Innovation in shifting cultivation in Asia:
Indigenous Fallow Management

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In Asia and other tropical regions shifting cultivation, characterised by the sequential rotation of forest vegetation and cultivated food crops, was the first form of agroforestry to be widely practised. Shifting cultivators normally use slash-and-burn methods to clear primary or secondary forest to prepare the land for food crops. They alternate fallow periods of either natural fallow vegetation or 'managed' fallow with food crop cultivation in order to suppress weeds and restore soil fertility. Staples such as maize, rice, cassava, and taro are typical of crops grown in this way in upland Asia. In the past, a relatively low population density and abundant forest cover provided optimal conditions for sustainable shifting cultivation practices in which long fallow periods of between 10 and 50 years were not uncommon.

Diversity and change

Shifting cultivation continues to be the economic mainstay of upland communities in many parts of the Asian-Pacific region. It has been estimated that 15% of the region's population, or some 450 million people, depend on the forests for their livelihood. Among these are forest-dwellers whose lives depend on a combination of shifting cultivation and hunting and gathering and those who live outside the forests but rely on them for food, domestic resources and trade goods. Today, the conditions that sustained rotations with long fallow periods have almost disappeared and it has become necessary for many communities to evolve more intensive forms of land use. Population growth and the immigration of 'colonist farmers' have led to a decline in the amount of farmland available. Forests are under increasing pressure from logging, mining, plantation companies and the activities of slash and burn immigrant farmers. The creation of protected areas and parks with their resettlement programmes have added to the pressure on land. At the same time government policies are actively encouraging sedentarised agriculture and discouraging the use of fallow and fire.

Examples of successful, top-down technical approaches to stabilising and improving the productivity of shifting cultivation systems are difficult to find. However, there are many compelling examples of shifting cultivators who are successfully managing local resources to intensify land use. It is therefore important to understand the forces behind change in the Asian uplands and how these should be handled. Among the factors that have had the deepest impact on shifting cultivation are: evolving legislation and policies on land use and rights, particularly those that affect ethnic groups practising shifting cultivation in mountainous and forest areas; trends toward decentralisation of governance and the empowerment of local organisations; the push toward market- and export-oriented commodity production; the effects of globalisation, trans-boundary trade and new information channels; population, migration and employment patterns; trade-offs, tensions and conflicts between upland and lowland watershed users.

Shifting cultivation sustainable?

The annual cycle of slash and burn that characterises land preparation in shifting cultivation systems has often been criticised for being inefficient and causing tropical deforestation. Governments generally consider shifting cultivation to be 'unsustainable' and 'primitive'. To them it is a system that should be 'sedentarised' and 'modernised.' However, most of the policies, strategies and programmes that government agencies have designed for the Asian uplands have been based on lowlander perspectives and solutions.

Detailed anthropological studies, starting with the work of Harold Conklin in the Philippines, provide us with a more positive assessment of shifting cultivation. They present evidence of a rational farming system that has evolved to meet the constraints and opportunities inherent in remote upland areas and, by stressing its long history, give us evidence of its sustainability.

Box 1. Spectrum of fallow management strategies used by shifting cultivators in Southeast Asia

- **Burning** of vegetation for easy clearing and nutrient activation. Also used to rejuvenate rangeland vegetation.
- **Slash and mulch** of fallow vegetation as an alternative to slash and burn to start a new production cycle. (for example, see p36).
- **Green manure / cover crops** for inter- and relay cropping and seasonal fallows in annual systems to improve soil productivity: viney and non-viney legumes, compositae and others (see Box 2).
- **Improved fallows:**
  - **Accelerated fallows**: natural fallow vegetation improved with (N-fixing and non-N-fixing) trees, shrubs, legumes, and others to improve soil productivity.
  - **Enriched fallows**: natural fallow vegetation improved with trees and shrubs of economic value.
- **Interplanted fallow**. N-fixing and non-N-fixing trees or shrubs for soil productivity improvement inter-planted in annual or perennial crops, for example, dispersed trees, alley's, bushes, field borders in 'cut and mulch' or 'cut and carry' regime (with Alder trees, for example, see p.20).
- **Intercropping economic trees** (timber and non-timber) with annual crops or shrubs for cash, shade or increased soil productivity, for example, taungya and other systems.
- **Analog (agro)forestry**, consciously making use of the ecological processes involved in natural forest regeneration such as natural species succession and natural rejuvenation: annual crops, economic shrubs and trees, introduced pioneer (fallow) vegetation (N-fixing and non-N-fixing) and natural fallow and forest vegetation (for example, see p.14).
- **Managed and enriched fodder fallow** to intensify livestock production: trees, shrubs, legumes and grasses. (for example, see p.26 and p.10 for further examples).

(Adapted from the **Spectrum of indigenous approaches to modify fallow vegetation in Southeast Asia**, ICRAF, IFM Programme. This spectrum provides a schematic overview of many examples of IFM strategies, names of species as well as how these strategies are being used.
Source and further information: Indigenous Fallow Management Network ICRAF-Southeast Asia

These studies argued that shifting cultivation is a land-use practice that is based on indigenous knowledge accumulated through centuries of trial and error. In maintaining the intricate balance between product harvest and ecological resilience, the shifting cultivator often succeeds in maintaining an impressive degree of agrodiversity. It is far from being a practice that involves destroying the forest.

Work by the Alternatives to Slash-and-Burn Consortium (ASB) has shown that a remarkably wide-range of smallholder land use options is agronomically sustainable. However, whether or not these options remain sustainable in the present, rapidly changing economic context or are suitable for other farmer communities has yet to be seen. It is clear that the simple dichotomy sustainable/unsustainable is too crude.

Recent studies have identified the custodial role played by shifting cultivators in preserving forest ecosystems and natural species and the close link between biological and cultural diversity. It is unlikely that these two extreme views on shifting cultivation will be reconciled in the near future. It is therefore essential to reframe the debate and move forward to identify research and development interventions that do not only stabilise forest agroecosystems threatened by degradation but that can also improve the standard of living of marginalised, shifting cultivator communities.

Indigenous pathways

A major challenge is to document and evaluate indigenous strategies for intensifying shifting cultivation through research and development. This process involves identifying promising indigenous practices and understanding them in the context in which they are used. Their utility must be validated and the possibility of employing them in other areas must be explored with the farmers concerned.

Strategies used by farmers to intensify their system of land use centre on strengthening the different functions of fallow:

The ecological function – improving the regeneration of soil productivity and the ecological control of pests and diseases, e.g. by introducing leguminous trees, shrubs, or herbaceous vegetation that improve soil productivity and enhance biodiversity. This ensures that the same or greater production benefits are secured in less time.

The economic function – improving direct economic benefits by adding value to the fallow by introducing valuable perennial species of timber, fruit, and fodder trees.

Combinations of the two – both ecological and direct economic benefits can be obtained, e.g. by introducing trees for wood fuel, improving soil productivity, and introducing legumes for green manure and fodder. Effective strategies usually combine the economic and the ecological function.

These strategies may lead to different systems:

- Annual cropping systems in which the ecological function of fallow vegetation is emphasised;
- Agrosilvipastoral systems where livestock is significant;
- Agroforestry systems which alternate annual cropping with annual and perennial fallow and economic shrubs or trees;
- (Agro-) forest systems in which the phase of clearing of forest vegetation and cultivation of annual crops is foregone altogether, as the farmer chooses to focus on producing valuable perennial vegetation, allowing it to develop into permanent (agro-)forests.

It is important to understand the many farmer-generated solutions that have successfully allowed shifting cultivation to be intensified in the face of growing pressure on land use. Unfortunately, these indigenous innovations are little documented, generally unobserved and often misinterpreted.

The IFM workshop in Bogor

Case studies of these practices were collected for discussion in a regional workshop on Indigenous Fallow Management (IFM) organised by ICRAF in Bogor, Indonesia in June 1997. Proceedings from this workshop - **Voices from the Forest** (Cairns, in preparation) - contain a large and fairly comprehensive review of many of these systems. A CD Rom version of the proceedings is expected to be available at the end of 2000.

An overview of IFM strategies was prepared for the workshop on the basis of these cases. An adapted version is presented in Box 1. Follow-up work will explore the value of this indigenous knowledge for researchers and policy makers. This will contribute to strengthening the argument for empowering local communities and enabling them to manage their own natural resources.

Building on the momentum of the workshop, a regional IFM Network was formed as a forum for collaboration and sharing experiences.

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Box 2. Green manure/cover crop systems are surprisingly common and varied

Green manure (gm) and cover crop (cc) systems are now widely used throughout the world. We listed more than 140 different documented gm/cc systems involving 41 different gm/cc species being used by farmers in 23 nations in the tropics. But farmers around the world, shifting cultivators included, use many more systems. For instance, in the very small state of Santa Catharina alone, over 125,000 Brazilian farmers use some 60 different species of gm/cc with dozens of different cash crops. Yet only 11 systems from Brazil are mentioned in our list.

Among the listed systems, more than 60% have been developed by farmers themselves. This gives us a clear impression of how appropriate these systems are for rural households and how interested farmers have become in finding, adopting, and adapting gm/cc's to improve their farming systems.

Gm/cc's are extremely multi-purpose. They are cultivated to enhance soil productivity, provide human food, animal feed, cash income and firewood and are used to help control erosion, regenerate waste lands, conserve water, combat plant disease and control pests.

The most common species used world-wide are:
Scarlet runner beans (*Phaseolus coccineus*). A legume grown by hundreds of thousands of farmers in the highlands of Latin American. They are usually intercropped with maize and the beans are harvested and eaten.
Pigeon peas (*Cajanus cajan*), common beans (*Phaseolus vulgares*), soybeans (*Glycine max*) and oats (*Avena spp.*) are more widely grown than any other gm/cc species.
Velvet beans (*Mucuna spp.*), undoubtedly the most widely grown gm/cc species introduced by development programmes. In Central America, Brazil, and West Africa, this species has been very successful. In many countries in Southeast Asia it is a traditional crop. Here the most common gm/cc's are probably from the family *Vignas*, which includes **mung beans** or **green beans** (*V. radiata*), **cowpeas** (*V. unguiculata*) and **rice beans** (*V. umbellata*). These species are all tasty, easy to grow, and drought resistant.
Jack beans (*Canavalia ensiformis*) is probably the second most widely introduced gm/cc species. They are very useful because most varieties are not such aggressive climbers as the velvet bean. Jack beans are capable of surviving and growing well in very poor conditions. Often, shifting cultivators plant it (or **Tephrosia candida**) in fields soon to be fallowed and after two years the soil is ready for rice cultivation. Furthermore, since jack beans are capable of fixing up to 240 kg/ha of Nitrogen, do not climb and can withstand heavy pruning, they can be intercropped quite easily with many different crops, such as maize, cassava, sorghum, tomatoes, and chili.

After: Bunch R, (2000). **A proven technology for intensifying shifting agriculture: green manure / cover crop experience around the world**. IIRR Resource Book (see p.30)

Further information: ILEIA Newsletter Vol.13, No.3, pp.12-13; and the web site of the Consortium for Tropical Soil Cover and Organic Resources Exchange see p.32.