



*Policy Research for  
Sustainable Upland Systems  
in Southeast Asia*



**INTERNATIONAL CENTRE FOR RESEARCH IN AGROFORESTRY**  
**Southeast Asian Regional Research Programme**

Cover: *Shifting cultivation of upland rice with  
bush fallow rotation in Sumatra, Indonesia.*  
(Photo: T.P. Tomich)

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*Members of a Karen community in Chiang Mai, Province North-Thailand, known for sustainable land use systems that include traditional paddy rice cultivation, rotational shifting cultivation of upland rice and long forest fallow, and permanent forest areas.*  
(Photo: T.P. Tomich)



## Seeking Alternatives to Unsustainable Slash-and-Burn in Southeast Asia

In most places it is found, “slash-and-burn” is both a *technique* for land clearing and a land use *system* (slash-and-burn agriculture, shifting cultivation). Of course, it is inaccurate to equate “slash-and-burn” with permanent forest conversion and unsustainable land use. Traditional forest fallow shifting cultivation of foodcrops, as practiced by generations of local people in Southeast Asia’s uplands, obviously was sustainable as long as population densities were low enough to allow long fallow rotations. But traditional forest fallow shifting cultivation tends to disappear as rural population densities and economic integration increase.

Slash-and-burn as a technique of land clearing, however, is used by virtually all actors (public and private, large and small-scale) contributing to forest conversion. The slash-and-burn technique continues to be attractive to all these actors because fire is the cheapest, most effective means to clear land. These other land uses involving slash-and-burn as a technique, such as continuous growing

of foodcrops on fragile upland soils, may not be sustainable because of soil degradation and nutrient depletion. And such conversion of tropical forests, regardless of the technique used, causes loss of biodiversity and release of stored carbon and may also contribute to sedimentation, flooding, and seasonal water shortages downstream.

ICRAF's Southeast Asian regional research programme has received major grants from the Asian Development Bank (ADB) and the Ford Foundation to fund collaborative policy research in SE Asia as part of the global Alternatives to Slash-and-Burn (ASB) project. The search for 'alternatives' to unsustainable slash-and-burn derives from global problems (climate change; loss of biodiversity), but poverty reduction, household food security, watershed functions and other local and regional issues are also central concerns of ASB. Since many small-scale farmers practicing slash-and-burn appear to do so because they lack other feasible livelihood options, development of sustainable land use practices that are viable alternatives to 'slash-and-burn' could reduce deforestation and improve natural resource management.



*Fires are often used as a tool to clear land.*

*(Photo: T.P. Tomich)*

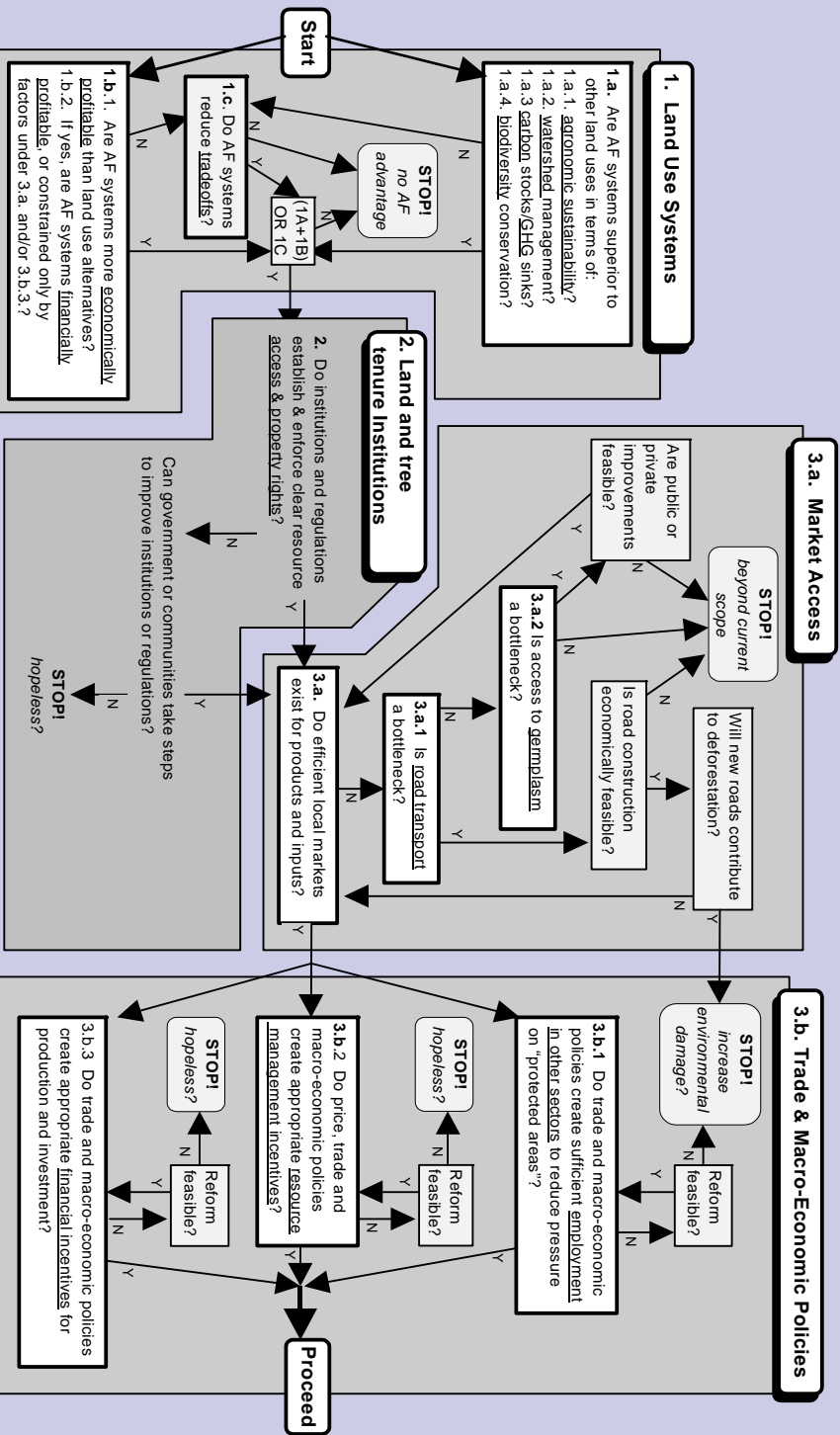
*Damar agroforest in Krui, West Lampung, Sumatra, Indonesia.  
(Photo: H. de Foresta, ORSTOM, L'Institut Francais de Recherche Scientifique pour le Developpement en Cooperation)*



## The ASB Policy Research Agenda for Southeast Asia

**T**he policy environment necessary for increased productivity of agroforestry and other systems to reduce poverty, improve upland resource management, *and* reduce deforestation is not well understood. The key hypothesis underlying the ASB research project in Southeast Asia can be summarized as: *Intensifying land use as an alternative to slash-and-burn can reduce deforestation and reduce poverty*. Under which conditions is intensification a reasonable approach; under which ones is it not?

There are at least three necessary conditions for validity of the intensification hypothesis; each forms a component of this project and is discussed below. The overall programme is designed to determine whether intensification of agroforestry production in specific upland settings can help SE Asian countries and donor agencies balance environmental objectives with economic development and poverty reduction. The research questions are nested (as in the *Figure* on the next page): each topic corresponds to a necessary condition for the intensification hypothesis, but none of these conditions is sufficient alone. Indeed, they may not even be sufficient together. Synthesis of the results of this research is intended to yield policy lessons relevant for the region.



*Research Framework: Decision Tree for Smallholder Agroforestry Systems for Upland Resource Management*

## Component 1. Impacts of Agroforestry and other Upland Systems

First, at the *field level*, intensification of land use needs to be ecologically and agronomically sound, socially acceptable, and financially profitable for smallholders. Raising productivity of existing **agroforestry systems** and emerging local innovations offers one promising intensification pathway. But in what ways, if any, are agroforestry systems superior to other major land use systems in profitability, agronomic sustainability, and environmental impact? Is the relative profitability of various alternatives skewed by distortions in sectoral price policies, trade policies, or macroeconomic mis-management? What are the tradeoffs across these various economic and environmental objectives and under which circumstances do particular agroforestry systems offer an attractive balance?



*Upland cinnamon and lowland paddy are the main products in customary land areas of Kerinci, Sumatra.*

*(Photo: Suyanto)*

Alternative land uses at the forest margins differ significantly in their ability to substitute for forests as sources of biodiversity conservation, carbon sinks, and soil and water conservation. While conversion of primary forest has the major effect on the supply of forest functions, the resulting land uses also matter a great deal for the supply of environmental services. Measurements of differences among environmental consequences of the various land use systems will provide the basis for quantifying major tradeoffs involved in land use change. Quantification of these environmental consequences of deforestation and other land use changes is essential to formulating sound policy responses--or even in knowing whether intervention is needed. Complex agroforests and land use mosaics involving agroforestry and other systems may approximate a number of these forest functions thereby providing the technical foundation for community-based forest and watershed management.

## **Component 2. Land and tree tenure**

Second, at the *community level*, there must be effective monitoring and enforcement of the boundaries of forest to be saved from conversion to other uses. **Land and tree tenure institutions** -- both formal and informal -- affect resource access and property rights, and are a major determinant of incentives (and disincentives) for sustainable resource management. But do existing formal and informal institutions and the regulatory framework create incentives that are compatible with sustainable





*View of the buffer zone of the Kerinci Seblat National Park in Jambi Province, Sumatra, Indonesia. Here, research attempts to gain basic insights into the evolution of land and tree tenure institutions.  
(Photo: Suyanto)*

resource management? In particular, do tenure institutions and regulations establish and enforce clear resource access and property rights? If not, what (if anything) can governments do to better support improved functioning of these institutions?

Existing resource access controls typically are inadequate to address the realities of poverty and land pressure in Southeast Asia. The result often has been increasing conflict among communities and between rural populations and the institutions of the state charged with managing forests. However, exceptional windows of opportunity currently exist in the region for institutional innovations aimed at authentic people's participation in forest resource management.

While clearer property rights may be necessary to establish better incentives for natural resource management, they alone may not be sufficient to secure environmental benefits. For example, community management of buffer zones of protected areas may be a more effective means of monitoring and enforcing

restrictions on forest encroachment by spontaneous migrants ('forest squatters') and illicit logging, but little is known about tradeoffs and complementarities among multiple goals in the implementation of such programmes. Another working hypothesis is that devolution of management of production forests (including logging) and/or watershed land use to local communities could improve natural resource management compared to the *status quo ante*. But devolution of control by itself may not create sufficient incentives for local communities to supply some forest services, including abatement of externalities felt at the regional level (flooding, siltation, smoke that impedes aviation) and global public goods (carbon sequestration and biodiversity conservation). Workable institutional mechanisms that can clarify, monitor, and enforce responsibilities as well as rights are needed to address such complex natural resource policy issues.

### Component 3. National policies and land use change

Third, at the *national level*, attention must be given to reducing the broader forces that drive deforestation. For example, an inflow of migrants facilitated by construction of new roads and driven by lack of economic opportunity elsewhere can swamp the effects of



*Roads provide market opportunities to local farmers.*  
(Photo: T.P. Tomich)

interventions at the field or community level. The recent emergence of severe financial instability in Southeast Asia combined with new global and regional trade agreements may lead to significant dislocations of people and economic activity.

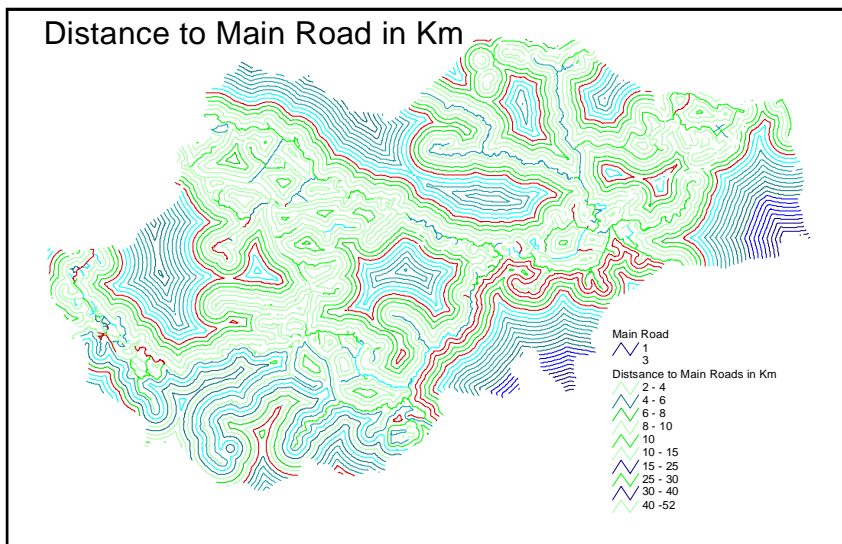
Priorities for research on national policies affecting deforestation may be grouped in two sets of policy instruments that influence incentives for forest conversion: policies that affect market access and links between trade and macroeconomic policies and migration pressure.

### *3.a. Market access*

Market access affects opportunities for land use by smallholders and large-scale operators and for local entrepreneurs, including those engaging in activities linked economically to forestry and agriculture (nurseries and seed producers, processors, traders and transport companies). Do efficient local markets exist for products and inputs? Planned investigations under this regional project focus on two elements of market access – the road system and germplasm supply – but also will endeavor to identify other important market imperfections, such as possible problems in credit markets, that may warrant further investigation.

The road system has powerful effects on people's access to resources and marketing links that condition land use choices in

the uplands. Is transport infrastructure (especially the road network) sufficient for marketing agroforestry products? If transport is a bottleneck, how will road construction change land use? Obviously, it matters where roads are built; but ICRAF researchers will work with colleagues from the World Bank and other collaborators to learn more about how interactions of road location and other factors (markets, property rights, sectoral policies, biophysical characteristics) affect land use choice in an effort to understand what determines whether a road project will be a boon for regional development or an environmental catastrophe.



*Map of Jambi Province, Sumatra, Indonesia, showing distances to main roads, as a tool to estimate the likely effect of distance to main roads on the probability that logged forest would be converted to rubber agroforests and other land uses by smallholders (Map: F. Stolle)*

*Harvesting damar resin from the damar forest garden (repong damar) in Krui, West Lampung, Sumatra, Indonesia.*

*(Photo: H. de Foresta, ORSTOM, L'Institut Francais de Recherche Scientifique pour le Developpement en Cooperation)*



Germplasm used in agroforestry systems may come from a mixture of sources, including the natural forest, existing local cultivated populations, or through public or private propagation and distribution channels. The size and variability of the available gene pool, choice of propagation techniques, and efficiency of germplasm markets may strongly affect an agroforestry system's profitability through the type, quantity and quality of its outputs, as well as its vulnerability to pests, diseases and environmental stress. Is access to germplasm a bottleneck? If so, are public or private improvements in germplasm distribution feasible?

### *3.b. Trade and macroeconomic policies*

Trade and macroeconomic policies affect households' livelihood options and, thereby, reduce (or intensify) forces that push migrants to forest margins; these policies also affect resource management decisions once they get there. Similarly, for subsistence-oriented communities who have long resided in remote forest areas, policies can affect opportunities for them to become more integrated into national economies, which could



*Large scale logging in Sumatra, Indonesia.  
(Photo: T.P. Tomich)*

alter local land use patterns (and their sustainability) or shift labor away from agriculture or forestry into other sectors of the economy. Yet despite the dramatic change that trade and macroeconomic policies have already brought to Southeast Asia, the current shocks sweeping the region, and further important changes that will be forthcoming under global and regional trade agreements, the effects of these powerful policy instruments on rural land use patterns and incentives for forest conversion seldom have been analyzed. Are current trade and macroeconomic policies compatible with sustainable natural resource management by households? If not, what are the policy reform options? Are expanding employment opportunities in other sectors likely to take pressure off protected forest areas? If not, is forest conservation hopeless? Research on these questions in Indonesia (and a twin study in Brazil) is led by colleagues at IFPRI (the International Food Policy Research Institute) and is funded primarily by the Danish International Development Agency (DANIDA).

## Impact through Support for Policy Reform

**A** **participatory, client-driven approach** and **multi-disciplinary collaboration** are distinctive features of this research effort that enhance prospects for impact on institutional development and policy reform. ASB research priorities are driven by the needs of two broad groups of clients: smallholders living at the forest margins in Southeast Asia and policymakers who influence the range of choices available to these smallholders. Just as participatory methods are used in ASB research to understand smallholders' objectives and constraints, consultation with policymakers also is a hallmark of this client-driven approach to policy research. The focus of consultation is to obtain crucial insights from policymakers about their perceptions of problems, opportunities, and constraints, including institutional mechanisms for policy implementation, in order to guide the iterative process of research to identify and develop feasible policy options.

This collaborative venture involves researchers drawn from multi-institutional ASB research consortia including government research agencies, universities, and NGOs in Indonesia, Thailand, and the Philippines. International partners, many of whom also bring additional research funding, include SEAMEO BIOTROP, IGBP's Southeast Asia Impact Centre, the Centre for International Forestry Research (CIFOR), and the Tropical Soil Biology and Fertility Programme (TSBF) on agronomic and biophysical measurements; the International Food Policy Research Institute (IFPRI), which collaborates in research on tenure and leads the macroeconomic modeling; and the Policy Research Department of the



*Participatory planning of natural resource management.  
(Photo: Suwito (LATIN, The Indonesian Tropical Institute))*

World Bank, which is collaborating in spatial modeling of road construction and land use change. In Thailand, the Australian National University and the Royal Project Foundation are collaborating in watershed research, and a partnership with the World Resources Institute (WRI) is helping link research activities in Vietnam and the Lao PDR.

The outputs of this research will provide ammunition for policymakers and others interested in community-based natural resource management in their efforts to foster appropriate policy reform. Outputs will take several forms:

- policy recommendations and institutional innovations conveyed to policymakers and donor agencies in Southeast Asia in brief memoranda and informal meetings;
- case studies and cross-country comparative research on strategic policy questions communicated both as policy briefs and in other types of publications;
- enhanced capacity for policy research in the region through collaborative research, regional workshops, policy internships for young policy analysts, and supervision of students' research;
- inputs to guide agronomic research priority setting for systems improvement programmes of ICRAF and its partners in Asia;
- improved databases for natural resource management and policy analysis in Southeast Asia.

ASB policy research in Southeast Asia integrates social and economic analysis with measurements of the biophysical outcomes of land use change and with efforts to identify opportunities for improvements in indigenous agroforestry systems. Taken together, these multi-disciplinary research activities provide an unprecedented opportunity to quantify policy problems and tradeoffs and to formulate meaningful policy recommendations. This approach to real problems already is paying off in Indonesia, where national scientists have presented results of ASB research to policymakers at the highest levels.



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