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**LAND TENURE AND DEFORESTATION**  
**Interactions and Environmental Implications**

**by Peter Dorner and William C. Thiesenhusen**

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## Preface

The UNRISD research programme on the **Social Dynamics of Deforestation in Developing Countries** is concerned with analysing how deforestation processes are generated in different ecological and socio-economic settings and how they affect the livelihood of different social groups. The programme has included local level case studies in Brazil, Central America, Nepal and Tanzania, as well as eight studies of specific themes which cut across countries and regions. This paper on Land Tenure and Deforestation by Peter Dorner and William Thiesenhusen is one of these thematic studies.

The paper examines the linkages and interactions between land tenure regimes, on the one hand, and population dynamics and human behaviour, on the other, and analyses how these together influence deforestation. It first addresses a number of relevant conceptual and methodological issues and defines land tenure in terms of a “bundle” of rights and obligations, recognized by law and custom, governing the use and control of land and water resources. Tree tenure may be part of land tenure or separate from it.

The authors then analyse linkages between land tenure and deforestation in selected Asian and Latin American countries. They conclude that land tenure problems are often the root cause of – or play an important mediating role in – deforestation both in situations where peasants reside permanently in a given area and where migration has occurred. The ownership of most prime agricultural land by small land-owning élites, for example, contributes to rural poverty and insecurity forcing many peasants to seek livelihoods in forest frontier areas unsuitable for sustainable agriculture and grazing. Peasants with very small plots cannot usually afford to grow tree crops while those with access to sufficient land have few incentives to do so because of their insecurity of tenure and also because of many public policies that provide incentives for mining forest resources. Indigenous peoples and others who traditionally depended on sustained use of forest resources for survival are frequently dispossessed while migrant settlers often lack both incentives and the necessary knowledge to use forests sustainably.

The authors then analyse land tenure and deforestation links in selected African countries where customary land tenure systems are under increasing stress as a result of the commercialization of agriculture and growing population. They emphasize that traditional tenure systems usually embodied both rights and duties of participants that ensured the sustainable use of land and forest resources. Such systems, however, are now breaking down under government, market and demographic pressures. Using a case study of Zaire’s Ituri forest area as an example, they show how this comes about. They caution against tenure reform consisting merely of individualization and titling as this often leads to concentration of landholding by a small élite.

The authors conclude that the root problems causing deforestation are often far away from the areas where deforestation occurs. They have to do with land tenure issues, political/economic structures and government policies. In most cases it is the wealthier sectors of society, not poor peasants, that are most destructive of forest resources, but it is the indigenous people who suffer the immediate negative consequences. The key issue, they believe, is to develop incentives through appropriate land tenure regimes and public policies that more adequately take into account the claims of poor peasants and forest users and also those of future generations who cannot be present to protect their interests.

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## **Table of Contents**

<b>I. Introduction: Land Tenure and Deforestation</b>	<b>1</b>
<b>II. Selected Countries of Asia and Latin America</b>	<b>5</b>
A. Deforestation by Farmers in Place	6
B. Migration and its Relation to Land Tenure and Deforestation	9
1. Land Tenure Characteristics of Sending Area	9
2. Land Tenure Issues at the Receiving End	12
3. Conclusions	25
<b>III. Selected Countries of Africa</b>	<b>26</b>
A. Zaire's Ituri Forest	31
B. Conclusions	32
<b>IV. Final Comments</b>	<b>33</b>
<b>References</b>	<b>34</b>

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This paper identifies some of the linkages between various aspects of population dynamics and human behaviour and their detrimental consequences on the forestry resource; our primary focus is on how various land tenure régimes interact with population and behavioural variables and how these together influence deforestation. Given space limitations, we cannot treat all these consequences nor the prospective policy alternatives. The issues are extremely complex and intertwined. Reliable data on these various linkages and interactions are often unavailable. Much more field research and primary data collection are required to achieve a thorough understanding of these deforestation phenomena. But some information is at hand; our task is to draw the conclusions that seem warranted based on the existing literature.

## **I. Introduction: Land Tenure and Deforestation**

Land tenure institutions have unique features growing out of historical patterns of settlement or conquest. Such institutions are tied to value systems and are grounded in religious, social, political and cultural antecedents. Land tenure relationships are sub-systems within a broader and complex web of institutions that make up a socio-cultural-political system. “Land tenure” refers to those institutions that are part of an interrelated system which embodies the legal and contractual or customary arrangements whereby people gain access to opportunities on the land. This system constitutes the rules and procedures governing the rights, duties, liberties and exposure of individuals and groups in the use and control over the basic resources of land and water. Trees and minerals may be included in the tenure rights in land, or they may be separate, requiring tenure rights of their own.

A “tenure” is often referred to as a “bundle of rights”. “Particular combinations or ‘bundles’ of rights in resources are recognized by law and custom in particular societies. . . . Tenure comes in a bewildering diversity of forms. Some Third World farmers are using land or trees under ‘freehold’, ‘leasehold’ and other tenures from Western law, but many others cultivate under indigenous land tenure systems” (Bruce, 1989:1; see also Dorner, 1972).

Just as tenure is diverse, there are likewise a great variety of forests as well as processes of deforestation. The Food and Agriculture Organization of the United Nations (FAO) uses a five-way classification of different types of forests in its tropical forest-resources assessment (FAO, 1988; see also Barraclough and Ghimire, 1990:5). In the main, our analysis of forest loss will concentrate on the closed forest region which FAO defines as: broad-leaved (hardwood) forests covering a high proportion of ground without a continuous grass layer allowing grazing or spreading of fires. They may be evergreen, semi-deciduous, wet, moist, or dry. For remote sensing purposes the crown coverage is 40 per cent or more.

Deforestation is likewise an ambiguous term. FAO uses the word to mean a complete clearing of trees and their replacement by non-forest land uses. Serious forest damage caused by excessive logging, wood-gathering, fire and livestock grazing is not considered as deforestation unless it results in total conversion of forests to other land uses. However, biologists, ecologists, and conservation agencies tend to consider as deforestation the degradation of entire forest ecosystems involving wildlife species, gene pools, climate and biomass stock (Barraclough and Ghimire, 1990; see also Myers, 1989). This paper accepts the more inclusive conception of deforestation.

Since deforestation can be defined in various ways, there is likewise wide divergence in estimates of areas and rates of deforestation. Estimates of annual rates of deforestation vary

from 0.4 per cent (FAO, 1988) to 1.8 per cent (Myers, 1989) (see Barraclough and Ghimire, 1990:7-8). Projections (made more than ten years ago) of global deforestation by the turn of this century vary from 4 million hectares annually to a high of 18-20 million hectares per year (Clawson, 1981:21). Such wide deviation notwithstanding, it is widely accepted that “most current use of tropical moist forest is unsustainable” (Goodland, 1991).

What are the main environmental consequences of deforestation? Prospective worldwide climate changes and global warming are perhaps most generally recognized as being directly linked to widespread deforestation. Increased desertification in semi-arid environments and increasing water run-off which leads to intensified soil erosion in humid areas are other consequences. This latter results in greater silting of riverbeds, lakes and reservoirs; inadequate replenishment of ground water reserves; and often increasingly devastating floods. In the process, countless species of plants and fauna are threatened with extinction as their forest habitats are destroyed (Barraclough and Ghimire, 1990:10).

The complexity of the issue is captured by Flader (1991): “The Amazon is virtually synonymous with biodiversity and with threats to biodiversity, but we have tended to approach the problem on a species-by-species basis. . . . But if we would preserve the biodiversity of the Amazon, it may not be enough to draw inviolate lines around particular islands of current richness. We need to understand the processes that produced and are producing that richness and then regulate our intrusions so that those natural processes can continue to function” (Flader, 1991:22).

While the number of distinct species of plants, animals and insects in the world is not known, the richness of species existing in the tropical forests is not in question. One estimate suggests 5 million species in the Amazon alone (Feldman, 1990:51). Another report suggests that, while tropical forests cover less than 10 per cent of the Earth’s land surface, they contain approximately half of the world’s plant and animal species (Wilson, 1988, cited in Southgate and Runge, 1990). The Brundtland Report notes an additional species which is endangered: “It is a terrible irony that, as formal development reaches more deeply into rain forests and deserts, it destroys the only cultures able to thrive in these environments. Their possible cultural extinction means the loss of a global resource” (Lebel and Kane, 1990:14).

What are the causes of deforestation? Land tenure arrangements, explored in this paper, are one causal factor. But land tenure institutions are linked in intricate ways with other factors. A particular system of tenure or property régime may be quite compatible with conservation of the forest resource at one level of population, but it may foster major negative consequences at another level.

Population growth and movements and their encroachment into the forest to clear land and plant crops is a key factor in deforestation. But, along with mass poverty, this phenomenon may be traceable to the systems of land tenure in non-forested regions which foster migration and unemployment. “The generalizations about population growth and poverty being the root cause of deforestation distract attention from other issues about which it is often much more possible to do something in a relatively short time” (Barraclough and Ghimire, 1990:13).

“Blaming population growth,” suggests Bromley (1990:25), “allows inept or corrupt governments to shift the blame for either their behavior or their inaction, as the case may be - to ‘promiscuous’ peasants. It further allows governments to appear helpless in the face of



forces beyond their control. And, it allows them to attract international assistance for projects to correct certain resource insults, the better to appear more beneficent to their citizenry.”

Among the processes often resulting in deforestation are expansion of commercial agriculture and cattle ranching, mining, timber harvesting and increased exploitation of forests for firewood. These in turn are frequently enhanced or intensified by particular government policies - highway and road construction, taxes, credits and various subsidies. “It should come as no surprise,” suggests Bromley, “that resource destruction follows road access as surely as night follows day” (Bromley, 1991:59). Government policy may encourage deforestation by recognizing and legitimizing the tenure of those who clear the land of forest and transform it into cattle ranches. “Globally,” notes Goodland, “settlement along logging roads and peasant agriculture may be the main causes of tropical moist deforestation” (Goodland, 1991:2).

At times, the threat of land reform and land expropriation may trigger such land clearing and deforestation. For example, *El Diario* (15 December 1989), a major Asunción, Paraguay, newspaper, carried the headline, “Tierra para los campesinos - los primeros victimas son los bosques” (Land for the peasants - the first victims are the forests). The story reports on the extensive destruction of forests in some of the eastern provinces of the country brought about by landowners who fear that forested land will be seen as “not rationally exploited” and thus subject to expropriation. The result is massive deforestation without any coherent production plan by most of those landowners.

As noted by Montgomery (1990), “The absence of tenurial security in traditional societies accounts for some surprising paradoxes in mankind’s relationship to the forest. In Africa, pioneers once planted trees because that was the customary way to establish tenurial rights; in Latin America, they removed trees for the same reason, to establish ownership or tenure” (Montgomery, 1990:69; see also Riddell, 1987:6).

Given the dubious nature of some estimates and projections, is it possible that the magnitude of forest destruction is overstated? Current global projections reveal a very broad range of conclusions. Some maintain that there is really no problem at all - “leave it to the market and all will be well”. At the other extreme is a judgement that the world’s environment has been unalterably and irreversibly damaged. Most informed opinion and the conclusions from credible research are more cautious and circumspect; they cover a much narrower spectrum.

When analysing deforestation, one must not be dogmatic. Harvesting of timber is not always undesirable. Clearing forests to make way for other land uses is not always a socially negative activity. The traditional conservationist land ethic does not suggest a prohibition of use of the forests. “There are . . . many social impacts of deforestation that may be positive”, note Barraclough and Ghimire (1990:12), pointing to the crop, pasture, and other non-forest lands of Europe, the eastern United States, Canada, Japan, and much of China and India which were once dense forests.

But in an estimate of total carbon dioxide (CO<sub>2</sub>) emissions into the atmosphere, it is shown that until nearly the turn of this century the major emissions were from deforestation, mainly from the northern hemisphere. Since that time the burning of fossil fuels has been the dominant source, and by the 1980s this source accounted for more than three fourths of all emissions (Palo, 1990).

It is not clear at what level the so-called greenhouse effect will be clearly measurable. A special study on this issue plotted from 1880 to 1980 the average sunspot numbers and global temperatures. The conclusion was: "The changes in the earth's temperature have followed changes in solar activity over the last 100 years. . . . When solar activity increased from the 1880s to the 1940s, global temperatures increased; when solar activities declined from the 1940s to the 1960s, temperatures also declined; when solar activity and sunspot numbers reversed and started to move up again in the 1970s and 1980s, temperatures did the same" (Marshall Institute, 1989:7).

This report does not maintain that CO<sub>2</sub> increases in the atmosphere have no consequences relative to the Earth's warming. Rather, these data "seem to explain the features that are so puzzling when scientists try to interpret the observed temperatures as a consequence of the greenhouse effect. The evidence points to changes in the sun's brightness as one contributor to the global warming observed since 1880" (Marshall Institute, 1989:7-8).

Additionally, Goodland (1991) points out that

"ethical dilemmas in economic development occur daily, specifically the conflict between human wants (not needs) and the needs of non-humans. Burning forests to create cattle ranches, and clearcutting to provide tropical pulp are two common examples. The fact that similar changes occurred in Europe and North America are irrelevant because relatively few extinctions occurred, carbon dioxide had scarcely started to increase, and most land cleared for food is being used sustainably" (Goodland, 1991:27).

How much tropical forest should be conserved? Goodland believes that "precise specifications are not needed because the limits are clear. No more tropical moist forest should be converted if the future use is not sustainable (for example, cattle ranching, clearcutting, most logging, subsistence agriculture, speculation). Forest extraction should not exceed regeneration" (Goodland, 1991:27).

The more serious distortion is likely to be an understatement of the environmental problems presented by unsustainable uses of the world's tropical forests. The negative consequences for life on this planet of marked global warming and species extinction are so threatening (and so likely to be irreversible) that it will be preferable for policies to err on the side of caution.

One final general issue must be mentioned before turning to a more specific discussion of the implications of different land tenure régimes for deforestation. Especially important is the question frequently heard from the Third World: are the rich countries to blame for the greenhouse effect? In fact, the greenhouse effect follows from two phenomena, both leading to increased atmospheric CO<sub>2</sub>. First is the increased burning of fossil fuels, especially coal and petroleum products. Here the wealthier, industrial nations are the major offenders. The other side of the equation is the destruction of CO<sub>2</sub> processing and holding capacity via deforestation (and, of course, the adding of massive amounts of CO<sub>2</sub> to the atmosphere via the burning of tropical forests). On this issue, Goodland (1991) suggests that

"the greedy rich destroy more than the hungry poor. One car damages the environment more than one poor person. Control of car populations is even more important than control of human populations; both are essential. While greed is

difficult to prevent, at least consumers should pay the true cost of their consumption which is far from the case at present. . . . Japan is the world's largest consumer of tropical timbers, importing about 30 percent annually, followed by the United States and the EEC" (Goodland, 1991:25).

"But is Japan really a major villain in tropical deforestation?" asks Jagels (1990). "'A mere 6 percent of the tropical hardwood removed worldwide is exported'. In fact, only one-fifth of tropical deforestation can be attributed to industrial logging (according to a U.S. interagency taskforce). The other four-fifths goes up in smoke - primarily as part of land clearing 'slash-and-burn' agriculture and secondarily as firewood for cooking or heating" (Jagels, 1990:33).

But be that as it may, "it is not unreasonable to suggest that the wealthy citizens of the industrial North wish the Amazonian 'lungs of the earth' be protected, the better to process carbon dioxide production arising from our self-indulgent lifestyle. In less polite language, tropical forests comprise a free waste-processing facility for the rich - whether in Japan, Europe, or North America" (Bromley, 1991:6).

It has been suggested that the rich, industrial North should compensate the poorer South where the major tropical forests are located. Various rather complex proposals have been developed to achieve the objective of providing a measure of financial gain in return for a decrease in tropical forest destruction, the cost to be borne by the industrial North (see Katzman and Cale, 1990; Bromley, 1991; Young, 1990). Several precautions to such actions are appropriate. Environmental accounting is in its early stages, even in the industrialized countries (Peskin and Lutz, 1990). Furthermore, it would appear difficult to avoid interference with national sovereignty in the efforts that may be deemed necessary by the countries providing the compensation to assure compliance by the recipient nations.

We turn now to the analysis of the land tenure and deforestation linkages in several world regions.

## **II. Selected Countries of Asia and Latin America**

Deforestation may occur when (1) government policies neglect agriculture *in situ*, permitting existing farmland to be wastefully used, failing to enforce access prohibitions to wilderness areas, and/or actually fostering the settlement of people there as in colonization schemes; (2) capital, technology and knowledge are unavailable to intensify extant agricultural areas so new forested areas are cleared; (3) jobs outside of agriculture are insufficient due to slow industrial development, cyclic depression, or economic growth in which operating costs do not reflect true labour abundance; and (4) harvesting and selling products from frontier regions offer possibilities of economic gain. Of course, if population grows unchecked for long periods, fragmenting already smallholdings, it cannot be prevented from swamping any deterrents, and the result is forest destruction at a faster rate than society deems desirable.

The phenomena above are filtered through the local land tenure system to the populace. Land distribution may be so inequitable and tenure régimes so insecure and/or inflexible that forest destruction is facilitated. For example, land tenure frequently plays a role in evicting people too rapidly from settled rural areas in the course of economic and structural change, causing labour productivity within agriculture to rise but at an enormous cost of greater underemployment and unemployment in society at large (the *latifundio-minifundio* structure

is prone to this characteristic; see Thiesenhusen, 1991a). This land tenure system also speeds forest destruction if migrants choose to go to other rural areas instead of the city. Alternatively, the predominant land tenure structure may accommodate the surplus population, sometimes in so hyperbolized a fashion that labour productivity falls nearly to zero [as in the case of involution described by Geertz (1983)<sup>1</sup> or exaggerated accommodation in Sri Lanka (Thiesenhusen, 1991b)]. The land tenure system in this latter case slows deforestation.

There are two situations to be described here in which land tenure problems may play an auxiliary role in deforestation: (1) that in which farm families remain to farm in situ but in conditions in which a faulty land tenure system encourages them to cut on-farm trees or encroach upon forested surroundings, and (2) that in which farm families migrate to areas where they cause forest damage. In the latter case, conditions in the sending and the receiving communities which may instigate deforestation will be briefly examined.

### **A. Deforestation by Farmers in Place**

The link between rural poverty and environment was clearly articulated by the World (Brundtland) Commission on Environment and Development (1987:28), which avers, “Those who are poor and hungry will often destroy their immediate environment in order to survive: they will cut down forests; their livestock will overgraze grasslands; they will overuse marginal lands; and in growing numbers they will crowd into cities” [World (Brundtland) Commission on Environment and Development, 1987:28]. If people are poor, they do not plant trees and give little attention to the maintenance of proximate forest land. Instead these small plot farmers may exploit forests by pruning, often indiscriminately, for firewood. They frequently destroy trees to establish another patch of cropland.<sup>2</sup> Or they may allow animals to graze low branches, weakening the trees. Short-term income - how to feed the family today - is a major goal for these peasants and little heed is given even to the medium term.

If these farmers had a somewhat larger farm, they might be encouraged to remain on it all the year round; as it is, it is common for small farmers or their family members to seek wage work elsewhere at some times of the year. A full-time “on-farm” labour force, one which also has security of tenure, often busies itself with long-term projects, some of which might be important to conserve forests.

Being semi-proletarian leaves little time, energy and means to practise conservation, Collins argues, using Bolivia and the Tambopata Valley of Peru as examples. She shows that the

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<sup>1</sup> Geertz details how rice culture becomes particularly labor-absorptive, using Java as his primary example. He compares swidden agriculture to rice culture and refers to involution in wet rice culture as its unusual ability to “maintain levels of marginal labor productivity by always managing to work one more man in without a serious fall in per-capita income” (Geertz, 1983:80). This was accomplished through labor-intensive practices and technology such as double cropping, special techniques of weeding, and so on. But Collier (1981) shows that some simple but capital-intensive and labor-extensive technology is adapted even as population rises in rural Java. Since this capacity to support dense populations holds, there remains something to the involution concept (see Brush and Turner, 1987:19-20).

<sup>2</sup> Much small plot farming in tropical areas may occur as swidden agriculture, which some commentators feel places forests in particular peril: “Traditional shifting cultivation that entails slash-and-burn forest clearance by forest farmers is the greatest cause of tropical deforestation worldwide, both quantitative and qualitative, accounting for 16 million hectares of the estimated 20 million hectares of forest converted from its original state worldwide each year. In Southeast Asia, now thought to have the greatest rate of forest loss, farmers are clearing at least 8.5 million hectares annually” (Mitchell et al., 1990:237).

smallest farms require a high level of off-farm labour in order to earn the families' subsistence. Only if families can garner sufficient income from property they own to support themselves can they husband their land all the year round; then, when harvest ceases, they have slack time to engage in activities that conserve natural resources, like planting trees (Collins, 1987:20; Collins, 1984:8-9).<sup>3</sup>

On-farm reforestation seems to depend on a farm's attaining a certain threshold size.

"There are basically two main forms of land use in [Tabango, the Philippines]: coconut-based perennial tree crop systems and permanent upland cultivation of field crops. As presently practiced, the coconut-based farming system, with or without additional tree crops and livestock grazing in the understory, appears to be a productive and sustainable land use system; permanent upland cultivation is not. Although the tree crop system is feasible for farmers with upwards of 5 hectares at their disposal, the major part of the coconut system is held by a small number of large landowners." (Torres et al., 1986:246.)

When plots reach the size and degree of security at which they become "family farms" and are no longer micro-plots or *minifundios*, their owners may be encouraged to plant trees for conservation purposes but also with the same motivation they run livestock: tree plantations might be convenient protection from inflation or even "savings accounts," a bond of sorts maturing over the long run. The investment is even divisible: trees may be harvested one-by-one, branches may be used for fuel, resin may be tapped, fruit may be gathered, and so on (Chambers and Leach, 1989). Also, of course, trees hinder erosion, and they may serve as "crops" on steep slopes which are not well adapted to anything else. Forest crops have the advantage of involving minimal work when labour demands for annual crops peak so that trees can be tended during slack times of the agricultural year.<sup>4</sup>

The smallest farmers, of course, tend not to plant trees; their time preference is for crops that mature in a much shorter run and even tea, cacao, and coffee (in favorable ecological zones), which begin to yield after several years, may demand too long a time frame for them.

A study on Nepal emphasizes a variant on this theme:

"The present landownership pattern shows a very unequal distribution of land resources, with 50 per cent of the total households owning less than 0.5 hectare of land each, which is not sufficient even for barest subsistence. In the absence of employment opportunities in other off-farm sectors, these households . . . tend to bring marginal and forest land under cultivation . . . or use forest resources for cash income" (Integrated Development Systems, 1986:91).

Small tropical farmers have problems with land tenure security as well as with size, as outlined by Jones (1988) in his work on Honduras:

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<sup>3</sup> This is Collins's summary of field work by Carmen Diana Deere and Robert Wasserstrom, reported in **Ingreso familiar y trabajo no agrícola entre los pequeños productores de América Latina y el Caribe**, paper presented at Seminario Internacional sobre la Producción Agropecuaria y Forestal en Zonas de Ladera en América Latina (Turrialba, Costa Rica, 1980).

<sup>4</sup> This argument does not imply combining *minifundios* under most circumstances; ordinarily this consolidation results in a near-landless class which obtains low level use of land from larger farms.

“Since farms are generally temporary due to the migratory farming pattern and lack of land titles, the plantation of slowly maturing crops is less likely . . . . In the case of Honduras, patterns of land ownership and current forestry laws combine unintentionally to discourage an optimal forest use by peasants. The lack of security of land tenure also discourages improvements such as fruit trees or plantations” (Jones, 1988:159).

According to Vergara et al. (1986), the situation on the Thai frontier is similar:

“Northeast Thailand . . . has rapidly been converting from forest to cultivation . . . . Although ownership of public lands is vested with the national government, de facto local control over these lands is shared by a number of individuals and organizations. . . . The occupants of the forest and cultivated lands, both legal and illegal, are motivated by a desire for economic security. They find it more economically attractive to grow crops than trees. They prefer the long term security and flexibility of being land owners rather than the restrictions and uncertainty arising from being ‘permitted’ forest tenants.” (Vergara et al., 1986:7.)

Chambers et al. (1989), writing on India, also emphasize security as a reason for peasants’ neglect of forestry:

“Security of land tenure and a sound base of land records are necessary preconditions for the poor to take to tree plantations. Any doubt in their [peasant or tribal] minds about their land rights or the recording of these rights would obviously inhibit them from investing their labour and meagre capital resources in a crop which yields benefits only after several years.

Unfortunately land records are in a bad shape, especially where share cropping is widely prevalent and tenants are unable to assert their rights, or where land has been recently allotted by the government.” (Chambers et al., 1989:177.)

Customary practices influence whether deforestation occurs in other ways also. Celis (1991) notes that in Jutiapa in Guatemala, neither landless tenants nor landlords have incentives to reforest. Landlords traditionally fed their livestock on crop residues produced by renters while in exchange their tenants took firewood gratis from the estates. The result was “severe and indiscriminate” deforestation. Under this system the tenants had no incentive to conserve, and since benefits would accrue to the renters, landlords had no incentives to plant trees either.

In sum, while planting trees and maintaining the forest make economic sense to family farmers who are available for year-round labour on the farm, smaller peasant plots in Latin America and Asia tend to be farmed, and this highly compromises forest resources. If their poverty is alleviated by receipt of more land or another job and/or their tenure becomes secure, farmers may well be more likely to conserve trees. Peasants understandably have a time preference for crops which yield at least a yearly subsistence for the family. Also there are often customary and legal barriers which figure into deforestation. The perplexing policy problem is how to prevent forest destruction amidst an agriculture made up of growing numbers of landless and rural semi-proletarians.

## **B. Migration and Its Relation to Land Tenure and Deforestation**

In some instances peasants are so disillusioned with farming in one location that they seek employment elsewhere, perhaps in cities or towns, perhaps on the forest frontier. It is the latter that concerns us here, for it probably involves deforestation. Conditions in the sending and the receiving areas which are related to land tenure matters necessitate analysis.

### **1. Land Tenure Characteristics of Sending Area**

There are at least three characteristics of a sending community which have to do with land tenure and they are often found in combination: (1) best land may be in the hands of the rich who farm it in an extensive fashion while (2) marginal land is in micro-plot agriculture; it becomes less fertile and eroded as families put more demands on the soil (paradoxically these farms produce more per hectare than large farms, usually because they possess a smaller percentage of unused land) yet do not have the capital to fertilize it properly or use required conservation measures; (3) small farmers may have less secure tenure than large farmers. All three conditions have an ultimate impact on deforestation because they determine who migrates. Also, whether a country utilizes its already existing cleared agricultural land to feed its people determines whether new land must be cleared. The question is: Does agriculture expand at the intensive or extensive margin when the demand curve for agricultural products shifts to the right? Expansion at the extensive margin virtually assures deforestation in countries with a wooded frontier.

The first two of these three characteristics can be treated together; they fit the Latin American situation particularly well. The *latifundio-minifundio* land tenure system provides inadequate niches for the rapidly growing residual labour force to earn a living until the industrial and service sectors are able to absorb it, and small amounts of city-based economic growth cause large spurts of internal migration (Thiesenhusen, 1969; and Thiesenhusen, 1971). While small farms almost always are more labour-intensive than large ones, the difference between them in labour intensity is particularly marked in Latin America: the farm-size spectrum is long and while small farms use their “homegrown” labour force, large farms hire theirs (economizing on manpower when they can because their labour bill is a significant operating cost). Chayanov (1966) believes that small-farmer families “exploit” this labour force, but the alternative, if that means being an unemployed worker, is worse. On small farms, therefore, a choice must be made by owner-managers: Should some family members remain on the farm, even though they are not producing or earning much, or go to the cities or the frontier where they might contribute remittances? Should the entire family or only a part of it move? From society’s point of view, migration may result in either unemployment in the cities or deforestation on the frontier.

Meanwhile, the evidence is that the best land in the region is occupied by the large farms while small farms have, on average, poorer quality land. For example, in the Dominican Republic, 9 per cent of large landlords control 64 per cent of the irrigated land while the remainder of the farmers, smallholders, have only 36 per cent (de Ceara, 1987:303). In southern Honduras, Stonich (1989) shows the initial land endowment of small farmers to be poor, documenting that “in general, the smallest landholdings and the highest population densities were located in the highlands, the area with least agricultural potential. Nevertheless, farmers strove to enlarge production in these marginal areas by more intensively farming land already in cultivation . . . and by farming previously uncultivated,

steeper areas” (Stonich, 1989:284). The 1970s and the 1980s saw the best land in the southern highlands taken up by export *latifundios*, Stonich argues.

Leonard (1987) notes that in El Salvador of the 1970s, up to 46 per cent of the land on large farms was used for pasture and an additional one third of the land on large farms was fallow: “The paradox, of course, is that the vast majority of smallholders . . . must use [their] land as intensively as possible. Thus . . . better lands are used less intensively while the poorer lands are used more intensively” (Leonard, 1987:107).

Schweigert (1990:97, 525) corroborates Leonard’s conclusions in his study of Guatemala, which shows that there was marked deforestation of the South Coast between 1950 and 1979. Trees covered 39 per cent of land in farms in 1950 and only 6 per cent by 1979. Now the major use of this land is for extensive grazing on *latifundios*, on property which Schweigert shows to be some of the best land in Central America - land where the highest corn yields in the country are obtained, a second crop is possible, and a variety of permanent crops can be economically grown.

All of these irrational (from society’s point of view) land use patterns were part of a larger, dynamic phenomenon in Central America, especially along the Pacific coast, in which peasants were pushed onto poor land and forest resources were destroyed. Karliner (1989) notes:

“In the 1950s, . . . tens of thousands of peasants were evicted from their land . . . to make way for the expansion of cotton . . . . These displaced peasants were then encouraged to clear nearby forestland for farming and would plant corn for a year or two before again being evicted to make room for more cotton. By the late 1960s, . . . Central America’s Pacific plain was almost completely deforested . . . . Free labor released during cotton expansion was used to cut the rain forest for the cattle expansion of the 1970s, which in the decade destroyed 15 percent of Central America’s rain forests.” (Karliner, 1989:791.)

Land is also used sub-optimally in Brazil. *Fazendeiros* use proportionally less of their available farmland and leave more land idle than do smaller owners. This contributes to a system that lacks labour retention and promotes its migration. In Brazil in 1980, only 5 per cent of the land on farms from 2,000 to 10,000 hectares in size was cropped; most of the remainder was in pasture or fallow. Sixty-four per cent of farms from 1 to 10 hectares was in crops (Thiesenhusen and Melmed-Sanjak, 1990).<sup>5</sup> Meanwhile, yields of some crops, predominately those for export, were higher on large farms than on small ones (Cardoso and Helwege, 1989:table 7A; see also Thiesenhusen and Melmed-Sanjak, 1990:405, table 14). Intensity of cropping overwhelms the yield result (Thiesenhusen and Melmed-Sanjak, 1990), however, and the net effect turns out to be the inverse relationship between farm size and production per hectare, the rule for most countries (Dorner, 1972; Berry and Cline, 1979; Cornia, 1985; Herring, 1983).

Roughly 35 million hectares of farm land lay idle in Brazil at the time of the last available agricultural census in 1985, up from 33 million in 1980, and most of this was on middle-sized

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<sup>5</sup> Originally these data were drawn from **Censo agropecuário, IX recenseamento geral do Brasil, 1980**, 26 Vols., Instituto Brasileiro de Geografia e Estatística, Rio de Janeiro, 1983-1984).



and large farms.<sup>6</sup> Yet, there are about 9 million landless in the country's agricultural sector. This raises serious questions about a land tenure system that rigidly permits such wastefulness of agricultural production and engenders forest damage as landless peasants move to the Amazon frontier.

Hecht and Cockburn (1989) conclude that some small farmers in South and Central Brazil sold out to large-scale owners and left for the Amazon, concluding that the influx of migrants to the Amazon throughout the 1980s was prompted in part by the growth in the profitability of soybeans, their mechanization inducing larger farmers to buy up smaller-sized units. This, in turn, pushed small farmers off their land, into the cities or the forest. "As they sold their land, these small farmers benefited from rising local prices and thus were able to buy larger holdings in the rain forest, portions of which they duly cleared" (Hecht and Cockburn, 1989:99).

Another way in which the Latin American and Asian land tenure systems affect deforestation is through tenure insecurity brought about by short leases, seasonal rental, squatting on public or private unused lands, and land conflicts. Hecht (1985) notes that "cultivators are often harassed by large landowners or land speculators and are unable or unwilling to cultivate carefully because they have no title . . ." (Hecht, 1985:679). Montgomery (1990) concludes: "The psychology of ownership provides an incentive to protect and develop land for a long-term future, thus reducing the temptation toward overexploitation. The prospect of inheritance also encourages continuity in farming investments . . ." (Montgomery, 1990:61). In Stonich's (1989) farm sample, short-term contract renters in the southern Honduran highlands had insecure tenure on very small plots. They exhibited poor conservation practices - tending to grow mostly annual crops, to farm the worst and steepest property, to burn crop residues, and to clear the land of all trees. In contrast, smallholders who owned their properties farmed intensively but preserved trees and followed other soil conservation measures.

Evidence suggests that, to the extent that titles are insecure or rentals are indefinite, *campesinos* will refrain from making long-term investments because they may believe that they will not receive their dividend. Likewise, Schmink and Wood (1987) find that "the lack of secure title and the precarious de facto hold over land mean that reinvestment in erosion control, fertilizer, and irrigation is both costly and irrational" (Schmink and Wood, 1987:41).

Southgate et al. (1989) undertake a regression analysis to predict deforestation using population pressure and security of tenure as independent variables. They point out that land clearing is a means of showing that an area is occupied while the lengthy process of land adjudication takes place; they postulate that deforestation should be a function of rural population and security of tenure. Although analysing a small data set (11 *cantones* in eastern Ecuador for the regression analysis), the authors do find that deforestation is more apt to occur when land is held in insecure tenure than when tenure is more definitive.

Hall (1989) adds land conflict to a list of factors contributing to peasant insecurity: "In areas marked by intensive land conflict the pace of peasant farmer expulsion had quickened unmistakably. In the municipality of Santa Luzia . . . , which has a long and violent history of

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<sup>6</sup> Calculated from Brazil, **Censo agropecuário, IX [and] X recenseamento geral do Brasil, 1980**, Secretaria de Planejamento da Presidência da República, Fundação Instituto Brasileiro de Geografia e Estatística, Rio de Janeiro, 1983-1984. For 1980, Vol. 2, No. 1, Tomo 3, table 18, pp. 26-27; for 1985, preliminary tabulation from SEPLAN-IBGE.

land-grabbing, the number of peasant squatter farmers or *ocupantes* fell by 20% from 1975-80 but the total area occupied by these farms fell by 74%, indicating a strong polarisation of landownership. The 1985 census shows that this trend continued unabated between 1980-85 . . ." (Hall, 1989:105).

## **2. Land Tenure Issues at the Receiving End**

There are seven characteristics related to receiving communities and land tenure which have an impact on deforestation: (1) the in-migrants may refuse to recognize the legitimacy of landholdings in the receiving community and their aggressive pursuits may be condoned or even encouraged by the government; (2) new arrivals may bring to the receiving community a style of land use so ill adapted to the ecology and lacking in cognizance of the host group that destruction of trees results; or (3) closely related to the last point, state-granted concessionaires may conflict with those who already live in the forest, thereby destroying resources; (4) clashes may occur between contending settled or newly settled groups over land use and tenure, arguments usually raging between those who would destroy trees in favour of cropping or pasture and those who harvest products the trees yield without doing damage to them; (5) colonization may act as a safety valve for excess population so that demands for land reform in the settled parts of agriculture are muted (and state property is transformed into private rights); (6) recent migrants for various reasons fail and sell out to those who are more economically strong, thus accentuating inequities in resource ownership and potentials for social conflict; (7) the legal, institutional and bureaucratic system as it affects land tenure may be rigged against preservation of the forest, for bureaucratic turf battles may result rather arbitrarily in some resources being preserved while others are destroyed.

(a) Non-tribal in-migrants may encroach upon land which belongs to indigenous people without recognizing the latter's legitimate rights. That is, there is a clash between customary tenure systems and more formally legalistic, private property notions of landholding.

Sharad Kulkarni (1988), for example, shows that in India the land-records system introduced by the British established land as a transferable resource; he notes that increasing population, rising prices for agricultural produce, and the development of communications led to rising land values after independence. Consequently, non-tribal peoples encroached upon lands held by indigenous peoples, sometimes aided and abetted by differences between traditional and formal tenure rules. State laws to prevent the attendant injustices proved ineffectual due to faltering political will, bureaucratic corruption, inertia, and lack of organized resistance by tribal peoples. With loss of lands, tribes began moving farther into the forested hills to cultivate small patches. But these were, on record, owned by the government and their cultivation was considered as encroachment. Some attempt has been made to regularize these by various state governments, but insecurity has led to forest destruction (see also Furer-Haimendorf, 1982).

This also occurs frequently in the Philippines, where lowlander peasants migrate to the forested uplands. As Kenmore and Flinn (1987) make clear, indigenous people who live in the mountains have but informal claims to their land. Their low-technology agriculture led to clearing new property; because there were so few indigenous people, they reasoned that there would always be land. As migrants arrived from the super-populated valleys in increasing numbers, they brought a new concept - formal landownership. This migration to the uplands

was inspired by the American occupation, which introduced the homestead concept to the Public Lands Act of 1903. The American colonizers felt that Central Luzon and Central and East Visayas and even Manila were too highly populated. This meant moving people to Northern Mindanao, where they would acquire homesteads.

Lynch (1986) argues that in the Philippines, much untitled upland is available neither to indigenous people nor to newer migrants from the lowland: both are in competition with logger concessionaires who increasingly displace them (a later section deals more specifically with this issue). In this system, it is the indigenous peoples who suffer most.

Tragically, indigenous occupants of the Philippine uplands are presumed to be squatters unless the national government decides otherwise (Lynch, 1986:270). As a consequence, “the overwhelming majority of forest occupants are legally considered to be squatters, regardless of their length of occupancy. Millions are living within existing natural resource concessions granted to outsiders engaged in commercial extraction. The tenurial instability which results among actual occupants erodes customary conservation values and undermines incentives to conserve the local resource base and make long-term improvements” (Lynch and Talbott, 1988:688).

Kenmore and Flinn (1987) point out that Claveria in Misamis Oriental was a “last frontier”: Misamis Oriental had the most rapid rate of population growth of any province in the Philippines in the 1930s and 1940s. Density of settlement increased from less than 5 persons per square kilometre in 1918 to more than 30 in 1980. They describe the situation well: “To those children who transferred to Claveria with their parents, they all remembered that when they first arrived, the whole area was *lasang* (forested); the men recall the game animals they used to hunt .y. .” (Kenmore and Flinn, 1987:15).

Poffenberger (1990) notes that the situation in Southeast Asia has cultural roots: “Current conflicts between forest peoples and governments over forest land use in Southeast Asia stem from different cultural presuppositions regarding resource management and control. Over the past several hundred years, states have systematically attempted to gain exclusive rights to vast areas of forest lands through legislation and policing measures, giving little or no recognition to the rights of populations inhabiting and dependent upon the forests” (Poffenberger, 1990:7).

Progress in correcting these land tenure problems which lead to reforestation is discussed by Poffenberger (1990):

“However, the Forest Occupancy Management program [in the Philippines] gave foresters new experience in integrating upland communities into forest management systems. These early activities also led to the Integrated Social Forestry (ISF) program in 1982. ISF parcellary survey teams began demarcating public lands for the issuance of lease agreements and by 1985 had surveyed over 270,000 families; however, only 50,000 had received tenure leases. The Uplands Working Group of the Philippines, which advised the program, concluded in 1987 that to accelerate and improve its effectiveness it would be necessary to (1) make tenurial arrangements more compatible with the diverse local traditions and agricultural practices in the uplands, (2) decentralize and empower local institutions, and (3) focus the social forestry strategy more closely on the needs of upland people.” (Poffenberger, 1990:14.)

Lynch and Talbott (1988) aver that the problem of non-recognition of indigenous land rights is not a constitutional one:

“The proposed perspective invokes existing constitutional and legislative rights to motivate and empower forest zone residents. The immediate promotion of a more enlightened and democratic response to Philippine forest denudation, therefore, need not be contingent on constitutional amendment or the enactment of new legislation. It is already supported. Conversely, the current governmental scheme for allocating legal rights to forest zone occupants is constitutionally flawed” (Lynch and Talbott, 1988:681).

Their solution seems simple and straightforward but pessimistic: “Until the Philippine government respects the undocumented but constitutionally protected property rights of indigenes and other long-term occupants of the forest zone . . . , there is little hope that the nation can effectively address its increasingly severe environmental problems” (Lynch and Talbott, 1988:713).

The Philippine situation should be contrasted with that in Malaysia where, as Hong reports, “the rights of natives to the use of the land were enshrined in the community *adat*, and the system of land tenure was the bedrock upon which the social, economic and cultural system rested” (Hong, 1987:14).

“Sarawak swidden society practised a customary land tenure system. Under customary law or *adat*, the concept of private ownership of land did not exist. Customary land tenure provided and entitled anyone who cultivated the land with rights to the use of land. These usufructuary rights did not amount to permanent ownership rights. Thus rights over land were created by an individual and his family who cleared the forest and observed native *adat* with regards to land, the required rituals and religious beliefs.” (Hong, 1987:14.)

The importance of land tenure issues in the design of development projects is analysed by Mitchell et al. (1990), who claim that “local land-tenure issues are often overlooked in forest management planning, as most unsuccessful development activities reflect. Respect for traditional land tenure and the rights of indigenous communities, together with community participation in management, is essential if forest management is to benefit, rather than displace, forest communities” (Mitchell et al., 1990:237).

This issue is not limited to Southeast Asia; it can be found in just as virulent a form in countries like Brazil (see Schwartzman and Allegretti, 1987:10-12). Dubois (1990:185) notes that planting trees in regenerating forest fallow is interpreted by indigenous people as giving them usufruct rights; in contrast, when outsiders seek land, they look upon the reforestation as abandonment and begin to claim the reforested areas.

(b) Migrants may bring another tenure system and style of farming with them which will be wasteful when it is compared to that of native forest dwellers: a style in which fewer forest products are used and there is more row-crop agriculture and perhaps larger families. Row or annual crop agriculture is probably more destructive than most types of livestock farming (the two most obviously inappropriate alternatives to maintenance of forested land which recent

in-migrants are likely to follow). Also, swidden may become more common when in-migrants come up against the forested frontier.

Hall (1989) expresses this for Brazil, where indigenous peoples have an “in-common, restricted-access” notion of land tenure while in-migrants usually view land as state-owned, prospective private property:

“Incoming colonists often do not have the skills of indigenous farmers and find it extremely difficult to adapt to the harsh environment. Colonists bring with them farming systems which are usually inappropriate to Amazonian conditions; they do not cultivate the wide variety of crops planted by indigenous shifting cultivators, and their short-cycle subsistence crops rapidly exhaust the already poor Amazonian soil. Their larger and more homogenous fields are thus more vulnerable to pest and disease problems. . . . Decreased yields, leaching, laterisation, weed invasion, soil erosion and permanent nutrient loss are the unavoidable results. . . .

On environmental grounds, the chief objection to occupation of the rainforest by migrant peasant farmers lies in the fact that, given the generally poor quality of soils in such areas, traditional forms of ‘slash-and-burn’ agriculture are not sustainable beyond a certain population density. Such techniques are successful on a small-scale, but this demands that the same plots can be recultivated only after many years, a fallow period long enough for the soil to recoup its fertility . . . . The essential mobility and high rotation required by this traditional system has broken down in many areas of Amazonia with the migration of large numbers of poor farmers accustomed to different practices.” (Hall, 1989:151.)

A particular target of Filipino government intervention is *kaingin* (upland swidden) farming, which has been “the target of government since 1874 when a Royal Decree of the King of Spain banned the practice on the islands of Cebu and Bohol because of the high rate of deforestation” (Thomsen, 1991:3). The Americans and Filipinos continued the policy attack. Thomsen claims, however, that some forms of *kaingin* are quite sustainable: “The element sustainable *kaingin* systems apparently have in common is a set of well-functioning institutional arrangements, including a strong authority system, to regulate the use of vital resources and coordinate transactions among community members. . . . Over the last 20 years or so modern lowland Filipinos have gradually migrated to the upland areas of Mindanao and interjected alien institutions” (Thomsen, 1991:7).

Lynch and Talbott (1988) point out that the label *kainginero* is applied indiscriminately to all farmer-occupants of Philippine uplands who are also considered squatters regardless of their farming practices, sensitivity to environmental concerns, or demonstrable willingness sustainably to manage the resource base. Penalty for forest zone farming is two to four years of imprisonment (Lynch and Talbott, 1988:683, n. 17).

In fact, there are important differences between sustainable and destructive *kaingin*. Government officials and bureaucrats, aid agencies, the media and many intellectuals broadly condemn *kaingin* farming for the country’s upland resource problems without distinguishing between the sustainable *kaingin* of indigenous uplanders and the destructive *kaingin* practised in the lowlands. Widespread *kaingin* farming is a significant problem in the Philippines;

however, indigenous uplanders' conservation-oriented "traditional" *kaingin* systems have sustained thriving populations throughout the Philippines and elsewhere for centuries.

In some parts of Latin America, indigenous systems which conserve resources have been almost completely destroyed by the expanding frontier. Peck (1990), for example, commenting on the rarity of indigenous agro-forestry systems in the Ecuadorean Amazon, notes that this is "in large part due to the nature of frontier expansion in the American tropics, where large-scale land uses such as cattle pastures predominate and frequently encroach on small-scale production systems. Practitioners of the latter often originate from other regions and have little prior knowledge of local resources and technologies. Faced with uncertain land tenure, distant markets, and lack of technical support, the [indigenous] small holder is frequently compelled to practice degenerate forms of shifting cultivation for subsistence" (Peck, 1990:168).

And Southgate and Runge (1990) reinforce Peck's point:

"The periodic fallowing scheme long practiced by the Amerindian community of Pasu Urcu, in eastern Ecuador, was abandoned during the 1970's after IERAC [Instituto Ecuatoriana de la Reforma Agraria y Colonizaci n] agents informed the community that fallow lands could be claimed by agricultural colonists, who were 50 kilometers away at the time. This and other case studies indicate that Amerindians respond to tenurial incentives much as do the agricultural colonists. As a result, indigenous resource management regimes are discarded." (Southgate and Runge, 1990:3.)

Similarly for the Philippines, Eder notes: "For generations, the shifting cultivation did not cause environmental damage given the small size of the population" (Eder, 1990). Indeed, this was "harmonic," long-fallow, shifting cultivation. As there is in-migration, both the indigenous peoples (who have an in-common, limited-access concept of land tenure) and the outsiders (who think of land as state-owned, that is, prospective private property) show less sound environmental techniques. Loss of indigenous identity or "detribalization" follows.

Eder (1990) reports:

"In areas heavily impacted by outside forces, traditional swiddeners may end up contributing to environmental degradation to the same degree as their immigrant counterparts. More aggressive lowland immigrants have often pushed minority cultivators further back onto the steeper slopes, where shifting cultivation is most damaging in terms of soil erosion. Although the erosion due to clearing within forests is minimized by a buffer of trees . . . almost all *kaingin*-making now occurs on the fringes of forests, and often swidden is practiced in degraded areas long denuded of trees. Reduced area available to indigenes, along with population growth, has led inexorably to shorter fallows." (Eder, 1990:107; see also Repetto, 1988.)

(c) A similar but more exaggerated problem than (2), above, is posed by state-granted timber concessions which may engender a system in which holders run up against those who already live in the forest and on its products. Or if no group lives there, the concession destroys the forest because no state policies protect it.

One perplexing example is Calminoe, a *kaingin* agricultural community located in an area previously forested, then logged, and now settled by migrants from all over the Philippines. According to Fujisaka and Capistrano (1986),

“The loggers tell the locals that they . . . have timber rights and that the settlers are illegal squatters. If the Calminoe area is under BFD [Bureau of Forestry Development] jurisdiction, then both local logging and settlement are illegal. But the BFD is powerless in the face of logging’s potential profits. In Calminoe, the individual farming family generally does not know whether or not the loggers have a legitimate claim to local timber. This ignorance has worked to the farmers’ disadvantage because outside loggers have exploited it. They have taken logs and, in the process, damaged *kaingin* [upland swidden] plots and the watershed itself. The logging continues with both local and outside participation. Timber is treated as an open access resource, and as long as most residents do not know who is acting legally or illegally, they have fewer incentives for improved resource management.” (Fujisaka and Capistrano, 1986:234.)

According to Lynch and Talbott (1988), the government so condemned all *kainginero* farming that it condoned “a publicity campaign, including paid ads, to blame the *kaingineros* and exonerate licensed loggers for deforestation . . . in the Philippine media during May and June of 1988” (Lynch and Talbott, 1988:682; see also Sesser, 1991).

Hong (1987) notes that “shifting cultivators in Southeast Asia have been increasingly marginalised, displaced or severely restricted, due to the encroachment of the ‘modern sector’, its various forms of logging companies, dams and other ‘development projects’. In Sarawak, the story is no different. Increasingly the natives have had their lands taken away from them, often without their even knowing it. . . . When the loggers came to their forest, the natives suffered the shock and bitterness of seeing their forest farms, ancestral lands and sacred places destroyed and defiled before their very eyes. When the dams were built, they were ordered to pack their belongings and leave, never to return or ever glimpse their homes, their lands, their fruit trees, and the graves of their beloved ancestors which will all be flooded out of existence. They have been herded into resettlement schemes . . .” (Hong, 1987:32).

Bautista (1990) feels that since forest land was largely under state control in the Philippines, government actions in privatizing this property and in granting timber concessions are primarily responsible for deforestation there. As of 1985, 47 per cent of forest lands had been leased out to timber companies and government forestry agencies are often too weak to enforce the terms of the leases, which results in illegal resource extraction. “Very little reforestation activity has been carried out in the deforested areas” (Bautista, 1990:80). Bautista estimates that by 1987 only 2 per cent of the deforested lands was reforested by the private interests that originally cleared the forest. “The factors underlying the forestry crisis are related. Policies on public land classification and use formalized the state’s preference for continued control over forest land and exploitation through lease. Together with its low forest charges and export tax, these policies provided the context for greater private incentive for forest exploitation” (Bautista, 1990:81).

(d) Clashes in the forest itself between those who would use the forest products and leave the trees undisturbed and those who aim to clear-cut the trees and run livestock, establish small local industries, or undertake to crop the land are caused

by lack of a clearly regulated system of land tenure in the forest and the desire of the outsiders with resources to obtain quick profits.

Poffenberger (1990) describes this situation in Southeast Asia:

“Many small saw mills and other related industries have disappeared with the growth of highly capitalized timber activities. Nonetheless, tens of millions of forest families throughout [Southeast Asia] . . . are involved in informal forest production linked directly to the domestic economy. These individuals collect, process, and market lumber, fuelwood, charcoal, medicinal herbs, bamboo shoots, rattan, rubber, spices, coffee, fruits, and numerous other commodities. Since the beginning of the twentieth century, swidden farmers have increasingly adopted a commercial orientation, establishing smallholder rubber, coffee, and other export crop estates. There also exist many indigenous systems of minor forest crop production.” (Poffenberger, 1990:21.)

Poffenberger suggests a shift of policy support from large-scale timber extraction to sustainable multiple-commodity production, which would allow the forest industry to break out of its current export orientation. The cost of forestry sector job creation could be greatly reduced and the integration of different economic sectors advanced.

Most documentation of this phenomenon refers to the Amazon:

“There are perhaps 500,000 people in the Amazon today whose principal source of income is the extraction and sale of native rubber latex. There may be as many more who make a living collecting and processing other products such as Brazil nuts, and various oils, resins, fibers, medicinals, and nuts, as well as firewood and charcoal. No reliable data exist to suggest what the economic contribution of products extracted from the forest might be for the agricultural population of the Amazon, but isolated studies suggest that it is significant. . . . ‘Extractive producers’ historically have had a number of subsistence and income generating strategies available to them, aside from rubber and Brazil nut or other extractive production for sale, including small scale subsistence agriculture, manioc flour production for sale, hunting, fishing, raising domestic animals including chickens, pigs, and occasionally cattle. Of people who call themselves *seringueiros* for census purposes, some 165,000 live in the westernmost part of the state of Amazonas, the state of Acre, and the northern end of the state of Rondonia.” (Schwartzman and Allegretti, 1987:2.)

“Francisco Mendes in the first stages of establishing unions in Acre, organized rubber tappers to stop paying rent, and this continues to be a position central to the unions’ strategy. This was only the first of a series of initiatives contesting control over the resource base, which has become the central issue in the conflict between unions and cattle ranchers in Acre.” (Schwartzman and Allegretti, 1987:9.)

“The issues of sustainability of land use, and of benefits forgone are fundamental in any comparison of the economic value of cattle, agriculture, and extraction. Extraction is entirely sustainable and involves no degradation of the forest,



whereas agriculture and cattle ranching require the irrevocable destruction of the forest.” (Schwartzman and Allegratti, 1987:16.)

This point is elaborated by Hecht and Cockburn (1989):

“The predominant tendency has always been the clearance of forest to claim land. However, several committed agronomists and researchers are working with peasant groups to incorporate extractivism with agriculture, allowing the areas such as the valuable Brazil-nut forests to exist along with securing the livelihoods of peasants. In Rondônia, the precarious economic conditions of the rural poor have resulted in many of them being involved in rubber tapping to augment their incomes. An emerging concern with the importance of extractive resources coupled with agroforestry has resulted in several small projects which involve local organizations and base communities working together to establish a system of production that would sustain the settlers.” (Hecht and Cockburn, 1989:180.)

Commenting on why extraction of forest products (rubber-tapping, nut gathering) is increasingly untenable as a form of Amazonian land use, Fearnside (1990) notes “the inability of the extractivists to secure their claims to the land in the face of appropriation by ranchers and squatters” (Fearnside, 1990:242).

(e) Colonization (which usually involves the transformation of state into private property) is established to reduce pressure on the settled agricultural parts of the country and thus to thwart efforts at agrarian reform.

One of Shrestha’s theses on Nepal is that frontier settlement serves as a safety valve to ensure that the elites in settled agriculture are not touched with reforms (a conclusion often made of the Latin American agrarian reforms; see Thiesenhusen, 1989). Shrestha (1990) implies that this policy will soon cease to work effectively: “The amount of land available for free distribution by the government has already reached a threshold in Chitwan and Nawalparasi” (Shrestha, 1990:205). “One may argue that Nepal has already reached a threshold in terms of land scarcity. Although the amount of farm land has increased from slightly less than 1.7 million hectares in 1961 to almost 2.5 million hectares in 1981” (Shrestha, 1990:117). But per capita acreages have declined. Ghimire takes strenuous exception to this argument, however, concluding in an authoritative recent study that the present agricultural area in Nepal could be extended by over two thirds and that “it is possible that much of this area could be used for settling the landless without causing any serious adverse effects on the local environment.” (Ghimire, forthcoming:147.)

Frontier land reclamation in the Terai, the only region where some new land may be brought under cultivation, has already reached its maximum, according to Shrestha. That is, the Nepal Resettlement Company has come to a conclusion that it can no longer continue its land resettlement policy without disturbing the ecological balance of the region. Here, again, Ghimire disagrees and shows that there is land appropriate for peasant farming in the Terai: “If settlers are not allowed to convert forest area into agricultural land, more [tax] volume is likely to be generated by maintaining forests and using them for timber extraction” (Ghimire, forthcoming:174). He continues by showing that some seek to protect forests for tourism and argues that other interest groups also benefit from forest preservation at the expense of landless peasant use for farming (see Ghimire, forthcoming, especially pp. 174-179 and pp. 193-196).

In Indonesia, the transmigration programme establishes fairly secure tenure to government-sponsored settlers, but tenure is very insecure for a long time for the majority group of spontaneous settlers (see Hardjono, 1986).

Lopez (1987) concludes of the Philippines:

“The influx of migrants to Palawan can hardly be dissociated from land tenure inequalities in the Philippines. Behind the rhetoric of land redistribution, the real purpose of agrarian reform has been to reduce rural unrest through minimal concessions . . . . Palawan was opened for colonization in 1949, following a critical period of peasant unrest and armed rebellion in Central Luzon. Agrarian policy favored land resettlement rather than a redistribution of land controlled by elites. Through resettlement, landlords retained their holdings and landless peasants found the opportunity to secure land with government capitalization.” (Lopez, 1987:232.)

Sawyer (1990) notes: “Frontier migration served as an escape valve, at least symbolically, relieving pressures for land reform and other profound changes in the Northeast, Southeast and South of Brazil” (Sawyer, 1990:267). He further claims: “Pressure on the Amazon environment would be less intense if there were better living conditions in the Northeast, Southeast and South of Brazil. If there were agrarian reform, urban reform, health and welfare reform, and other changes . . . , small farmers would be more secure and would not have to seek sustenance in the rain forest” (Sawyer, 1990:270).

(f) Recent migrants are likely to fail and then to sell out to larger speculators, thus reproducing the land distribution inequalities and pushing the line of forest destruction further.

On this matter, the situation in Southeast Asia and Latin America is similar. Scholz (1986) writes of Chonburi in eastern Thailand:

“Landlords generally leave the job of forest clearing to landless squatters whom they allow to open and cultivate small plots of land along the pioneer front. The choice of crops is entirely left to the squatter; he is, however, obliged to leave the place after a fixed period, mostly 3-5 years, when the tree stumps and roots are rotten, and tractors can move in. The squatter then moves on further into the forest, and the procedure starts again from the beginning. In this way, locally called the *pa boei* system, landlords are able to expand sugarcane holdings without the risk of being blamed for illegal forest clearing, and, if squatters are convicted of illegal timber felling, the landlords are easily in the position to buy them off.” (Scholz, 1986:22.)

Previously, when public policy in Thailand was not so concerned with its forest resources, gangs of labourers from Northeast Thailand were used to clear for sugar production. *Pa boei* is less easy for the government to monitor successfully.

The native forest dwellers often sold off land at a cheap price to the newcomers and retreated deeper into the forest in upland areas of the Philippines. Kenmore and Flinn (1987) note: “Arguments and fighting over claimed land did not only occur between migrants and natives but between settlers as well” (Kenmore and Flinn, 1987:18). Sometimes native peoples

accepted barter for their land; other times they became indebted to the newcomers who later took their land in payment for debt.

Lopez (1987:238) documents the operative mechanism by which settlers cheated the Palaw'an in the Philippines:

“Settlers regard Palaw'an land as government land, that is, public space open to their private claims. Palaw'an private rights to crops are respected, but unless they plant permanent crops their land claims are considered temporary. When Palaw'an move from one clearing to another and leave their fields to fallow, settlers can occupy the vacated area. As the road network expanded, migrants . . . [squatted] on 'vacant' forest. Some compensated Palaw'an for clearing forest and for fruit trees the Palaw'an had planted, a practice meant to avoid conflict. Others swindled Palaw'an by giving them 'gifts' of tobacco, fish, sugar, and clothing. Palaw'an claim that they were then unaware of the consequences of accepting what settlers gave them. After some time, settlers demanded payment for the 'gifts' and, lacking cash, Palaw'an were forced to cede their lands. Where Palaw'an refused to leave, settlers threatened violence.” (Lopez, 1987:238.)

There are similarities in Latin America, where enormous tracts have come to be held by foreigners and/or local speculators. In Nicaragua, for example, government programmes which were established to qualify the country for Alliance for Progress funding set up displaced *campesinos* on the agrarian frontier. These spontaneous settlers took over virgin forests and became basic grain farmers. But after a time, they were again forced deep into the forests by large landholders expanding their cattle breeding enterprises. Between the beginning of the 1960s and the Sandinista revolution (1979), the amount of land used for agriculture and livestock production doubled, at the expense of forests. Spontaneous forest settlement also grew during the Sandinista reforms because expectations for rapid change exceeded the speed of the agrarian reforms (see Ramirez 1986).

Jones (1988) notes: “As pawns in the development process, peasants find themselves irresistibly pushed toward programs of colonization and deforestation” (Jones, 1988:157). In Honduras, the poor clear the forested areas but find that these lands cannot sustain agriculture. They sell out to cattle ranchers and move on to new areas of the forest. “Since peasant use rights are based on clearing the forest, reforestation diminished the value of the improvement they might otherwise sell . . .” (Jones, 1988:160).

Hall (1989:145) concludes:

“The means through which property for cattle ranching is obtained are various. The normal pattern is for cattle-breeders to follow in the wake of small pioneer farmer settlers, taking over land either through agreed purchase or, as is commonly the case, through violence and coercion in situations where genuine land-titles are the exception rather than the rule and a whole corrupt industry exists to fabricate such documents. Often small farmers trade a year's use of the land for pasture formation and exit from the area . . . . Frequently also, logging companies will in the first instance open up crude trails through the forest, or official highway construction will be commenced, facilitating subsequent penetration. The original vegetation will be removed usually by the small settlers

so that they may practise slash-and-burn agriculture for a few years until moving on.” (Hall, 1989:145.)

Furthermore, land tenure patterns in the agricultural parts of the country enjoy a reprise in the forest, as explained by Collins (1986), who notes that social differentiation was imported to the Amazon with the migrants. It may work via “brokers” who possess managerial experience and small savings upon their arrival while “clients” have neither. Brokers become market intermediaries and transporters and a system of patronage emerges. Clients become increasingly dependent on brokers and often sell their land in recompense if they are unable to repay. According to Collins (1986), those who “succeed” at the frontier are from the broker class. Especially when the Brazilian government began to emphasize larger land units in the Amazon after 1974, inequalities increased, extending a social process that was already under way (Branford and Glock, 1985). Like Collins, Hecht and Cockburn (1989) show that settlers to the Amazon arrive with varying amounts of capital and credit: “the better-endowed were able to capture more of the state resources and also snap up the lots of faltering neighbors, thus repeating the familiar rhythm of the Brazilian countryside: consolidation of large holdings and fragmentation of small ones” (Hecht and Cockburn, 1989:112). Schmink (1982) agrees,

“Conflicting policy directions have attracted both small-farmer migrants and large-scale capitalist investors to the region where they have come into direct conflict over access to land. With or without the direct mediation of government bureaucratic agencies, the process of land conflict resolution has favored the appropriation of peasant lands, hence re-creating the concentrated agrarian structure of other regions of Brazil.” (Schmink, 1982:354.)

Maurer (1988) vividly illustrates one situation which he believes to be somewhat general in the Amazon:

“The *grileiro*, or real estate swindler, . . . prey[s] on the peasants; they trek a mile or two into the forest, clear a plot, build a hut on it and then, claiming ownership, sell out to one or more gullible newcomers. The large-scale *grileiros*, many of them lawyers, are more ambitious. They set up storefronts in town and deal in huge parcels of land on the basis of titles that at best are doubtful and at worst are printed for the occasion. Since INCRA [Instituto Nacional de Colonização e Reforma Agrária (National Institute for Colonization and Agrarian Reform)] usually must go to court to have the titles declared invalid, and since the new ‘owners’ may well be rich and powerful groups of *Paulistas* [literally, people from São Paulo; more generally, speculators from Southern Brazil], property questions are often settled by what one official politely called ‘extraofficial means’.” (Maurer, 1988:164.)

Fearnside (1990) summarizes the human effects: “Pasture has pernicious effects on Amazonian society. Ranching drives small farmers off the land, either by violence . . . or by tempting smallholders to sell their plots to more wealthy newcomers. Land tenure distribution becomes highly skewed towards large holdings with absentee owners. Only a minimal amount of employment is generated after the initial clearing phase is over” (Fearnside, 1990:236).

As in more settled regions, the frontier's cycle of poverty may be connected to the inability of small-scale settlers to obtain ample credit. Collins's (1984:5-6) study of peasants in the upper Ecuadorean Amazon concludes that clearing costs are high and title cannot be obtained until the land-debt obligation is fully met. In an effort to repay debts, small cultivators frequently intensify their operations beyond sustainable limits. In the process, production drops and settlers become even less able to repay, finally selling their property in discouragement. Hay (1988) believes the settlement process on the Brazilian frontier is a progression through stages which are marked by an increasing level of needed capital - and, therefore, a growing proletarianization of the poorest and least prepared for frontier life - and a marked concentration of land in fewer hands. "Finally . . . the high value and productivity of land demand larger capital investments to maintain and expand production . . . . At this point, capital begins to replace labor as machinery and chemicals perform the work of men and women. Unemployed labor and failing smallholders have no alternative except migration to cities" (Hay, 1988:4). Pereira (1989:21) claims that 80 per cent of frontier settlers in Brazil fail.

It should be noted, however, that the problem is deeper than lack of credit. Redclift (1989:371) concludes that only 20 per cent of the land in the Amazon is suitable for sustainable agriculture.

And patterns vary; sometimes large holders are on the forefront doing the forest damage directly. Rodríguez and Vargas (1988) outline the provisions under which private owners can obtain permission to cut trees in Costa Rica, concluding that the total land area supporting a stand of trees shrunk considerably between 1961 and 1983. Over half of this deforestation was illegal, and large landholders accounted for more direct deforestation than did small owners.

(g) The legal or institutional system may work in such a way that the tenure system is rigged against preservation of forests in some way.

In 1966, for example, the Dominican Republic passed a law that no trees should be cut on private or public land. Now farmers resist planting trees because they will not be able to realize a profit on their investment. And peasants came to regard the forest as a direct competitor for their subsistence; they began to kill sport seedlings before they could be classified as trees. Also, *contrabandistas* moved in to exploit the forests, selling lumber illegally at night (Thiesenhusen et al., 1991:2). In sum, while the law has been quite successful in protecting mature stands, the prospect is less encouraging for the matter of reforestation. Another example of policy going awry is Indonesia, where transmigration caused destruction of forests in Kalimantan to settle peasants from overpopulated Java.

In Brazil and other countries, deforestation may secure land claims; it may be "needed" in a legal sense to show "use" required for preemption. Hall (1989) says that

"the granting of an INCRA [Institute for Colonization and Agrarian Reform] land title may be dependent upon the clearing of a certain proportion of the property's rainforest by the owner as 'proof' of intention to engage in productive activity. Thus, there is no inevitability about ecological deterioration, even following significant settlement; the process of environmental degradation becomes intimately bound up with the whole question of land economics, the nature of agrarian development policies pursued by government and the institutional

context within which they are implemented. To an overwhelming degree it is a matter of choice exercised by commercial and State interests.” (Hall, 1989:153.)

Mahar (1989:16) writes that the government incentives for livestock ranching in Amazonia include investment tax credits against federal income liabilities elsewhere in the country. Cattle ranching in the Amazon produces little beef, and hardly any local employment, but is a certain way to gain land title. A few head of cattle are all the government inspectors need as proof that the farmer is a serious rancher - after all, he did clear the forest. The land, of course, is appreciating and can be used to secure credit for other business ventures.

Binswanger (1987, 1991) argues that Brazil’s tax rules of land allocation and credit policies were instrumental in assuring that land at the frontier is used in a profligate manner. While the Collor government has signaled that change may be in the offing, Brazilian income-tax laws virtually exempt agriculture, thus converting idle land into tax shelters for large-scale farmers and speculators; thus the mere purchase of land (or clearing land as a way of claiming it) becomes profitable.

Southgate and Runge (1990) show Ecuador to be similar on this score: “Ecuador’s government allows individuals and firms to acquire public lands. However, ecosystem destruction is typically a prerequisite for private tenure. Private parties interested in forest management, for example, cannot acquire legal interests in tree-covered land, timber concessions having been banned in 1982” (Southgate and Runge, 1990:3). The Ecuadorean Land Reform and Colonization Agency (IERAC) adjudicates a claim for private tenure in a frontier parcel only if at least half of that parcel has been cleared.

Denevan (1982) generalizes: “There is a tradition in Amazonia and elsewhere in Latin America that it is the act of deforestation, or other ‘improvement,’ which gives one the right of possession of land. Given land tenure injustices, this is a means of allowing the poor to use and/or obtain land. The legal system often recognizes this. Many squatters thereby obtain land and many apparent legal owners thereby lose land or have to compensate the deforester; even corporate owners can lose land this way. As result, there is great incentive to clear as much land as possible as quickly as possible” (Denevan, 1982:25) and simply wait for it to appreciate in value. Speculators may either claim large virgin tracts directly or buy out unsuccessful peasant settlers. Movement of land from the public to the private domain during the past several decades is unprecedented in its magnitude. Frequently new owners pay little or no tax: they benefit from being land speculators.

Nepal has a long history of taxing agricultural land, and this, as in many countries, has added to deforestation problems in the kingdom. In 1950, when the Rana family rule was overthrown, a succession of acts followed to control the deforestation. Legislation after 1950 concerned with forests was often misinterpreted by the local people as not being in their best interests and, as a consequence, deforestation occurred. However, more recent legal action, which allocated land for *panchayat* (local government) administration, has sown the seeds of effective community forestry (see Mahat et al., 1986:231). Earlier, “government policy promoted the conversion of forests to agriculture in order to maximize agricultural surpluses and land taxes. The severity of taxation in turn led to further forest clearing as peasants attempted to maintain subsistence living standards” (Mahat et al., 1986:223).

Many commentators paint the Nepalese picture in a more pessimistic hue, however. Since sharecroppers in Nepal can eventually claim tenure rights according to law, a pre-emption

policy is in place. Consequently, “landowners with holdings beyond their operational capacity are hesitant to rent out the portion which they cannot manage to share-croppers for fear that they may claim tenancy rights. Instead such lands are either left fallow or sub-optimally operated. On the other hand, households with no land or with very small pieces of land are driven to encroach on the forest area. The present tenancy provisions, therefore, have had an adverse effect on the resource conservation and utilization fronts. A more even distribution of resources, and a tenure system which can lead to optimum productivity of land, seems to be indispensable for conserving resources” (Integrated Development Systems, 1986:92).

Lynch and Talbott (1988) claim: “The Philippine Republic’s land allocation framework consists of a complex and, for most people, inaccessible series of legal and bureaucratic processes for securing official documentation of customary land claims. The possibility of securing such documentation, however, was virtually foreclosed for most occupants of the so-called public domain when martial law was formally imposed during the period 1972-81” (Lynch and Talbott, 1988:689). There has been little or no improvement on this score under the Aquino government, Lynch and Talbott note.

In some countries, bureaucratic turf battles which do not clearly define jurisdictions may result in forested property in some tenure patterns being preserved while others are not. Poffenberger (1990) illustrates:

“In the first thirty years of the postwar era, the leaders of Thailand, Indonesia, and the Philippines passed legislation to further strengthen state control. Many new agrarian laws denied recognition to forest communities, especially swidden cultivators, hunters and gatherers, and migrant farmers. In fact, these groups were generally stigmatized throughout the period as destroyers of the forest and branded practitioners of ‘slash and burn’ agriculture, ‘encroachers’, and ‘backward tribals’. . . . As hostilities and the social distance between forest communities and the state grew, the ability of forest departments to regulate forest use was further eroded, and responsibilities for protecting state claimed forest lands were often turned over to the military and police units.” (Poffenberger, 1990:19.)

### **3. Conclusions**

Land tenure problems are often root causes - or play an important mediating role - in deforestation whether peasants are located in situ, in sending, or in receiving communities. A search for policies to rectify a situation in which trees are destroyed in such a wanton fashion is a priority (see Rodriguez et al., 1991). Poverty and deforestation are inextricably linked; those in most poverty are often only agents for the elite who hold prime agricultural land. Through agrarian reform that would distribute some land presently used in extensive agriculture among the rural poor, migration to the forest frontier (and the subsequent destruction of trees) might be prevented. At the very least, forest settlers should not have to clear the land in order to claim it.

### III. Selected Countries of Africa

We treat Africa in this separate section since it has a number of unique features which are not as prevalent in other regions. Nevertheless, as we will show, some of the land tenure-deforestation connections in Latin America and Asia are also found in this large and diverse continent.

Most African nations achieved independence relatively recently. In many cases, the individual nation states which were shaped by the colonial powers include large numbers of different language and ethnic groupings. This diversity is as pronounced within some of the larger African nations as it is between individual nation states. Relative to most of Asia, the availability of land is much greater in most of Africa. However, with increasing populations, migration, and agricultural commercialization, pressures on the land and forest resources are growing rapidly.

Not totally unique to Africa, but certainly more prevalent than in Asia or Latin America, are the customary land tenure systems in which rights for land and other resources are based upon ownership by local kinship groups. Farming families generally have secure rights to individual parcels for crop production, whereas grazing and forest areas are usually subject to communal use. In most cases, these grazing and forest areas would be designated by the general term “common property”. There has been a great deal of discussion and some controversy over different property régimes and their consequences for resource use and conservation.<sup>7</sup> This controversy developed in response to Garrett Hardin’s **The Tragedy of the Commons** (1968), in which he maintained that property held in common provides no discipline against over-use of the resource by the community’s members. Ciriacy-Wantrup and Bishop (1975) countered this argument by maintaining that Hardin actually describes a situation in which there are no defined property rights governing access and use to the communal areas. This, they note, is not the case with common property, where clearly defined communities of right holders are subject to local rules and regulations governing use. What Hardin describes is actually “open access,” which implies an absence of property rights.

Bromley (1989) suggests that common property is just one of four types of property rights régimes. Others include state property, private property, and non-property. In the latter, there is no defined group of users or “owners” and so the benefit stream is available to anyone. Individuals have both **privilege** and **no right** with respect to use rates and maintenance of the asset. The asset is an “open access” resource. According to Bromley, common property is present where two conditions are met. The first corresponds to the definition of common property used here: “The management group (‘the owners’) has [the] **right** to exclude nonmembers, and nonmembers have [the] **duty** to abide by exclusion” (Bromley, 1989:872). The second condition is that “individual members of the management group (the ‘co-owners’) have both **rights** and **duties** with respect to use rates and the maintenance of the thing owned” (ibid.). “The former condition,” notes Lawry (1990:406), “is frequently present in common property use situations in Africa; the latter condition is rarely present.”

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<sup>7</sup> For an excellent discussion of this controversy, and a major source for the following discussion, see Lawry, 1990.



Lawry's point, that "the latter condition is rarely present", is of major significance and leads him to differ with Runge, "who believes that strong incentives operate in favor of collective action in Third World village situations" (Lawry, 1990:407; Runge, 1986). Runge's belief, according to Lawry, is based on the unwarranted assumption that local communities are organized and structured in such a way that, if left to their own devices, they will devise and enforce rules that ensure sustainable use of communal resources such as forests and grazing lands. But, says Lawry, local incentives are not always clear and they will depend a great deal on how critical the resource is to local income as well as on its scarcity. Likewise, he says, "Collective action will be more difficult to achieve where interest in the resource as a source of income varies, or where resource use strategies differ significantly" (Lawry, 1990:413).

"Only in rare cases," notes Shepherd (1991:171), "can management be passed to small local user groups whose internal composition and whose resources are clearly defined and felt by them to be manageable. When institutions of the strength of the clans and lineages, which have allocated land for hundreds of years, break down, we should not lightly suppose that it will be easy to create arbitrary new village institutions to do their work."

Where such local institutions remain strong, they may prohibit strangers or outsiders from settling on lands within their jurisdiction which may, in turn, lead to settlement in the forest with consequent deforestation. This is indeed what happened in one area of Uganda. People from Kigezi (Kabale District) sought new lands for settlement because of the growing population pressure and land fragmentation in their home area. But since local, customary tenure rules elsewhere in southwestern Uganda made it impossible for the BaKiga<sup>8</sup> migrants to obtain land, they occupied large areas of the Kibale/Queen Elizabeth National Park Game Corridor and the Kibale Forest Reserve. Although this encroachment was technically illegal, the government agencies first ignored, and later found it most difficult to enforce, the rules restricting such settlements in the gazetted forest and game reserves (Aluma et al., 1989).

In addition to the incentive problem discussed above, there is "the authority problem". Economic integration within the national economy reduces the scope for local action; the authority of traditional and local elites is eroding; and traditional authority over resources rarely extends to intensive control over individual use (Lawry, 1990:415-417).

Lawry is equally sceptical about state management which, he says, has rarely worked well, notwithstanding the fact that since independence a majority of the African states "have declared all or most of their land to be state or national land" (Lawry 1990:419). The difficulty with state management, notes Lawry, is that "state agencies lack timely information on resource conditions and use practices. Local input is often not solicited and local initiative is obstructed. State authority is still weak, especially in Africa" (ibid.).

State regulatory action may also result in conflicting signals. For example, Senegal's proposed forest code would grant to farmers property rights over trees they plant or establish on their farms. Yet, other provisions of the code grant powers to the forest service to restrict farmer rights to use and manage their trees as their interests dictate. "Depending upon how they are framed, regulations could reduce farmer incentives to plant and better manage trees

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<sup>8</sup> The people of Kigezi are known as BaKiga.

on their farms, and thereby defeat the broad intent of policies extending clearer property rights” (Lawry and Elbow, 1990, executive summary).

There has, in fact, been widespread destruction of forested regions in the Sahel in both the past and the present. The breakdown of traditional agro-pastoral systems is in part responsible for this transformation in the density and composition of Sahelian tree cover. The state has tended to support the interests of the sedentary agriculturalists over those of agro-pastoralists by encouraging the expansion of sedentary agriculture into the forested areas of this semi-arid region. Government policies and programmes, such as the construction of infrastructures to promote commercial agriculture, have greatly facilitated the settlement of sedentary populations on land once used exclusively for grazing (Moorhead, 1989:256-272; Swift, 1982:170-171). In the wake of this migration, deforestation often follows from the conversion of forest cover into fields.

In Senegal, for example, the expansion of export-oriented peanut production supported by the financially strapped colonial and post-colonial governments in order to earn foreign exchange has long led to clear-cutting of bush lands by the Islamic Mouride sect. The removal of the forest cover leads to wind and water erosion, a process that has turned much of central Senegal into an area that resembles a desert. This trend continues, as recently seen when “173 square miles of one of the last remaining forests in Senegal’s degraded heartland” was razed in a mere three weeks (K. Freudenberger, 1991:1).

This expansion of agriculture into areas once used by agro-pastoralists is also linked to the decline in average annual rainfall in the Sahel over the past 25 years. There appears to be a tendency for the agricultural front to press southward toward the more humid forested regions during years of drought. During these crisis-ridden years, the newcomers settle in the new territories and clear the forested zones allocated to them by the resident populations. Yet, disputes often arise between the migrant and the original populations over the destruction of forest cover. Local populations often have difficulties enforcing restrictions against what they consider deleterious cultivation practices. Many such cases have been recorded along the fringes of the tropical forests of West and Central Africa (Savonnet, 1986:276; Talbott, 1991). But when relatively good rains return, the sedentary populations tend to expand once again along the fringes of desert lands into the grazing zones of the agro-pastoralists. Here, again, there is a constant and conflictual reshaping and redefining of rights of access to natural resources (M. Freudenberger, 1991).

“While states have usurped the last vestiges of local control through legal reform, they have been unable to put in place an effective alternative system for managing collective resources” (Lawry, 1990:419; see also Lawry, 1989). This analysis leads Lawry to suggest greater balance (relying solely neither on state government nor on local community control) in the form of a co-management model (Lawry, 1990:420).

“One useful model has evolved out of a USAID-funded program in the Guesselbodi Forest Reserve in Niger” (Lawry, 1989:6). A division of responsibilities for forest management evolved, including the Forest Service, a local co-operative established for marketing wood from the forest, and individual woodcutters who are granted rights to cut and supply wood to the co-operative. The state establishes overall use standards and grants use rights to a viable local group (the co-operative), which, in turn, organizes utilization for the benefit of the local residents. The state retains its rights over setting harvest rates and other management policies. “Importantly,” notes Lawry (1989:7), “the state takes an active role in the

enforcement program. Rigorous enforcement of rules against overuse by local residents is something the cooperative would find difficult.”

Basically, when population density is very low, when sustainability of resource use levels is easily maintained, and when livelihood is closely tied to the resource in question, the local owners of common property will provide excellent management - having both the incentive and the authority to do so. As conditions change, as population density increases and economic integration provides new income-earning opportunities, the state enters the picture. Policy-makers may have the best of intentions to conserve fragile resources, and state ownership of the resources is declared. But the state cannot always carry out its promises and the local community loses both incentives and authority to manage the resource. What was a “common property” resource may be converted to an “open access” resource to the detriment of the forests (see Lawry, 1991; and Chapman, 1990).

One of the fundamental problems of dealing analytically with the land tenure regimes and issues in Africa is that they do not always fit easily into the analytical categories developed by the social sciences. “The analysis of the clusters of rights and claims, privileges and liabilities which are related to the ways in which Africans hold and work the land, live on it and use its products, is complex, on the one hand, because of the difficulties in evaluating the exact nature of the rights and claims, and, on the other hand, because of the imbrication of economic and social, political, and religious factors. It is, therefore, difficult to characterize African systems of land-tenure in terms of familiar legal and linguistic concepts” (Biebuyck, 1963, as quoted in Brokensha et al., 1984:26).

In analysing land tenure, especially in the African setting, “tree tenure” must be distinguished from the tenure of the land on which trees are grown. It is often assumed that trees are like buildings and are owned by whoever owns the land. “But, in fact, trees can like minerals and water be an object of property rights separate from the land on which they are located” (Bruce, 1989:3). There is often a bewildering array of rights associated with trees in African countries - who has the right to plant, to own and inherit, to use trees and tree products, to dispose of trees, and so on. “Four classes of right holders must be considered separately: the State, groups, households, and individuals within households” (Fortmann, 1988:19). Additionally, several factors affect who has what rights: the nature of the tree, the nature of the use, the nature of the land tenure system (Fortmann, 1988:20-21). Gender may be an additional complicating factor. In societies where women cannot own land, “their rights in trees may be restricted. Where planting trees establishes rights to land, women may be forbidden to plant trees to prevent them from using this route to obtain land” (Fortmann, 1988:24).

The rights to such commercial tree crops as fruit or cocoa may be highly individualized and may operate quite independently of land rights. But tree tenure is not confined to such crops. It can apply to trees grown for firewood, posts and poles, or other uses. Generally tree planting is a prerogative of landownership. People farming as tenants or “strangers” who obtain cultivation rights from another community may be discouraged or forbidden to plant trees because of the access rights they would have to the land in order to manage their trees (Bruce and Noronha, 1987). In fact, tree planting can be used to support claims of landownership.

Where the modern state is the proclaimed owner of all land, tenure to the land may at times be secured by the planting of trees (known as *mise en valeur* in Francophone Africa). In

contrast to areas where land reform laws have led to deforestation (in an attempt to demonstrate that the land is being put to a socially desirable use), tree planting can be motivated by the desire incontestably to establish such desirable use. Cocoa and coffee plantings in a Liberian project were apparently driven by such a dynamic. The same dynamic also operated in the Côte d'Ivoire. Here an impressive expansion in smallholder cocoa was achieved by clearing virgin forest and planting cocoa trees (Hecht, 1983).

As is evident, this dynamic can operate as a double-edged sword. Natural forests may be destroyed on a more extensive scale than would otherwise be economical simply because more extensive land rights are thereby established. "Serious tensions exist between forest conservation and tree commercialization objectives under such systems" (Bruce and Fortmann, 1989:6).

Chambers and Leach (1989) suggest that where the tenure is secure, trees have increasing importance and potential as savings and security for the poor and for use to meet contingencies. They note two areas where pressure on resources has increased markedly while tree cover also increased. In an area near Kano in northern Nigeria, aerial photographs showed an increase in tree density of 18.5 per cent between 1972 and 1980/81. This was attributed to natural regeneration following drought and tree planting by farmers - 75 per cent of whom in a sample "said they planted trees" (Chambers and Leach, 1989:334). Likewise, a careful study of the Kakamega District in Kenya, using aerial surveys and ground control, "found the density of planted trees to vary with population density, and inversely with the average size of holding. In such conditions", the authors conclude, "trees may well be substituting for livestock as savings banks, with poor people planting and retaining trees as part of their long-term survival strategy" (Chambers and Leach, 1989:334). A prerequisite for this, it should be recalled, is security of tenure.

Yet another practice involving land and tree tenure security is alley farming, an agro-forestry technology involving production of leguminous trees and shrubs in inter-cropping arrangements with cereal and tuber crops. Prunings from the trees are used as a mulch and as a supplementary livestock forage. Alley farming is designed to improve fallow management in areas of declining soil fertility and increasing population pressure. At the same time, it can provide tree products for household consumption, sale, or savings (LTC, 1989). But again the form of land tenure can have an important impact on the adoption of alley farming. Tenants operate under a variety of "constraints that mitigate against intensification of land use and agricultural management in ways supportive of alley farming adoption. . . . It is our view that tenancies do not hold great promise for alley farming" (Lawry and Stienbarger, 1991:62; see also Raintree, 1986).

Alley farming can have an important reforestation role in some areas via the increased fertility and productivity of farmland which it fosters. A principal cause of deforestation in much of Sub-Saharan Africa is the increase in area of land under cultivation. The major increases over the past two to three decades in African food production have come from area expansion rather than from higher yields. "One important means of reducing human pressure on buffer-zone and reserve resources is to promote agricultural intensification" (Bloch, 1991:22).

## A. Zaire's Ituri Forest

We chose as a case study of land tenure and deforestation in Africa the Ituri Forest in Zaire. While the previous discussion included a number of special tenure features of significance to the forest resources in Africa, this case study is of more central significance to the closed forest deforestation issues. We chose Zaire for several reasons. Of the estimated 100,000 square kilometres of closed tropical forest being lost annually during the 1980s, nearly half of this occurred in three large countries: Brazil, Zaire, and Indonesia (UNRISD, 1990:2). The Zaire River Basin represents approximately 75 per cent of all of Africa's tropical moist forest (Peterson, 1991a, citing World Resources Institute, 1990; see also Timberlake, 1985).<sup>9</sup> The Ituri Forest is located in the north-eastern corner of Zaire on the edge of the Zaire Basin and comprises an area of more than 65,000 square kilometres (Peterson, 1991a, 1990). When compared to all other Zairian forests, the Ituri contains the most diverse and greatest number of endemic flora and fauna (Peterson, 1991a, citing Wilkie and Finn, 1988:308).

Some of the land tenure-deforestation issues and categories noted in Latin America and Asia also apply to this region. Recent immigration from outside the forest region is a chief factor in the degradation of the Ituri Forest, a fairly widespread phenomenon in other closed forest regions of Africa as well.

Immigration into the Ituri is not a new phenomenon. The groups of indigenous shifting cultivators living in the Ituri today were at one time (as early as 2,000 years ago) immigrants from other areas, often adjacent to the forest. They engaged in low-intensity shifting cultivation, and their farming was supplemented by hunting, fishing, and gathering of forest fruits and nuts. This farmer group learned to live in a close (and symbiotic) relationship with indigenous hunter-gatherer groups, the BaMbuti. These BaMbuti have been hunting and foraging in the Ituri for thousands of years. The hunter-gatherers and the farmers have been interacting in the Ituri for at least 1,500 years. Each group is in part dependent on the other for the exchange of needed materials.

With large in-migration (especially from Kivu), this state of relative harmony within a symbiotic system is rapidly breaking down. Until recently the low population density made land in many areas easy to acquire. But in recent times, the wave of immigrants has contributed to increasing pressure on the land. Furthermore, the immigrants bring with them more extensive as well as more intensive land-use practices. As a result, the rate of conversion of primary forest has increased markedly and environmental deterioration continues apace. Agriculture is the primary economic activity for the immigrants now coming to the Ituri. They are also more inclined to engage in commercial agriculture (Peterson, 1990).

The knowledge of forest products and their uses is much less extensive among immigrant farmers than it is among the indigenous cultivators:

“Immigrant farmers would often respond to interview questions on their use of forest products with statements such as:

- The only benefit of the forest is land to farm and food that is grown to sell and eat.

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<sup>9</sup> A final reason for concentrating on this region is the excellent field research on the area conducted by Richard B. Peterson. A large part of our case material is drawn from his studies.

- We do not go to the forest. I do not get one thing from the forest. The profit of the forest is farming.
- There is nothing in the forest that one can live on.
- The only food of the forest is that which I put into it.
- I don't know about the things of the forest. Things like forest fruits, we are not accustomed to." (Peterson, 1990:58-59.)

As in parts of Latin America and Asia analysed above, immigrants to the Ituri are themselves victims of deeper structural factors back home. And the immigration of farmers into primary forest is as symptomatic as the destruction of the forest itself of more fundamental causes of environmental degradation which are rooted in the unjust relations between different groups in Zairian society. "Both stem from a growing tendency, taking place throughout much of Zaire, towards individualization of land tenure, whether through manipulation of the legal concessionary system or through the spontaneous creation of unofficial land markets. These mechanisms are increasing the level of social inequality within rural Zairian society and favor a growing unequal distribution of land" (Peterson, 1991b).

For example, in the highlands of Kivu (one of the major emigration areas and home to a principal immigrant group, the Nande), a growing entrepreneurial class is buying up land from village chiefs and converting it to cattle ranches and plantation crops. "A study by a Nande anthropologist found that as early as 1980, 25 per cent of Nande farmland in the zones of Beni and Lubero was owned by wealthy businesspeople and private cash croppers" (Peterson, 1990:58, citing Vwakyankazi, 1982:329). Land tenure changes and land grabbing by the wealthier members of the community have led to land shortages and subsequent out-migration from the sending areas. There is also a need to caution against tenure reform consisting merely of individualization and titling. "Often this has led to concentration of land holding by an elite through manipulation of the titling mechanism, as the case of r,forme rurale in Kivu illustrates" (Peterson, 1991a:35).

Peterson (1991a:36) concludes: "Policy-makers seeking to conserve areas of intact forest and improve resource management within adjacent areas, must recognize that blame for local level environmental degradation can rarely be attributed to the people living within those areas." The root of the problems and not the symptoms must be treated, that is, the land tenure issues and the political/economic structures and policies that are far from these areas of deforestation.

## **B. Conclusions**

There is obviously a great need to shape positive and constructive government policies to counter deforestation activities, including the abolition of some existing policies. There is often a bewildering mixture of indigenous systems and rules, a continuing legacy of concepts imposed by colonial governments, and the more recent property régimes and tenure rules designed by the post-colonial national governments.

In some cases, indigenous rules and sanctions served extremely well in fostering rational land use practices and life styles. Whether or not such indigenous régimes could cope with the increasing pressures being brought to bear on the resources is not clear at this time. State policies may be well intended in seeking to impose a new system and thus reducing or eliminating authority of local communities. But some uncertainty remains as to whether this is a positive force for conservation or whether it may lead to transforming what was a locally

governed and managed common property resource into an open access resource. There must be further search in most cases for appropriate sharing and balancing of management authority as among individuals, local entities and/or communities, regional governments, and national sovereign states.

#### **IV. Final Comments**

That deforestation is a very serious problem cannot be contested. By means of various climatic and biological linkages and interrelations, the negative eco-system consequences of deforestation cannot be escaped by anyone or any region on this planet. Likewise, there is ample evidence that land tenure relationships are a key factor in such deforestation, as are the several dimensions of population dynamics and human behaviour. The negative consequences for the world's forests of these various linkages and relationships are frequently intensified by government policies and the rules formulated by government agencies.

Land tenure relationships in areas far removed from where the forest destruction occurs are quite commonly linked to such destruction. And while poor peasants moving into the forests are often singled out as the causal force behind deforestation, in most cases it is the action of the wealthier segments of society that are the most destructive. Profits and other incentives inherent in cattle ranching, commercial farming, mining, and timber harvesting are underlying causal factors. And such profitability is frequently enhanced by various government policies: taxation, subsidies, credit, and so on.

Deforestation in the tropical forest regions affects more than trees. The indigenous peoples who have lived in these forests for thousands of years, and who have developed sustainable resource utilization systems, are often threatened and displaced. For these people, the tragedy is immediate; for others, the world over, the negative consequences of deforestation are more deceptive. They are cumulative and the full impact is gradual and spread over generations.

The key fact is that there are long-range objectives to be fulfilled as well as the more immediate ones of the current generation. The current generation must somehow find the incentives to use forest and other resources in such a way so as not to foreclose the options of future generations. The key issue in seeking the appropriate division of authority and balance in management is to develop such incentives and thus in essence insert the claims of future generations who cannot be present to protect their interests.

## References

- Aluma, John et al.  
**Settlement in Forest Reserves, Game Reserves, and National Parks in Uganda: A Study of Social, Economic, and Tenure Factors Affecting Land Use and Deforestation in Mabira Forest Reserve, Kibale Forest Reserve, and Kibale Game Reserve/Corridor**, LTC Research Paper No. 98, Land Tenure Center, University of Wisconsin-Madison, July 1989.
- Barracclough, Solon and Krishna Ghimire  
**The Social Dynamics of Deforestation in Developing Countries: Principal Issues and Research Priorities**, UNRISD Discussion Paper No. 16, United Nations Research Institute for Social Development, Geneva, 1990.
- Bautista, Germelino M.  
 “The forestry crisis in the Philippines: Nature, causes, and issues”, **Developing Economies**, Vol. 28, No. 1, March 1990.
- Berry, R.A. and W.R. Cline  
**Agrarian Structure and Productivity in Developing Countries**, Johns Hopkins University Press, Baltimore, 1979.
- Biebuyck, D. (ed.)  
**African Agrarian Systems**, International African Institute, London, 1963.
- Binswanger, H.P.  
**Fiscal and Legal Incentives with Environmental Effects on the Brazilian Amazon**, World Bank Discussion Paper No. ARI 69, World Bank, Washington, D.C., May 1987.
- Binswanger, H.P.  
 “Brazilian policies that encourage deforestation in the Amazon”, **World Development**, Vol. 19, No. 7, 1991.
- Bloch, Peter  
**Buffer Zone Management: Access Rules and Economic Realities**, paper presented at Land Tenure Center Workshop on Tenure and Management of Natural Resources in sub-Saharan Africa (Arlington, Va., 13 February 1991), in **Land Tenure Center Workshop on Tenure and Management of Natural Resources in sub-Saharan Africa**, Land Tenure Center, University of Wisconsin-Madison, 1991.
- Branford, Sue and Oriel Glock  
**The Last Frontier: Fighting over Land in the Amazon**, Zed Books, London, 1985.
- Brazil  
**Censo agropecuário, IX [and] X recenseamento geral do Brasil, 1980**, Secretaria de Planejamento da Presidência da República, Fundação Instituto Brasileiro de Geografia e Estatística, Rio de Janeiro, 1983-1984.
- Brokensha, David et al.  
**Fuelwood, Agro-forestry, and Natural Resource Management: The Development Significance of Land Tenure and Other Resource Management/Utilization Systems**, paper prepared for AID/PPC/PDPR, Washington, D.C., 1984.
- Bromley, Daniel W.  
 “Property relations and economic development: The other land reform”, **World Development**, Vol. 17, 1989.



- Bromley, Daniel W.  
 “Arresting renewable resource degradation in the Third World: Discussion”, in Duane Chapman (ed.), **Arresting Renewable Resource Degradation in the Third World**, Environment Working Paper No. 44, World Bank, Washington, D.C., 1990.
- Bromley, Daniel W.  
**Sustaining the Global Commons: Environmental Policies through International Cooperation**, paper prepared for the Agency for International Development, at the Department of Agricultural Economics, University of Wisconsin-Madison, March 1991.
- Bruce, John W.  
**Community Forestry: Rapid Appraisal of Tree and Land Tenure**, Food and Agriculture Organization of the United Nations, Rome, 1989.
- Bruce, John W. and Louise Fortmann  
**Agroforestry: Tenure and Incentives**, LTC Paper No. 135, Land Tenure Center, University of Wisconsin-Madison, July 1989.
- Bruce, John W. and Raymond Noronha  
 “Land tenure issues in the forestry and agroforestry project contexts”, in John B. Raintree (ed.), **Land, Trees and Tenure: Proceedings of an International Workshop on Tenure Issues in Agroforestry, Nairobi, 27-31 May 1985, Sponsored by the Ford Foundation**, ICRAF and the Land Tenure Center, Nairobi and Madison, 1987.
- Brush, Stephen B. and B.L. Turner II  
 “The nature of farming systems and views of their change”, in B.L. Turner II and Stephen B. Brush (eds.), **Comparative Farming Systems**, Guilford Press, New York, 1987.
- Cardoso, Eliana and Ann Helwege  
**Land Reform in Latin America: Can Brazil Learn from Bolivia, Mexico, and Peru**, paper prepared for the Third InterAmerican Seminar on Economics (Rio de Janeiro, 16 March 1989).
- Celis, Rafael  
**Land Taxation, Land Tenure and Resource Use**, Poverty, Natural Resources and Public Policy in Central America Series, March 1991.
- Chambers, Robert and Melissa Leach  
 “Trees as savings and security for the rural poor”, **World Development**, Vol. 17, 1989.
- Chambers, Robert, N.C. Saxena and Tushaar Shah  
**To the Hands of the Poor: Water and Trees**, Westview Press, Boulder, Colo., 1989.
- Chapman, Duane (ed.)  
**Arresting Renewable Resource Degradation in the Third World**, Environment Working Paper No. 44, World Bank, Washington, D.C., 1990.
- Chayanov, A.V.  
 “On the theory of non-capitalist economic systems”, in D. Thorner et al. (eds), **The Theory of the Peasant Economy**, Richard D. Irwin, Homewood, Ill., 1966.
- Ciriacy-Wantrup, S.V. and Richard Bishop  
 “‘Common property’ as a concept in natural resources policy”, **Natural Resources Journal**, Vol. 15, 1975.
- Clawson, Marion  
 “Entering the twenty-first century--The global 2000 report to the president”, **Resources**, No. 66, Spring 1981.

- Collier, William  
 “Agricultural evolution in Java”, in G. Hansen (ed.), **Agricultural and Rural Development in Indonesia**, Westview Press, Boulder, Colo., 1981.
- Collins, Jane L.  
**Land Tenure, Institutional Factors, and Producer Decisions on Fragile Lands**, Working Paper No. 11, Institute of Development Anthropology, Binghamton, N.Y., 1984.
- Collins, Jane L.  
 “Smallholder settlement of tropical South America: The social causes of ecological destruction”, **Human Organization**, Vol. 45, Spring 1986.
- Collins, Jane L.  
 “Labor scarcity and ecological change”, in Peter Little and Michael Horowitz (eds.), **Lands at Risk in the Third World: Local Level Perspectives**, Westview Press, Boulder, Colo., 1987.
- Cornia, G.A.  
 “Farm size, yields and the agricultural production function: An analysis for fifteen developing countries”, **World Development**, Vol. 13, 1985.
- de Ceara, Isabel A.  
 “Land tenure and agroforestry in the Dominican Republic”, in John B. Raintree (ed.), **Land, Trees and Tenure**, Land Tenure Center and International Council for Research in Agroforestry (ICRAF), Madison and Nairobi, 1987.
- Deere, Carmen Diana and Robert Wasserstrom  
**Ingreso familiar y trabajo no agrícola entre los pequeños productores de América Latina y el Caribe**, paper presented at Seminario Internacional sobre la Producción Agropecuaria y Forestal en Zonas de Ladera en América Latina (Turrialba, Costa Rica, 1980).
- Denevan, William M.  
 “Causes of deforestation and forest and woodland degradation in tropical Latin America”, in Report to the Office of Technology Assessment, U.S. Congress, 16 July 1982. Also in Louise Fortmann and John Bruce (eds.), **Whose Trees? Proprietary Dimensions of Forestry**, Westview Press, Boulder, Colo., 1988.
- Dorner, Peter  
**Land Reform and Economic Development**, Penguin Books, Baltimore, 1972.
- Dorner, Peter (ed.)  
**Land Reform in Latin America: Issues and Cases**, **Land Economics** Monograph Series No. 3, published by **Land Economics** for the Land Tenure Center at the University of Wisconsin-Madison, 1971.
- Dubois, James C.L.  
 “Secondary forests as a land-use resource in frontier zones of Amazonia”, in Anthony B. Anderson (ed.), **Alternatives to Deforestation: Steps toward Sustainable Use of the Amazon Rain Forest**, Columbia University Press, New York, 1990.
- Eder, James F.  
 “Deforestation and detribalization in the Philippines: The Palawan case”, **Population and Environment**, Vol. 12, No. 2, 1990.
- FAO (Food and Agriculture Organization of the United Nations)  
**An Interim Report on the State of Forest Resources in the Developing Countries**, FAO, Rome, 1988.

- Fearnside, P.  
 "Agriculture in Amazonia", in G. Prance and T. Lovejoy (eds.), **Amazonia: Key Environments**, Pergamon, Oxford, 1985.
- Feldman, Orna  
 "Crunch goes the rain forest", **Harvard Magazine**, September-October 1990.
- Flader, Susan L.  
 "The river of the mother of God", **Wilderness**, Spring 1991.
- Fortmann, Louise  
 "The tree tenure factor in agroforestry with particular reference to Africa", in Louise Fortmann and John W. Bruce (eds.), **Whose Trees? Proprietary Dimensions of Forestry**, Westview Press, Boulder, Colo., 1988.
- Freudenberger, Karen Schoonmaker  
**MBEGUE: The Disingenuous Destruction of a Sahelian Forest**, Land Tenure Center, University of Wisconsin-Madison, 1991.
- Freudenberger, Mark Schoonmaker  
**The Evolution of Gum Arabic (*Acacia senegal*) Collection Systems in the Jolof, Northern Senegal c. 1890-1990**, paper presented at Common Property Conference, sponsored by International Association for the Study of Common Property (Winnipeg, Manitoba, Canada, 26-29 September 1991).
- Fujisaka, S. and A. Doris Capistrano  
 "Upland development in Calminoe: The roles of resource use, social system, and national policy", in S. Fujisaka, P. Sajise, and R. del Castillo (eds.), **Man, Agriculture and the Tropical Forest: Change and Development in the Philippine Uplands**, Winrock International Institute for Agricultural Development, Bangkok, 1986.
- Furer-Haimendorf, Christoph von  
**Tribes of India: The Struggle for Survival**, University of California Press, Berkeley, 1982.
- Geertz, Clifford  
**Agricultural Involution: The Process of Ecological Change in Indonesia**, University of California Press, Berkeley, 1983.
- Ghimire, Krishna  
**Forest or Farm? The Politics of Poverty and Land Hunger in Nepal**, Oxford University Press, New Delhi, forthcoming.
- Goodland, Robert  
**Tropical Deforestation: Solutions, Ethics, Religions**, Environment Working Paper No. 43, World Bank, Washington, D.C., 1991.
- Hall, Anthony L.  
**Developing Amazonia: Deforestation and Social Conflict in Brazil's Carajás Programme**, Manchester University Press, Manchester, Eng., 1989.
- Hardin, Garrett  
 "The tragedy of the commons", **Science**, Vol. 162, No. 3859, 13 December 1968.
- Hardjono, Joan  
 "Spontaneous rural settlement in Indonesia", in **Spontaneous Settlement Formation in Rural Regions**, Vol. 2, **Case Studies**, United Nations Centre for Human Settlements, UNHS/Habitat, Nairobi, 1986.
- Hay, James Diego  
 "The remaking of the proletariat: Social change on the Amazon frontier", **Latin Americanist**, 23 May 1988.

- Hecht, Robert M.  
 “The Ivory Coast economic ‘miracle’: What benefit for peasant farmers?” **Journal of Modern African Studies**, Vol. 21, 1983.
- Hecht, Susanna B.  
 “Environment, development, and politics: Capital accumulation and the livestock sector in eastern Amazonia”, **World Development**, Vol. 13, June 1985.
- Hecht, Susanna and Alexander Cockburn  
**The Fate of the Forest: Developers, Destroyers and Defenders of the Amazon**, Verso Press, London, 1989.
- Herring, Ronald J.  
**Land to the Tiller: The Political Economy of Agrarian Reform in South Asia**, Yale University Press, New Haven, Conn., 1983.
- Hong, Evelynne  
**Natives of Sarawak: Survival in Borneo’s Vanishing Forest**, Institut Masyarakat, Malaysia, 1987.
- Integrated Development Systems  
**The Land Tenure System in Nepal**, Kathmandu, 1986.
- Jagels, Richard  
 “Notes on responding to those concerned about perception and reality: Tropical forest exploitation”, **Journal of Forestry**, Vol. 88, No. 9, 1990.
- Jones, Jeffrey  
 “Socio-cultural constraints in working with small farmers in forestry: Case of land tenure in Honduras”, in Louise Fortmann and John Bruce (eds.), **Whose Trees? Proprietary Dimensions of Forestry**, Westview Press, Boulder, Colo., 1988.
- Karliner, Joshua  
 “Central America’s other war: The environment under siege”, **World Policy Journal**, Vol. 6, Fall 1989.
- Katzman, Martin T. and William G. Cale, Jr.  
 “Tropical forest preservation using economic incentives”, **BioScience**, No. 40, December 1990.
- Kenmore, Zenaida F. and J.C. Flinn  
**An Ethnohistory of an Upland Area: Claveria, Misamis Oriental**, unpublished paper, Agricultural Economics Department, International Rice Research Institute (IRRI), Los Banos, Philippines, 24 January 1987.
- Kulkarni, Sharad  
**India: Indigenous Communities**, IWAIA, No. 55, 1988.
- Lawry, Steven W.  
**Tenure Policy and Natural Resource Management in Sahelian West Africa**, LTC Paper No. 130, Land Tenure Center, University of Wisconsin-Madison, February 1989.
- Lawry, Steven W.  
 “Tenure policy toward common property natural resources in sub-Saharan Africa”, **Natural Resources Journal**, Vol. 30, Spring 1990.
- Lawry, Steven W.  
**An Overview of the Land Tenure Center’s Program on Tenure and Management of Natural Resources in sub-Saharan Africa**, paper presented at Land Tenure Center Workshop on Tenure and Management of Natural Resources in sub-Saharan Africa, (13 February 1991, Arlington, Va.), in **Land Tenure Center Workshop on Tenure and Management of Natural Resources in sub-Saharan Africa**, Land Tenure Center, University of Wisconsin-Madison, 1991.

- Lawry, Steven W. and Kent Elbow  
**Forestry Regulation in Senegal**, report of a consultancy for Senegal reforestation project, USAID No. 685-0283, Dakar, Senegal, 1990.
- Lawry, Steven W. and Douglas M. Stienbarger  
**Tenure and Alley Farming in the Humid Zone of West Africa: Final Report of Research in Cameroon, Nigeria, and Togo**, LTC Research Paper No. 105, Land Tenure Center, University of Wisconsin-Madison, August 1991.
- Lebel, Gregory G. and Hal Kane  
**Sustainable Development: A Guide to Our Common Future**, report of the World Commission on Environment and Development, Center for Our Common Future, Geneva, June 1990.
- Leonard, H. Jeffrey  
**Natural Resources and Economic Development in Central America**, Transaction Books, New Brunswick, N.J., 1987.
- Lopez, Maria Elena  
 "The politics of lands at risk in a Philippine frontier", in Peter D. Little, Michael M. Horowitz and A. Endre Nyerges (eds.), **Lands at Risk in the Third World: Local-level Perspectives**, Westview Press, Boulder, Colo., 1987.
- LTC (Land Tenure Center)  
**The Implications of Land and Tree Tenure for the Introduction of Alley Farming in Tropical West Africa: A Preliminary Report**, submitted to the International Livestock Centre for Africa, Land Tenure Center, University of Wisconsin-Madison, December 1989.
- Lynch, Jr., Owen J.  
 "Philippine law and upland tenure", in S. Fujisaka, P. Sajise and R. del Castillo (eds.), **Man, Agriculture and the Tropical Forest: Change and Development in the Philippine Uplands**, Winrock International Institute for Agricultural Development, Bangkok, 1986.
- Lynch, Jr., Owen and Kirk Talbott  
 "Legal responses to Philippine deforestation crises", **New York University Journal of International Law and Politics**, Vol. 20, No. 3, 1988.
- Mahar, Dennis J.  
**Government Policies and Deforestation in Brazil's Amazon Region**, World Bank Publications, Washington, D.C., 1989.
- Mahat, T.B.S., D.M. Griffin and K.R. Shepherd  
 "Human impact on some forests of the middle hills of Nepal: Forestry in the context of the traditional resources of the state", **Mountain Research and Development**, Vol. 6, No. 3, 1986.
- Marshall Institute  
**Scientific Perspectives on the Greenhouse Problem, Executive Summary**, George C. Marshall Institute, Washington, D.C., 1989.
- Maurer, Harry  
 "The Amazon: Development or destruction", in Louise Fortmann and John Bruce (eds.), **Whose Trees? Proprietary Dimensions of Forestry**, Westview Press, Boulder, Colo., 1988.

- Mitchell, Arthur, Yance de Fretes and Mark Poffenberger  
 “Community participation for conservation area management in the Cyclops Mountains, Irian Jaya, Indonesia”, in **Keepers of the Forest: Land Management Alternatives in Southeast Asia**, Kumarian Press, West Hartford, Conn., 1990.
- Montgomery, John D.  
 “Trees to the tiller: Environmental perspectives on land reform”, in **Land Reform in Central America and the Caribbean**, proceedings of Seminar on Aspects of Land Reform in Central America and the Caribbean, sponsored by University of San Carlos, Guatemala, and Land Reform Training Institute, Republic of China (Guatemala City, 11-14 September 1989), Centro Impresor Piedra Santa, Guatemala, 1990.
- Moorhead, Richard  
 “Changes taking place in common-property resource management in the Inland Delta of Mali”, in Fikret Berkes (ed.), **Common Property Resources: Ecology and Community-Based Sustainable Development**, Belhaven Press, London, 1989.
- Myers, N.  
**Deforestation Rates in Tropical Forests and their Climatic Implications**, Friends of the Earth, London, 1989.
- Palo, Matti  
**System Causality of Deforestation and Development in the Third World**, paper presented at United Nations Research Institute for Social Development (UNRISD) Conference (Geneva, August 1990), Finnish Forest Research Institute, Helsinki, 1990.
- Peck, Robert B.  
 “Promoting agroforestry practices among small producers: The case of the coca agroforestry project in Amazonian Ecuador”, in Anthony B. Anderson (ed.), **Alternatives to Deforestation: Steps toward Sustainable Use of the Amazon Rain Forest**, Columbia University Press, New York, 1990.
- Peskin, Henry M. and Ernst Lutz  
**A Survey of Resource and Environmental Accounting in Industrialized Countries**, Environment Working Paper No. 37, World Bank, Washington, D.C., 1990.
- Peterson, Richard B.  
 “Searching for life on Zaire’s Ituri Forest frontier”, **Cultural Survival Quarterly**, Vol. 14, No. 4, 1990.
- Peterson, Richard B.  
**Whose Forests: Land Tenure Dynamics on Zaire’s Ituri Forest Frontier**, paper presented at Land Tenure Center Workshop on Tenure and Management of Natural Resources in sub-Saharan Africa (Arlington, Va., 13 February 1991a), in **Land Tenure Center Workshop on Tenure and Management of Natural Resources in sub-Saharan Africa**, Land Tenure Center, University of Wisconsin-Madison, 1991.
- Peterson, Richard B.  
**To Search for Life: A Study of Spontaneous Immigration, Settlement and Land Use on Zaire’s Ituri Forest Frontier**, M.S. thesis, Land Resources, University of Wisconsin-Madison, 1991b.
- Poffenberger, Mark  
 “The evolution of forest management systems in Southeast Asia”, in Mark Poffenberger (ed.), **Keepers of the Forest: Land Management Alternatives in Southeast Asia**, Kumarian Press, West Hartford, Conn., 1990.

- Raintree, J.B.  
 “Agroforestry pathways: Land tenure, shifting cultivation, and sustainable agriculture”, **UNASYLVA**, No. 154, 1986.
- Ramirez, Luis F.  
 “An answer to spontaneous rural settlements--Nicaragua: A case study”, in **Spontaneous Settlement Formation in Rural Regions**, Vol. 2, **Case Studies**, United Nations Centre for Human Settlements, UNHS/Habitat, Nairobi, 1986.
- Redclift, Michael  
 “The environmental consequences of Latin America’s agricultural development: Some thoughts on the Brundtland Commission report”, **World Development**, Vol. 17, 1989.
- Repetto, Robert  
**The Forest for the Trees? Government Policies and the Misuse of Forest Resources**, World Resources Institute, Washington, D.C., 1988.
- Riddell, James C.  
 “Land tenure and agroforestry: A regional overview”, in John B. Raintree (ed.), **Land, Trees and Tenure: Proceedings of an International Workshop on Tenure Issues in Agroforestry, Sponsored by the Ford Foundation**, ICRAF and the Land Tenure Center, Nairobi and Madison, 1987, 1987.
- Rodríguez C., Silvia and Emilio Vargas M.  
**El Recurso Forestal en Costa Rica: Políticas Públicas y Sociedad, 1970-1984**, Departamento de Publicaciones, Editorial de la Universidad Nacional, San José, 1988.
- Rodriguez, Silvia et al.  
**An Annotated Bibliography on Community Management of Forest Resources in Latin America**, Land Tenure Center, University of Wisconsin-Madison, March 1991.
- Runge, C. Ford  
 “Common property and collective action in economic development”, **World Development**, Vol. 14, 1986.
- Savonnet, George  
 “Evolution des pratiques foncières dans le Bwamu méridional”, in B. Crousse, E. Le Bris and E. Le Roy (eds.), **Espaces Disputés en Afrique Noir: Pratiques Foncières Locales**, Editions Karthala, Paris, 1986.
- Sawyer, Donald  
 “The future of deforestation in Amazonia: A socioeconomic and political analysis”, in Anthony B. Anderson (ed.), **Alternatives to Deforestation: Steps toward Sustainable Use of the Amazon Rain Forest**, Columbia University Press, New York, 1990.
- Schmink, Marianne  
 “Land conflicts in Amazonia”, **American Ethnologist**, No. 9(2), May 1982.
- Schmink, Marianne and Charles H. Wood  
 “The ‘political ecology’ of Amazonia”, in Peter Little, Michael Horowitz and A. Endre Nyerges (eds.), **Lands at Risk in the Third World: Local-level Perspectives**, Westview Press, Boulder, Colo., 1987.
- Scholz, Ullrich  
 “Spontaneous rural settlements and deforestation in South East Asia: Examples from Thailand and Indonesia”, in **Spontaneous Settlement Formation in Rural Regions**, Vol. 2, **Case Studies**, United Nations Centre for Human Settlements, UNHS/Habitat, Nairobi, 1986.

- Schwartzman, Stephan and Mary Helena Allegretti  
**Extractive Production in the Amazon and the Rubber Tappers' Movement**, Environmental Defense Fund, Washington, D.C., 28 May 1987.
- Schweigert, Thomas E.  
**Land Distribution and Land Use in Guatemala**, Ph.D. dissertation, Economics/Agricultural Economics, University of Wisconsin-Madison.
- Sesser, Stan  
 "A reporter at large: Logging the rain forest", **The New Yorker**, 27 May 1991.
- Shepherd, Gill  
 "The communal management of forests in the semi-arid and sub-humid regions of Africa: Past practice and prospects for the future", **Development Policy Review**, Vol. 9, 1991.
- Shrestha, Nanda  
**Landlessness and Migration in Nepal**, Westview Press, Boulder, Colo., 1990.
- Southgate, Douglas and C. Ford Runge  
**The Institutional Origins of Deforestation in Latin America**, Staff Paper No. P90-5, Department of Agricultural and Applied Economics, University of Minnesota-Minneapolis, January 1990.
- Southgate, Douglas, Rodrigo Sierra and Lawrence Brown  
**The Causes of Tropical Deforestation in Ecuador: A Statistical Analysis**, Environmental Economics Centre Paper No. 89-09, Institute for Environment and Development, London, 1989.
- Stonich, Susan C.  
 "The dynamics of social processes and environmental destruction: A Central American case study", **Population and Development Review**, Vol. 15, 1989.
- Swift, Jeremy  
 "The future of African hunter-gatherer and pastoral peoples", **Development and Change**, Vol. 13, No. 2, 1982.
- Talbott, Kirk  
**Managing Tropical Forest Resources in Central Africa: An Examination of Nation State Authority and Local Communities Rights**, paper presented at Common Property Conference, sponsored by International Association for the Study of Common Property (Winnipeg, Manitoba, Canada, 26-29 September 1991).
- Thiesenhusen, William C.  
 "Population growth and agricultural employment in Latin America, with some U.S. comparisons", **American Journal of Agricultural Economics**, Vol. 51, No. 4, November 1969.
- Thiesenhusen, William C.  
 "Latin America's employment problem", **Science**, Vol. 171, No. 3974, 5 March 1971.
- Thiesenhusen, William C.  
 "Implications of the rural land tenure system for the environmental debate: Three scenarios", **Journal of Developing Areas**, Vol. 26, No. 1, October 1991a.
- Thiesenhusen, William C.  
 "Sri Lanka: Strife, development, and the environment", **Land Reform, Land Settlement and Cooperatives**, forthcoming 1991b.
- Thiesenhusen, William C. and Jolyne Melmed-Sanjak  
 "Brazil's agrarian structure: Changes from 1970 through 1980", **World Development**, Vol. 18, No. 3, March 1990.



- Thiesenhusen, William C. et al.  
**Report of the Second Evaluation of Plan Sierra**, Madison, Wisconsin, 15 August 1991.
- Thomsen, Michael  
**Upland Resource Degradation and the Demise of Indigenous Institutions in South Cotabato Province, Mindanao Island, Philippines**, proposal for dissertation research in Agricultural Economics, University of Wisconsin-Madison, September 1991.
- Timberlake, Lloyd  
**Africa in Crisis**, John Tinker (ed.), International Institute for Environment and Development, London, 1985.
- Torres, Filemon et al.  
 “Agroforestry systems for smallholder upland farmers in a land reform area of the Philippines: The Tabango case study”, in S. Fujisaka, P. Sajise, and R. del Castillo (eds.), **Man, Agriculture and the Tropical Forest: Change and Development in the Philippine Uplands**, Winrock International Institute for Agricultural Development, Bangkok, 1986.
- UNRISD (United Nations Research Institute for Social Development)  
**Social Dynamics of Deforestation in Developing Countries**, research proposal, UNRISD, Geneva, 1990.
- Vergara, Napoleon et al.  
**Social Forestry Research Issues: Preliminary Problem Identification in Sisaket Province, Northeast Thailand**, Social Forestry Network Paper No. 2b, Overseas Development Agency, London, May 1986.
- Vwakyanakazi, M.  
**African Traders in Butembo, Eastern Zaire (1960-1980): A Case Study of Informal Entrepreneurship in a Cultural Context of Central Africa**, Ph.D. dissertation, University of Wisconsin-Madison, 1982.
- Wilkie, D.S. and J.T. Finn  
 “A spatial model of land use and forest regeneration in the Ituri forest of northeastern Zaire”, **Ecological Modeling**, Vol. 41, 1988.
- Wilson, E. (ed.)  
**Biodiversity**, National Academy Press, Washington, D.C., 1988.
- World (Brundtland) Commission on Environment and Development  
**Our Common Future**, Oxford University Press, Oxford, 1987.
- World Resources Institute  
**Improving Land Tenure Systems for Forest Management in the Zaire River Basin of Central Africa**, preliminary draft of research project concept paper, World Resources Institute, Center for International Development and Environment, Washington, D.C., November 1990.
- World Resources Institute and International Institute for Environment and Development  
**World Resources, 1987**, Basic Books, New York, 1987.
- Young, N.P.  
 “Sharing the burden of global warming”, **Philosophy and Public Policy**, Vol. 10, No. 3/4, 1990.