From the Field

Learning from Indigenous Fallow Management Technologies

A New Component of Research on Alternatives to Slash and Burn in S.E. Asia

Many S.E. Asian countries share the challenges posed by mountainous terrain populated by a myriad of diverse ethnic minority groups; sparse road infrastructure and distant markets have limited development of alternative livelihood options and swidden cultivation often continues as the economic backbone of upland communities. However the preconditions that have historically underpinned the sustainability of long-fallow swiddening - extensive tracts of forested lands, sparse population densities, and few pressures to produce surpluses for outside markets - have largely vanished. Instead, pressures of rapid population growth (both endogenous and in-migration), gazettement of remnant wildlands into protected areas, and state policies to sedentarize agriculture and discourage use of fallow and fire, are all converging on the imperative to intensify swiddening into more permanent forms of land use. In the absence of mitigating adaptations, farmers are forced to shorten fallow periods and extend the cropping phase, eventually pushing their swidden systems beyond their ecological resilience and into a tailspin of degradation. As weeds proliferate and crop yields plummet, swiddenists earn decreasing returns to labor invested and food security is threatened. Upland tribal groups, already on the economic, political and geographic fringes of society, find their resource base and standard of living declining even further.

As part of its activities *on Alternatives to Slash and Burn (ASB)*, the ICRAF S.E. Asia Program hosted a workshop on 'Indigenous Strategies for Intensification of Shifting Cultivation in Southeast Asia' in Bogor, Indonesia on June 23rd - 27th, 1997. This bottom-up focus on farmer-generated technologies has recently been adopted by ICRAF in response to the long history of failure of researcher-driven agendas to identify solutions that have earned wide farmer adoption. Although the notion of improved fallows is not new, and many years and resources have been devoted to a litany of on-station trials and demonstration plots across the region, most of these were designed in isolation from farmer realities; despite ambitious extension programs, few ever extended much beyond the perimeter fences of the research stations. Farmer rejection of outside solutions has highlighted the imperative for participatory research approaches that emphasize more genuine farmer-scientist-extensionist partnerships in jointly identifying practical technologies that resonate with farmer needs and 'fit' local farming systems. This initiative on *Indigenous Fallow Management (IFM)* takes a determined stride in that direction by focusing research attention on a compelling array of case studies in the region where swiddenists confronted with mounting land use pressures have successfully developed their own technologies to manage fallow land more productively, thus permitting a sustainable intensification of the swidden system.

The Bogor workshop was very successful in launching this initiative by bringing together about 120 scientists, practitioners and policy-makers from across S.E. Asia to review 67 such case studies. Building on the momentum of the workshop, a regional IFM Network was formed as a forum for collaboration and sharing of experiences between 5 cores institutions representing those areas where stressed swidden systems are most endemic: northern Vietnam, northern Lao PDR, north-east India, south-west China, and the northern Philippines. The following morning after the workshop, a team consisting of two representatives from each of these member institutions departed for West Timor and West Sumatra on a ten-day study tour of Indonesia farmer innovations in fallow management. The trip concluded with planning meetings to conceptualize a series of parallel research activities on the most promising IFM practices, and use of the network to exchange literature, share proven methodologies and findings, and facilitate cross visits.

ICRAF is strongly committed to working with its national partners in S.E. Asia in developing a coordinated and sustained regional research initiative on IFM technologies and their promise to contribute solutions towards the stabilization and intensification of collapsing swidden systems. ICRAF's capacity to engage in this work was recently bolstered with the arrival of Paul Burgers, joining Malcolm Cairns in spearheading the IFM initiative. As immediate outputs from the workshop, the proceedings are now being compiled and prepared for publication; and plans are materializing for posting the workshop abstracts and a collection of IFM photos on the internet. Cornell University has continued to make a valuable contribution by hosting an e-mail listserve to facilitate information sharing and a continuation of the fallow management discourse that began at the Bogor workshop. Delegates from both Vietnam and the Philippines judged fallow management to be such a crucial issue to their own uplands, that after the Bogor meetings they returned home to form national working groups focused around the IFM theme. ICRAF has now begun follow-up visits to members of the IFM Network to consolidate their efforts into a unified regional thrust and provide technical backup as needed.

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Why Indigenous Fallow Management?

ICRAF Considers Farmer's Practices as Starting Point for Intensifying Degrading Systems

So far researcher driven solutions to degrading upland fallow systems have not met with wide farmer adoption. So far, the "fallow" was not seen as a dynamic part of the system, where farmer's knowledge and practices are being applied for protective and / or productive goals to cope with increasing land use pressures. Fallow lands were viewed as abandoned fields, where no planting or sowing is done. This definition does not recognize farmer's practices to actually manipulate and manage fallow vegetation. Farmer responses to intensification pressures can be classified as innovations to achieve either more effective fallows or more productive fallows.

More effective or accelerated fallows develop where the biological efficiency of fallow functions improves, so that the same or greater benefits can be achieved in a shorter time. These fallows often provide an intermediate step in a transition to permanent cultivation of annual crops.

By way of contrast, more productive fallows develop when a farmer wants to add value to the fallow by introducing perennial economic species. The fallow length stays the same or actually lengthens. The phase of reopening and cultivation of annuals may be foregone as the fallow develops into semi- or permanent agroforests.

There are many examples of where swidden cultivators have successfully managed local resources to meet both bio-physical and economic benefits. A wide range of systems can be distinguished along a continuum, guided by farmer's preferences and needs (see figure 1). If the fallow land is understood as being part of the productive agricultural phase, it will have a number of advantages which can be summarized as follows:

- Looking at a "fallow" which features largely in the agricultural system; it will put this type of land use at the center of stabilization / intensification of degrading swidden systems,
- Recognize a farmer's distribution of the limiting production factors land, labor and capital among staple food cropping and the management of the fallow land, and
- In this respect, the recognition of the fallow as part of agricultural production, makes it more acceptable for policy makers to view fallow land as a productive phase, and not unused land.

To obtain a more holistic perspective on possible development pathways for intensifying swidden systems, the ICRAF S.E. Asia Program's IFM initiative (see the article by Malcolm Cairns in this *APANews* edition) centers its research efforts and activities along the following topics:

- Understand the socio-economic and biophysical conditions that contribute to the evolution of managed fallow systems, and the process of how farmers adopt innovations,
- Understand the science underlying farmer practices in improved fallow management,
- Understand the objective of the systems from a farmer's point of view,
- Evaluate if farmer innovations are situation-specific or are replicable in other stressed swidden agroecosystems in the SE Asian uplands,
- Develop a common research approach for a set of parallel studies of fallow management in the region,
- Suggest opportunities for further technological refinements, and
- Establishment of a collaborative structure that will enable a regional research thrust.

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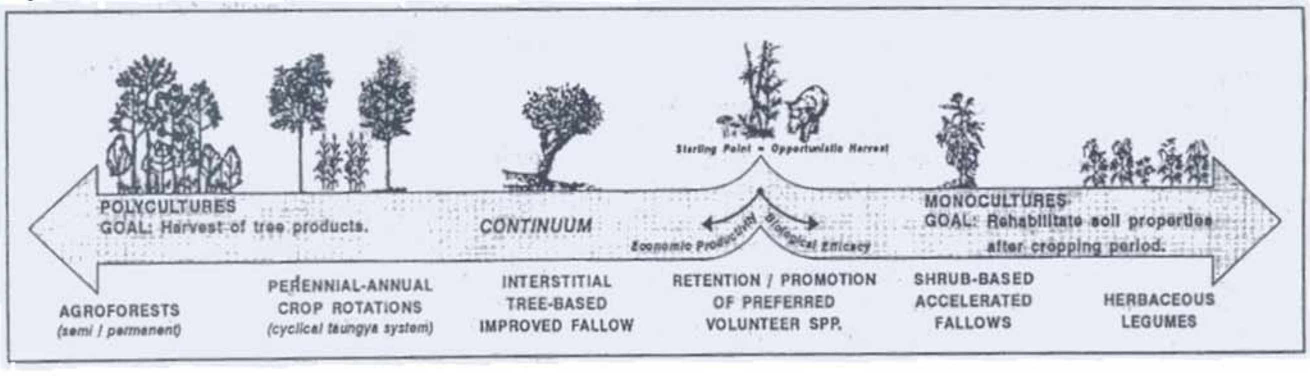
Figure 1: Continuum of different fallow management systems.



Villagers in Indonesia gather fruits, vegetables and firewood from the natural Sumatran forests.

Natural forests: a luxury or a necessity for farmers?

An El Niño dry season in Sumatra, Indonesia

The extreme drought in most of Southeast Asia last summer under the influence of El Niño illustrated how forests can be essential to farmers who, in normal times, have few links with them. What happened in Sumatra and Kalimantan in 1997 highlights the complementarity between forest and agriculture in forest margins. It also points to the unexpected consequences of rapid and massive forest conversion to agricultural systems that are more productive but also more sensitive to climatic crisis. ***I Clement, W Djatmiko, A Aliadi, G Michon*** *and* ***H de Foresta*** *tell us more.*

Indigenous communities in the wet tropics depend on forests — this is a well publicized and politically acknowledged fact. However, when we think of communities which rely on forests, we most often think of forest dwellers like the native Indian tribes or Caboclos forest collectors in the Amazon, who operate in vast forest domains.

We often do not realize that farming communities are also highly dependent on forests for their livelihood. These farming communities indeed include traditional slash-and-burn cultivators, like many Dayak villages in Kalimantan, who shift their fields in vast forest domains. The integration of slash-and-burn agriculture and forest use in such communities is often considered as a special type of agroforestry system.

Forest dependence also concerns communities living on the forest margins and engaged to various extents in commercial agriculture. The importance of forests for such communities is often qualified by phrases like 'in times of food scarcity' or 'in periods of crop failure'. But the extent of this forest dependence and its relevance to agroforestry remain unclear.

When the rain comes

In the Bungo valley of Jambi Province, Sumatra, Indonesia, smallholder farmers grow wet rice in seasonally flooded lands and dry rice in swidden fields opened in secondary forests. The main sources of income in the villages of the valley are rubber and cinnamon — two export-oriented tree crops — which are managed in complex agroforestry gardens or agroforests. Bungo farmers are fully engaged in commercial agriculture, and have been for almost a century now. But they still rely on slash-and-burn agriculture to grow rice and to establish agroforestry gardens.

Natural forests in these areas are on the borders of agricultural land, sometimes a few hours walk from the village. The forests have two main uses for villagers.

Subsistence gathering

Firstly, women gather fruit, vegetables and fuelwood for home use. Other subsistence use of forests includes fishing and hunting by the men. Such use is highly irregular and depends on the balance between individual needs and opportunities, and on the occurrence of fruiting seasons or game migrations. Gathering of supplies is more intensively done when farmers live for extended periods in their swidden, or when they go to the forest for other purposes. Subsistence gathering is also highly opportunistic: it is carried out with other activities while 'passing through'. As much as possible, farmers tap forest resources when these are close to their village, in agroforests and in secondary vegetation patches: firewood, many plant materials and medicinal plants, and some wild fruits and vegetables are provided in abundance by rubber agroforests, for example, through self-sown forest plants. Due to its unpredictable and opportunistic nature, gathering for subsistence is difficult to quantify. But it remains significant for poor families, and in the seasonal periods of residence in the swidden.

Commercial extraction

The second category of forest use is collection of commercial forest products for exchange or trade — 'extractivism'. This plays a more significant role in household economy than subsistence gathering, but it involves a limited number of households, and depends completely on external demand. Commercial use of forests is almost exclusively a male activity. It is usually carried out without seasonal variations — except for times when the high labour demand in rice fields or swiddens prevents it — and requires stays of several weeks in the forest. It provides high returns on labour inputs. Though 'extractivism' usually refers to non-timber forest products, the main recent extractive resource in the Bungo valley is timber. Driven by a strong external demand and organized from outside the villages, it involves most young, strong men in all villages along the valley. Rattan collection used to be widespread, but has lost its importance as relatively close sources of canes become scarce and following dramatic price falls after changes in trade policy. Most former rattan collectors have therefore turned to timber harvesting.

When the rains stop for too long

The prolonged drought of 1997 had immediate consequences for the agricultural economy of the valley. The failure of rainfed rice crops forced families to buy rice, sometimes the whole of their expected needs for next year. Vegetable and fruit crops in village gardens, though promising due to mass flowering, could not reach maturity. The lack of available groundwater entailed a sharp decrease in rubber sap flow, which translated into a more than 50% fall in daily harvest. Forage collection for buffaloes and water transport for domestic use required more time and energy as regular sources dried up.

Timber harvesting in the forest stopped because restricted water flows in the rivers rendered transport more and more difficult and costly. Forest animals started to roam around villages to feed on whatever crops remained in the fields.

Economic consequences of the drought at the national level — mainly increased prices of basic commodities— were combined with the local problems, and there were unexpected drops in the prices of export commodities. In brief, the farmers' incomes dried up while expenses increased dramatically. How did they react to this crisis?

Back to the forest

The immediate response in all villages along the valley was a large-scale rush towards the forest, looking for food as well as for income.

Extractive activities suddenly burgeoned with both an intensification of regular collection practices and diversification towards new products. Intensification concerned, for example, commercial fishing, which was usually only practised by specialized groups in well-known rivers. Suddenly, many new groups of inexperienced villagers started exploring new rivers several walking days from villages, and overfishing them. Diversification was obvious in bird catching that started targeting, in addition to regular high-value species, a much larger number of potentially ornamental varieties, including many lower-value species. Commercial game hunting also diversified, adding rare prey such as tortoises, wild cats and bears to the commonly sought after deer.

This sudden burst of activity was different in three ways from normal extractive practices. First, villagers did not care about labour productivity any more — any source of cash was welcome, at whatever costs in human energy. The best illustration of this was the reviving of rattan collection, formerly considered unprofitable due to the low market prices and the long walking distances.

The second difference was that collection of forest products did not rely on external demand or external organization. The collecting stimulated a demand — or even anticipated one — and villagers organized themselves. Any potentially marketable product was harvested. This aggressive extractivism benefited from an unusual fruiting season of some edible species like 'jengkol' and 'petai' (*Pithecellobium lobatum* and *Parkia speciosa),* two pod-producing trees of the legume family. Honey production in this El Niño year was also exceptional, allowing 'miracle' harvests for more than two months.

The last difference was that this sudden commercial use of forests was not confined to a given social group, but attracted all classes and ages: men and women, elders and children, wage-labourers as well as landlords and shopkeepers went to the forest to harvest whatever could be sold. Strong or agile men concentrated on hunting and honey gathering or on expeditions involving long distances and extended stays in the forest (fishing, rattan collection). Women, elders and children wandered in the forest looking for jengkol and other fruits. Even those who usually feared the forest — mostly shopkeepers rather than farmers — dared to join in the gathering.

Profitability of these exceptional collections was quite impressive. For example, a single honey tree, usually tended by a group of fewer than a dozen people, yielded between 100 and 400 kg of honey, which sold at Rp. 4500/kg (about USD 1.60 in November 1997), enough to cover the expenses of the families involved for more than two weeks. Jengkol gathering can yield a daily average of 25 kg of husked fruits, worth Rp 7500 (USD 2.60). These returns can be compared with those for rubber tapping, which usually provides about Rp 4000 (USD 1.40) per day.

Collection of forest foods also intensified, though to a lesser extent. This increased subsistence role of the forest was directly related to the increased density of collectors working in the forest day after day, hunting for their meals and eating whatever greens they could find. Forest game and plants significantly improved the villagers' diets, impoverished by the failure of vegetable crops in the fields.

Maintaining natural forests in farmlands: a strategy to reduce risks

This short story of Bungo villagers could be repeated all over drought-affected Indonesia. It highlights the occasional but essential role of natural forests in difficult times. Most farmers in Indonesia — and in many other parts of the tropical world — have very limited capacities for saving or hoarding. They usually consume all they produce and are therefore very vulnerable to any unexpected decrease in their regular food production levels or income. In cases of extreme and general scarcity, natural forests act as a back-up for both food and income and, in this particular year, they saved many farmers from hunger. The case of the Bungo villagers shows that this role of forests is not only essential in remote forest communities, but persists even in communities where farmers have a diverse production system, are well integrated into a market economy and commercial channels, and are usually quite well-off.

Can the economic value of this use of forests be calculated meaningfully? Putting a value on forest production either per hectare of forest used or per hour of labour involved, or as a statistical mean over years, would give only a pale reflection of its crucial importance in crisis times. In normal years, for most families, the economic value of forests can be close to nil. In critical years, this value is high over a limited time. It might be comparable, on a per season basis, to other agricultural activities, but even then, the statistical annual value might remain small. However, in more real terms, this value means survival. Colfer (1997) has illustrated this on a less happy note, with the example of farmers in Kalimantan. These farmers have been faced with successive crop failures, accompanied by less and less resort to natural forests as the forests are converted to monocrop tree plantations by estate companies. When the forests have gone, farmers suffer.

Forests are not the only last resort of farmers, nor their sole way of minimizing risks. Biodiverse agroforests too play that role. However, during crisis years, that role is limited by the fact that they are usually quite intensively used in comparison with natural forests. So agroforests (at least rubber agroforests) did not have enough untapped resources or unexplored space to accommodate the needs of whole villages. In these cases, enhancing the agroforest productivity as well as the smallholder farmers' ability to store surpluses would be more help in reducing risk.


G Boklin

Many farmers use forests to provide them with an income, particularly when times are hard.

The 1997 dry season in Indonesia clearly refines our understanding of the complementarity of forest and agriculture in forest margins. It also helps us understand better some of the hidden risks of forest conversion in strategies aimed at quick stabilization of shifting cultivation. Analysing, publicizing and helping maintain this agriculture/agroforest/forest complementarity is essential, especially until other strategies can be used on farmlands. And this is, intrinsically, part of agroforestry research.

Reference

Colfer, CP. 1997. El Niño's human face. *CIFOR News* 16: 2.