in the sustainability of rural population and as a means of protection of the environment has receded in the face of post war farm policies. Agriculture has escaped the mandatory environmental controls applied to other economic sectors, such as the authorization of pollution sources, application of a polluter-pays principle, pollution taxes and so on. Today, such measures are increasingly mooted as means to control modern agriculture, but wide spread changes to landscapes to ecosystem and to natural resources have occurred already. Indeed agricultural modernisation has been predicted upon processes that are inherently damaging to the environment, such as the increasing use of chemical additives, biological and genetic transformation, tree clearance, land drainage and use of heavy machinery (Nature Conservancy Council, 1984). Popular and scientific concern for the environmental effects of agriculture has been slow to emerge. The broad consensus over post-war agricultural development along with a long established belief that agriculture is a "natural" rural activity, has had pervasive effect upon European attitude. Initially, the scale and implications of change brought out by agricultural modernisation took environmentalists and policy makers by surprise. Today, however, the environmental impact of intensive agriculture is a major issue in all European countries (Buller, 1992). The

agricultural change and its impact on environment, however, is a growing concern for all the countries of the world, developed or underdeveloped. The remarkable success of green revolution technology in increasing agricultural productivity and improving the food security situation in Asia is hardly debated. It also catalysed investments in agricultural research, institutional development, infrastructure improvement and above all, in extensive development of irrigation facilities. However, these benefits also marked the damage to living environment, physical properties of the natural resources stocks, especially the soil and water and human and animal health caused by indiscriminate use of synthetic pesticides and fertilizers. These concerns have led tone initiatives and policy commitments towards "sustainable development" which basically shifts the emphasis from inputs like seeds and chemical fertilizers to resource management (A.P.O. Reports, 1997).

In fact, there are at least three classes of argument one could make to justify a claim that economic activity should be sustainable. The first argument is a moral one. We, the present generation, have main obligations to those generations which will come after us. The second type of argument is ecological one. Suppose we believe that ecological diversity is an important objective in its own right. Then economic activity that threatens to reduce such diversity is intrinsically undesirable. The third approach to justifying a sustainability goal is an economic one. To develop an economiccase, one should need to argue either that sustainable economic behaviour is more efficient than non-sustainable behaviour or that sustainable behaviour is that which maximises inter- temporal social behaviour (Perman et. al., 1996).

Sustainable Jhum Agriculture in N.E. Region: The major advantage of the jhum cultivation to the hill people is that it provides a very easy method for the preparing of land for cultivation. Weeds and jungles can be easily cleared by slash and burn process and yield can be obtained within a short period of time. However, the most important evil effect of jhum cultivation is that destruction of forest in the hill area causes heavy soil erosion due to rainfall. Moreover, loss of the "top soil" in the hill areas to the extent of 22 per cent of the total soil due to "jhuming" causes a serious fall in the fertility of the soil and thus it creates a serious problem for the tribal people (Dhar, 1995). In fact, the major problems associated with jhum in the NER are the drastic shortening of the "jhum cycle" to 4 to 5 years during recent years. The important cause for shortening of the cycle is the rapid increase in the tribal population and consequent reduction in the availability of land for cultivation. The obvious effect of shortening of the cycle can be grouped into two classes: (i) Economic effects, and (ii) Environmental effects.

As a result of the reduction in the "jhum cycle" has adversely affected economic yield with gradual decline in yield over a period of time when short cycles are imposed (Ramakrishnan, 1996). The table-3 compares the monetary output/input analysis of the jhum under different cycles in the north eastern region.

Table-3: Monetary Input-Output under Different Jhum Cycles in N-E Region (Rs./hect./yrs.)

	Jhum Cycle		
	30 Years Gap	10 years Gap	5 Years Gap
Input	2616	1830	896
Output	5586	3354	1690
Net gain/loss	2970	1524	794
Output/Input	2.13	1.83	1.88

Source: Ramakrishna, 1996:25

The reduction in overall economic return is very obvious, when cost is calculated on the basis of prevailing market rates. The decrease in economic return under short cycle of jhum is related to reduced soil fertility and increased weed potential of the site.

Another most important effect of the jhum cultivation is that it leads to environmental degradation and disturbs the fragile ecosystems in the north eastern region. This occurs as a result of the destruction caused to the surrounding natural vegetation. The environmental imbalance has resulted uneven spread of monsoon rainfall leading to the problem of draught and excessive rainfall resulting flood in the region. In Meghalaya, unabated jhuming has turned the once thick evergreen forest belt of Cherrapunji, a place which used to record the highest rainfall in the world into a dry brown scar. The jhuming practice has caused extensive climatic changes in the region and destroyed rare flora and fauna (Dhar, 1995). The Cherrapunji ecosystem that now stands desertified due to deforestation inflicted sometime in the distant past no refused to recover its original state. Linked with this drastic loss in biological diversity is the human suffering which now is immense. Water is a scarce commodity during the dry months in this high rainfall spot of the world, a contender for being the driest spot on earth along with the near by Mousengram in the Khasi hill of Meghalaya. The tribal who is traditionally bound to the forests has been forced to seek other avenues for survival (Ramakrishnan, 1996). A relative scenario of change in forest cover in the N.E. Region is depicted in Table-4 and Table-5.

Table-4: Change in Forest Cover (1991 and 1993 Assessment (Sq. Kms.)

State	1991 Assessment			1993 Assessment			Total Change in 1993 assessment
	D.F.	O.F	Total	D.F.	O.F	Total	
Arunachal Pradesh	54542	14215	68757	54510	14151	68662	-96
Assam	15842	8908	24751	15998	8510	24508	-243
Manipur	5309	12376	17685	5307	12314	17621	-64
Meghalaya	3305	12570	15875	3305	12464	15769	-106
Mizoram	4279	14574	18853	4238	14459	18697	-156
Nagaland	3351	10790	14321	3487	10861	14348	+27
Tripura	1825	3710	5535	1819	3719	5538	+3
Total	88633	77144	165777	88664	76478	165142	-635

Note : D.F.: Dense Forest, O.F. : Open Forest

Source : Basic Statistics of N.E. Region, 1995, North Eastern Council.

Table-5: Loss/Gain in the forest cover in 1993 assessment as compared to 1991 assessment in the N.E. States (sq. km.)

State	Loss due to			Gain due to			Net (+) Gain (-) Loss
	Jhum cultivation	Other reason	Total loss	Regeneration in abandoned jhum cultivation	Other reason	Total gain	
Arunachal Pradesh	70	26	96	-	-	-	-96
Assam	165	190	355	104	8	112	-143
Manipur	28	36	64	-	-	-	-64
Meghalaya	110	2	112	6	-	6	-106
Mizoram	256	-	256	100	-	100	-156
Nagaland	63	-	63	90	-	90	+27
Tripura	10	27	37	15	25	40	+3
Total	702	281	983	315	33	348	-635

Source: Govt. India, Forest Survey of India (Ministry of Environment and Forest), 1993. Note: Net loss in forest cover in the N.E. States = 983 ? 348 = 635 sq. km.

The Table-4 and Table-5 depicted a detailed picture of forest coverage in the N.E.R. From table-3, (it is found that the total loss of forest area in the N.E.R between 1991 and 1993 was 635 sq. km. from the loss and gain accounts. Table-4 indicates that loss due to jhum cultivation accounted to 702 sq. km., while the total loss becomes 983 sq. km. Due to regeneration and other reasons gains amounted to 348 sq. km., totalling a net loss of 635 sq. km. The principal reason for loss of forest area seems to be the practice of jhum cultivation. The net Loss due to jhum cultivation during the period was 387 (702-315) sq. km.

Jhum Cultivation invites so many problems. The authority tries to reduce such practice but not gets result up to the expectation. Continuation of primitive form of agriculture offers very little scope for introduction of modern technology. This along with loss of fertility has led to such a low level of productivity that the farmers may live in near famine condition. The traditional farm tools/equipments are normally used in this farming process. This results in low productivity. Further there is no scope for development of any source of subsidiary income for the farmers. Since cultivators use to shift settlement very often after every two-three years be-cause of their jhum cultivation in new plot of land which is comparatively more fertile, different species of plants disappear gradually. Jhum cultivation has serious effects on ecology and natural heritage. Jhum cultivation leads to environmental deg-radation and also disturbs the fragile eco-system. Due to the jhum cultivation, thousands of valuable timber, medicinal and aromatic plants, large number of edible vegetation and number of species of various fauna are disappearing every year. The environmental imbalance has resulted uneven spread of monsoon rainfall leading to the problem of drought and excessive rainfall resulting floods in the low lying areas of the region.

The Government of India has been, therefore, devoting considerable attention to the economic development of the hilly regions and its people. However, the pace of development has not led to any desirable change in the living standards of the hill people. This has been to great extent due to certain peculiar nature of the problems of the hill areas. The hilly nature of the terrain in collaboration with other topographic and climatic hardships has posed serious constraints for its proper development. Physically the hills are more or less isolated from the main land. Physio-geographical conditions are unfavorable leading to difficulties in communication and adverse man-land ratio. The local inhabitants of the hill areas have their own culture, social structure and political and economic institutions which are altogether different from those found in the plains.

CONCLUSION

The fact is that the Govt. and other agencies have undertaken various measures for controlling jhum cultivation in desired directions. The North Eastern Council and the Indian Council of Agricultural Research has been effectively involved to find way out to solve the problem. From fifth plan onwards different programmes have also been undertaken in this direction. In the Environment report submitted by the Union Environment Ministry to the United Nations in 1992 has mentioned about the practice of jhum cultivation among the tribal people of the North-East India. The report reasoned out why the old practice became enviable and damaging and also states that the increasing population and decreasing availability of land led to the fall in the "jhum cycle" affecting the cultivation process.

Although various attempts have already been made by the State Governments and various other agencies in weaning the north-east tribals into modern scientific cultivation

but most of these attempts have failed to achieve desired results. A field study of the Department of Sociological Anthropology of the North Eastern Hill University, Shillong in 1994 showed that the tribal hardly used the subsidy given to them for starting a settled way of cultivation. In some cases they sold the land allotted to them, and went back to other old life. The study pointed out that jhuming is an ancient socio-economic tradition that the tribes likes to cling to.

However, tribal resistance to change alone is not the only reason rather lack of whole hearted effort on the part of government agencies is also responsible for such failure. Field surveys in Garo hills of Meghalaya show that some areas selected for terrace cultivation as part of the anti jhuming efforts were unsuitable for food crops. Seeds were often not supplied on time and proper infrastructural facilities required in this connection are also not provided in the resettlement colonies. Such half-hearted official endeavours will hardly stop jhuming silent march in the NER (Dhar, 1995).

The fact that recently jhum around Cherrapunji is banned by the village council is a positive indication of transformation. What needed is an "area-oriented approach" of planning and more patience on the part of the Government agencies and N.G.O's. These will help in making the painful switch to settle agricultural existences. The universities of the region must also come forward in arranging area oriented specific short term motivational programme on the issue.

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