

Ecological and Socio-economic Impacts of Modified Shifting Cultivation in Northeast India

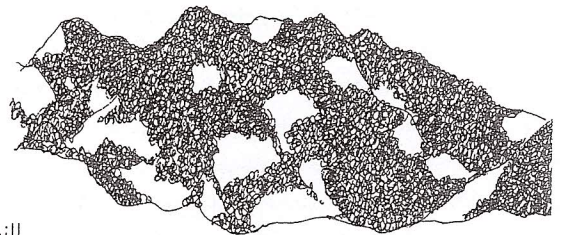


Traditional shifting cultivation is an agricultural system characterized by a rotation of fields, rather than crops, by a short period of cropping alternating with long fallow periods, and by clearing by means of slash and burn. It is an age-old land use system practiced by over 300-500 million people in the tropical regions of the world.

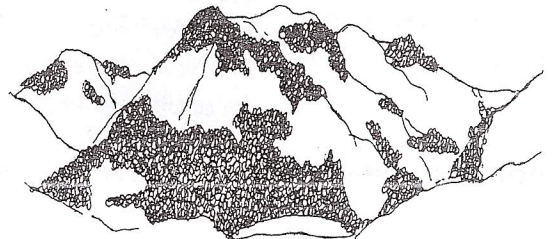
On the average, the cropping period ranged from one to three years, and the fallow period from 15 to 20 years.

This period is long enough to rejuvenate the soil and restore its fertility. Thus, this type of shifting cultivation continued to be a sustainable farming system. This was the practice of the hill farmers of humid tropics for a thousand years now.

However, due to increased population, the fallow period in most areas in northeast India has been remarkably reduced to more or less three to five years. This modified shifting cultivation allots inadequate time for soil regeneration and vegetation development. In effect, it degrades and depletes the soil, water and genetic resources and has significant ecological and socio-economic implications.



Shifting cultivation (THEN)

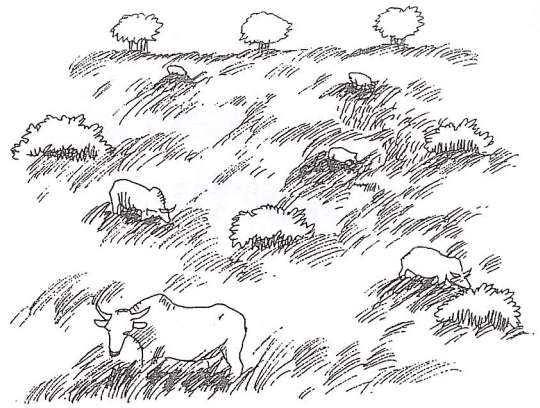


Shifting cultivation (NOW)

Ecological considerations

Animal grazing in fallow lands

A fallow land that is abandoned for a long period or managed properly can regenerate and regain its fertility status. However, in many areas, these fallow lands are subjected to intense grazing by domesticated cattle and goats. The grazers hamper the growth of vegetation and reduce water percolation due to soil compaction, thus, increasing runoff that accelerates soil erosion.



Proper Management of Fallow Lands

- Protect from fire by cutting fire lines
- Protect from intense grazing
- Maintain fresh sprouts of biennial and perennial food crops
- Sustain collection of wild, leafy vegetables, tubers, herbs, bamboo shoots, mushrooms, etc.
- Limit the collection of dry wood and sticks for firewood.
- Collect bamboo and thatch grass for construction of dwellings.

To address this concern, a part of the community land may be converted into grasslands for community grazing. Certain species of grass, or grass and legume combination, can be planted to increase grass yield as well as nutritive forage. The distribution of grasslands interspersed with the cultivated fields in a mosaic fashion enables checking of soil erosion, as part of the sediment, and dislodged nutrients from cultivated fields are retained in the grasslands.

Fire in fallow lands

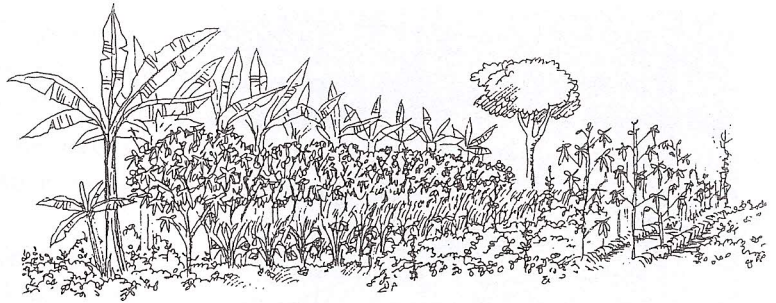
In some parts of northeast India where livestock population is high, the fallow lands are invariably subjected to accidental or deliberate burning in the months of February and March. This is carried out to produce new shoots that are more palatable to the livestock and to get rid of unwanted

vegetation. Frequent burning of vegetation evidently results to loss of vegetation, soil organic matters and most surface soil organisms. It also causes drastic change in the species composition of fallow lands. In extreme cases, such fallow lands continue to deteriorate and recovery of soil fertility needed for cultivation of agricultural crops would be difficult. Such lands are abandoned permanently and join the category of uncultivable wastelands, which particularly abound the Khasi hills of northeast India (see also *Sustainable Agriculture Systems in the North Mountain Regions of VietNam*, pages 191-195 for another example).



Crop diversity

Customarily, the hill people in India grew as many as 35 different plants in their shifting cultivation plots. With the shortening of fallow period and advent of sedentary cultivation, the number of crops is reduced (generally less than five). In some places, a monoculture system replaces the mixed culture.



Plants that can be grown in crop fields:

- Grains: rice, maize and millet
- Vegetables and fruit crops: pumpkin, watermelon, mustard brassicas, brinjal, lady's finger, gourds, cucumbers, beans, chillis, squash, *Cucumis*, *Momordica* and banana
- Tuber crops: cassava, yam, taro, sweetpotato
- Economic Plants and spices: cotton, cardamom, ginger, *Hibiscus*, pepper
- Others: *Sesamum*, cotton, castor

Ecologically, the traditional mixed crop cultivation represents, structurally and functionally, a more complex ecosystem than do the single or few crop systems. Also, for hill slope agriculture, the traditional system has greater ecological stability than the monoculture of grains.

Multistoried crop canopy with perennial crops:

- Top Layer: cassava, banana and castor
- Middle Layer: cereals
- Bottom Layer: cucurbits and legumes

A number of shifting cultivators at high elevations of Meghalaya have adopted potato cultivation. The preparation of ridges along hill slopes causes a large-scale loss of topsoil, resulting to rapid depletion of soil fertility. The produce has a ready market and fetches good income. Some industrious farmers take two crops of potato every year. While others go for a rotation of potatoes and cauliflowers.



Socio-economic considerations

Impact of cash crops

Shifting cultivation does not provide enough income to support the family of a shifting cultivator. To remedy this, farmers have opted to plant cash crops. True enough, this shift to cash crops significantly improved the livelihood of the cultivators. Although some cash crops are more ecologically sustainable as they provide soil cover that reduces erosion losses, nevertheless, the introduction of cash crops in shifting cultivation areas tends to redirect resources from social sectors to mercantile sectors, and from domestic to export needs. As a result, it exposes the shifting cultivators to the vagaries of market forces.

Field observations suggest that the shift from food crops to cash crops, particularly in the case of small holders, adversely affects the food security and the health of women and children living in the rural areas. Cash crops

Cash crops grown include:

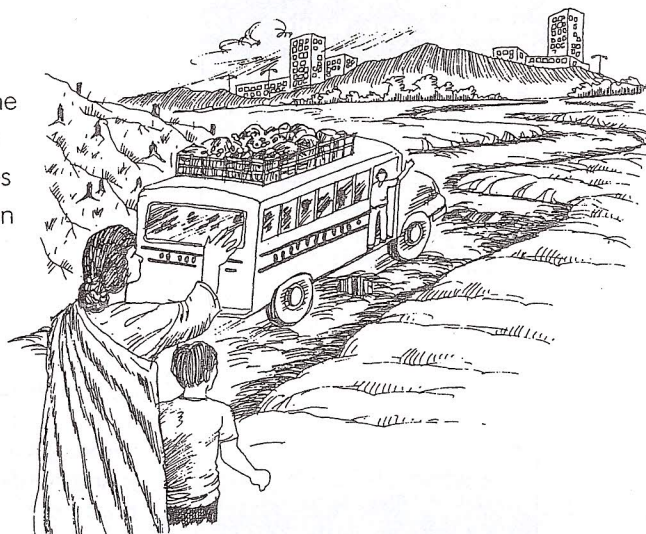
pineapple, cashewnut, banana, betel nut, tea, coffee, rubber, bamboo, ginger, cardamom and potato.

also depend heavily on storage facilities and transport network, which are poorly developed in this region, so growers cannot warrant a commensurate price for their produce. In addition, small farmers quite often get entrapped in the clutches of moneylenders and businessmen. By and large, comparatively well-to-do farmers have adopted the cash crops and the poorer ones have not benefited much.

Development of road networks, rural credit and marketing facilities is desirable for making the cash crops as alternative livelihood for the resource-constrained shifting cultivators of the interiors of northeast India.

Migration to urban centers

Repeated cultivation of land under the modified shifting cultivation degrades the land. This land degradation causes low productivity which consequently reduces the farmers' income. Severe soil erosion causes a total collapse of agriculture, hence, the migration of people to urban areas to seek employment. In such case, the fields are left to the care of the elderly and young children. As a result, rural societies become more and more dependent on cash remittances from urban employment.



Diet and nutrition

The modified shifting cultivation likewise affects the diet and nutrition of rural poor. Traditionally, the shifting cultivators of this region obtain meat by hunting and trapping, fruits (generally obtained from naturally growing plants), rice, leafy vegetables and tuberous crops comprise the

traditional food of shifting cultivators of the region. All these

foodstuffs taken together provide a fairly well balanced diet to rural populations.



Recently, however, meat, leafy vegetables and wild fruits have become scarce due to the shortening of fallow period and large-scale deforestation. Furthermore, the advent of market-based economy causes these items to be sold at high prices due to the great demand in urban areas. This lures the rural poor to sell whatever produce they have and the money will be used to purchase consumer items. The purchase of consumer items then becomes the priority over the provision of nutritional food for the family.

Most shifting cultivators of the region are quite acquainted with the skill of livestock rearing. However, this has remained to be a household activity and, therefore, less productive and least remunerative. Promotion of these activities are required for supplementing their diet, as well as creating avenues for earning extra income.

The modified shifting cultivation practice, clearly, brings along with it ecological and socio-economic considerations that should be properly addressed. Any strategy to be employed must be supplemented with modern input of conservation techniques. Although this should be done with caution so that the new system causes minimum changes in the customs and traditions of the local people.

Traditional shifting cultivation, with long fallow period and large interstitial lands covered by forests, is probably the best land use option for the hill slope agriculture in humid tropics in general, and northeastern India in particular. Wherever possible, such as in places where population pressure is low, the traditional shifting cultivation should continue or may even be promoted with suitable modifications by way of providing technological and managerial inputs. The modified shifting cultivation, with reduced fallow period and low crop diversity, is, however, not sustainable and therefore needs to be discouraged or further modified. The total population dependent on shifting cultivation need to be reduced by way of providing alternative livelihood, so as to keep more and more areas under pasture and tree cover. In so doing, the land will be more productive and sustainable.

Suggested readings:

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Possible remedies and management practices to offset improper shifting cultivation practices:

- Popularization and continued operation of traditional mixed cultivation of multiple canopy crops at higher densities and leaving crop residues on the fields as protective mulch for the following crop cycle. In this way, the cropping period can be extended.
- Raising of pastures for community grazing.
- Development of biomass (viz., bamboo, cane etc.) based handicraft and village industry for employment generation.
- Afforestation of hill slopes with fodder, fuel and fruit trees near human habitations to check destruction of forests around shifting cultivation lands.
- Timber tree plantation on wastelands and uplands.
- Educating people about the benefits of conservation and evolving a mass conservation movement.
- Providing better facilities for family welfare and child care in order to check population growth.
- Creating awareness and providing better education for making the shifting cultivators less dependent on land-based activity and expose them to avenues and opportunities available elsewhere.

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