

How Blaming ‘Slash and Burn’ Farmers is Deforesting Mainland Southeast Asia

JEFFERSON M. FOX

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S U M M A R Y For decades, international lenders, agencies, and foundations as well as national and local governments have spent millions of dollars trying to “modernize” the traditional practices of farmers in many mountainous areas of Southeast Asia—an agenda driven by the belief that their age-old shifting cultivation practices (known pejoratively as “slash and burn”) are deforesting Asia. But a new look at how forests fare under shifting cultivation (as opposed to under permanent agriculture) clearly demonstrates that efforts to eliminate the ancient practice have actually contributed to deforestation, loss of biodiversity, and reduction in carbon storage.¹ In fact, shifting cultivation, rather than being the hobgoblin of tropical forest conservation, may be ecologically appropriate, culturally suitable, and under certain circumstances the best means for preserving biodiversity in the region. The real threat to these tropical forests is posed by the steady advance of large-scale permanent and commercial agriculture.

The Region and the Threat

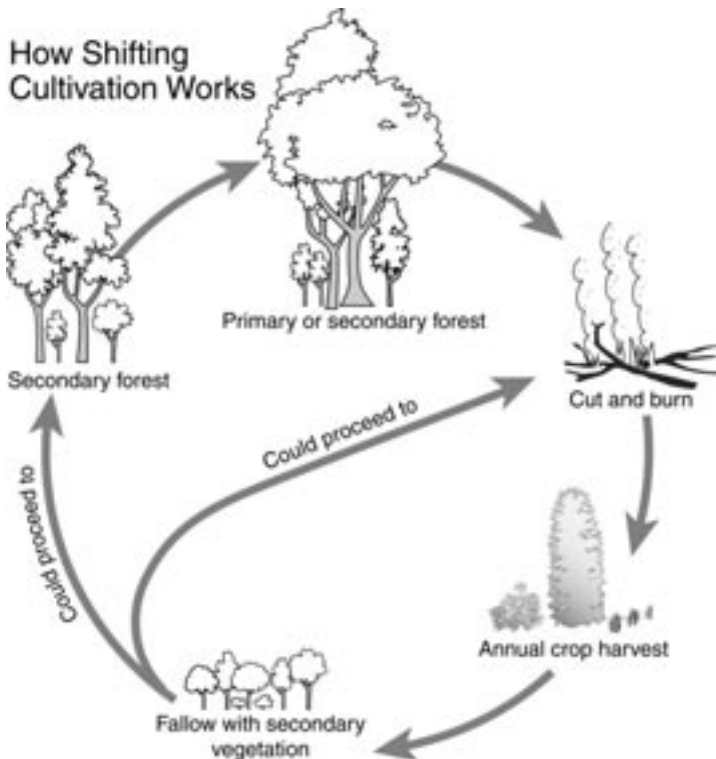
The mountainous area of mainland Southeast Asia is an enormous, ecologically vital region comprising about half of the land area of Cambodia, Laos, Myanmar, Thailand, Vietnam, and China's Yunnan Province. The region harbors an immense wealth of natural resources, including globally important stocks of forests and biological diversity; it is home to a rich heritage of indigenous cultures; and it is the headwaters of major Southeast Asian river systems. Much of this region has only recently been reopened to outside influences, bringing profound and widespread changes to both its physical environment and to its local societies.

The greatest threat to this ecological bounty is settled agriculture, which permanently eliminates complex forests and replaces them with crops of a single species, such as rubber, palm oil, coffee, or bamboo, or by annuals, such as maize, cassava, and ginger. National policies favoring permanent fields (including introduced exotic crops) over shifting cultivation,

combined with both an increasing need for cash and increasing opportunities to earn it, are pushing farmers away from traditional shifting practices and toward permanent agriculture, with potentially devastating ecological consequences. If this continues, the region will finally see the extensive deforestation for which it has so long been cited.

Shifting cultivation. Shifting cultivation (also called “swiddening”) is the dominant farming system found in the region, where it has been practiced for at least a millennia. It is a system in which vegetation felled in patches of forest during the dry season is burned before the onset of the rainy season to open the site and release nutrients. The cleared fields are cultivated and harvested for one or more years, and then left to lie fallow for varying periods to allow secondary forest to regrow. Indigenous farmers manage the system in ways that integrate production from both cultivated fields and diverse secondary forests, including everything from grass and bushes in its early stages, to young open-canopy trees, to mature closed-canopy tree communities. Swiddens have been described as “[a] natural forest...transformed into a harvestable forest,”ⁱ and others suggest that vast areas considered primary or virgin forest are really late secondary forests on lands previously cleared for swiddens.ⁱⁱ In fact, it is arguable as to whether there is any primary or virgin forest left in accessible areas of mainland Southeast Asia given the long history of shifting cultivation in the region.

Opposition to shifting cultivation is based mainly on misconceptions about how the system works, especially misunderstandings about its effects on soil as compared to the effects on soil of permanent agriculture. Indeed, the Food and Agricultural Organization of the United Nationsⁱⁱⁱ defines deforestation as “the transfer of forest land to non-forest uses” and



¹ Because plants absorb and store carbon as they grow, forests help keep carbon out of the atmosphere, where it is a major contributor to greenhouse gases. When a plant sprouts and as it matures, it absorbs carbon dioxide from the atmosphere, breaks it down chemically, and uses carbon as construction material for roots, stems, branches, flowers, and leaves. When the plant dies, some of the carbon goes back into the atmosphere, but some is also released into the soil as the dead plant decays.

lists shifting cultivation as one of its causes. Shifting cultivation, however, involves only temporary use of forest lands, not permanent loss, as is the case with permanent agriculture, human settlements, mining, and dam building.²

What Works and What Doesn't

In fact, shifting cultivation has a significant advantage over permanent agriculture: the fallow periods allow soil to stabilize and give forest vegetation an opportunity to regrow, providing a home for a variety of life forms. Because of its fallow period, swidden agriculture promotes both greater carbon sequestration and biodiversity conservation than permanent agriculture.^{iv}

The stability of shifting cultivation, an asset that has typically been ignored, was recently documented by five studies of land-use and land-cover change over the last 35 to 50 years at five sites in mainland Southeast Asia (Thailand, Vietnam, Cambodia, Yunnan-Mengsong, and Yunnan-Baka). These studies classified and quantified changes, explored the forces driving them, and investigated their probable environmental effects at local, regional, and global levels. They revealed that secondary forest vegetation remained fairly stable throughout the study period: despite continuous shifting cultivation, 77 to 95 percent of the total landscape of each of the five sites remained under secondary vegetation. The only true deforestation that occurred—about 7 to 8 percent of the land-cover change—was from conversion of areas under swidden cultivation (including secondary forest) into permanent and commercial agriculture.

Significant areas, however, were transformed from one type of secondary vegetation to another. Some closed-canopy cover was lost at all sites—except Yunnan-Baka, where a new nature reserve resulted

² It should be noted, however, that not all swidden systems are sustainable. A minority of cultivators practice “pioneer” shifting cultivation, a system in which new areas of forest are cleared for fields, allowed to remain under cultivation for too long, and then abandoned in a degraded condition. This can ultimately produce grasslands, rather than forest regrowth. The type of shifting cultivation that is practiced more widely, and that is reported on here, rotates through the same plots, rather than continuously clearing new land.

It is arguable that there is any virgin forest left in accessible areas of Southeast Asia



in an annual increase in forest cover (3.4 percent)—while open-canopy and grass, bamboo, and shrub vegetation tended to increase. A second significant land-cover change related to shifting cultivation was a great increase in forest fragmentation in Vietnam, Thailand, and Yunnan-Baka. Forest fragmentation is an important cause of species loss. Tropical forests are especially susceptible to species loss because they are unusually rich in species and ecologically complex as compared with other terrestrial ecosystems (and thus have more to lose) and they contain many species with restricted or patch distribution. They suffer especially because fragmentation often lowers local immigration rates of many rare tree animals in tropical forests. Forest fragments are also more vulnerable to drought and fire.

Thus, although shifting cultivation has not caused deforestation, it has changed the structure and composition of the forest as well as the pattern of forested areas in the landscape. This may be the reason that the contribution to carbon absorption made by

secondary forests may have been significantly underestimated by scientists who have focused almost exclusively on timber inventories and ignored carbon in secondary forest regrowth, soils, and wetlands.^v By failing to consider forest regrowth in fallow swiddens across Southeast Asia, we may well be missing another important carbon sink, one that will be severely compromised by a boundless expansion of commercial agriculture.

By ignoring forest regrowth, we may be endangering a major carbon 'sink' so important to mitigating climate change

The high price of permanent agriculture. The small amount of land-use change that has occurred in this region has been caused by a move away from shifting cultivation to the growth of cash crops, including paddy rice and plantation tree crops. In some cases annual rates of change have been significant—as high as 35 percent per year in Yunnan-Baka.

It is the spread of permanent and commercial agriculture that ultimately will bring about true deforestation. The result will be a landscape dominated by tree crops (e.g., rubber, palm oil, and coffee), or composed of annuals (e.g., maize, cassava, and ginger). In either case, biodiversity, as measured by the number of plant and animal species on the landscape, will decline. By contrast, surveys of secondary

vegetation often find species diversity comparable to more mature forests (although the diversity of large mammals and bird species may not recover). Similarly, surveys suggest that the negative impacts of swiddening on water- and soil-holding properties have been exaggerated, especially as compared to those of commercial agriculture, plantation forestry, or roads.^{vi}

Carbon sequestration, so important in mitigating global warming, may be similar under intensive tree-cropping systems and swiddening (though tree-cropping systems' effects on biodiversity and hydrology are often negative). But carbon accumulation is negligible in agricultural plots planted with annuals.

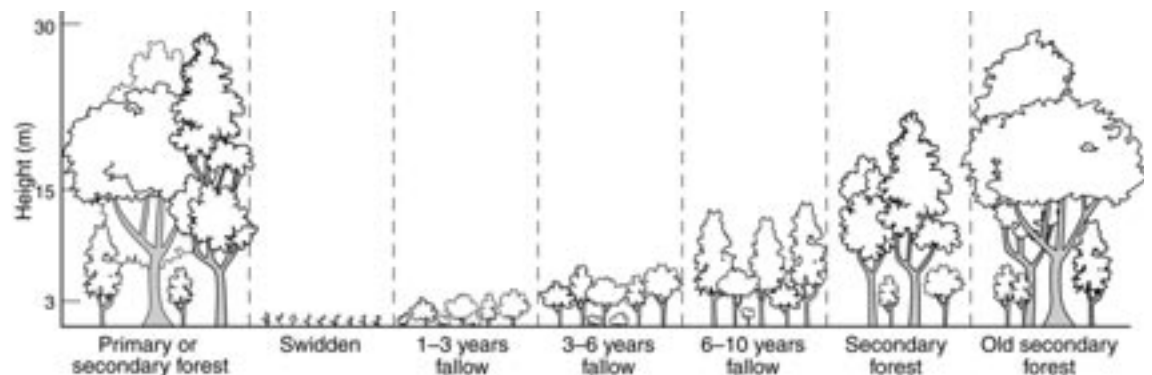
Forces Driving Land-Use Change

Shifting cultivation has remained the dominant land-use system throughout the past 35 to 50 years despite attempts to eliminate it by every country in the region. Policies have included outright banning of shifting cultivation, declaring an area a forest reserve and excluding people, resettling people into the lowlands, and promoting and subsidizing permanent and commercial agriculture either in place of existing shifting cultivation systems or in new locations.

The Life of a Swidden Fallow

Contrary to the popular belief that swidden fallows are impoverished environments, fallows have a richness of plant and animal species, many of which are not found elsewhere, and are not dominated by any single species. Secondary forests consist of up to three

canopy layers including older trees from the previous fallow forest, younger trees that have sprouted from trees cut earlier, and trees that have developed from seeds. The swiddening environment as a whole is complex, dynamic, of uneven age, and structurally diverse: a compound of successional stages that replace each other at a rapid pace.



Governments have also encouraged human settlements at such high population density that the fallow periods necessary for forest regeneration cannot be maintained, making sustainable swidden impossible (which has helped give it a bad name).

But despite the historical resilience of shifting cultivation, national land tenure policies militate increasingly against traditional shifting practices. A legacy of the colonial era, national land policies do not recognize customary use rights to swidden fields, and in particular do not recognize swidden fallows—uncultivated land perceived as unused or abandoned as far as the government is concerned, and therefore not claimable. Governments do not want to lose their own rights to land they can lease to large commercial agricultural interests or devote to plantation forests. Governments are also swayed by a history of “bad science” that argues that shifting cultivation leads to soil and water degradation; are often biased against the “primitive” nature of traditional cultivation practices; and like to see their people settled, the better to collect taxes and provide services. Finally, they have been told by international development agencies such as the Food and Agricultural Organization, and multilateral banks such as the World Bank, along with groups such as the Consortium for International Agricultural Research (comprising more than a dozen research institutes around the world) that indigenous agricultural practices must be eliminated or transformed.^{vii} The result is that settled farmers, rather than shifting cultivators, secure rights to their land. And it is permanent agriculture, not shifting cultivation, that is perpetuated and spreads. National policies to replace swiddening with commercial agriculture are beginning to work at the Thailand, Yunnan-Baka, and Cambodia sites. While this trend was too small to measure at the Yunnan-Mengsong and Vietnam sites, there is evidence of increasing commercial farming.

Market pressures will also grow. Shifting cultivators have traditionally grown a variety of subsistence crops, including, for example, rice and cassava. As the cash and then the global economy reached them, they began to introduce some cash crops (such as

The Effects of Burning on the Atmosphere

Greenhouse gases such as carbon dioxide are produced by consuming fossil fuels such as gasoline and coal, and by other activities, including the burning of forests. Large uncontrolled fires have recently ravaged landscapes as diverse as Borneo, the Western United States, Australia, and Siberia. The causes of these fires vary. Plantation and industrial logging interests use fire to facilitate large-scale, high-speed land conversion. Expanding urban communities that find overgrown trees and bush in their way will also use fire to clear land. In Kalimantan, Indonesia, replacing shifting cultivation with estates devoted exclusively to the growth of oil palms (used to produce palm oil) and tree plantations led to the monumental and disastrous fires of 1998 that caused acute air pollution in Southeast Asia (and even spread to other parts of the world). The fires, originally blamed on shifting cultivators (of “slash and burn” fame), had actually been set on behalf of the large commercial interests to clear their own vast tracks.

According to the World Resources Institute, “blaming climate change on shifting cultivators does not follow the evidence. Although carbon emissions from burning biomass are partly from shifting cultivation, a focus on the emissions alone is misleading as it ignores another important parameter—carbon absorption (or sequestration) by vegetation. Both output and absorption must be understood together. Shifting cultivation systems have relatively high carbon absorption because they typically maintain and enhance vegetation in the successions and often include trees in the cropping cycle.” (See endnote vii, Thrupp, et al.)

coffee) and to expand the production of traditional subsistence crops on a commercial scale. Cassava, for example, once grown as famine food and for family livestock is now produced for processing into livestock feed and exported to Europe. Today, some farmers have given up their traditionally varied subsistence crops to grow just one or two commercial crops. The focus on cash crops and the commercialization of former subsistence resources offers almost immediate financial benefits to the farmers. But these changes also have many long-term disadvantages. Some affect the environment: when crops are not varied (e.g. when “monocropping” is practiced) biodiversity suffers; increasingly large areas of land go

The shift from subsistence to cash crops offers immediate benefits to farmers, but also many long-term disadvantages

into settled, permanent agriculture; wild plants that have found a market, such as bamboo, are encouraged to spread and become in effect a commercial crop, suspending the fallow period that normally permits forest regeneration. Other disadvantages also affect the farmer: monocrops are more susceptible to pests and make the farmer vulnerable to price fluctuations; as self-sufficiency decreases, vulnerability increases; and like all people living on the margin, the farmers of Southeast Asia's mountain areas are safer when they diversify.

Recommendations

The recognition that shifting cultivation may be the most ecologically appropriate and culturally suitable means available for promoting sustainable economic growth in many mountain areas requires some fundamental changes in how development is envisioned and funded and in the ways governments manage land. Two responses are particularly important.

Protect and improve the traditional systems. The integrity of shifting cultivation systems, which are under pressure from shortened fallow periods, lack of legal recognition, and commercial pressures, must be improved. It is essential to learn how to maintain the biodiversity of fallows while also increasing their productivity and soil-sustaining properties. Research aimed at accelerating the regeneration of fallows could address the effects of different methods of land clearing, crop cultivation, fertilizer use, propagation of wild crops found in swidden fallows, and a number of other issues. Education efforts aimed at the farmers must disseminate this information in a way that is meaningful and useful to them.

Recognize the land claims of shifting cultivators. Land tenure policies that disenfranchise shifting cultivators in favor of settled farmers must end. New policies must be designed and implemented in order to empower local people to manage and utilize their own land and forest resources, a development that would help control the spread of large plantations and their negative effects on the environment.

National legislation needs to be developed that recognizes customary claims to swidden fallows and grants farmers and farming communities legal access to the land they have traditionally used.

In this way, the international, national, and local forces that have worked to eradicate shifting cultivation can work toward preserving the ecological diversity and stability of the enormous, and immensely important, mountain region of mainland Southeast Asia.

How This Study Was Conducted

The calculation and comparison of deforestation rates, so necessary to evaluating the relative impacts of shifting cultivation and agriculture, is notoriously difficult and complicated. Especially problematic is that there are no standardized definitions of "forest," and other traditional land-cover classifications such as "agriculture" and "plantation" do not capture the crucial variations in shifting cultivation and its associated stages of secondary vegetation. For example, between 26 percent and 49 percent of all mainland Southeast Asian land has been classified as "other" where other is defined as shrub, brush, pasture, waste, and other land-use categories, many of which are actually some stage of secondary forest or vegetation.^{viii}

In this project, aerial photographs and satellite images were interpreted and grouped into five classes: secondary forest, cultivated swidden plots, paddy, cash crops and plantations, and miscellaneous. We believe the study sites contained no significant "primary" forest. Secondary vegetation was further subdivided into three classes: closed-canopy forest, open-canopy forest, and grass, bamboo, and shrub. The more refined classification scheme permitted better study of the complexity of secondary vegetation, its diverse vegetation types, and its species compositions and structures that change rapidly in the course of successional stages of growth.

Socioeconomic databases were compiled through interviews with local residents and government officials. Researchers documented changes in national and regional policies influencing land use (e.g., land tenure, taxation, credit, import and export regulations) and changes in infrastructure (roads and markets). The purpose was to identify the socioeconomic and institutional factors influencing land use and management decisions affecting land use.

There must be fundamental changes in how development is envisioned and funded and in how governments manage land

Notes and Sources

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About the Author

Jefferson M. Fox is a senior fellow in the East-West Center Research Program. His interests include land-use and land-cover change and community-based resource management. His most recent publication is "Shifting Cultivation: A New Old Paradigm for Managing Tropical Forests," by Fox et al. in *Bioscience* 50:6, 521–528. He can be reached at:

East-West Center

Telephone: (808) 944-7248

Email: FoxJ@EastWestCenter.org

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