Proc. *Approaches for Increasing Agricultural Productivity in Hill and Mountain Ecosystem*
Eds. : B.P. Bhatt, K.M. Bujarbaruah, Y.P. Sharma and Patiram, pp. 317-322
ICAR Research Complex for NEH Region, Umiam, Meghalaya, 2003

4.4

Shifting Cultivation in North East India

R.S. Tripathi and S.K. Barik

Shifting cultivation or slash and burn agriculture (locally called as *jhum*) is the main form of agriculture in the hills of north-east India. In view of the mountainous terrain, settled cultivation constitutes only a small portion of the total cultivated land, which is mostly confined to the valley lands.

The shifting cultivation is a time-tested system of agricultural practice, most often evolved indigenously and is strongly based on traditional knowledge. It used to be an appropriate and sustainable land use practice in diverse socio-economic set ups where the dependent human population was within the carrying capacity of a 10-15 year *jhum* cycle. However, today the scientists view shifting cultivation as environmentally destructive and a faulty land use practice having very low output-input ratio. The shifting cultivation became unsustainable primarily due to the increase in population that led to increase in food demand. In order to meet the growing food demand, the *jhum* cycle (the intervening period between two successive slashes) got shortened which resulted in the overall decrease of crop yield. This necessitated in bringing more virgin forest areas under the shifting cultivation. Thus, the vicious cycle continued and more forest areas were converted to wastelands as a result of repeated *jhum* having very short (often 2-3 years) cycles.

The present paper describes the status of shifting cultivation in north-east India and reviews the works done on various alternative farming systems in the region as well as many other possible alternatives that may be acceptable to the people of north-east as modified shifting cultivation practice.

Shifting Cultivation Practices in North-East

Although practices under shifting cultivation vary widely in different parts of north-east and the variability in practices are largely tribe-specific, the shifting cultivation in its any form invariably involves clearing of vegetation, and then slashing and burning the plant parts including debris. After 2-3 years of cropping, the land looses its fertility and the farmer shifts to another piece of virgin forested land for cultivation. The vegetation in the fallow land regenerates during the fallow period. After certain number of years, which varies from 3 to 15 years, depending upon the place, population and land ratio, and tribe, the farmer again comes back for farming to the same piece of land, which he left fallow a few years back. Thus, the cycle of cropping and fallow continues. The period between slash and coming back again to the same plot after completion of intervening fallow period constitute one *jhum* cycle. With rising population, the *jhum* cycle in most areas, which used to be 10 – 15 years earlier is now reducing to 2-3 years only.

Area affected by shifting cultivation

Area affected by shifting cultivation in north-east India as estimated by various agencies

differs significantly (Table 1). According to these estimates, the area under shifting cultivation is between 2.80 million ha and 7.40 million ha.

Shifting cultivation has been the main source of livelihood for most tribes of north-eastern hills and a substantial portion of the total hill population exclusively depends on it for survival (Table 2). On an average, 3,869 sq. km area is put under shifting cultivation every year and an estimated 4,43,336 households earn their livelihood from shifting cultivation. It is not only the source of livelihood but also has high cultural importance among the people of northeast. The extent of area under shifting cultivation is maximum in Nagaland, followed by Mizoram and Manipur (Table 3 & 4).

Table 1. Area under shifting cultivation in north-east India as estimated by different agencies

Agency	Year	Area (million ha)
North-Eastern Council	1975	2.80
FAO	1975	7.40
Task Force on Shifting cultivation, Ministry of Agriculture	1983	3.81
Forest Survey of India	1999	1.73

Table 3. Area affected by shifting cultivation in different north-eastern states as per the estimate of Forest Survey of India (1999)

State	Cumulative area (million ha) of shifting cultivation (1987 to 1997)
Arunachal Pradesh	0.23
Assam	0.13
Manipur	0.36
Meghalaya	0.18
Mizoram	0.38
Nagaland	0.39
Tripura	0.06
Total	1.73

Table 4. Area under shifting cultivation in north-east India as per Ministry of Agriculture

State	Area (million ha) under shifting cultivation	No. of families practising shifting cultivation
Arunachal Pradesh	0.26	54,000
Assam	0.31	58,000
Manipur	0.36	70,000
Meghalaya	0.26	52,290
Mizoram	0.04	50,000
Nagaland	0.63	1,16,046
Tripura	0.10	43,000
Total	1.96	4, 43, 336

Table 2. Shifting cultivation in north-eastern region as reported by the Task Force on Shifting Cultivation, Ministry of Agriculture (1983)

State	Annual area under shifting cultivation (sq.km)	Fallow period (in years)	Minimum area under shifting cultivation one time or other (sq. kms)	No. of families practising 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	**3,869**			**4,43,336**

Shifting cultivation in north-east – a critical analysis

Positive aspects of shifting cultivation

The shifting cultivation helps conserve the rich cultural diversity as *jhum* is interwoven into the culture and tradition of more than 200 tribes those inhabit the north-east region.

Shifting cultivation, being a labour intensive and low subsidy based farming system, provides an assured source of food security to the sustenance level farmers of the hill region. Shifting cultivation in its traditional form may also contribute towards conservation of agrobiodiversity, particularly the germplasm of native crop varieties. The shifting cultivation practices in north-east also represent an effective form of landuse by way of optimum utilization of space, where as many as 60 varieties of crops are cultivated at a time in the same plot. In the process, a small piece of shifting cultivation plot fulfills almost all the needs of the farmer and minimizes his dependency on external inputs. Besides burning, various cultural practices followed in shifting cultivation help controlling the weeds, soil-borne pathogens and other diseases of crops. Given the difficult terrain of north-east, application of modern technologies has several limitations. *Jhum* provides base for low external input agricultural technologies.

Negative aspects of shifting cultivation

One of the most important negative environmental impacts of shifting cultivation is the damage that it causes to the soil system. It accelerates the soil erosion manifold. Besides causing air pollution due to burning, shifting cultivation is responsible for loss of soil nutrients and useful soil fauna and microbes. Burning of slash lowers soil acidity, organic matter and total nitrogen, but enhances phosphorus and cations. The net change in soil available nutrient pool from pre-cropped stage through slashing and burning and subsequent cropping result in substantial lowering of carbon, nitrogen and magnesium. Most shifting cultivation practices are subsistence level farming system having very low output/ input ratio compared to other farming systems/ methods. The clearing of forest areas at regular and frequent intervals for shifting cultivation results in the loss of primary forests and formation of secondary forests. This causes substantial loss to tree diversity and associated vegetation those are adapted to primary forests. Due to shortening of *jhum* cycle, quite often, the secondary forests also do not get adequate time to regenerate. The repeated use of land with short *jhum* cycle finally converts the *jhum* fallows into degraded wastelands. Therefore, shifting cultivation is considered to be the single most important factor causing deforestation and forest degradation in north-east. Incidentally, the largest wasteland area in north-east is under shifting cultivation category.

Difficulty to wean away people from shifting cultivation

The ill effects of *jhum* on the environment are well-established scientific facts. Such conclusions are based on the scientific data and experiments conducted world-wide including north-east India (FAO, 1984; Tawnenga *et al.* 1997). Many *jhum* farmers are also well aware of it. However, in spite of their awareness, farmers continue to do shifting cultivation. The prevailing land tenure and ownership pattern has been viewed as the most important factor for replacing shifting cultivation in north-east. Besides, being a mountainous region, there is no alternative means to meet farmer's food and other needs. Moreover, *jhum* has been the way of life and integral component of the cultural ethos of the people in the north-east since time immemorial. Considering all these factors, it has never been easy to develop a viable and widely acceptable land use model that can replace shifting cultivation and thus, wean the people of north-east away from practicing the *jhum*.

Efforts made to control shifting cultivation in north-east

Several *jhum* and *jhumia* rehabilitation schemes have been implemented in the north-eastern region since independence by the state and central governments to control shifting cultivation in the region. The examples of such schemes are Watershed Development Projects in Shifting Cultivation Areas (implemented by the Ministry of Agriculture, Government of India), Soil conservation schemes of Government of India, Tripura *Jhumia* Rehabilitation Scheme of Government of Tripura and New Landuse Policy Scheme of Government of Mizoram. However, most of these schemes could not achieve desired level of success due to the reasons summarized in Box 1.

The concern of the Government of India for controlling the shifting cultivation is reflected in its agricultural and forestry policies from time to time. For instance, both the Forest Policies notified during the post-independent period, viz., National Forest Policy 1952 (NFP 1952) and National Forest Policy 1988 (NFP 1988) have emphasized the need to control shifting cultivation and rehabilitate the affected areas. The NFP 1952 states that "tree lands in agricultural areas and their importance in rural economy" (section 17) and "concern for damage caused to forests by shifting cultivation" (section 23), and the NFP 1988 states that "concern for adverse effects of shifting cultivation on environment and land productivity" (section 4.7) and "to contain the areas already affected and rehabilitation through energy plantation and social forestry".

In order to deal with the problems of shifting cultivation, the Government of India has also constituted two task forces, one in the Ministry of Agriculture in the year 1983 and the other in the Ministry of Environment and Forests in 2001. Besides estimating the area under shifting cultivation in the country, the task forces recommended a sustainable approach to manage the shifting cultivation adopting a holistic and integrated approach.

Box 1. Factors responsible for the failure of *jhum* rehabilitation schemes in north-east India

- Conceptualisation and formulation of schemes done unilaterally without involving the *jhumias* in the process of scheme development
- Testing of scheme as pilot projects is necessary before its large scale implementation
- Top-down approach does not work
- Effective involement of the target population to create a sense of belongingness
- Poor research back-up
- Integrated approach
- Lack of coordination
- Sustained and intensive training to both scheme operators and farmers
- Popularisation of high value cash crops
- Sustained and intensive monitoring and evaluation of schemes

Successful experiments having potential to manage shifting cultivation effectively

Several research and extension organizations in the north-east have been trying to develop alternatives to shifting cultivation since independence. Many of such efforts have resulted in developing ecologically and economically viable land use models having potential to work as alternatives to shifting cultivation. These successful experiments need to be adapted widely depending upon the local socio-economic and bio-physical conditions. Some of these successful experiments tried in the north-east have been listed in Box 2. The list also includes the successful practices those are tried and standardized by the people themselves and have been successfully practised for some time now as alternatives to traditional *jhum*.

The ideal approach to improve shifting cultivation

There can be two approaches to successfully manage the shifting cultivation in north-east

Box 2. Successful experiments having potential to manage shifting cultivation

- ICAR 3-tier model (experiment by ICAR)
- NEPED (Nagaland Environment Protection and Economic Development) (experiment by Government of Nagaland)
- Salt models (sloping agriculture land technology) (experiment by GBPIHED)
- SWEET (Sloping Watershed and Environmental Engineering Technology) (experiment by SFRI)
- Intensive watershed based livestock production system (experiment by ICAR)
- Modified shifting cultivation practices undertaken by *jhumias* with introduction of cashcrops like large cadamum, medicinal plants, broomgrass, beetle leaf and beetle nut, cinamomum, fruit orchards and orchid cultivation (documented by RCNAEB and SFRI)

India. Considering the socio-cultural importance of *jhum* in the life of the people of north-east, the best strategy could be to modify and improve the existing practices of *jhum* cultivation. Alternatively, the existing forms of *jhum* can be replaced by new alternative programmes. The characteristics of an improved and modified system are summarized in Box 3. Box 4 lists out certain alternative programmes those can be practiced in lieu of *jhum* cultivation. While modifying the existing *jhum*, the following aspects must be taken into account:

- soil and water conservation,
- maintenance of soil fertility,
- crop diversity,
- food security,
- high-yielding varieties of crops,
- low volume and high value cash crops,
- market linkages,
- yield optimization, and
- conformity with ecological principles.

Aspects to be considered for effective management of shifting cultivation

In order to effectively manage the shifting cultivation, certain aspects pertaining to *jhum* need to be looked into for appropriate policy intervention and action, although they may not be directly related to the agriculture and forestry sectors. Some of these issues have been summarized in Box 5.

Box 3. What should be the improved or modified system ?

- The modified system should improve the shifting cultivation to accommodate the needs of the growing population
- The system should be suitable for farmers especially marginal and small scale farmers
- The system should take into account the prevailing land tenure system
- The system should be ecologically sound, economically sustainable and socially acceptable

Box 4. Alternative programmes

- Ideal land use
- Agricultural land use including terrace and wet terrace rice cultivation
- Horticulture landuse
- Livestock farming
- Fish farming
- Agroindustries
- Mushroom farming
- Sericulture
- Floriculture

Box 5. Issues to be considered for effective management of shifting cultivation in north-east

- Declining availability of forests and farmlands per household
- Evolving government policies and legal framework on landuse and land rights that affect ethnic groups practising shifting cultivation in mountainous, forested and critical watershed areas
- Policies promoting sedentarization of upland agriculture, use of fallow lands and fire management
- Policies promoting cash crop plantations
- Encourage market and export oriented production
- Development in education and migration of younger generation to cities lead to labour scarcity for shifting cultivation
- Recognise shifting cultivation as a form of agroforestry having two distinct phases - cropping and fallow phases

Technological guidelines for improvement of shifting cultivation in north-east

Certain technological guidelines and principles those have been successfully applied in different parts of the world for the rehabilitation of shifting cultivation are listed in Box 6. Depending upon the site conditions and suitability of the technologies, these principles may be quite useful in developing ideal cropping systems as a modified form of *jhum* system.

Box 6. Technological guidelines for improvement of shifting cultivation in north-east

- Maximize both cropping and fallow period
- Identify innovative technologies, institutions and policies that can address two fundamental challenges - poverty alleviation and biodiversity conservation
- Adoption of wide spectrum of fallow management strategies
- Slash and mulch (minimizing burning)
- Green manure and cover crop
- Accelerated fallows (fallow vegetation to be improved with nitrogen fixing trees, shrubs and herbs)
- Enriched fallows (enriched with economic plants)
- Interplanted fallows (nitrogen fixing trees/shrubs and interplanting of crops)
- Managed and enriched fodder fallows
- Analog agroforests
- Intercropping economic trees
- Introduction of candidate species in fallows

Conclusion

Considering the high cost, labour and energy input involved in terrace cultivation, and in absence of other viable alternatives to shifting cultivation, the majority of the population of the north-eastern hill states continues to depend on shifting cultivation for their subsistence livelihood. Due to limited arable land and increasing population growth, the farming on the ecological fragile and marginal mountain lands including those situated on more than 30° slope will continue. If the shifting cultivation in its present form is allowed to continue, land degradation and the impoverished living conditions of resource-poor upland farmers are bound to worsen with time. Considering the adverse impacts of the shifting cultivation such as loss of precious top soil, nutrients and forest biodiversity, destabilization of slopes and its low productivity, sustainable farming alternatives need to be developed and implemented immediately.

References

F.A.O., 1984. Alternatives to Shifting Cultivation.

Tawnenga; Uma Shankar and Tripathi, R.S. 1997. Evaluating second year cropping on *jhum* fallows in Mizoram, north-east India: Soil fertility. *Journal of Bioscience*, **22**: 615-625.