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Literature Review

Environmental policies and the livelihoods of people living in the forest margins

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Introduction

The search

The literature was searched using two sources: the ISI database (via the Web of Science portal) and CABI (via Edina). Search terms used included: policy[1], environment, and forest. Since it was felt important to be able to appreciate the country context, an attempt was made to focus the reading on particular cases. So by country, the search was restricted to the cases of: Brazil, Colombia and Mexico in Latin America; Ghana, Kenya and Madagascar in Africa; and Indonesia, Nepal and Thailand in Asia. These were selected on the grounds that they were countries where there were substantial areas of tropical forests (Kenya excepted) and it was thought that their ecological problems were well researched (not true for Colombia). The search was further restricted to publication since 1990. Important findings published before 1990 should be captured in the citations in articles written during the last decade.

[1] As well as 'policies', 'environmental' as well as 'environment' etc. Use of wild cards in searches makes it easy to capture the various derivations from terms.

Initial considerations

This produced around 275 references.[2] References seen fall into various groups:

- Explanations of environmental degradation, mainly loss of forests, other favoured habitats and species, and proposals for their mitigation and solution. Such articles usually suggest ways to deal with the 'problem'.
- Considerations of how to make optimal and sustained use of resources, above all forests. 'Sustainable forestry' is a popular topic.

Conversely, rather little focuses on the livelihoods of people living in the forest margins. They are usually seen either as one set of actors in the processes that are the focus of attention, or else as victims in the general malaise. As actors they often appear as impelled by wider forces. Relatively few studies set their livelihoods as the centre of attention.

Accounts of natural resource management by people on the ground are also rather scarce. Much of the literature sees natural resources in broad aggregates—forests, pastures, fields. It is not so much their management and use that matter, so much as the apparent (when seen by remote sensing or in ecological surveys) cover under different resources. The details of natural resource use and management are often ignored.

Policies are also less well served than might be imagined. They may be mentioned as part of the influences on what is thought to be taking place. Specific programmes and initiatives may attract comment and evaluation. For forestry, there are some inventories of forest legislation. But few studies begin with the policies and look at their impact.

The main themes in the literature

Much of the literature looks at perceived environmental problems. These arise at different levels, but much writing focuses on the global issues of climate change, loss of biodiversity and associated deforestation. Perceptions matter here: as Batterbury et al. (1997) note, environmental issues arise at different levels. What is seen as a problem at one level may be very different when seen at another level. For example, for the Amazonian settler farmer clearing forest, the key issues are income and security, in which the environmental matter of soil fertility plays a part. At the other extreme, the global concern may be carbon release and its impact on the weather and loss of biodiversity. Perceptions create 'problems' that attract policy concern and create interests.

In a search that narrowed to only those abstracts including the term 'forest', the key problems mentioned were loss of tropical forest, loss of biodiversity, carbon release and climatic change, soil erosion, sedimentation and flooding.

When looking at perceived problems, the typical issues addressed are:

- What is the problem and how serious is it?
- What causes the problem?
- How may it be remedied?

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[2] Here is the search strategy used on the CABI base:

1	(environ$ and polic$ and (Bra#il$ or Colombia$ or Mexic$ or Ghana$ or Kenya$ or Madagasc$ or Malgach$ or Nepal$ or Thai$ or Indones$)).mp. [mp=abstract, title, original title, heading words]	1295
2	limit 1 to yr=1990-2000	936
3	2 and Forest$.mp. [mp=abstract, title, original title, heading words]	275

In what follows, the first two of these will be reviewed. Some notes on favoured remedies will appear in the section on policies below.

The seriousness of forest-related environmental problems

There is much documentation on deforestation. Hardly a piece has been written about tropical that does not report data, at levels ranging from districts to the world as a whole, on the rate at which forest is being removed. Generally the data show alarming rates of loss of tropical forests. But there are important caveats that qualify the picture of widespread deforestation.

Defining deforestation

The first reservation concerns the definition of forest. Metz (1991) reports that in Nepal the government was prepared to accept areas with as little as 10% of the land covered by tree crowns as 'forest'. Other agencies working in Nepal took rates of 40% and 50% crown cover as the threshold of 'forest'. No other study seen went into the matter of the precise definition of forest, although others mention the perils of definition. For example Vandergeest (1996) reports that at the start of the twentieth century, the Government of Thailand designated all unsettled land as 'forest'. By the 1990s, fully 48% of the country was 'protected' forest, despite no more than one third of the reserves being covered in trees.

This is worrying. Many authors report international statistics on deforestation or combine in their analyses data from different countries.[3] But if there is no internationally accepted way of defining forest, then any aggregation of figures across countries risks combining incommensurate data. Moreover, how areas of forest are measured was not often reported, although some articles took pains to explain their methods (Gilruth et al. 1990, Sussman et al. 1994).

The second caveat concerns the difference between deforestation and degradation, that is between outright removal of the forest and loss of quality. The desirable environmental functions of forest such as providing soil cover and habitat for other flora and fauna, ability to absorb moisture, minerals and carbon, capacity for transpiration; as well as desirable economic attributes such as timber species and occurrence of non-timber forest products—all depend largely on the quality and composition of the forest. There are worlds of difference between primary gallery forests, secondary regrowth after felling or coppicing, and monospecies plantations of industrially valuable softwoods, no matter that they have similar extents of tree crown cover. Statistics on forest cover are common: those describing the quality of the forest are less frequently reported.

To complicate matter still further, what counts as 'degradation' depends much on what functions are seen as important. For example, a logging company would not see well-populated stands of single species of a valuable timber as a 'degraded' forest. But an ecologist interested in biodiversity might feel the plantation to be inferior compared to a species diverse primary or secondary forest.

Finally, there are questions about what constitutes 'deforestation'. Is the swidden plot of a subsistence farmer, cleared in the forest but cropped for only two or three years before being abandoned to revert to forest re-growth, to be counted as lost woodlands? For some any removal of primary forest constitutes deforestation. For others, forest is only seen as lost when the land is converted to some other use permanently—or at least for the foreseeable future.

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[3] For example, Antle & Heidebrink 1995 ran a cross-country regression of rates of deforestation against population and income, using data from no less 95 states. Did all the states use the same definition of forest?

Hence it is as well to be wary when reading the more sweeping allegations of widespread and wholesale destruction of tropical forests.

Questioning the seriousness of losses

These qualifications notwithstanding, no one seems to dispute that tropical forests in many regions are being lost in the sense of being permanently cleared of trees or degraded. But the nature of the loss is in dispute. For example, Metz (1991) reports Nield's (1985) claim that there was no net loss of forests (deforestation) in the Nepalese hills between 1964/65 and 1978/79. Forest clearance in the country was taking place almost entirely in the lowland Terai region. But Metz does argue that the hill forests were being degraded by heavy collection of leaves and branches and by grazing livestock in the woods (see also Thapa & Weber 1995 for similar reports from a watershed near Pokhara).

More in question are the environmental consequences of loss of forests. In reviewing the case of Nepal, Metz (1991) reports a series of studies that revise the conventional wisdom of the Nepalese environmental crisis. In this account, population pressure leads to deforestation, and that in turn leads to soil erosion and more erratic river regimes. Within the Nepalese hills the consequences are loss of soil fertility and landslips. Downstream, on the floodplains of the Brahmaputra and the Ganges, the effects are felt in increasingly frequent and severe floods and sedimentation. The revisionists, however, provide evidence that most of the sediment in the streams comes from landslides, the result of mass wasting, as streams cut down and steepen slopes—to be expected in a geomorphology where the landscape is still rising. Indeed sediment loads in Himalayan streams roughly equate to the mass equivalent to a rise of 1mm–2mm a year. Compared to these natural processes that have been going on for millenia[4], they claim, human contributions to erosion are insignificant. Other studies show no change in the frequency and intensity of flooding downstream, whatever changes in land use have taken place in the Nepalese hills. Finally, any loss of forests in Nepal can have little or no effect on the rains from monsoons arising from continental climatic systems.

In less dramatic fashion, reports from the Amazon (Pichón 1996, Serrao et al. 1996, Toniolo & Uhl 1995) qualify the idea that the removal of tropical rain forest leads inexorably to soil impoverishment. Much depends on the soil and its subsequent use and management.

In Thailand, where swidden[5] systems are seen as destructive, Schmidt-Vogt (1998) reports that in classic long-fallowing systems in as little as eight years after abandoning plots the vegetation has recovered most of the attributes of the forest before felling.

Such reports are not cited to argue that loss of tropical forest does not matter. The conventional wisdom that sees removal of forest as leading to soil impoverishment, soil erosion, loss of biodiversity, less carbon sequestration and release of carbon into the atmosphere and thus contributing to global warming—is surely correct to some degree in many cases. The point is that for any specific case, such general propositions need to be tested before blithely accepting that loss of forest is unambiguously harmful.

The causes of forest-related environmental problems

Much has been written to explain the causes of deforestation and the associated problems arising from this. Of the factors cited, the following are frequently mentioned:

(i) Population growth, sometimes linked to poverty;

[4] The Ganges flood plain consists of no less than 5 km depth of sediments laid down through geological time periods.

[5] Swidden refers to slash-and-burn farming whereby forest is cleared, burned and then tilled for a few years before allowing the land to revert to fallows.

(ii) The profit motive of individual entrepreneurs, stimulated by demand in the regional, national or international economy. Sometimes this may be still further heightened by development strategy and policy that encourages particular land uses or affects the price of factors of production;

(iii) Uncertainty over land tenure and inappropriate tenure rules;

(iv) Misguided policy and development projects; and,

(v) Construction of roads.

These categories overlap. A simpler reduction might be a threefold split into: population growth (i), market opportunities (ii) and government policy (ii), (iii), (iv) and (v). Otherwise put, these might be labelled push factors, pull factors, and government failure. These three will now be reviewed.

Push factors: population growth and poverty

That population increases put pressure on natural resources and lead people to clear or degrade forests is as popular an idea as it is plausible. People are 'pushed' into the forest to eke out a livelihood. There is much evidence that shows deforestation in the presence of increasing populations. For example, Mertens et al. (2000) see correlation between population increases and deforestation in eastern Cameroon in 1986-91. Sussman et al. (1994) ascribe forest clearance in eastern Madagascar to population pressures. Rigg (1993) sees part of the reason for forest loss in Thailand as the expansion of lowland cropping by an increasing population. In Nepal, Thapa & Weber (1995) report more people putting unsustainable pressure on grazing land and the forests.

But the literature is perhaps more marked by those questioning the importance of population than those asserting its importance. Some query just how closely associated are population increase and deforestation. Sunderlin & Resodarmo (1999), for example, note that correlations between population growth rates and deforestation rates that might apply nationally do not hold at disaggregated levels. In particular they report that most of Indonesian population growth in the 1980s took place in the cities, with rural population growth at as little as 1% a year. Yet forest clearance continued unabated in the 1980s.

Another doubt is expressed by those who probe the relation of local populations on forest. As populations in forest zones increase, or when farmers with few resources other than their labour arrive in the forests, the most frequently seen use of the land is swidden (slash-and-burn) farming. This is often seen as destructive: felling the forest for no more than a few years cultivation, and then yet more forest is cleared. It can be seen as the epitome of careless use of a natural resource: trees that have grown over decades are felled within hours, and burned within days.

But there is controversy over just how harmful swidden is. As mentioned, Schmidt-Vogt (1998) in northern Thailand records just how quickly secondary forests regain the characteristics of primary forests. But then, as he admits, when population pressure mounts and fallow times are shortened, regeneration of forest is both slower and less certain. Moreover, there are different patterns of swidden with different implications for recovery. Some groups in northern Thailand use their swidden fields briefly, as little as one year, and in that time they scarcely destump or harm the roots of the trees they have cut.[6] Indeed, the Lawa commonly do not even fell the largest trees, but merely trim their crowns. Forest re-establishes itself rapidly under such conditions. Others, however, till their cleared gardens

[6] Nyerges (1996) in northern Sierra Leone notes how the Susu seem to coppice their trees, rather than clear them.

much more intensively and for six or more years. In such cases, grasses and bamboos may colonise abandoned plots and forests regenerate slowly if at all.

Even when population increases correlate closely with population growth, it is not clear what the direction of causality is. It may be that deforestation is precisely what allows the local population to increase. Or it may be that both population growth and deforestation respond to some separate cause. For example, in eastern Cameroon in the late 1980s (Mertens et al. 2000) it was economic crisis that drove people to seek livelihoods in sparsely-populated forest lands.

But this example suggests that it may be poverty that pushes people to clear or degrade forests. In a desperate struggle to survive, people clear forests to carry out subsistence farming, convert forest to charcoal for sale, or extract fodder and fuel wood beyond the capacity of the forest to regenerate. Being poor, it is added (Vosti & Witcover 1996), makes the short term critical so that households undertake activities that they know cannot be sustained so as to survive. Frickman Young & Bishop (1995) see poverty, exacerbated by adjustment policies, as likely to lead to heavier pressure on natural resources. In Mexico, Deininger & Minten (1999) use a multivariate analysis to assess deforestation at the level of the Municipio (the smallest administrative unit of local government), and find that there is, all other things being equal, less forest removal in higher elevations, where there are steep slopes, in arid areas, and where soils are poor. Yet such areas are where poverty tends to be worst. When they control for these natural factors, poverty correlates with more rapid loss of forest. Their work demonstrates the importance of context in tracing associations and causality.

These ideas are strongly rejected by other authors. In a review of 140 models of deforestation, Angelsen & Kaimovitz (1998) deny that population growth causes deforestation, and claim that the impact of poverty is not clear. Arnold & Bird (1999) argue that if poverty were the cause of deforestation, then as economies grow and assuming that at least some benefits trickle down so as to alleviate poverty, rates of deforestation would slow. But no, they claim, boom times often mean more rapid clearance of forest. Duraiappah (1998) in a wide-ranging review of the impact of poverty on the environment, rejects poverty as the cause of loss of forest—although admitting that once degradation has taken place the poor may suffer most and then further exploit the resource under pressure.

The debate over the effect of poverty depends in part on the point of departure in the causal chain. For example, as will be argued below, landlessness is often seen as a spur to settling in forests. The poor are often landless. But what then drives settlement: lack of land, or poverty?

Pull factors: market opportunity and economic growth

In contrast to accounts that see push factors as important, are those studies that argue that forests are cleared by the pull of profit. Forests, given physical access to markets with attractive prices, fall victim to logging, mining, and conversion to plantations of tree crops or cattle grazing lands. Angelsen & Kaimovitz (1999) in their review of other studies indicate that higher prices for timber and farm output tend to lead to deforestation.

Angelsen (1995) and Sunderlin & Resordamo (1999) argue that it is the lure of the gains from timber and tree crop plantations that have contributed more to deforestation in Indonesia than other factors, above all clearance by small-scale farmers. In the Amazon, Pichón (1996) emphasises that when returns are attractive to cattle ranching and other uses of the forests, the only restraint on even faster rates of deforestation is the scarcity of capital. This argument is supported by the household models of Tomich et al. (1998). Indeed, in the Amazon it seems the longer established and more successful are settlers, the more forest they will have converted, and the greater the proportion turned into cattle pastures (Walker et al. 2000). For

Honduras, Stonich (1992) reports the creation of cattle pasture in the 1970s and 1980s as the main motive for deforestation.

This set of arguments presents a bleak picture for tropical forests. In a future world in which incomes are higher, the demand for timber, minerals and land could be much higher than today. At the same time the technology of access is likely to improve, so that one wonders just how much tropical forest could ever survive. Against this stands the importance of forests for public and collective goods, above all ecological services in stabilising hydrological regimes, storing carbon, regulating micro- or regional climates, and providing a biodiverse habitat.[7] Affluent consumers may value these services more than those of modest means, and may be able to afford to take into account long-term effects. They may effectively demand more of these goods and services.

Thus some have argued that there may be an environmental counterpart of the Kuznetz curve, with forest first being depleted as economies grow but later being conserved as prosperity spreads. Antle & Heidebrink (1992) tested this by regressing areas under national parks and other national parks, and rates of deforestation, against incomes. Their regression confirmed the curve posited. Indeed, they estimated that for high income countries the income elasticity of demand for environmental services might be two or more. The turning points on the curve arose at incomes between US$1,225 and US$2,050 a year a head. But other authors cast doubt on this relationship, claiming that studies have only partly succeeded in demonstrating the effect (Angelsen & Kaimovitz 1999).

If there are collective goods and services that people value, then some form of collective action will be needed to ensure that these values are not overridden by the calculus of individual gain. Government and in some cases civil associations will be instrumental in rectifying the bias in decision-making.

Government failure

Of course the last argument does assume that governments function in the interest of the citizens they govern, and can implement competently. Unfortunately, governments may fail to do either. This can happen either wilfully, as when government becomes the pawn of powerful private interests, or more or less by accident as government proves unable to recognise problems, take coherent and appropriate decisions, or to implement them. What follows is a listing of problems noted in the literature that affect forest clearance.

Development strategy and structural adjustment

Does the choice of development strategy affect the rate of deforestation? More particularly, does the adoption (or imposition) of structural adjustment packages encourage forest clearance? Adelman & Fetini (1991) see that strategies based on staple exports and agricultural development-led industrialisation are likely to put pressure on the resource base. Marinova (1999) accuses Indonesia of making large grants of land to plantation interests. It is they who clear much of the forest, in the process sparking the huge fires seen in the late 1990s.

In the case of Ghana, Owusu (1998) claims that sectoral loans for forestry granted after the Economic Recovery Programme of 1983 was put into place, encouraged rapacious logging. Indeed, he claims that the donor funds were lent on to local companies denominated in dollars at a time the nominal value of the cedi was falling. Hence the only way the companies

[7] To these values can be added those of the option of having the forests in the future for whatever use made be made of them, and the intrinsic existence values that people assign to the comfort of knowing tha the forest is there, irrespective of any direct utility it may confer on them.

could meet their repayments was to export all they could. In their extensive review, Angelsen & Kaimovitz (1998) report that liberalisation is likely to encourage forest clearance. On the other hand, adjustment may bring lower domestic aggregate demand that may put less pressure on resources (Frickmann Young & Bishop 1995). Then again it may increase poverty and push people to exploit resources however marginal the returns may be. Finally, adjustment will probably involve cuts to government budgets and these may weaken the ability of any state monitoring and regulatory agencies to control forest clearance (Marinova 1999).

That said, there are all manner of conditioning variables that lie between a structural adjustment package, to say nothing of the many variations within such packages, and clearance of forest, so that the major reviews are reluctant to rule that adjustment itself necessarily has any generalised impact on forest clearance (Angelsen & Kaimovitz 1998, Frickmann Young & Bishop 1995).

Taxes and subsidies

Much has been said about how these policies have encouraged Amazonian deforestation in Brazil. The ability to write off investments in cattle ranches against tax liabilities, tax holidays on profits from uses of cleared lands, and subsidises on credit have all been part of Brazilian policy (Binswanger 1991). Not only do such incentives encourage conversion of the forest, but also they are biased in favour of large entrepreneurs and corporations. It is they that have tax liabilities that make the write-offs attractive. It is they that have access to credit. Moreover, once they are attracted into cattle ranching, they bid up the price of land and thus make it even less likely that smallholders can benefit from government favours.

Land tenure

Many countries in Latin America, but also Thailand as well, have property claims legislation that confers rights to cultivators and graziers but not to those who use the forest to hunt and extract products. Hence anyone who wishes to establish their formal claim to land as property has an incentive to clear forests. This applies as much to the poor and under-capitalised household that wants to ensure recognition of resources that underpin their livelihoods, as it does to wealthier individuals and corporations who wish invest in land against an expected appreciation of its value.

In Brazil, the most effective way to maintain cleared land is to establish a pasture. This costs little to establish and maintain and requires little labour. It is also reported that pastures are least likely to be contested by those invading large estates to claim land (Binswanger 1991).

Development programmes

Clearly the large-scale programmes to encourage settlement of forest land pursued by governments in the Amazon basin in the 1960s and 1970s, and in Indonesia through to the 1990s, have contributed to forest clearance. Binswanger (1991) cautions against attaching too much importance to these projects, since in the Brazilian case the impact of settlement schemes has been far less than cattle ranching in removing forest.

Livestock development programmes in Latin America have encouraged forest clearance. In many cases, loans from the World Bank and the Inter-American Development Bank supported these programmes (Jarvis 1986, Stonich 1992). The attraction of cattle also responded to growing demand for beef from the rapidly growing cities, and from the prospects for export of meat.

Other examples include the complementary projects to mining development, such as Carajás in eastern Amazonia. In this case, smelters were encouraged to set up furnaces close to the railway to convert some of the mined iron ore into metals. The furnaces were to use charcoal.

Roads

Most roads are built by public monies. During the second half of the twentieth century, most developing countries invested in expanding and improving the road network. In some cases these investments were spectacular. In Brazil in the 1960s a highway more than 2,000 km long was driven north from the capital Brasilia to Belém at the mouth of the Amazon. This was followed in the 1970s by the Transamazônica routes including that west from Belém to the Peruvian border some 3,000 km distant, and that north from Cuiabá to Porto Velho and on to Manaus. Governments are not the only builders of roads: logging and mining companies may also invest in roads and access tracks, as may some large-scale commercial farmers.

The construction or improvement of roads in or close to forests is almost always associated with settlement of forests close to the highway. For example, when the road was built to Porto Velho in the Amazonian state of Rondônia, the population rose from just 70k in 1960 to 500k by 1980. In the early 1980s the World Bank paid for the road to be asphalted, leading to yet more settlement of the Rondônia forests (Brown & Rosendo 2000).

Roads also provide a major stimulus to use of the land since transport costs fall and the farm-gate price of produce increases. Better roads also reduce the farm-gate price of purchased inputs, making it more attractive to intensify production. They also reduce the local price of manufactured consumer goods brought from distant industrial centres, thus providing even more incentive to market a surplus.

Road building is thus likely to lead to forest clearance as settlers clear land to farm, and as farms expand to take advantage of the improved market opportunities. The stimulus to marketing, however, may not always encourage forest clearance. As output prices rise and those of fertiliser and other agro-chemicals fall, it may become more attractive to intensify the use of land close to the road, rather than to convert forests in areas farm from the roads. For example, in Paragominas, Pará, Amazonia, some small-scale beef operations were being converted to dairy farms in the early 1990s, with far higher returns to land, labour and capital than extensive grazing to produce meat (Mattos & Uhl 1994).

Road access sometimes worsens. Amanor (1994) in his study of the upper part of Manya Krobo District in southern Ghana records the failure to maintain the roads of the area as leading to lower returns to farming. This contributed to decline in farming, an exodus of labour from the area, with farmers increasingly unable to maintain soil fertility and combat weed invasions.

Conclusions

The literature reports all manner of processes and outcomes. Much is contingent on the interplay of multiple factors operating within diverse local contexts. Generalisations must then be qualified. That said, the weight of the evidence suggests that forests will be cleared by 'pull' factors, above all the chance to earn profits from removing or converting the forest to some other use. What value the forest may have indirectly in providing ecological functions such as carbon sequestration scarcely enters the calculus of those cutting trees, since such benefits are externalities.[8]

Government could, of course, intervene to ensure that the social value of externalities is reflected in private decision making, and otherwise act to conserve forests. By and large, however, policy tends to support and encourage the clearance of forests—if only by road construction.

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[8] Trinidade de Almeida & Uhl 1995 report that the value of carbon sequestered in the forests of eastern Amazonia may be worth as much as US$375 a hectare a year. This is well above the gross returns estimated for logging, extensive grazing, or slash-and-burn cropping.

Country perspectives

What patterns emerge when looking at forest margins in different countries?

Brazil

Until the 1990s, Brazilian policies affecting the forest margins were almost entirely concerned with 'developing' the land through timber cutting, mineral exploration and extraction, and the conversion of forest to cropping and grazing. Much of the support afforded by road construction, tax breaks and other incentives were directed towards or appropriated by large-scale investors. During the 1970s there were important programmes to try and resettle the landless from the North-east of the country along the Transamazônica highways, although support for them came second to the stimuli to larger-scale concerns.

The interests of forest dwellers, be they the long-standing indigenous communities of hunter-gatherers or the smattering of rubber tappers ('seringueiros') remaining from the nineteenth century latex boom, were given scant attention. Much of the dynamic of events over the last forty years comes from the newly-arrived. For these people, inexperienced in forest ecology, with access to large areas of forest but with little labour, cattle ranching has become the ideal activity. Even the poverty-stricken settlers arriving from the North-east whose first priority was to plant food crops to assure basic nutrition, have seen cattle raising as their best option in the long run. Thus small farms in Amazonia show through time increasing areas devoted to pastures.

Although before the 1990s, Brazilian tax policy favoured forest clearance, those incentives have largely been removed—partly owing to international publicity about their damaging effects. Similarly, under donor encouragement, in the 1990s some 885k ha of Rondônia's forests have been set aside in 19 'extractive reserves' to be used by rubber tappers. This is a notable political success for forest dwellers, although Brown & Rosendo (2000) wonder if the reserves can provide reasonable livelihoods without forest clearance.

From the mid 1990s, Brazil became a major recipient for funds from the G7 facility established after the 1992 Rio Conference on Environment and Development. With donor support, there are initiatives to find ways to conserve the forests through promotion of small-scale extractive industries, sustainable logging, agro-forestry, and perennial tree crops. It is too early to report the impacts of these efforts.

Perhaps more importantly, in the 1990s the Brazilian government has invested much less in road construction in the Amazon.[9] The Transamazônica network remains much as it was in the 1980s, with many of the roads unmade and difficult to use in the rains. The slow-down in road building has much reduced the rate of removal of primary forest.

Ghana

In the south of Ghana, forest and woodland is so prevalent that the history and economy of the region is one of life in the forest margins. The long-standing human settlement has been established around the use of forests for gathering, hunting and farming. That said, since the last quarter of the C19 there has been increasing use of the forests.

On the one hand, during the C20 the population increased greatly by as much as ten times. Although some of that population increase has been absorbed by urbanisation, rural populations have risen and with that has come greater use of the forest for the production of food crops. This has led to the cutting of primary forests and farming systems with ever

[9] The main exceptions are the roads planned by the military to ring the country's Amazonian perimeter. It is not known to what extent these plans have put into operation.

shorter fallows, leading to lower soil fertility and declining yields. Gyasi et al. (1995) lament these processes in an area north of Accra.

On the other hand, the promise of export earnings from oil palm, cocoa and logging has led to the cutting and conversion of forests for commercial ends.

Consequently, there is little left in Ghana of the original primary moist tropical forests. Instead much of the landscape is a mosaic of clearings for food crops, cocoa and palm plantations, and secondary forest. A feature of land use in the region is that most users of land do so on a small scale: there are relatively few farmers cultivating more than five ha of arable crops, or maintaining more than 20 ha of tree crops. This arises from the nature of land tenure. With ownership of the land vested in the authority of the local chiefs who hold the land in trust for the community, land allocations are according to reasonable usufruct. Thus it is difficult to acquire large areas of land for speculation.

The main environmental policies in Ghana concern the forests. From 1962 to the early 1990s, forests were formally state land. The central government could thus offer logging concessions to timber companies, seen as an important part of the country's strategy for economic growth (timber is the third most important export, after cocoa and minerals). Logging companies even acquired the rights to cut timber on farmed land from chiefs, and could do so without paying anything to the immediate user, the farmer. As a consequence, for farmers, trees became a liability, to be removed by burning if possible.

Areas of primary forest were designated as forest reserves, leading locals to fear further designations. To forestall this, they undertook pre-emptive occupation of remaining areas of primary forest.

To make matters worse, 1983 saw droughts and extensive bushfires. In the same year, the Economic Recovery Programme was introduced, a structural adjustment package. A central plank of the package was the encouragement of exports. To this end, a sectoral loan was granting to the logging industry leading to revitalised exports, and so to greater pressure on the forests. (Owusu 1998)

In the early 1990s, rising awareness of the malaise of the forests prompted a re-thinking of forest and environmental policy. Policy changes included: a reduction in annual allowable timber cut, temporary bans on exports of round logs; indexing timber royalties; and improved collection of royalties. Tertiary processing of logs was encouraged. The introduction of the 1994 Forest & Wildlife Policy has led to the Forestry Department (FD) bringing in a new system of off-reserve controls that has increased royalties and reduced illegal felling. The policy, above all, shifts the balance of forest management rights and responsibilities away from the timber industry and towards management by farmers and landholders. The FD is now charged with consultation and becoming client-oriented.

In reporting these changes and the processes by which they came about, Kotey et al. (1998) argue that the experience has proven the value of negotiation and collaboration, of using local knowledge and institutions, of developing local ways of dealing with conflicts; as well as the value of good information as a prerequisite for policy-making. Ghana now seems to be moving towards using a mixture of incentives and regulations—information, markets and institutional incentives come first, control by the law second.

Indonesia

Indonesia is well-known for running the largest official resettlement scheme in the world, the 'Transmigrasi' programme. Under this 1.6M families moved from the crowded islands of Java and Bali to the outer islands between 1969 and 1994. There many were settled in the forests. Although highly visible, the country's forest margins have been as much if not more affected by the overall development strategy followed by Indonesia.

A central plank in the country's economic success during many of the last 40 years has been the export of primary commodities: oil and gas, minerals, timber and plantation crops. While some tree crop production comes from smallholdings established by Transmigrasi settlers, the major part comes from larger-scale businesses. Government has encouraged logging and plantations of tree crops through the building of roads into the forests of Sumatra, Kalimantan, Irian Jaya and other sparsely-populated islands. Under the Transmigrasi programme alone, 55k km had been cut by the early 1990s. Private logging companies had complemented this with another 38k km.

Government has also granted large concessions to cut timber and to develop plantations to private enterprises. Sunderlin & Resodarmo (1999) report that as much as 35M ha out of the 100M ha of forest in Indonesia has been classified as land to convert to plantations.

Against these major forces that remove and convert forests, conservation efforts have been minor. The main success has been in encouraging farms and plantations to practice forms of agro-forestry that come closer to mimicking the original forest than other land uses might.

The Indonesia case has parallels with Brazil. Both are large countries in area and population, but with notable concentrations of people in some regions while large tracts of remote forests remain little populated. Both countries have seen their forests as resources to be converted in support of economic growth. In both cases, analyses of the causes of alarming rates of deforestation have polarised between those who see the forests removed by small-scale farmers as a consequence of population growth and poverty, and those who argue that it is the drive for profit by large businesses that has led to most forest removal.

The main contrast has been the use of forests after clearance. Whereas in Brazil much of the former forest has been converted to cattle pasture, in Indonesia much has been planted to tree crops. The difference arises in part from the different factor ratios, since Indonesian settlement of islands such as Sumatra has been much denser than in much of Amazonia. Labour shortage has not been so acute in the Indonesian islands. The settlers in Indonesia coming from Java and Bali have experience of humid tropical conditions and have understood agro-forestry options in ways that Amazonian settlers coming from cooler or drier areas have not. Perhaps more important has been the market as experienced at the farm-gate. Brazil has a relatively high demand for meat including beef. Cities such as Manaus and Belém within the forest zone constitute important markets for beef. The price for mature cattle has been relatively good. Tree crops in the Amazon have suffered in comparison from the heavy discount on their market value offered at the farm-gate owing to the remoteness of much of the Amazon basin and the high costs of transport. Indonesia, in contrast, has less demand for beef and easier access to the settled zones, especially in Sumatra. Farm-gate prices for palm oil, fruits, coffee, cocoa, latex, etc., have been attractive.

Madagascar

The main concern shown internationally is for the loss of rain forests along the eastern escarpment of the island, largely since Madagascar is one of the biodiversity 'hotspots' of the world with many unique species. At least half of that rainforest had been cleared between 1950 and 1985. In this case, it is push factors that seem to cause loss of forests: '*Thus, widespread poverty, increasing population, and the absence of resources and techniques to improve the productivity of agricultural and pasture lands have led to massive deforestation.*' (Sussman et al. 1994, 334)

Yet, as Kull's (1998) re-survey of a village in the central highlands shows, population increase may not mean environmental degradation. It may mean conservation of resources as the ratio of labour to land increases, and as market opportunities in the growing towns and cities raise the returns to farming.

In southern Madagascar, forests are being lost as people make charcoal, graze animals and cut construction poles. Sussman et al. (1994) complain that official efforts to conserve the

forests are uninformed about the realities of the livelihoods pursued by local residents. Hence the government promotes irrigated rice in the south of the country as a way to provide an alternative to use of the forest, in blithe ignorance of the lack of labour for such a system. Local issues of infertility in dryland fields and grazing for cattle are neither understood nor addressed. Both government and international environmental organisations stand accused of not understanding local realities.

Nepal

The literature on Nepal tends to stress the importance of rural population growth in the hills and mountains in creating environmental impacts. The accounts emphasise the poverty of the upland rural population and their dependence on farming, livestock and forest gathering for their livelihoods. Thus population growth implies pressure on a limited resource base, one often seen as fragile owing to the steep slopes that characterise at least a part of the land. This pressure results in erosion of arable fields, and degradation of collective grazing lands including the increasingly denuded forests. This in turn reduces the returns to farming and livestock keeping, leaves the majority of the upland rural population in poverty, and prevents investment in techniques that might better conserve resources. And to cap it all, poor households are likely to have large families as parents hope that many children will provide for their old age. Hence the vicious circle, or downward spiral, is closed.

In contrast to the cases of Brazil, Indonesia and Thailand, large-scale business interests scarcely enter the picture. Poor road access to upland resources often means the only effective demand for them arises from local use.

This dismal picture, however, oversimplifies. As Metz (1991) argues, the relation of population growth to environmental destruction is not as straightforward as some claim. The view of an impoverished upland population forced to over-use their land does not square with the accounts of high rates of out-migration of young men from the hills. In some reports, this has led to the least accessible hill lands being abandoned for lack of labour.

Policy in Nepal has stressed the need to conserve fractions of particular environments as parks or reserves. Such areas include some parts of the lowland Terai as game reserves as well as areas of high Himalaya in the far north of the country. It has also in the past seen local woodlands as areas to be managed by the state forestry department. Recent initiatives have seen the forestry department adopt a participatory approach to woodlands, vesting management in the hands of local communities with the department providing technical expertise. Similarly, in conservation areas there are attempts to integrate the development of impoverished local communities with conservation goals (see Mehta & Kellert 1998 on the Makalu-Baran experience).

Thailand

Through much of the twentieth century Thailand saw the removal of great swathes of its forests. As recently as 1960, half or more of Thailand was considered to be forest.[10] By the 1990s the proportion was 15% or less.

Loss of forest can be variously attributed to: the pressure of population growth in the lowlands, leading to the expansion of smallholder farming with rice fields and dryland commercial crops of maize, cassava, kenaf, sugar cane, tapioca, coffee and even eucalyptus plantations; to the clearance of forests by logging, mining and large-scale plantation businesses; and to the ravages of swidden farming carried out by the hill tribes. These last tend to be singled out for criticism in the official view, although observers such as Schmidt-

[10] This may exaggerate since all land that is not permanently settled and used has been denominated as 'forest' (Vandergeest 1996).

Vogt (1998) and Sato (2000) argue that this exaggerates the impact of these forest dwellers, since their farming practices are less destructive than officially claimed. Rigg (1993), Vandergeest (1996) and Sato (2000) argue that it is the first sets of processes that account for most forest clearance.

Thailand established a forestry department as early as 1896. This has variously tried to control and regulate logging, and to declare areas of forests as protected or reserves. Indeed, so strong have been the calls for conservation, that by the 1990s fully 48% of the territory was denominated as reserves. But this has had little effect on preventing deforestation. Vandergeest (1996) laments the predilection of official agencies to classify land by ecological functions such as 'protected watersheds' ignoring the realities of land use on the ground, and any rights that forest dwellers might have. Thai land registration policy seems to have only recognised permanent cultivation as the basis for legal recognition. Hence, the remaining land, designated 'forest' has been seen as state property. Those farming under transient regimes or common property in the forest are at best tolerated. Often, however, their rights have been curtailed abruptly as they have been excluded from selected areas of forest, or land has been designated for resettlement of the lowland landless, or land grants have been made to loggers, miners, or plantation operators.

Vandergeest (1996) argues that by the 1990s forest policy was driven by an interest in conserving what remains of the Thai forests, but that approach to policy making was top-down. Much effort was put into land classification on the basis of remotely-sensed data that did not include information on the often complex local use of land, land use rights, social patterns, and history of settlement. Only recently has there been an interest shown in more participatory forest management.

Thailand seems a case where the welfare of forest margin dwellers has been imperilled not only by understandable economic pressures on the resource base, but also by myopic government policy that has simply failed to accord such people their rights to resources they have used for decades or longer.

Country summary

These six cases present a range of cases. The main contrast to be seen is between situations where forest is being appropriated for commercial ends—timber extraction, tree crop production, cattle grazing, etc.; and those where the main pressure comes from smallholders trying to produce a crop of staple foods and otherwise assure themselves of livelihoods that assure their basic needs.

This dichotomy should not, however, be seen as anything other than empirical observation. Given the chance, there is every sign that smallholders will also use the forest for commercial ends. Their only restriction is access to capital and access to market. Those forests that survive such pressures owe this to their remoteness, or to the poverty of their inhabitants, or both.

In most cases, government policy has tended to encourage forest removal, whatever fine words may be written into national conservation plans. The only way in which countries have tried to reconcile private with social interests is by the declaration of certain forests as protected to some degree or other. Governments also have a poor record in recognising the rights of forest margin dwellers to property within the forests. Too often groups with a long-standing use of forest, and often poor groups, have had their rights set aside in the interests of either conservation or of concessions to large-scale business interests.

Policies, the environment and people

As indicated above, government policy has often failed in two ways. One, it has accelerated the removal of forest leading to whatever ecological harm that may imply. Two, policy has ridden roughshod over the rights of marginalized groups living in and close to forests, thus

making it more difficult for them to earn their livelihoods. In what follows, some of the more common tendencies in policies affecting forest margin dwellers are outlined.

Development strategies and economic polices

During the first few decades of the great drive for development that began around 1950, there were few planners and policy-makers who doubted that the role of natural resources of all kinds was to be harnessed to economic growth. Nature was to be appropriated for the use and benefit of humanity (Norgaard 1988). Forests in developing countries were resources, the same as deposits of hydrocarbons and other minerals, with the added advantage that they were potentially renewable. It is only relatively recently, from the 1980s onwards, that concern over the consequences of large-scale removal and degradation of tropical forests has become widespread—mainly owing to fears over loss of biodiversity and contributions to climate change.

Thus it is not surprising to find that historically policy for economic growth and development has encouraged commercial exploitation of the forests. These include:

- Offering exclusive concessions to use forest lands to those prepared either to invest in enterprises located in forests or to take up residence in forests. When forest have been converted to other uses, the rights conferred often amount to freehold property rights conferred in perpetuity (see below);
- Subsidising the costs of investments in forest zones, either directly through grants or by subsidising the cost of capital through cheap credit schemes, or indirectly by offering concessions on tax liabilities. Tax breaks could either be those of allowing investments in forest ventures to be offset against profits arising in other sectors, or else by offering tax exemptions and holidays on profits derived from forest use;
- Providing public infrastructure to facilitate private access to forests from markets and centres of population. Roads and bridges are the main example, but public investments also include railways, air strips, ports and river navigational aids. Note that these may also be privately funded; and,
- Establishing public programmes to resettle people (see below).

Since the early 1980s, there has been some retreat from these policies, but in many cases there is still a net policy stimulus to those who wish either to cut forests or to convert them to other uses.

Less directly, some macroeconomic policies have encouraged enterprises in forests. For example, devaluation should encourage exports and boost the returns to logging, mineral extraction or tree crop production. Similarly, allowing exporters to retain at least a part of their earnings in dollars may boost such export activities. Policies designed to increase exports of primaries have increased since the introduction of structural adjustment programmes in the large majority of developing countries since the early 1980s. Governments under adjustment programmes have been committed to trying to find ways to increase exports and economic growth.

The ecological consequences aside, policies to develop forests might improve the livelihoods of those already living in the forests or those attracted to them by the new opportunities created. Evidence on the impact on the poor in forest zones is not readily available. The tenor of some of the literature is that policy has favoured large-scale business interests and not the poor. This argument readily elides into the proposition that the poor must thus have been harmed, which does not automatically follow. To be sure, those with capital and connections may derive the lion's share of the benefits from use of forest lands, but that does not mean that the poor necessarily suffer. The chance to work for cash, albeit seasonally and badly paid, access to half hectare of food crops, road access to market, school and

hospital—these advantages, meagre though they may appear, may be seen as concrete benefits for the poor.

To the extent that poor forest dwellers have been deprived of property rights (see below) they may be harmed. But for those who have not been so deprived, the impact of policy on their lot is less obvious. There are few studies that have been able to establish changes in incomes and welfare of forest margin dwellers. In this search of the literature, not a single study was found that was able to compare welfare levels of any group through time.

There are some studies that hint at welfare changes. On the one hand, Kull's (1998) study of change in highland Madagascan village suggests welfare gains through time despite population growth. Findings from Paragominas, Pará (Mattos & Uhl 1994, Toniolo & Uhl 1995, Trinidade de Almeida & Uhl 1995) emphasise the changing nature of smallholder cattle keeping with intensification and higher returns through time. On the other hand, some studies see rising population exerting unsustainable pressure on the local ecology leading to a downward spiral of poverty and environmental decline. Thapa & Weber (1995) on a valley close to Pokhara, Nepal, Amanor (1994) on Manya Krobo and Gyasi et al. (1995), both in southern Ghana, take this line. It is interesting to note that this group of studies see poverty as arising largely from endogenous processes—although Amanor stresses the links from the fate of Manya Krobo farmers to world commodity markets and neglect by national government.

Land tenure and property rights

In many countries, property rights in forests are vested at national level. Private individuals or companies may have concessions awarded to them to cut timber or extract other forest resources, but are rarely awarded freehold rights in perpetuity. Timber concessions are typically for less than 25 years, reducing the incentive to replant cut areas. If individuals wish to control forest lands, they usually have to convert the forest to some agricultural use—crops, tree plantations, pastures. This encourages forest settlement and clearance either for speculation on the future value of the land—as seen widely in Brazil; or to defend access to forest lands against declaration of the forests as a reserve under state control, as has applied in parts of western Ghana.

A factor that moderates this is collective tenure. In southern Ghana, most land not under primary forest is held at community level, with usufruct mediated by local leaders, the chiefs. The community norm is that no farmer or household should be given usufruct of areas larger than an area that can be farmed by the household. Some exceptions arise, when plantation companies buy the rights to large plots for teak and other crops. Above all, community norms do not allow landholders to exclude people from land that they are not working. Idle land reverts to community ownership. Hence while forest has been cleared in Ghana to establish the rights to farm the land, it has not been cleared in excess of individual and household requirements so as to speculate on the value of the land.

Collective forms of tenure effectively impede the development of a full-blown private market in land. They also reduce dramatically the incidence of landlessness. But such forms are mainly found in Africa south of the Sahara. Outside of this region such rights can be found in Mexico under the ejido and indigenous community forms of tenure[11], and in some remote areas where land rights follow local custom and not national law. In the latter case, local customs have no status in national legislation and rights conferred under such arrangements can be abrogated by the state or private citizens prepared to use the law. This is the case of Thailand, for example. As Schmidt-Vogt reports (1998) the Lawa of north-east Thailand make use of forest land collectively. Yet Thai law recognises no community rights

[11] De jure the inalienability of ejido and community land was ended in 1994, de facto it remains the norm in most ejidos.

to these lands. The fields of the Lawa are part of the nation's forests, with ownership vested in the state.

A new initiative in land rights has been the Brazilian establishment of extractive reserves, as seen in Rondônia: areas of forest designated for the use of rubber tappers and controlled by their associations. Brown & Rosendo (2000) record 19 such reserves as being set up in the State covering an area of 885k ha.

Conservation policy: forestry

Most countries have laws and policies designed to protect at least part of the forests from destruction, excessive use, some specified uses (such as logging), or in extreme cases, from any use at all. Under the umbrella of land laws that vest ultimate rights to forests in the state, agencies concerned with forestry, wildlife, conservation and the environment, have designated areas of forest as protected to some degree or other. Thailand represents a dramatic example of this: with all forests being state land, an extraordinary process of demarcation of protected or reserved forests took place from the 1960s onwards. In the early 1960s, 66k km^2 out of a national area of 511k km^2 had been designated as protected or reserved forest, 13% of the territory. By 1974 the area so marked was up to 165k km^2, 32%, and by the 1990s it covered fully 48% of the country (Vandergeest 1996). In Ghana, forest reserves cover 17.7k km^2, or between 20 and 25% of the land in the 'high forest zone' of southern Ghana (Kotey et al. 1998).

Historically, the tendency has been for reserves to be marked out and the rules governing use of the designated resources set according to criteria determined by technically-specialised staff in central agencies—foresters, zoologists, ecologists, etc. Boundaries and rules were set mainly in consideration of conserving the forests as such and maintaining their ecological functions. These did not necessarily take into account the interests and historical rights of those making their livelihood out of the forests. Demarcation of boundaries and policing of rules was assigned to forestry and wildlife departments. Given the size of the reserves and their remoteness, in most cases it has proved difficult or impossible to exclude potential users or to ensure that regulations are adhered to. In the worst cases, the rules have merely created a rental opportunity for the staff of implementing agencies.

During the last two decades, there have been cases of governments re-assessing such conservation policy, taking into account the limitations of state agencies and the interests of those who derive livelihoods from forests (Bass et alia 1997, Poffenburger 1996). This has led to initiatives that have involved local forest communities in the management of resources, sometimes with land rights restored to them. State agencies then come not to control the process, but to facilitate it. Incentives to get people to help conserve resources are used where possible in contrast to regulations that forbid actions.

Conservation policy: other

There are few accounts in the literature of conservation policy that affects lands other than forests. Regulations on land use, on use of inputs, on disposal of wastes, etc. are common to many countries. But they attract little interest amongst researchers.

Settlement schemes

Settlement of people from outside the forest zones on to forest lands has been seen as a way both to alleviate land hunger and poverty in the zones of origin of settlers, as well as a way to develop the forests. In some cases, populating the forest was also seen as a way for nation states to assert sovereignty over remote areas of forests close to the boundaries with neighbouring countries. Almost all Latin American countries with tropical forests, some Asian countries—most notably Indonesia, and a few African countries have actively promoted settlement of the forests.

Programmes have consisted of building roads, schools, hospitals and other facilities in forest zones, mapping and demarcating plots, selecting settlers, investing in their transport, and offering settlers grants, credit and technical advice during the initial years of settlement. The schemes have generally been costly for each household officially settled. The results have been mixed. Where soils and other physical conditions in the forest have been apt, where routes to market have been passable, where prices in markets for crops and produce from forest have been favourable, and where settlers have had access to capital and know-how, settled households have been able to establish productive farms offering a better livelihood than before. But this is a stiff list of conditions. All too often migrants have been stymied by daunting physical obstacles (poor soils, pests and diseases), difficult and expensive access to markets, low prices for their produce, and lack of capital and skills. In such cases they have either abandoned their plots after a few years, sometimes pushing on to find new forest lands to till, or they have remained carrying out subsistence farming sunk deep in poverty.

Regionally there has been a notable contrast between Latin America and Indonesia in this regard. In the former area, the forests have generally been remote and very lightly populated, settlers finding themselves hundreds if not thousands of kilometres from the main markets of their country and connected only by roads that have been closed during the rains. Settlers have often come from areas quite distinct to the humid lowland tropics, typically more temperate uplands. In Indonesia, in contrast, settlers have found themselves in forests where there have been more locals with well-adapted farming systems, they have had much better access to markets (if only because they have generally been settled within 100 km of a coast), and have come from the humid lowland tropics and are aware of farming methods for such zones.

Despite the failures of settlement schemes, evaluations find that for every household settled officially in the forests, another one or more households have migrated of their own accord into the forests using the newly opened roads. This may reflect excessive optimism regarding their own chances, or else reflect the desperation of their circumstances in the area of origin—although the very poor may find migration impossible since they cannot afford the transport costs. But it may also reflect that the opportunities in the forests are real and appealing—especially for those who have some capital, and who can choose to settle in zones linked to markets and with reasonable soils.

Settlement schemes have created new categories of forest margin dwellers, but have generally taken little account of those previously living in such areas. When settlement has taken place, any hunting and gathering groups, or those extracting forest products, have seen their lands lost.

Policy-making for the forest margins

The way in which much policy is made for and affecting the forest margins is marked by centralisation and uniformity, uncertainty and ignorance, and bias.

By and large, governments have been reluctant to allow key decisions affecting the forests to be taken over than at national level. The more remote the forest, the more this has tended to apply. Fears of secession, of policy incoherence, and sheer lack of staff to allow differentiation have encouraged centralisation. This has gone hand in hand with uniformity of policy making, so that the same policies apply over large administrative units that do not necessarily reflect variations in the physical and economic geography of the forests (Vosti & Witcover 1996).

Central governments taking decisions about regions lying hundreds if not thousands of kilometres distant rarely have more than a part of the knowledge they need to take well-informed decisions. This is all the more so when the forests in question are lightly populated and inaccessible by road. This is not just a problem for government. Sussman et al. (1994)

report that misunderstandings of local livelihoods in southern Madagascar are as common amongst the expatriate staff of Northern NGOs as among Madagascan ministry staff ensconced in their offices in Antananarivo. For some countries, policy to develop the forests has been made on the basis of changing scientific opinion. For example, the Brazilian research agency Embrapa once argued that tropical pastures improved tropical soils from their condition under forest cover (Pichón 1996).

A reaction to ignorance has been to gather information, taking advantage of the powers of new technologies. Remote sensing has many attractions, since apart from its relatively low cost, it allows data to be collected for remote areas where ground access would be painfully difficult. But useful as remotely sensed data can be, it can introduce an information bias. In Thailand, Vandergeest (1996) reports that remotely-sensed data is being used to create ever more differentiated categories of reserved lands. But this is almost entirely by ecological function—and there is no corresponding data on local people, their land tenure systems, and livelihoods.

Centralisation and ignorance has produced the top-down model of forestry management by semi-militarised forest departments determined to exclude locals from gazetted territories and to ensure adherence to national rules and regulations. This has usually failed to achieve conservation objectives nor to gain the respect of local people, let alone afford them any benefits. Consequently boundaries and laws have been routinely flouted. We are now seeing in country after country a retreat from the top-down approach towards forms of participatory forest management (Bass et al. 1998, Poffenburger 1996). The new approaches promise more diversity and flexibility of policy-making and implementation with much greater recognition of local circumstances.

Policy-making for the forests has, when confronted with difficult choices, tended to be biased to wards the interests of the rich and the powerful and against those of poor and the powerless. Loggers, plantation owners, mining companies, ranchers have all found favour with policy-makers whereas indigenous hunter-gatherers and slash-and-burn farmers have usually seen their interests set aside. This problem reflects the former two sets of problems. If policy is taken centrally, then the only voices heard tend to be those of the rich and the powerful who have a physical presence in capital cities and who often can influence the media. If there is ignorance, the views, opinions and knowledge of the big players prevail unchallenged.

Worse, in the absence of knowledge or understanding of the more humble forest dwellers, misinformation and prejudice tends to multiply. When forest dwellers speak other languages, follow different gods, and otherwise embrace cultures different to those at the centre of national affairs, it is easy to see how prejudices form. But these conditions are not necessary for prejudice to arise: myths can be created about the actions of groups whose only difference from the key decision-makers is their poverty and lack of formal education. Debates on the cause of deforestation, for example, reveal much repetition of entrenched positions—for example, the destructive impact of swidden farmers on the tropical forests.

Recently, new political alliances have emerged between powerful outsiders interested in environmental conservation and the formerly powerless of the forest margins. In Rondônia, Brown & Rosendo (2000) recount the way in which pressure was brought onto State authorities by a combination of local associations of rubber tappers in alliance with US and international conservationists who were able to convince the World Bank that the kind of projects it had previously funded were misconceived. The result was the designation of extractive reserves for the tappers and indigenous groups. Poffenburger (1996) includes accounts of similar local organisation by aboriginal forest dwellers in Panama and Canada.

Conclusions

What does this survey indicate about the impacts of environmental policies on the livelihoods of those living in the forest margins?

First, there is much less written on this topic than might be imagined. There are far more studies that look at the impact of policy on the tropical forest environment, than on the welfare of those living in and around the margins of such forests. Hence conclusions from the literature are somewhat tentative.

Second, policy for economic growth in general has tended to stimulate the 'development' of the forests—leading directly to the conversion of forests to other uses. Although some policy—such as land settlement—has tried to help some categories of poor, by and large policy has been biased towards the interests of large-scale business. In particular, the long-standing, traditional rights of usufruct of forests by hunters, gatherers, and small-scale farmers have often been set aside in favour rights to large-scale operators or to national conservation goals.

Third, policy for the forest margins that might be termed specifically environmental has tended to stress the protection of woodlands through exclusion of use or residence. In many cases, this has been tantamount to usurping the property of groups living in the forest margins. To some extent the impact of this has been muted through the inability of overstretched forest departments and other agencies to implement national policy in remote forests.

Policy has thus tended at best to neglect the interests of those living in the forest margins, and at worst to harm them. That said, it does not directly follow that the effect of policy has prejudiced their livelihoods, even if that is often a reasonable presumption. It may be that in stimulating other developments in the forest margins, the majority of forest dwellers benefit indirectly —through, for example, the creation of additional jobs, opportunities to market more produce, etc. That one may doubt the ecological wisdom and sustainability of such processes is another matter.

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