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SHIFTING CULTIVATORS AS AGENTS OF DEFORESTATION: ASSESSING THE EVIDENCE

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Increasing concern on two fronts - the international environmental movement and growing interest in biodiversity conservation - has brought shifting cultivation back into the foreground of rural development forestry. Opinions remain divided as to the part that shifting cultivation plays in accounting for the high levels of deforestation in the tropics. While it is viewed in some quarters as a major cause of tropical deforestation, recent research suggests that the reality is often more complex, and that explanations for deforestation must be sought in a variety of factors, many of which should be placed at the door of governments and international capital rather than of shifting cultivators.

Policy conclusions

- There are many causes of deforestation other than shifting cultivation. These include resource privatisation, land speculation, fiscal incentives for land conversion, tenurial policies, and government 'development projects', particularly resettlement schemes. A situational approach is therefore needed to generate policies appropriate to local circumstances.
- The term 'shifting cultivation' does not refer to a single farming system but rather a broad range of land use types. There is need for a careful diagnosis of the farming system before any attempt is made to change its practices.
- Attempts to replace shifting cultivation systems often fail because of an inadequate understanding of the decision-making processes involved. Although shifting cultivation systems may have some longer term social costs, from the farmers' perspective they may offer greater shorter-term efficiency in resource use than any of the available alternatives. Development interventions need, therefore, to make the link between societal interests and farmer decision-making. Farmers will only change their traditional practices where the alternatives represent a more rational use of their labour time.
- Incentive schemes which have sought to encourage changes in farming practices have often done so without the necessary understanding of the underlying factors and have proven unsustainable.
- Changes to the tenurial system - giving farmers greater security of their cultivation rights - are likely to be a necessary first step in any attempt to

change farming practices in the direction of permanent cultivation.

The causes of deforestation

The two main causes of deforestation in the tropical world are widely accepted as logging practices and the expansion of agriculture. The balance of responsibilities between these two is a matter of debate. One view, greatly favoured in some quarters, is that the expansion of small-scale agriculture can be held to blame for much of the deforestation, as well as habitat destruction and species loss, either directly or in the wake of logging activities which open up the forest and pave the way for land conversion. At the top of the list of alleged culprits would be the form of small-scale agriculture which is most destructive of trees - shifting cultivation - also known as swidden farming or, more pejoratively, as slash-and-burn agriculture. However, this position is hotly contested by others, who point to the inherent stability and viability of many shifting cultivation systems, and the benefits which this type of agriculture brings in terms not merely of high returns to labour but also species enrichment and biodiversity conservation.

The rationality of shifting cultivation

Today, shifting cultivation is estimated to support the livelihoods of some 300-500 million people worldwide (Brady, 1996). The common belief that it is an outmoded and 'irrational' system in urgent need of replacement through external intervention must be treated sceptically. Esther Boserup's classic work *The Conditions of Agricultural Growth* (1965) was one of the first to show that - far from being an irrational system and a survival from a 'traditional' past - shifting cultivation might well represent a highly efficient adaptation to conditions where labour, not land, is the limiting factor in agricultural production. Boserup argues that the transition to more intensive systems of land use is unlikely to offer increased output per unit of labour - in fact, the transition is usually associated with declining output per unit of labour, as more and more effort needs to be given to development of infrastructure, tending of draught animals, etc. The main reason that more intensive systems are adopted is lack of choice - faced with declining returns to labour, the farmer is forced to invest increased labour in order to preserve the existing levels of output. Only later, as technology starts to develop, are the conditions created for a progressive increase in productivity.

Shifting cultivation and environmental degradation

In recent years, opposition to shifting cultivation has taken new forms. While its rationality at the farmer level now tends to be conceded, critics increasingly focus on the disjuncture between the individual and social costs and benefits, particularly as regards alleged negative environmental effects. Here again, the evidence is in doubt. For example, the role of farm burning under shifting cultivation in starting forest fires has been exaggerated (see NRP 28, on forest fires in Indonesia), and the assumption that it is a major cause of biodiversity loss has been challenged by recent research. The historical record offers little support to the supposition that the low population density areas of tropical rainforests will inevitably fall into agriculture-based decline as population and land pressures increase, leading to human impoverishment and loss of species richness. Where historical records are available, these usually attest to the

innovativeness of traditional societies and to the force of endogenous processes of agrarian change. Likewise, many areas of prolonged habitation are marked by high biodiversity, and in some cases biodiversity may be higher in inhabited areas than in neighbouring zones of climax vegetation. This suggests that farmers actively manage their landscapes, bringing tree species onto the farm at such times as the forest fails to provide the range and quantities of benefits desired.

A typology of shifting cultivation systems

One reason for the widely held negative view of ‘shifting cultivation’ is the failure of many observers to differentiate between the wide variety of practices which tend to be lumped together under this label. Broadly speaking, shifting cultivation refers to any temporally and spatially cyclical agricultural system that involves clearing of land - usually with the assistance of fire - followed by phases of cultivation and fallow periods (Thrupp *et al.*, 1997). The principal arguments made with respect to various shifting cultivation systems are summarised by Sunderlin’s (1997) concept of a ‘forest farming continuum’ (Box 1).

Box 1. Schematic typology of farming systems on the forest farming continuum (adapted from Sunderlin, 1997)

<p>Long fallow shifting cultivation long fallow rotation traditional mainly subsistence crops mainly self-generated capital far from urban areas</p>	<p>Short fallow shifting cultivation short fallow rotation semi-traditional mixed subsistence & cash crops mixed capital sources intermediate distance to urban areas</p>	<p>Forest pioneer farming no rotation modern mainly cash crops mainly outside capital close to urban areas</p>
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Within the continuum from long fallow rotation to permanent cultivation, we can identify a number of points at which shifting cultivation appears in one form or another, and at each of these points interesting questions are raised as to the dynamics of the system and the extent of active resource management within it. The classic model of long fallow shifting cultivation, with 2–3 year periods of crop growth followed by long fallows, is found at one extreme under conditions of low population pressure. Ethnographic studies of forest fallow have uncovered complex management systems, in which decisions as to which trees to cut or preserve are made on sound agronomic criteria, and in which patterns of land use are influenced by a series of factors relating to the maximisation of returns to labour. Contrary to the belief that shifting cultivation is the sole source of support for small farmers, farmers usually derive their livelihoods from an intricate mixture of different land uses and off-farm sources of income, the balance of which varies according to their particular needs.

Moving along Sunderlin’s forest farming continuum into areas where land scarcity exerts a pressure on resource use, short fallow shifting cultivation is likely to figure as one type of rotational system in which decisions as to whether to fallow the land,

plant it with leguminous crops or invest in agroforestry technologies will depend on a variety of criteria, some specific to the soil physiology, others to the labour supply situation, yet others to the extent and operation of the market economy.

Many forest farmers are from cultures with a long history of shifting cultivation, and communities which have maintained a long association with the forest area and expect to do so into the distant future. This imposes a rotational and managerial character on the system which is an important positive feature of this type of forest use. The negative stereotype of shifting cultivation – of unrestrained slash-and-burn, in which the sole constraint on land use is the extent of soil exhaustion – tends to be derived from a rather different type of economy, which is arguably not a ‘shifting cultivation’ system in the proper sense of the term but rather a variant of forest pioneer farming or ‘shifted’ cultivation. Typical examples are government resettlement and transmigration schemes, which tend to attract opportunistic migrants for whom forest cultivation is a last resort means of earning a living, and possibly a temporary one at that. Much of the forest destruction in Amazonia may be accounted for by frontier-type land markets which promote forest clearance by migrants who remain on one plot of land until it is exhausted, and then sell it to accumulate the necessary capital to buy higher value land with better access to social infrastructure (Richards, 1996).

‘Shifting cultivation’ is not, therefore, a single stage in the evolution of agricultural production, but a variable element within a wide variety of farming systems encompassing stable rotational systems, extensive forest fallow cultivation and also forest mining. Clearly, the impacts on forest cover and composition of systems at varying points on the continuum are very different and need to be discussed by both researchers and policy-makers in a much more rigorous fashion than has tended to be the case to date. A framework for discussion based on data drawn from 136 cases of ‘slash-and-burn’ is proposed by Fujisaka and his colleagues in the ‘Alternatives to Slash-and-Burn’ Programme (ASB) coordinated by ICRAF. Their classification (Box 2) groups shifting cultivation systems into nine main categories on the basis of four key variables:

- the initial type of vegetation cleared;
- the user or type of person involved in the clearing;
- the length of any fallow period;
- the nature of the final vegetation.

Box 2. Classification of 'slash-and-burn' systems by distinguishing variables
(Fujisaka and Escobar, 1997)

Class	Initial vegetative cover	Resource users	Final vegetative cover	Length of fallow	Total cases in group
1	primary forest	indigenous users	secondary regrowth	long	2

2	primary forest	settlers	natural regrowth	(fields abandoned)	1
3	primary and secondary forest	indigenous users	natural regeneration	medium to long	13
4	secondary forest	indigenous communities	natural regeneration	medium to long	46
5	secondary forest	colonists	natural regeneration	medium	3
6	primary and secondary forest	mostly indigenous communities	agroforest	none	28
7	secondary forest	government-sponsored colonists	plantation crops or <i>taungya</i>	none	7
8	secondary forest	mostly settlers and ranchers	pasture	none	10
9	grasslands	indigenous users and settlers	natural regeneration and pastures	variable	12
10	insufficient information	available	14

As is the case in the Sunderlin typology, this classification also clearly distinguishes between indigenous and colonist/settler users of forest land for cultivation. The interaction of these two groups of users with the resource base is determined by a number of factors ranging from cultural practices to the availability of market and social infrastructure and the relative profitability of other forms of land use such as monocropping and livestock.

Alternative causes of loss of habitat and biodiversity

Cultivation in primary forest is nowadays rather infrequent on a world scale and, on closer scrutiny, tends to be closer to long-cycle secondary forest farming even in conditions of near climax forest growth. Although ICRAF (1996) states that slash-and-burn agriculture results in the cutting and burning of over 10 million ha of tropical moist forests every year, Fujisaka *et al.* (1997) found that primary forest is only cleared in a relatively small proportion of reviewed cases (17%) and that even fewer entail a permanent conversion of forest to a completely treeless land use.

Many international agencies such as the World Bank now acknowledge that the causes of deforestation are much more complex than had previously been thought, and that it is mistaken to put the primary blame on the small cultivator and expansion of traditional shifting cultivation practices. Deforestation under modern conditions is much more likely to be the result of market and policy pressures arising outside the traditional farm economy. Such influences include:

- resource privatisation and associated tenurial changes (particularly where associated with damaging practices, e.g. commercial cattle ranching in the humid tropics)
- land speculation
- fiscal incentives
- government 'development' projects.

Just as it is becoming clear that shifting cultivators cannot be held solely to blame for forest loss, so their impact on biodiversity is also being investigated more carefully. In Honduras, for example, House (1997) provides data to show that the impact of the shifting cultivation practised by the Tawahka, under a long fallow rotational system may mimic that of natural forest clearing, and that long fallow periods allow for a diverse and rapid regrowth of secondary forest. This lends support to the idea that shifting cultivation may not lead to forest destruction, and may even, over many centuries, have contributed to the present structure and composition of the rainforest.

Downhill all the way?

It would be mistaken to assume that there is an inevitable developmental sequence from viable low density forest fallow systems to increasingly unstable bush fallow ones, leading to a crisis of traditional agriculture which can only be resolved by an abandonment of the practice of shifting cultivation and the adoption of more sustainable permanent cultivation. Not only may pressure on natural resources decline (where, for example, urbanisation rates are high, leading to rural depopulation), but the progression in either direction may be marked by a range of variant livelihood systems, even in one locality, each marked by its own characteristic combination of cropping arrangements, agricultural practices, lengths of fallow, and preferred agroforestry and annual species. Even where livelihood systems follow the logical sequence from forest to bush fallow and then to permanent cultivation, ethnographic data point to complex pathways and considerable situational variations (see, for example, Brocklesby and Ambrose-Oji, 1997).

Where changes in farming systems do come about, leading to a movement away from shifting cultivation, the causes are not always internal to the practice itself. A case in point concerns the Tawahka people of Honduras, mentioned above. In the past, communities tended to migrate to new homestead areas once they had cleared most of the primary forest in close proximity to their village. Changes are now occurring in the Tawahka's mix of farming practices, not because of any crisis in shifting cultivation, but because the communities are increasingly keen to reap the benefits of sedentarisation (schooling, ease of transport, access to health care, etc.). They are, therefore, adapting their farming systems accordingly, with a growing emphasis on permanent orchard gardens, at the expense of shifting fields.

Development interventions in shifting farming systems

Until the rise of the conservation movement, long fallow systems were generally seen as unpromising sites for extension activities. With low population pressure, generous rainfall regimes and the capacity to exploit the surrounding forest for a range of non-timber forest products (including oil-bearing fruits and seeds, mushrooms, wrapping leaves, vines and rattans, bushmeat and skins), fallow systems were viewed as presenting few opportunities for livelihood enhancement, by comparison with higher-density sites in the transitional and savanna regions where human livelihoods were more precarious.

In recent years, however, conservation projects have been drawn to these sites precisely because of their low population densities and lack of 'development'. Taking a defensive posture in relation to the preservation of biodiversity, interventions in such areas have tended to involve 'integrated conservation with development projects' (ICDPs), aiming to relieve pressure on the forests through the promotion of alternative income-generating activities, both agricultural and non-agricultural. These have had a rather poor record, particularly outside the main tourist areas. The optimism which still holds widely in aid management circles that it is possible to offer peasant farmers other more attractive alternatives, including ready-made agroforestry systems (even in situations where no crisis in the extensive farming system can be detected), is rarely borne out in practice: more often than not, attempts to modify shifting cultivation systems through the instrument of aid projects have ended in comprehensive and expensive failure. The disjuncture between conservationists' perceptions and farmer decision-making points to the frequent failure to acknowledge the extent of farmer awareness of environmental constraints, as well as to recognize that, in conditions of land surplus, innovations must be considerably more labour-efficient than existing practices if farmers are to judge it worthwhile to invest extra labour in risky and uncertain enterprises.

Box 3. Myths and realities about shifting cultivation
(Thrupp *et al.*, 1997)

Improving conditions for land management in conditions of long-fallow cultivation

A strong case can thus be made for the rationality and viability of many systems of shifting cultivation, at least from the perspective of farmer decision making. There may, however, be instances in which the differences between the private and social costs and benefits of shifting cultivation are significant, with the result that what is rational for the individual farmer may not be rational for the longer term interests of the society. This is most obviously the case where timber is a major industrial commodity and where the value of the timber lost to shifting cultivation is greater, actually or potentially, than the agricultural crops that replace it. Converting such facts into a change in farmer behaviour requires a number of policy steps. Improving tenurial security is likely to be the most effective way of changing small farmer behaviour in many parts of the developing world, for only with radically improved security of tenure will farmers have the confidence to make long-term investments on their land. Whether this requires full ownership of land title or just guarantees of access depends on the circumstances. Experience has shown that the latter may be more important than the former, although the former may still provide the best way of convincing farmers that their interests will be respected in the longer term. Secure tenure in itself may not be a sufficient condition as other factors such as risk and market incentives also need to be conducive to changing land management practices. Revenue-sharing arrangements in timber concessions may, for example, play an important part in encouraging farmers not to cut down trees for agricultural purposes. It goes without saying that if farmers can gain more from the long-term husbandry of their tree resources than from their destruction, then they are likely to act accordingly.

1. Shifting cultivation is a primitive precursor to more commercial forms of production in the theoretical stages of agricultural development.

1. Shifting cultivators respond to agroecological and socioeconomic factors in dynamic, nonlinear ways.

2. Shifting cultivation systems in tropical rainforests are uniform and unchanging, and shifting cultivators are homogeneous poor people.

2. Shifting cultivation systems encompass a remarkably diverse range of land use practices developed and changed over time by farmers in varied social, ecological, economic, and political settings.

3. Shifting cultivation is the sole activity among rural subsistence farmers in forest margins and is unconnected to commercial market activities.

3. Shifting cultivators engage in a wide variety of activities in subsistence and cash economies and often merge subsistence production with commercial surplus-oriented production.

4. Shifting cultivation is always characterised by low productivity and low yields and can support only low population densities.

4. Shifting cultivation systems are often productive, make relatively efficient use of resources, and have supported large populations.

5. Shifting cultivation systems are environmentally destructive, wasteful, unsustainable, and cause the majority of tropical

5. Shifting cultivation systems are not responsible for the majority of deforestation or land degradation, and they have varying and

Making the necessary legislative and tenurial changes may, however, prove easier said than done. Despite an outward appearance of homogeneity, forest communities are often quite highly stratified, and there may be important distinctions within the community based on kinship and tribal affiliations, length of residence and circumstances of the original land claim. Such distinctions may reduce the capacity of communities to manage their forest resources for the long-term benefit of the collectivity. The presence of immigrant populations and refugees without an interest in, or possibility of, long-term management of the resource, is an additional complicating factor. Attempts to change forest legislation are also fraught with difficulty. Incorporating fallows into legislative reform has proven a step too far for many governments in the high forest zone, given the extent of loss of control over timber resources that would be implied.

Until ways are found to address the institutional and legal constraints in a manner acceptable to the shifting cultivators, those responsible for development interventions may be better advised to support innovative capabilities within the constraints of their existing land use systems rather than attempt to introduce alternative systems of permanent cultivation with uncertain environmental and social effects. Above all, interventions should not be driven by the many myths surrounding shifting cultivation (Box 3), but should be based upon a more differentiated and location-specific assessment of the evidence.

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This paper is based primarily on Mailing 21 of ODI's Rural Development Forestry Network, in particular:

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