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DEFORESTATION AND LAND USE CHANGES INDUCED BY THE EAST ASIAN ECONOMIC CRISIS

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Abbreviations and Acronyms

CGE	Computable General Equilibrium
CIFOR	Center for International Forestry Research
DFID	Department of International Development
DGEC	Directorate General for Estate Crops
EIU	Economist Intelligence Unit
EUFREG	European Union Fire Response Group
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GEF	Global Environment Facility
IFLS	Indonesia Family Life Survey
IPM	Integrated Pest Management
UNICEF	United Nations Children's Fund

Deforestation and Land Use Changes Induced by the East Asian Economic Crisis

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Acknowledgements

This paper was prepared as part a regional assessment of the environmental implications of the East Asia economic crisis led by Aziz Bouzaher (SASEN) with core team members Giovanna Dore, Michele Gragnolati (EASES), Kirk Hamilton, and Stefano Pagiola (ENV).

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Executive Summary

East Asia is one of the most important areas of tropical forests worldwide. In addition to providing a multitude of benefits locally, including both products and services, these forests are also of global importance because of their biodiversity and the carbon they sequester. Despite the benefits they provide, East Asian forests have been under considerable threat in past decades, and the extent of forest cover has declined considerably throughout the region. Considerable concern has arisen that the East Asian economic crisis would result in a further worsening of the already high pressures experienced by the region's forests. This report examines the available evidence on the impacts of the crisis on deforestation and land use in the affected countries. The analysis focuses on three main countries–Indonesia, Thailand, and the Philippines. The situation in Indonesia, where the impact of the crisis has been most severe, is examined in particular detail.

This study was motivated by widespread concern, among both environmental experts and civil society, that the crisis, and the response to it, would worsen the region's already acute environmental problems. It is part of a broader study of the environmental impacts of the East Asian economic crisis commissioned by the World Bank to examine these concerns. An initial desk review of the potential environmental implications of the crisis (World Bank, 1999a) showed that there was considerable reason for concern. The possible effect of the crisis on the region's already high rates of deforestation was identified as a key issue. An in-depth follow-up research effort, of which this paper forms part, was undertaken to study these issues in more detail. Companion papers examine in detail the social impact of the crisis (Gragnolati, 1999), its effect on mining (McMahon, 1999), and overall macroeconomic trends (Dore, 1999).

Analysis of the impact of the crisis on East Asian forests is constrained by severe data limitations. Data on forest cover and rates of deforestation are very weak in all countries of the region. Because of this, and because of the relatively short time elapsed, it was not practical to examine changes in forest cover and in the rate of loss of forest cover directly. Rather, the focus is on examining to what extent factors which tend to drive deforestation and environmentally-harmful land use change have been affected by the crisis. This effort faces constraints as well, however, partly because there is often little agreement on the relative and absolute importance of different pressure factors, and partly because data on changes in pressure factors are also limited–data collected since the crisis began are only beginning to be available. The results of the study should be interpreted with these constraints in mind. To help supplement available secondary data, several case studies of the extent to which rural households have been affected by the crisis and the ways in which they have responded were commissioned in Indonesia, Thailand, and the Philippines. These case studies collected a mixture of qualitative and some quantitative data on household coping strategies. Although they are only intended to be illustrative, these case studies help shed light on the concrete consequences of the crisis on the ground.

There are four main mechanisms by which the East Asian economic crisis might have affected land use and deforestation in the affected countries: (i) the **social impact** of the crisis; (ii) **changes in relative prices**; (iii) **changes in government expenditures**; and (iv) **political changes.** The **effects of adjustment policies** would also be reflected through these mechanisms, and so are difficult to describe separately. Where relevant, the discussion of each mechanism indicates when price movements, for example, were influenced by the adoption of adjustment policies. Several confounding effects also make it difficult to identify the impact of the crisis exactly. Perhaps the most important such effect is the widespread drought caused by *El Niño*, which coincided with the early part of the crisis.

Social impact

The speed and severity of the social impact of the crisis has varied from country to country and within each country. Thailand, Indonesia, and Korea were among the first to suffer from the crisis, while Malaysia and the Philippines suffered a delayed impact. Indonesia has been worst hit. Throughout the region, urban households in sectors closely linked to the formal financial economy appear to have been hardest hit, while rural households appear to have been better protected. Nevertheless, many rural households were affected by the return of family members who lost their urban jobs, by lower remittances from family members still working away from home, and by changes in the relative prices of products they produce and consume.

Return migration. The possible impact of 'return migration' has been a major source of concern and an important explanation offered for much anecdotal evidence of crisis-induced environmental damage. Available data suggest that the extent of return migration has been substantially smaller than initially believed, except in Thailand. In Indonesia, return migration has been concentrated primarily on Java, and was much more limited in the outer islands, while in the Philippines out migration from rural areas has continued to be an important household strategy. The sectoral and regional concentration of return migration–particularly in Indonesia–are important, because to the extent that the negative impact of the crisis has been greatest in areas with the least forest cover–urban areas and Java–the potential for a consequent impact on forests is also lower than if a similar social impact had been experienced in rural areas in the outer islands. To the extent that return migration has occurred in frontier areas, a critical question concerns the employment of the returnees. Whether return migrants would turn to resource-extracting activities as a way to earn a livelihood was an issue of significant concern. In all three countries, this fear does not appear to have been realized.

Income shortfalls. For many rural households, the crisis resulted in marked income shortfalls, due to falls in remittances, loss of off-farm income, and in some cases reduced income from own production. Rising prices for many necessities have compounded problems. All rural households have not been adversely affected, however. In fact, changes in relative prices have resulted in substantial income increases for some households–particularly for many tree crop producers. Inflation may be eroding the benefits experienced even by this latter group, however. To the extent that some households did experience income shortfalls, the question becomes to what extent they turned to resource-extraction activities as a way of compensating, and in particular whether they expanded the area they cultivated at the expense of forests, and whether they increased their use of forest products such as fuelwood.

Expansion of cultivated area. In some cases, household coping strategies did entail opening new land to cultivation. This appears to have been the case in some parts of Riau Province on Sumatra and in Central Sulawesi, for example, but not in more remote villages in Riau and in East and West Kalimantan. In Thailand, almost none of households in the case study area expanded their area under cultivation by clearing additional forest land. Although there have been some well-publicized cases of encroachment into protected areas in Thailand, these may have been efforts to place pressure on the government so as to obtain other forms of assistance, rather than representing coping strategies in and of themselves.

Increased collection of forest products. Increased collection of a variety of forest products was noted in all three countries studied. However, increased collection was sometimes selective. In the Thai case study, almost 60 percent of households increased their collection of forest products for home consumption but almost none increased collection of fuelwood. The degree to which this increased collection is likely to result in forest degradation is limited, however, by the location of the social impact of the crisis. In Indonesia, the impact was concentrated on Java, where the extent of remaining forests–and hence, opportunities to collect products from them–is limited. In Thailand the impact was more generalized, but because the forest frontier has already been pushed well back from the most populated

areas, relatively few Thais live in areas in which there are substantial areas of forest still susceptible to damage. The proportional increase in pressures on forests, therefore, is likely to have been smaller than the social impact.

Changes in Relative Prices

The financial crisis, through currency devaluations, changes in trade and domestic price policies, and subsequent inflation, has resulted in substantial changes in relative prices throughout the region. Such relative price changes might encourage land users to shift from one land use to another, to clear additional forest so as to expand production of crops which have become more profitable, or to change land use practices. The effects of these changes can be either negative or positive, depending on the specific circumstances.

Time trends of output prices in nominal terms show that many export commodities experienced very rapid price increases throughout the second half of 1997 and first half of 1998. The devaluation of local currencies was a major driver in this price rise. Some policy reforms, such as export liberalization, also contributed. Since late 1998, however, many prices have begun to fall in nominal terms as currencies strengthened. In Thailand, for example, rice prices increased by half between May 1997 and January 1998, but had returned to pre-crisis levels by August 1999–indeed, to below pre-crisis levels given the intervening inflation. Likewise, coffee prices in Indonesia more than doubled in some provinces in 1997, but were often lower than before the crisis by late 1998. Only in some areas and for some crops have real price increases been sustained. The real price of coffee in Sumatra in late 1998 was about 20 percent above its level in early 1997.

Assuming that these increases are not completely eroded by inflation, one might expect that production will expand. There are some indications that Indonesian smallholders have expanded their production of oil palm, for example. Since most of the crops which appear to have benefited most from relative price changes are tree crops, however, the area cultivated is likely to respond less rapidly to price changes than that cultivated to annual crops might have. Tree crops are a long-term investment that take 5 to 10 years before they bring a benefit, so long-term price changes are more important than short-term fluctuations. Expanding the area under tree crops also requires substantial up-front investments, which can be a significant constraint for many smallholders. It will take some time before sufficient data are available to confirm this effect and to gauge its extent.

The consequences of such an expansion are also hard to predict. Tree crops are in many ways less damaging as a land use than annual crops. Rubber production as traditionally practiced by smallholders in Indonesia is particularly benign. Thus, an expansion of tree crop production is likely to cause less environmental damage than a similar expansion of annual crop production would have. This is not necessarily true when tree crops are grown in large monoculture plantations, however–although here too, some benefits such as watershed protection might be preserved. A final factor to consider is that the environmental consequences of increased tree crop production are very different depending on whether this expansion occurs in virgin primary forest (high negative impact), in secondary or logged-over forest, or within existing agricultural land (potentially positive impact). Unfortunately, this is extremely difficult to ascertain using available data.

Oil Palm. The effect of the crisis on oil palm production is of particular interest since the area planted to oil palm had already been growing rapidly even before the crisis. Oil palm prices increased substantially during the crisis, making an already highly profitable activity even more so. The effect of this increase has been muted, however, by important constraints. In Indonesia, for example, large-scale developments have been hampered by the collapse of the financial sector and by political uncertainty. As a result, the expansion of the area under oil palm slowed markedly. Given the increased profitability of

oil palm, however, this is likely to be only a temporary respite. As the political situation in Indonesia improves and financing mechanisms come back on line, the interrupted growth of the oil palm sector is likely to resume.

Changes in Government Expenditures

Changes in government policies and expenditure patterns can affect both activities designed to improve environmental conditions (for example, maintenance and protection of national parks, conservation activities, and enforcement of logging regulations) and those which can have an adverse impact (for example, the Indonesian transmigration program and road construction).

Expenditures on environment-related activities have tended to decline throughout the region, both in real terms and as a share of the overall government budget. Where expenditures on specific environmental issues have been protected, they have often been maintained in nominal terms, meaning that their real value has fallen. In the Philippines, for example, the budget for protected areas has declined by about 23 percent in nominal terms between 1997 and 1999, raising fears that already inadequate protection efforts would be further compromised. There isn't necessarily a direct correlation between spending and protection, however. Even with falling budgets, protection might be maintained if patrolling is a priority. Only 13 percent of Indonesian park managers planned to target patrolling for cost savings. Conversely, protection may fall more than proportionally to spending if there are large fixed expenditures, such as for salaries. Moreover, for park rangers on a fixed salary pressures to seek supplementary sources of income are likely to increase. In Thailand, there is anecdotal evidence or laxer protection of the country's protected areas, although in the case study area in Chayaphum Province, at least, protection appears not have been reduced.

The crisis forced significant cuts in public works programs. Road-building expenditures have remained static in nominal terms, but declined in real terms. This may have alleviated some pressures on forests, though fully assessing any impact would require a detailed analysis of where road-building is taking place. Building roads through undisturbed areas is likely to have a much greater impact on forest cover than the same expenditure devoted to densifying a road network in an area already served.

Longer-term, reduced investment in research and extension might affect productivity trends in major crops such as rice; should rice yields decline, or even fail to continue to increase, there may be increased pressure to convert additional area to rice production so as to increase production. Reduced investment in irrigation and other forms of intensification might have a similar effect.

Political Changes

The countries of the region have experienced a great variety of political and policy changes. The bulk of the impact of these changes has already been discussed, however, in terms of their effects on relative prices and direct government expenditures. Over and above these effects, in the case of Indonesia there have also been additional effects due to the wrenching political changes that the country has undergone since the beginning of the crisis. These have had two opposite effects. On the one hand, large-scale investments such as oil-palm plantations appear to have been delayed; despite increased profitability due to relative price changes, large-scale oil palm development may actually have slowed rather than accelerated because of the political uncertainty and difficulties in arranging financing (though data on this point as on many others are weak). On the other hand, the already weak political control over land use appears to have weakened even further, and in some cases collapsed altogether. Anecdotal evidence of increased illegal logging is rife, although some may be higher reporting of illegal logging due to the increased openness–another important political change–rather than actual increases in illegal logging.

Conclusions

The analysis shows that there has been a great diversity of effects across and within countries, depending on the extent and nature of the impact of the crisis. No simple story emerges. The balance of the available evidence does not seem to support the more pessimistic scenarios that were proposed early in the crisis. Indeed, one can point to at least some evidence suggesting that some sources of pressure have been alleviated. Other evidence, conversely, suggests that some pressures may have increased. The net effect of these factors is hard to gauge, both locally and at the national level. In many cases, the pre-existing trends are likely to continue to dominate, with the crisis merely nudging them slightly higher or lower. This reinforces the need for long-term attention to these important environmental problems.

The basic conclusions that emerge are:

(a) There has been a continuum of effects, with Indonesia most heavily hit, the Philippines the least so, and Thailand somewhere in between.

(b) Within this overall pattern, there is also substantial variation in the impact within each country, across regions, and across sectors.

(c) The primary mechanism through which deforestation trends are likely to have been affected is through changes in relative prices and the coping strategies of rural households. There is little evidence to support hypotheses that return migration has had a major impact. In Indonesia, the weakening of government authority and enforcement powers is also a major source of concern.

(d) There is little evidence to support the more alarmist fears of vastly accelerated deforestation processes resulting from the crisis; indeed, in some cases pressures may actually have been reduced. In the absence of data on actual land use changes, analysis is limited to examination of changes in pressures. In some cases, these changes act in opposite directions, making it difficult to predict what the net effect will be. That tree crops have been the major beneficiaries of relative price changes further complicates the assessment, since they can be less environmentally damaging than other agricultural uses. Much will depend on whether any expansion of tree crops occurs on existing agricultural land or by converting additional forest land.

The extremely high level of threats to East Asian forests that existed even prior to the crisis leave little room for complacency even if some of the more alarmist scenarios of the crisis' impact do not seem to have occurred. Some aspects of the crisis are likely to have worsened already high pressures, others to have slightly alleviated them. The underlying pressures created by demand for more agricultural land and for timber and wood products remain. These conclusions indicate that the main policy priorities remain those of improving the management of the region's forest and land resources.

1. Introduction

East Asia is one of the most important areas of tropical forests worldwide. In addition to providing a multitude of benefits locally, including both products and services, these forests are also of global importance because of their biodiversity and the carbon they sequester. Despite the benefits they provide, East Asian forests have been under considerable threat in past decades, and the extent of forest cover has declined considerably throughout the region. Considerable concern has arisen that the East Asian economic crisis would result in a further worsening of the already high pressures experienced by the region's forests. This report examines the available evidence on the impacts of the crisis on deforestation and land use in the affected countries. The analysis focuses on three main countries–Indonesia, Thailand, and the Philippines. The situation in Indonesia, where the impact of the crisis has been most severe, is examined in particular detail.

Data. Analysis of the impact of the crisis on East Asian forests is constrained by severe data limitations. Data on forest cover and rates of deforestation are very weak in all countries of the region. Because of this, and because of the relatively short time elapsed, it was not practical to examine changes in forest cover and in the rate of loss of forest cover directly. Rather, the focus is on examining to what extent factors which tend to drive deforestation and environmentally-harmful land use change have been affected by the crisis. This effort faces constraints as well, however, partly because there is often little agreement on the relative and absolute importance of different pressure factors, and partly because data on changes in pressure factors are also limited–data collected since the crisis began are only beginning to be available.[1]

Case studies. To help supplement available secondary data, a few case studies of the extent to which rural households have been affected by the crisis and the ways in which they have responded were commissioned in Indonesia, Thailand, and the Philippines. These case studies collected a mixture of qualitative and some quantitative data on household coping strategies. Although they are only intended to be illustrative, these case studies help shed light on the concrete consequences of the crisis on the ground.

Definitions. Much of the debate on deforestation has been plagued by varying and often imprecise use of terms. The term 'deforestation', for example, has been used to describe complete loss of forest cover; reduction of forest to below a given (but varying across authors) proportion of land cover; and loss of *primary* forest alone. Plantations and other managed forests may or may not be included in the definition of forest. The term is sometimes used only for permanent loss, and sometimes includes temporary loss as well. As many have noted, what definition is used matters to the results (Dick, 1991; Kummer, 1991; Angelsen, 1995; Sunderlin and Resosudarmo, 1996). Definitions of deforestation that focus on loss of natural forest cover will inevitably assign a larger role to logging than definitions which focus on loss of tree cover. Clear-cutting an area of natural forest would always be considered deforestation under the narrower definition, but it would not be considered deforestation under the broader definition if the logged area regenerated as secondary forest or was replanted as a forest plantation. Conversely, smallholder agriculture will get a larger share of the blame for deforestation under a definition that focused on loss of tree cover than under a definition that focused on loss of natural forest alone. Changes in natural forest cover are particularly important for biodiversity, while changes in total forest cover are more important for regulation of hydrological flows. Unfortunately, the weakness of

[1] Reliance on such a partial analysis has its dangers. Results obtained in past partial analyses may not be reliable in a context in which so many aspects of the situation have changed. The same limitation holds true of general equilibrium analyses, however. Models which have been calibrated for a specific set of conditions may no longer prove a reliable guide when those conditions have changed drastically, as has been the case in many countries affected by the East Asian financial crisis.

the available data makes it very difficult to use a precise definition. This paper is concerned broadly with both permanent reduction of forest cover and significant degradation in forest quality, each of which can result in environmental problems. To the extent possible, pressures that affect forest quantity will be distinguished from those that affect forest quality, though the lack of data makes this difficult to do. When even the extent of forest cover isn't known with any precision, fine distinctions about forest quality are hard to make. Note that use of the term deforestation is not meant to imply that all loss of forest or change in forest quality is necessarily undesirable (see Box 1.1).

Box 1.1: When is land use change undesirable?

Forests provide a wide variety of productive and environmental services. Traditionally, forests have been seen solely as a source of timber, but it has been increasingly recognized that forests provide a much broader range of benefits. In addition to timber, extractive values can include a wide variety of non-timber products (Lampietti and Dixon, 1995). Forested watersheds can also provide important hydrological benefits (Chomitz and Kumari, 1996; Cassells and others, 1987; Hamilton and King, 1983). It is important to bear in mind, however, that the specific nature and magnitude of benefits provided by forests can vary substantially from place to place.

The extent to which land use change affects the environmental services provided by forests depends on the nature of the change. Some land uses, such as jungle rubber, can preserve substantial parts of the biodiversity of primary forest, for example (Thiollay, 1995; Tomich and others, 1998). Even monoculture plantations can preserve at least some of the functions of primary forests, such as watershed protection. For example, agroforestry areas in West Java were found to have erosion rates as low as those of natural forest (Kusumandari and Mitchell, 1997), and Whiteman and Fraser (1997) find that both conservation and production forests contribute to reducing downstream flooding, in addition to the protection forests that are designed to do so. Conversely, sometimes even minor changes can severely disrupt biodiversity even though the forest might remain apparently intact.

That cutting down forests can result in environmental damages does *not* imply that forests should never be cut down. If the benefits obtained by doing so are high enough, replacing forests with another land use may be socially optimal in particular instances. In practice, however, land use change decisions often do not take into consideration many of the benefits provided by forests–indeed, in many cases they only consider the timber benefits and completely ignore all other benefits. There are good reasons to believe, therefore, that loss of forest is excessive. Had all the benefits provided by forests been taken into account, it is likely that less forest would be cut down.

2. Deforestation in East Asia

Background

Extent of forest cover. East Asia is one of the most important areas of tropical forests worldwide. Indonesia alone has the world's second largest forest area, after Brazil, and accounts for about 10 percent of the world's remaining tropical forest. Table 2.1 provides recent estimates of the extent of forest cover in the countries of the region.

National importance of forests. Forests play an important role in the national economies of the region's countries. Most obvious is the revenue from production of timber and wood products, which has been a major driver of economic growth in past decades. This contribution has been declining in recent years, partly due to the rapid growth of other sectors, and partly due to the depletion of forest resources. Historically, the role of forests in economic activity has been, and remains, particularly large in Indonesia; in 1997, for example, exports of wood and wood products from Indonesia accounted for about 19 percent of the total value of merchandise exports, second only to oil and oil products (EIU, 1998). Even from the narrow perspective of revenues from timber, these figures probably understate benefits substantially. First, because logging practices are often inefficient, and second, because there is extensive illegal logging in every country (Brown, 1999).[2]

Table 2.1: Estimates of Forest Area and Deforestation in East Asia

	Forest Area 1995		*Deforestation*	
Country	*Thousand sq. Km*	*% of land area*	*sq. Km 1990-95*	*% change 1990-95*
Cambodia	98	55	1,638	1.6
China	1,333	14	866	0.1
Indonesia	1,098	61	10,844	1.0
Korea, Republic of	76	77	130	0.2
Lao PDR	..	..	NA	NA
Malaysia	155	47	4,002	2.4
Mongolia	94	6	0	0.0
Myanmar	272	41	3,874	1.4
Papua New Guinea	369	81	1,332	0.4
Philippines	68	23	2,624	3.5
Thailand	116	23	3,294	2.6
Vietnam	91	28	1,352	1.4

Source: Forest area and deforestation estimates from FAO State of the World's Forests 1997

More important, estimates of the contribution of forests to GDP usually completely ignore the many non-timber benefits that forests provide, including a variety of other products and watershed protection services. Thailand experienced catastrophic flooding in 1988 as a result of deforestation of watersheds (Sadoff, 1995). A recent analysis of the value of forests in Indonesia suggests that timber and wood products account for only about one-tenth of the total value of goods and services provided by forests, with other products collected in the forest–especially fuelwood–accounting for another tenth. Of the rest, the bulk consisted of watershed protection services: regulation of streamflows, flood prevention, and prevention of sedimentation damage to downstream infrastructure (Whiteman and Fraser, 1997). Even

[2] National accounts figures also fail to take into account the depletion of the natural resource base (Hamilton and Clemens, 1999). Estimates based on available data suggest net forest depletion in 1997 (the excess of roundwood harvest over natural growth) amounted to 0.75 of GDP in Indonesia, 2.1 percent in Malaysia, 1.3 percent in the Philippines, and 0 percent in Thailand (World Bank, 1999c).

though such estimates depend on weak data and many assumptions, they do show that timber benefits alone are only part of total benefits.[3] A rising awareness of the environmental benefits of forests has resulted in restrictions being placed on logging in many countries.[4] Some countries have imposed outright bans, including Thailand and Vietnam, while others have mandated various forms of 'sustainable' logging, as in Indonesia where clear-cutting was banned and restrictions on selective felling imposed. These restrictions have not always proven effective, however.

Global importance of forests. The region's forests are also regionally and globally important, for their biodiversity and for the carbon they sequester. Indonesia, Malaysia, and the Philippines are all considered to be among the world's "megadiversity" countries–17 countries that account for some 60-70 percent of total global biodiversity. Almost all of Southeast Asia is included in the list of biodiversity hotspots–threatened areas with very high levels of biodiversity (Mittermeier and others, 1999). The regional importance of good forest management was dramatically illustrated by the widespread impact of smoke from the 1997 forest fires on Borneo and Sumatra (EUFREG, 1998). Much of Indonesia and its neighboring countries were blanketed by thick smoke, with substantial adverse effect for health and economic activity.

Rates of deforestation. East Asia is characterized by high pressures on forests and high rates of deforestation. However, poor data make it hard to quantify either the extent of remaining forests or the rates of loss. Table 2.1 shows the FAO's estimates of deforestation rates during the first half of the decade; as pointed out in the country-specific analyses, there is considerable controversy over the magnitude of these estimates. A critical point to bear in mind throughout this analysis is that deforestation was already extremely high in East Asia even before the crisis. Care is needed, therefore, to avoid attributing pre-existing problems to the crisis.

Causes of deforestation. The two primary causes that have been identified for deforestation in the region are logging and conversion to agriculture.[5] There has been considerable disagreement, however, on the share of deforestation attributable to each of these causes. Conventional wisdom has generally blamed farmer slash-and-burn practices for a large share of deforestation. Myers (1994), for example, claims that an influx of small farmers moving into forest areas and practicing slash-and-burn cultivation (whom he calls 'shifted' cultivators) "accounted for 61 per cent of all forest destruction, a proportion that since 1989 appears to have been increasing steadily" (pp 32-33). In more recent years, however, the relative importance of shifting cultivation and other causes of deforestation has been re-assessed (Sunderlin and Resosudarmo, 1996). Evidence from a number of detailed case studies tends to indicate that the impact of shifting cultivation may be much smaller than had been thought (Angelsen, 1995). Roads have been identified as playing an important role in mediating the effect of a variety of other factors that promote deforestation. Roads provide access to settlers and increase the returns to conversion of forests to agriculture. The role of roads in deforestation is highlighted by Panayotou and Sungsuwan (1994) and Cropper and others (1997) in Thailand, and by Liu and others (1993) in the Philippines.

Adverse Land Use Changes. Although the primary focus of this report is on deforestation, some potential land use changes within areas already used for agriculture are also of concern. Did the crisis increase the pressures to use this land unsustainably? Will it lead to higher levels of externalities (sedimentation, contamination from pesticide or fertilizer runoff)?

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[3] For a state-of-the-art review of forest valuation techniques, see Bishop (1999).

[4] Two areas are of particular concern from an environmental perspective: protected areas and coastal mangrove forests. These areas have been determined to have particularly high environmental benefits (Dixon and Sherman, 1990; Hamilton and others, 1989).

[5] This report does not cover deforestation caused by mining, which is covered in a separate report (McMahon, 1999).

3. Impacts of the Crisis

There are four main mechanisms by which the financial crisis can affect land use and deforestation in the affected countries:

(a) ***Social impact***. The social impact of the crisis may force households to turn to forests as alternative sources of income if their income is reduced as a result of the crisis. In particular, it was feared that there would be substantial 'reverse migration' from the cities to rural areas, and that these return migrants would have to turn to forests either to extract materials or to obtain agricultural land. The extent to which the region's forests have been affected by the social impact of the crisis depends on the magnitude of this impact and on the coping strategies that households adopted to deal with it.

(b) ***Changes in relative prices***. The crisis has resulted in substantial changes in relative prices for many goods, especially following the massive devaluations of the currencies. The removal of many trade restrictions in the subsequent adjustment efforts also resulted in changes in relative prices. Because a considerable share of East Asia's trade was within the region, the crisis has also affected export demand for many commodities. The prices of products consumed locally has also been affected by changes in consumer demand for various goods and services induced by the economic impact of the crisis. Whatever their precise cause, changes in relative prices are likely to result in substantial changes in the relative and absolute profitabilities of many commodities, encouraging production of some to be expanded and others to be reduced.

(c) ***Changes in government expenditures***. As a result of the crisis and the subsequent adjustment efforts, most countries in the region have had to substantially reduce expenditures. Even when expenditures have remained unchanged, their real value has declined because of high inflation rates. These reductions in expenditures, as well as changes in relative priorities across sectors and sub-sectors, are likely to induce a variety of short-term and long-term changes in land use.

(d) ***Political changes.*** In a few countries, the crisis has induced important political changes over and above the policy shifts reflected in points (c) and (d) above. This is especially true in Indonesia, whose long-standing political system has been severely shaken. These changes are reflected in a variety of policy changes, many of whose effects are still difficult to assess.

Effects of adjustment policies. In addition to the effects of the crisis itself, there is also a risk that misconceived adjustment policies might make things worse for forests. The effects of adjustment policies, however, will operate through the same price, public expenditure, and political impact mechanisms described above and so are difficult to describe separately. Where relevant, the discussion of each mechanism will indicate when price movements, for example, were influenced by the adoption of adjustment policies.

Confounding effects. Several confounding effects make it difficult to identify the impact of the crisis exactly. Perhaps the most important such effect is the widespread drought caused by *El Niño*, which coincided with the early part of the crisis. On-going political changes–such as the on-going process of decentralization in the Philippines, in which government expenditures have been both reduced and re-allocated across different levels of government–also complicate examination of the impacts of the crisis itself.

4. Indonesia

Background

Forest cover. Indonesia has the world's second largest forest area, after Brazil, and accounts for about 10 percent of the world's remaining tropical forest. However, there is considerable uncertainty about the actual extent and state of most Indonesia's forests. Table 4.1 provides one recent estimate of current land use (World Bank, 1994). Under the 'Consensus Land Use Plan' prepared in 1984, 144 million ha were officially classified as 'forest land' and were to be administered by the Ministry of Forestry. Of these, 30 million ha were expected to be converted to agricultural use (including tree crops), while 19 million ha were to be set aside for the protection of biodiversity and 30 million ha for watershed protection. The remaining 65 million ha were designated as production forests.

In any discussion of Indonesia, an important distinction must be made between Java and the Outer Islands.[6] Practically all of Indonesia's forests are located in the outer islands. Only vestigial forest areas remain on Java, which has the highest population density in Indonesia. Most remaining forests on Java are located in the uplands and have been designated as protection forests.

Table 4.1: Land Use in Indonesia
(million hectares)

	Java		*Sumatra*		*Sulawesi*		*Rest of Indonesia*		*Total*	
Land Use Type	*ha*	*%*	*ha*	*%*	*ha*	*%*	*ha*	*%*	*ha*	*%*
Forest	1.2	9	23.3	49	11.3	61	83.9	75	119.7	63
Bush/Scrub	1.4	11	7.7	16	2.2	12	7.4	7	18.9	10
Grassland	0.1	1	2.8	6	1.1	6	6.3	6	10.3	5
Shifting Cultivation	0.3	2	3.4	7	0.5	3	7.5	7	11.7	6
Upland	2.3	17	1.7	4	0.8	4	0.5	0	5.3	3
Wetlands	3.4	26	2.2	5	0.8	4	1.5	1	7.7	4
Tree Crops	2.4	18	3.5	7	0.8	4	1.2	1	7.6	4
Urban Areas	1.8	14	1.4	3	0.3	2	0.3	0	3.8	2
Other	0.5	4	1.6	3	0.8	4	3.1	3	6.0	3
Total	13.3	100	47.5	100	18.6	100	111.5	100	190.9	100

Source: World Bank, 1994

Benefits of forests. Indonesia's forests generate a wide range of benefits. Most obvious is the revenue from production of timber and wood products, which has been a major driver of economic growth in past decades. In 1997, Indonesia exported about $4.7 billion worth of wood and wood products (including paper products, which have been rising rapidly in the 1990s)–about 19 percent of the total value of merchandise exports, and second only to oil and oil products (EIU, 1998). An analysis of the different sources of value by DFID found that timber accounts for only a small share of total forest benefits (Whiteman and Fraser, 1997). According to this study, timber for export and domestic use accounted for about one-tenth of the total value of goods and services provided by forests, with other products collected in the forest–especially fuelwood–accounted for another tenth. Of the rest, the bulk consisted of watershed protection services: regulation of streamflows, flood prevention, and prevention of

[6] The 'outer islands' are generally taken to include all islands except Java, Madura, and Bali, although Nusa Tenggara Barat and Nusa Tenggara Timur are sometimes also considered 'inner islands.'

sedimentation damage to downstream infrastructure. Even though such estimates depend on weak data and many assumptions, they do show that timber benefits alone are only part of total benefits.

Table 4.2. Estimated loss of natural forest cover in Sumatra, Kalimantan, and Sulawesi, 1985-1997

	1985		*1997*		*Deforestation*		
	Natural Forest (million ha)	*% of total area*	*Natural Forest (million ha)*	*% of total area*	*Decrease 1985-97 (million ha)*	*% loss*	*Mean rate million ha/year*
Sumatra	23.3	49	16.6	35	6.7	29	0.6
Kalimantan	40.0	75	31.5	60	8.5	21	0.7
Sulawesi	11.3	61	9.0	49	2.3	20	0.2
Total	74.6	62	57.1	48	17.4	23	1.5

Notes: Based on comparison of 1995-97 Landsat satellite imageries to 1985 forest cover maps prepared for the transmigration program (RePPProT), also from remote sensing data. The data show changes in natural forest *that can be recognized as such on satellite imagery.* Timber plantations are not included in this definition of forest cover.
Source: Holmes, 2000

Extent of deforestation. There has been considerable controversy over the extent of deforestation in Indonesia, with estimates ranging as high as 1.3 million ha per year (FAO, 1990). A 1990 World Bank study arrived at an estimate of 0.7-1.2 million ha per year (World Bank, 1990), and many have taken the mid-point of this range (about 1 million ha per year) as a reasonable estimate. In a review of the available evidence, Dick (1991), has argued that many estimates of deforestation are too high because of double-counting and derived an alternative estimate of 0.6 million ha per year–much of it due to programs sponsored by the Indonesian government, including the transmigration program and forest concessions. Dick's reasoning (but not necessarily his numerical estimate) has since been endorsed in a more recent World Bank study (World Bank, 1994) and by others (for example, Angelsen, 1995). A recent analysis of data from Sumatra, Kalimantan, and Sulawesi (Holmes, 2000) suggests that deforestation in the twelve years ending in 1997 in these islands alone may have been as high as almost 1.45 million ha per year (Table 4.2). The average annual deforestation rate nationwide over the twelve years is now generally assumed to be about 1.7 million ha.

Whatever the actual estimates of deforestation in Indonesia, there is almost universal agreement that current rates of deforestation are excessive, in that many important benefits provided by forests are undervalued. Indeed, even from the narrow perspective of forests as sources of timber, there are strong reasons to believe that current policies are inefficient. Brown (1999), for example, attributes low timber yields in Riau Province in Sumatra to past over-logging. Few estimates are available of the impact that reductions in forest areas and changes in forest quality are having on long-term timber production and the environmental services that forests provide. One attempt, by the World Resources Institute, estimated that depreciation of forest stock in Indonesia amounted to around US$3.1 billion in 1982, or approximately 4 percent of GDP (Repetto and others, 1989).

Causes of deforestation. The primary factors which have been blamed for deforestation in Indonesia are: (i) shifting cultivation, by both indigenous groups and by new migrants (including migrants arriving through the official transmigration program and 'spontaneous' migrants); (ii) clearing for agricultural use, and particularly for tree crops; and (iii) logging, which is said to be destructive in itself because of the way it is carried out, as well as facilitating the entry of cultivators (Sunderlin and Resosudarmo, 1996). On Java, conversion of land to urban use is also a significant concern (although much of this conversion is occurring at the expense of agricultural land, it may in turn induce pressures to clear additional land elsewhere to compensate for its loss).

A village-level study of crop choice at the forest frontier (Chomitz and Griffiths, 1996) suggests that tree crops rather than subsistence-oriented shifting cultivation play the largest role in deforestation. Although deforestation is greater in areas where agricultural households are shifting cultivators, the share of households engaged in subsistence agriculture at the forest frontier is surprisingly low. Even in subsistence-oriented areas such as Kalimantan, only 36 percent of agricultural households are subsistence households. Deforestation is associated with a high proportion of tree crop households in total agricultural households. In Kalimantan and Nusa Tengarra almost half of the households in high deforestation areas cultivate tree crops. Of the tree crops, rubber is the dominant smallholder crop with coconuts, coffee and cocoa being important in some parts of the country.

Angelsen (1995) finds that shifting cultivators in Seberida District in Riau Province, on Sumatra, only cleared about 2,400ha of forest in 1991, which represents only 0.85 percent of the land area in the study area. Moreover, only about 10 percent of the area cleared represented an expansion of the area under cultivation, with the rest consisting of areas that had been used for agriculture in previous years. Moreover, much of the area cleared was used to produce jungle rubber, which tends to preserve a large proportion of the area's biodiversity (Thiollay, 1995; Tomich and others, 1998b).

Logging has been a very important source of pressure on Indonesian forests for decades. In 1995, 585 timber concessions covering 62 million ha (about one-third the total area of Indonesia, and roughly half its forested area, depending on the estimate of the latter) had been issued (Brown, 1999). Logging in Indonesia has often been thought to be inefficient and unsustainable: logging practices often cause substantial damage to areas logged, affecting the ability of forests to regenerate even in the absence of cultivators following loggers to use logged areas for cultivation.[7] Although loggers are required to reforest logged areas, few are believed to do so. Moreover, legal logging in concessions is supplemented by extensive illegal logging in other areas. Brown (1999) has calculated that the entire legal timber harvest of 1994 would only have been sufficient to provide a little over half the timber necessary to feed all the country's sawmills and plymills, even assuming these were running at their minimum capacity. The balance, plus the feed requirements of the growing pulpmill sector, would have had to come from illegal logging. Growth in the number of mills since 1994 would have further increased demand for illegal timber.

Forest fires. Extensive forest fires on Java and Sumatra in 1994 and 1997 have provided spectacular evidence of the extent of forest degradation in Indonesia, with over 2.5 million ha estimated as having been affected (EUFREG, 1998), and some estimates reaching as high as 5 million ha (von Gemmingen and Huljus, 1998). Although the government at first blamed slash-and-burn cultivators for the fires, analysis of remote sensing photographs showed that many fires originated in logging concessions and in areas planned for oil palm development (EUFREG, 1998; Tomich and others, 1998a).

Unsustainable land use. In addition to deforestation, there has also been concern in Indonesia about unsustainable land use in areas converted to agriculture. Concern has been especially high in the densely-populated uplands of Java (Magrath and Arens, 1989; Barbier, 1990; Nibbering, 1991). Magrath and Arens (1989) estimate that erosion damage on Java resulted in a loss of about 0.5 percent of total GDP, mostly from reduced long-term productivity.

[7] Logging practices also have a marked effect on the environmental problems associated with logging. Adverse hydrological changes, sedimentation, and nutrient outflows can all be mitigated by appropriate logging practices, or exacerbated by inappropriate practices (Hamilton and King, 1983). See Kumari (1995) for a detailed comparison of the effects of different logging practices in peninsular Malaysia. Reduced-impact logging guideline for dipterocarp forests in Indonesia are provided by Sist and others (1998).

Offsite effects of poor land-use. Prior to the mid-1980s, massive use of pesticides was causing considerable harm, especially on Java. Pesticide pollution was a major cause for concern in Indonesia's densely populated village communities, particularly where water for drinking and bathing was in limited supply. Problems were further compounded by the disposal of hazardous wastes produced by the pesticide industry. Moreover, heavy pesticide use also came to undermine the very purpose for which it had been promoted: stabilizing agricultural production. Pests developed resistance to pesticides, resulting in widespread pest resurgence problems (Kenmore, 1991). Removal of subsidies, bans on particularly harmful pesticides, and adoption of IPM in 1986 have substantially reduced the impact of these contamination problems. As a result of these changes, the problem of contamination from pesticide use was already substantially reduced well before the onset of the crisis (Pagiola and others, 1997).

Impacts of the Crisis

In examining the effects of the crisis, it is important to bear in mind that damage to forests was already widespread, and causing substantial adverse effects, even before the crisis. Moreover, these trends were expected to continue and even to accelerate even before the crisis. Any finding that the crisis has either aggravated or alleviated problems, therefore, is only intended to be relative to these extremely high pre-crisis trends.

Data limitations. Uncertainty over the pre-crisis rate of deforestation makes determining the impact of the crisis extremely difficult. Analysis of the impacts of the crisis is perforce limited to an examination of various sources of pressure. Data on these factors is itself limited, however. Even arriving at strong qualitative conclusions about the direction of changes in pressure is difficult, because different effects often work in different direction, making the net effect unclear. The task is further complicated because of intense controversy over the extent and relative importance of different sources of pressure. These constraints should be borne in mind in reading the analysis below. In an effort to alleviate data constraints, the World Bank has, among other activities, helped finance a detailed household survey by CIFOR in five provinces in Indonesia's outer Islands (Sunderlin and others, 2000).[8]

No simple story emerges on the effect of the crisis on Indonesia's forests. The only clear result is that the effect of the crisis has been extremely heterogeneous throughout Indonesia. The diverse impacts of the fires and of the drought have further complicated the story. The diversity of impacts is illustrated in Table 4.3, which summarizes the results of four CIFOR case studies in Indonesia's outer islands (Angelsen and Resosudarmo, 1999). The impact of the crisis has varied not only across regions, but also within them; Box 4.1 below, for example, discusses how different groups in a specific area of Sumatra have been affected and how in turn this has affected the Kerinci Seblat National Park.

Social Impact

Income change. The crisis, though falling short of the devastation initially feared, has had a greater impact on Indonesia than on other countries in the region (Gragnolati, 1999; Poppele and others, 1999). Analysis of household data from the Indonesia Family Life Surveys (IFLS), which collected data from about 2,000 households in seven provinces before and after the crisis shows that, on average, per capita expenditure declined by 24 percent between 1997 and 1998 (Frankenberg and others, 1999). The impact appears to have been especially large in urban areas, although differential inflation makes comparisons difficult. A qualitative assessment of the impact of the crisis in 4,000 *kecamatan* (sub-districts) carried

[8] The World Bank has also helped finance a number of other surveys which have shed considerable light on the social impact of the crisis, but these other surveys do not specifically address the impact on forests and land use.

Box 4.1. The Impact of the crisis in the area of the Kerinci Seblat National Park

Kerinci Seblat National Park is the largest national park in Sumatra. It covers 1.4 million hectares of tropical rainforest, and is significant to conservation on a national and international scale. In 1991 Kerinci Seblat was granted GEF funding for an Integrated Conservation and Development Project (ICDP). The Kerinci valley, a large enclave where 280,000 people live and farm, lies within the park though formally outside it. Agricultural activities are the primary source of income for between 80 percent and 90 percent of households in the valley. The main crops are rice, coffee, tea, cinnamon, maize, and chilies. Rice is particularly important in the Kerinci Valley, while cinnamon dominates on the surrounding slopes, where it is grown in combination with a number of other crops.

There were several visible symptoms of prosperity, including new buildings under construction, not only in the *kabupaten* capital at Sungai Penuh but also in outlying villages. Many motorcycles are also reportedly being sold in the area. The high visibility of these symptoms masks, however, at least some adverse impacts.

- Farmers who produce tree crops and horticultural crops appear to have benefited from price increases, though yield changes due to weather conditions moderated these benefits. Because of high transport costs, more outlying communities benefited less. There does not appear to have been any significant increase in area planted to these crops, partly due to limited available land, and perhaps because prices have declined from their high points in the immediate post-crisis period.
- Rice production appears to have been little affected, with output price increases offsetting the impact of rising fertilizer prices. Farmers indicated that they had not changed their fertilizer use.
- Households that produced neither rice nor the favored tree crops have been adversely affected. In particular, civil servants–including, importantly, park rangers–have suffered, since they are on a fixed income.
- There are many reports of household members returning from Malaysia after losing their jobs there. Returnees are mostly employed in agriculture (either in family-owned land or as laborers). A minority is reported to have been hired by forest mills to supply them with wood through illegal logging.

The communities surrounding Kerinci Seblat National Park place substantial pressures upon it, by collecting non-timber products, clearing for agricultural use (mainly for agroforests), and illegal logging. These are long-standing concerns, however, and only illegal logging seems likely to have increased as a result of the crisis. The major threats to the Park appear to derive primarily from other factors:

- **Road construction** is fragmenting the park and threatening its ecological viability. Several road projects have been proposed in the park, including roads of convenience that transect the park, linking communities that already have road access, and roads to enclave communities inside the park which do not have road access. It is unclear how the government's budget problems will affect road construction. At least one road project appears to have been suspended (another was halted after protests from the ICDP). Work to improve the main access road to Sungai Penuh, which traverses part of the park near Mount Kerinci, is on-going.
- **Logging** both harms the ecosystem and facilitates the subsequent entry of cultivators. Seventeen logging concessions border almost the full length of the park boundary in Jambi and Bengkulu provinces. Logging in these concessions frequently encroaches within the park boundaries. As noted, forest concessions are reported to have hired jobless migrants from urban areas, causing a possible increase in illegal logging.
- **Lack of management staff (park rangers).** There are only 74 park rangers for the whole park. Inflation has substantially reduced their real income, so many rangers are seeking to supplement their income through farming, thus further reducing the effective staff available for monitoring and enforcement. Reduced real income levels have also made rangers more susceptible to bribery.
- **Gold mining**. Only three mining concessions are now said to exist within the park or surrounding buffer zones. Since the beginning of the crisis, an increase in individual gold miners (mostly coming from neighboring provinces in Sumatra) has been noted.

Source: Author's observations during February 1999 visit

out by the Ford Foundation also indicates that urban areas have, in general, been harder hit than rural areas (Poppele and others, 1999; Sumarto and others, 1999). The data from both surveys, and a third survey of 100 villages carried out by UNICEF, also indicate that the impact of the crisis has varied substantially within the country. In the IFLS survey, for example, South Sumatra was found to have been

much less affected than other provinces in the sample (Frankenberg and others, 1999). The impact was particularly strong in Java, even in rural areas (Poppele and others, 1999). Some areas appear to have actually benefited (see section on relative price changes, below). As the crisis has unfolded and the initial impact has been supplemented by widespread price increases, however, it is likely that negative impacts have been felt more broadly. These sectoral and regional differences are important, because to the extent that the negative impact of the crisis has been greatest in areas with the least forest cover–urban areas and Java–the potential for a consequent impact on forest is also lower than if a similar social impact had been experienced in rural areas in the outer islands.

Table 4.3. Impact of the Economic Crisis on Livelihood and Forests: Indonesian Case Studies

	Province			
Impact on	*Riau, Sumatra*	*West Kalimantan*	*East Kalimantan*	*Central Sulawesi*
Livelihood	Generally worse off	Generally worse off	Significant impact of drought and fires, uncertain effect of crisis	Varies, depending on area of holdings and type of commodities
Smallholders	Greater in central villages, lower in remote ones	No change in frequency observed	No effect or reduced	Probably increased
Commercial clearing	In some areas, by in-migrants and plantation companies (for oil palm)	No information available	Might be some, but limited information available	Not observed in the areas visited, but reported in other areas (for cocoa)
Logging	Ongoing, probably limited effect of economic crisis	Some small scale logging, uncertain effect of crisis	Increased	No logging in the areas visited
Non-Timber Forest Products	Increased rattan and turtle collection in some villages	Where available not too attractive (lack of transport and buyers)	Increased for some products, but availability affected by drought and fires	Increased rattan collection (favorable prices)

Source: Angelsen and Resosudarmo, 1999

Reverse migration. Agriculture has acted as a major shock absorber in the Indonesian economy (Warr, 1999). Employment actually increased by 4.5 million between February 1997 and February 1998, with almost all new jobs in agriculture (Poppele and others, 1999). On the other hand, relatively limited return migration was found in the CIFOR case studies in the outer islands (Angelsen and Resosudarmo, 1999).

Coping strategies. IFLS data shows that households devoted a significantly larger share of their budget to food, and particularly to staples, following the crisis; again, the increase appears to have been particularly large in urban areas (Frankenberg and others, 1999). There was also an increase in labor force participation (Gragnolati, 1999; Frankenberg and others, 1999; Poppele and others, 1999). The key question is here is the extent to which coping strategies are likely to place additional pressures on natural resources. To the extent that households attempt to cope with reduced incomes by increasing their collection of forest products (including fuelwood, fruit and other products, and game) the pressure on forest quality would be increased. And to the extent that they cleared additional forest land to expand cultivated area, the loss of forest cover would be accelerated.

Analysis of data from the CIFOR survey shows that about 36 percent of the 63 percent of households that considered themselves worse off as a result of the crisis (or 23 percent of all households in the survey) had expanded the area they cultivated (Sunderlin and others, 2000). If confirmed, this result would indicate that pressure on the country's forests has increased. A large part of this increase

appears to have been for increased production of tree crops, driven in part by their increased profitability (see next section) as well as by coping strategies.

Taking a different cut, and one that is of particular interest because of the importance of protected areas, a survey of National Park Managers shows that most thought pressures on the areas they manage have increased (ACNielsen, 1998). Among these managers, 57 percent thought that illegal logging by local people had increased as a result of the crisis, 45 percent thought that collection of non-timber forest products had increased, 42 percent thought that land encroachment had increased, and 36 percent thought that hunting had increased. These were all problems that these managers had identified as being the most serious threats to the parks' integrity.

Changes in Relative Prices

The crisis has caused substantial changes in relative prices in Indonesia, because of a combination of devaluation, policy changes, inflation, and changes in market demand. A CGE model of the Sumatran regional economy by San and others (1999) predicts that these changes will result in reductions in food crop production, expect for rice and sugar, whose elasticities of demand are low, and expansion of tree crop production, especially oil palm, rubber, coffee, and other estate crops. The model also predicts that demand for forest products, both as final products and as intermediate inputs for the wood processing industry will increase.

Logging. The impact of the crisis on the logging industry has varied over time. At first, there was a relatively substantial impact due to reduced demand in domestic and export markets. More recently, the industry appears to have recovered at least partially.

Demand for wood and wood products comes from both domestic and export markets. In terms of exports, there seem to have been mixed effects. Devaluation has tended to make exports more attractive. This effect has been reinforced by reductions in export barriers undertaken under the adjustment policies: the prohibitive export tax on rough sawnwood has been cut to 30 percent and the ban on roundwood exports abolished; there have also been some reductions in forest taxes (Scotland, 1998). The effects of devaluation are not unambiguously favorable, however, since the logging industry uses considerable amounts of imported equipment, which has become more expensive. In any case, prices have increased much less than might have been expected, because of stagnant or declining demand in many of Indonesia's main export markets. Plywood export prices had been rising throughout the 1990s, due to strong demand. An important component of this demand, however, had been from growing Asian economies, and this has been significantly affected by the crisis. The crisis resulted in substantially lower demand in Indonesia's main export markets (Japan, South Korea, Thailand, and Singapore). Prices fell by about a third between mid-1997 and mid-1998. While Malaysia was able to redirect exports towards other markets such as the US, Indonesia does not appear to have been as successful in doing so–while US imports of Malaysian plywood increased by 120 percent between 1997 and 1998, imports from Indonesia increased by only 15 percent, surprising many in the US plywood industry (Flynn, 1999). Reports indicated that a large stockpile of logs accumulated in the early part of the crisis (Scotland, 1998) and that many mills were laying off employees (Sunderlin, 1998). More recently, however, export prices have recovered, in large part thanks to China's expansion of plywood imports (Sunderlin, 1998). However, exporting logs remains problematic: although the ban on exports has been lifted, new administrative barriers continue to impede log exports (Brown, 1999).

Domestically, demand from the construction industry declined substantially as a result of the crisis. However, the existence of many plywood and pulp mills, which must run at full capacity or not run at all, has tended to sustain demand. Moreover, many of these mills are seeking to draw supplies from a wide area, having failed to ensure they had sustainable supply sources nearby.

Financial incentives for loggers have never been easy to ascertain, as there are strong reasons for them to conceal the benefits they are reaping (Brown, 1999). Changes in the regulatory regime in recent years further complicate matters. Scotland (1998) estimates that financial incentives to loggers fell overall, although logging could remain profitable with appropriate cost reductions–including cuts in activities designed to reduce the environmental damage from logging. Brown (1999) believes that potential rents to timber production have increased overall now that exporting has in principle been liberalized, but that vertically-integrated timber groups have an incentive to allocate profits to their logging operations rather than mills, so as to reduce their tax burden.

Illegal logging has apparently increased in many areas, as a result of the breakdown of the government's enforcement powers. The remaining teak forests in Java appear to have been particularly hard hit. As Brown (1999) documents, there has long been a disparity between the possible output from legal logging concessions and the feed requirements of the growing plywood, sawnwood, and pulp mill sector. Whether the persistent anecdotal reports of increased illegal logging represent a real increase or a continuation of previous trends is, therefore, difficult to ascertain without much better data than are currently available. The increased openness resulting from the on-going political changes may also be resulting in a higher level of reporting on illegal logging.

Oil Palm. Oil palm production has grown rapidly in recent years, expanding from 0.1 million hectares in 1967 to 2.5 million hectares in 1997 (Casson, 1999). Increases in oil palm area were expected to be a major source of conversion of forest, with plans calling for a major expansion of the area cultivated to it–to as much as 5.5 million hectares in 2000 (Casson, 1999). Even before the financial crisis, Indonesia had the world's lowest production costs for oil palm, estimated at about 10-25 percent below the costs in neighboring Malaysia, and about 15 percent below the world average (Potter and Lee, 1998; Casson, 1999). The structural adjustment program has attempted to further encourage production of crops such as oil palm, since their attractiveness on export markets can help Indonesia recover from the crisis.[9] Much of the expansion of oil palm, however, would come at the expense of forests–although at least some of this area would be degraded or logged-over forest.[10]

It is not clear to what extent oil palm production is in fact expanding. Devaluation of the Rupiah should have made oil palm production even more profitable. Everything else equal, this would tend to encourage oil palm expansion. However, the need for large capital investments has proved a major constraint, partly because of the current problems of the financial sector in both Indonesia and Malaysia. 90 percent of the 50 foreign investment projects which had planned to establish 900,000ha of oil palm plantation in Indonesia during 1998 were partly or wholly financed by Malaysian companies (Sunderlin, 1998). The uncertainty resulting from the political situation has also made investors wary. Another factor, tied to the breakdown of the Suharto regime's power structure, is that some local communities which had been displaced by oil palm concessions–often on very unfavorable terms–appear to be seeking

[9] To help ensure sufficient local supplies of edible oils, Indonesia imposed a ban on palm oil exports in early 1988. This was lifted in April 1998, and replaced by an export tax of 40 percent, later increased to 60 percent (Potter and Lee, 1998). The export tax was subsequently lowered further to 10 percent

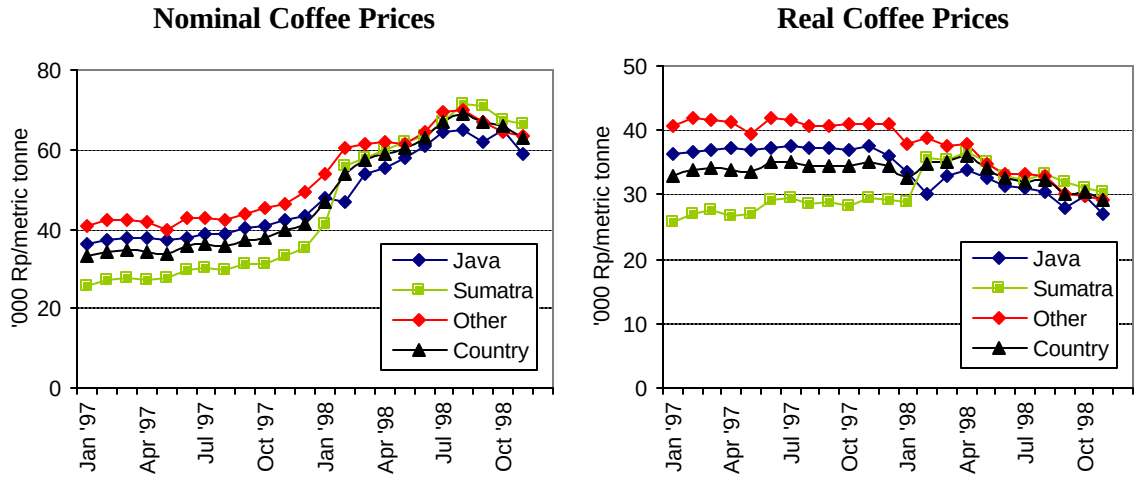
[10] Since oil palm production is quite profitable, it is legitimate to ask whether forest loss for the purpose of oil palm production should in fact be considered inefficient. Where the environmental benefits of forests are high, it may be. For example, Bennett and Reynolds (1993) found that the costs of converting mangroves to oil palm in Sarawak, Malaysia, would substantially outweigh the benefits because of the ensuing damage to fisheries and tourism. Not all conversion for oil palm is in such sensitive areas, however. In some cases, oil palm production may in fact be more valuable than continued use of a given area as forest, even after the environmental benefits of forests are taken into consideration. However, it is quite likely that any expansion of oil palm production would be inefficient in the sense that it will not be undertaken in a way that maximizes social returns and minimizes environmental damage.

to retake their lands. The net result is most likely a slowdown of the expansion of oil palm. Data from the Directorate General for Estate Crops (DGEC) shows continued expansion in the area planted to oil palm, but these data appear to be based on projections of past trends rather than observation. Other data from DGEC is more consistent with a retrenchment of oil palm production: for example, sales of oil palm seed to plantations fell by over one third in 1998, compared to 1997. Some estimates place the area planted in 1998 at 70,000-80,000 hectares, well below the 200,000 hectares per annum average observed in the period 1990-1997 (Casson, 1999). This is likely to prove only a temporary respite, however. As the political situation stabilizes and regional financial markets recover, oil palm can be expected to resume its prior rapid growth.

Smallholders. The effects of the crisis on land use by smallholders has been very diverse, reflecting both the unevenness of the crisis' impact and the very different situations of different smallholders.

One of the unexpected effects of the crisis is that many smallholders–especially those that are producing tree crops and other export-oriented cash crops–at first actually benefited. Rapid devaluation meant that the rupiah prices of many export-oriented crops soared. All crops did not benefit equally, however. Rubber prices, for example, increased relatively little because the effect of the Rupiah's devaluation was offset by declining world market prices.

Figure 4.1: Evolution of nominal and real coffee producer prices in Indonesia, 1997-98



Note: Deflated using Wholesale Price Index (excluding petroleum)
Source: Price data from Statistics Department; Inflation data from IFS

Over time, however, the initial gains experienced by export crop producers have been eroded by higher production costs due to domestic inflation (although low agricultural wages continue to help) and by the relative strengthening of the Rupiah. Figure 4.1 shows how nominal and real prices of coffee evolved over 1997 and 1998. The left panel shows that as the value of the Rupiah fell in late 1997 and early 1998, nominal prices rose rapidly, more than doubling in some provinces. Even in nominal terms, however, there was a downturn in prices in late 1998, as the Rupiah strengthened, going from a peak of about 14,000 to the dollar in July to below 8,000 in December. In real terms, the situation appears quite

different, as can be seen in the right panel.[11] Only in Sumatra have real prices increased since the beginning of the crisis, and even there they were trending down in the latter part of 1998.

For some crops, this means that they are now no more profitable, in real terms, than they had been prior to the crisis. In these cases, it is doubtful that they would induce any lasting changes in pre-existing trends. Higher prices for export commodities at market centers will also have little effect on production if they do not manifest themselves in terms of higher pricers to producers at the farmgate. Where physical and marketing infrastructure is poor, this may not occur. Thus, although rattan prices have tripled since the onset of the crisis, rattan collection has increased in Central Sulawesi but not in West Kalimantan, where transport is more limited and buyers scarce (Angelsen and Resosudarmo, 1999).

Even though the increase in cash crop prices has been eroded by inflation, it nevertheless remains significant in some cases. As noted above, the real price of coffee in Sumatra in late 1998 was about 20 percent above its level in early 1997. This is significant, since Sumatra accounts for about two thirds the area planted to coffee in Indonesia. Assuming that this increase is not completely eroded by inflation, one might expect that smallholder tree crop production will expand. Data from the Directorate General for Estate Crops do not show any obvious trend in area planted to coffee on Sumatra in 1998, but these data are based on projections rather than field measurements and so may be misleading.

Indeed, there are some signs that increased tree crop production is occurring. Sales of oil palm seeds to smallholders in 1998 were double the sales in 1997, for example (although this only brings them to about 10 percent of sales to large plantations). This suggests that smallholders are either expanding the area of oil palm they are cultivating, or upgrading their existing oil palm areas using higher-yielding planting materials–most likely some of both. Data from the CIFOR survey of rural households in 5 provinces show that 17 percent of the households that considered themselves better off as a result of the crisis increased the area they cultivate, presumably to take advantage of the increased profit potential of individual crops (Sunderlin and others, 2000). Because only 31 percent of households considered themselves better off, this only comes to 3 percent of all households, however.[12]

That tree crops seem to have benefited most from relative price changes is important for several reasons. First, tree crops are a long-term investment. They take 5 to 10 years before they bring a benefit, so long-term price changes are more important than short-term fluctuations. Expanding the area under tree crops also requires substantial up-front investments, which can be a significant constraint for many smallholders. As a result, the area cultivated to tree crops is likely to respond less rapidly to price changes than that cultivated to annual crops might have. Second, tree crops are in many ways less damaging as a land use than annual crops. Rubber production as traditionally practiced by smallholders in Indonesia is particularly benign (Thiollay, 1995; Tomich and others, 1998). Thus, to the extent that an expansion of tree crop production has taken place, it is likely to have caused less environmental damage than a similar expansion of annual crop production would have. A final factor to consider is that the environmental consequences of increased tree crop production are very different depending on whether this expansion occurs in virgin primary forest (high negative impact), in secondary or logged-over forest (uncertain impact), or within existing agricultural land (potentially positive impact). Unfortunately, this is extremely difficult to ascertain using available data.

[11] The wholesale price index is used in deflating these values; using the consumer price index would not appreciably change results.

[12] This proportion is in addition to that of worse-off households that also increased their cultivated area, as mentioned earlier. Overall, 26 percent of all households in the survey expanded the area they cultivated (Sunderlin and others, 2000). For at least some of the worse-off households, expanding the area under cultivation may well have been a response to higher prices for some tree crops, rather than solely a coping strategy

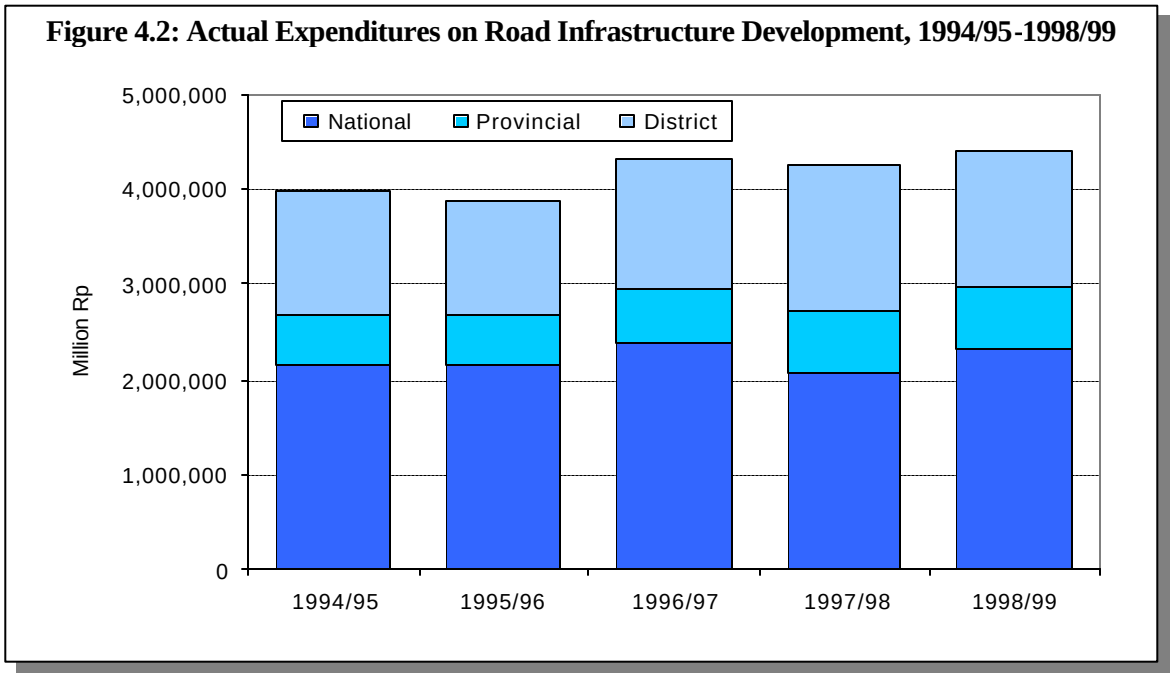
Food crops. For smallholders on the Outer Islands that mainly produce food crops (especially rice), the impact of the crisis appears to have been relatively minor, with increases in output prices offset by higher input prices. Such smallholders may not be doing as well as those who produce tree crops, but neither do they appear to have stronger incentives to clear more land for agriculture than they did before. Higher prices for inputs such as pesticides and chemical fertilizer are reported to be discouraging their use, and hence reducing the danger of contamination of water supplies and other possible adverse side-effects. Since pesticide use had already declined substantially following the withdrawal of subsidies and the promotion of IPM in the mid-1980s, however, this further reduction may have had only a minor positive effect on the environment.

Changes in Government Expenditures

Changes in government expenditures induced by the crisis can affect the environment negatively if expenditures on environmentally-beneficial activities are reduced (for example, protected areas budgets) or positively if expenditures that create pressures on the environment are reduced (for example, trans-migration and road building). Overall, government spending declined substantially. Although spending on the environment-related activities does not appear to have fallen in relative terms, it fell considerably in absolute terms.

Protection. Over 90 percent of park managers thought their routine budgets insufficient to effectively meet their park management objectives even prior to the crisis. Only 25 percent thought that this problem had increased as a result of the crisis (ACNielsen, 1998). This may be a reflection of how limited resources had already been prior to the crisis. 58 percent of managers expected reduced budgetary resources to have their greatest impact on procurement of equipment, whereas relatively few (13 percent) thought that routine patrolling would be a target for cost savings. Even if budgets are held constant in nominal terms, however, inflation will erode their real value. As noted in Box 4.2, for example, park rangers have experienced a substantial reduction in their real income, which has forced them to supplement their income from other sources.

Figure 4.2: Actual Expenditures on Road Infrastructure Development, 1994/95-1998/99



Road-building. Roads have often been a major contributor to deforestation, by facilitating access to settlers and by improving the profitability of agricultural production in remote areas. Several road projects threaten to increase pressures on forests, including the Trans-Kalimantan highway between Balikpapan and Pontianak and a major road along the border with Malaysian Borneo on Kalimantan. The crisis forced significant cuts in the public works programs. Figure 4.2 shows actual expenditures on road infrastructure development in recent years. Actual expenditures have remained essentially unchanged since the crisis. In real terms, however, they have declined substantially. Although the principal concern is with new roads, which would likely spur deforestation in new areas, reduced maintenance on existing roads might also have an impact. For example, during 1998, a 200 km section of the Trans-Kalimantan highway in Central and South Kalimantan was closed for extended periods because of poor road conditions and insufficient funds to conduct repairs (Sunderlin, 1998).

Political Changes

The breakdown in the Soeharto regime's power structure, and to some extent in law and order, which is reducing the government's already limited ability to enforce regulations and secure protected areas, appears to have been much more significant in Indonesia than in the other East Asian countries.

Forestry is the sector in which there has been most movement toward reform, propelled in part by a number of forest policy-related conditions in the IMF agreement. The reform process is still underway, with previously agreed changes only partially implemented. How these reforms will work themselves out remains to be seen. Entrenched interests which have long benefited greatly from forest exploitation have very strong incentives to attempt to perpetuate these benefits (Brown, 1999).

The forest fires and the controversy surrounding them were an important factor in encouraging reform in forest sector. After years of blaming shifting cultivators for burning, the widespread availability of remote sensing images on the internet showing that many fires appeared to coincide with logging and oil palm concessions forced an official recognition of the role these firms were playing. The Forestry Ministry released a list of plantation, timber, and construction companies suspected of having participated in large-scale burning. Despite the controversy, no logging companies lost their concession, and few lost their permission to cut wood–and many of these had it restored (Potter and Lee, 1998).

With the demise of the *ancien regime*, local populations have apparently become much more assertive in their relations with large logging firms and plantations (Potter and Lee, 1998).

One of the main dimensions of many political changes has been an emphasis on decentralization. This emphasis creates both dangers and opportunities. Although regional governments may be better able to monitor local conditions and more attuned to possible local environmental problems, they may also be more vulnerable to pressure from commercial interests and more dependent on income from timber. For example, the regional government in Kalimantan is allowing oil palm companies to clear logged-over concessions which should in principle be used for plantation forests (Potter and Lee, 1998). The situation is still extremely fluid, however, and it will take time to determine whether this trend is ultimately helpful or harmful; there is also still time to attempt to direct it in a positive direction.

Summary

The multitude of effects, the diversity of conditions, and the scarcity of data make it hard to come to strong conclusions about the impact of the financial crisis on Indonesia's already highly threatened forests. The balance of the available evidence does not seem to support the more pessimistic scenarios that were proposed early in the crisis. Indeed, one can point to at least some evidence suggesting that

some sources of pressure have been alleviated. Other evidence, conversely, suggests that some pressures may have increased. The net effect of these factors is hard to gauge, both locally and at the national level.

Subsistence agriculture. The social impact of the crisis, and particularly the income shortfalls that many Indonesians have faced due to loss of jobs or the effects of inflation, suggests that pressure on forest resources may have increased, from both increased collection of products such as fuelwood and from conversion of forest areas to agriculture, as households sought to cope. The magnitude of this effect is likely to have been limited, however, because the social impacts of the crisis appear to have been greatest in areas in which little forest remains.

Tree crops. Devaluation and other consequences of the crisis have tended to increase the profitability of many tree crops (produced by both smallholders and large estates), although this increase was not always sustained. Some expansion of smallholder treecrop production is likely as a result of this, although the inherent inertia of tree crop production may limit its extent. Whether this will result in positive or negative environmental effects is unclear, however. Tree crop production is often less damaging environmentally than other agricultural uses, so much will depend on whether tree crops displace largely undisturbed forest or existing agricultural land. Large-scale tree crop developments (such as the extensive planned increases in oil palm production) appear to have slowed as a result of the crisis. Although their potential profitability has increased, they have been hampered by the poor investment climate and high political uncertainty.

Logging. The available evidence on logging is also mixed. As with tree crop plantations, potential profitability appears to have increased–though perhaps not as much as initially anticipated, due to lower demand on export markets–but here too the poor investment climate may have dissuaded new investments. The most worrisome aspect is the substantial anecdotal evidence of increased illegal logging, although it is hard to determine whether illegal logging has in fact increased or whether it is more visible thanks to the greater political openness. Substantial turmoil in the policy framework offers hope for improvement but also many dangers of mis-steps actually worsening the situation.

The extremely high level of threats to Indonesian forests that existed even prior to the crisis leave little room for complacency even if some of the more alarmist scenarios of the crisis' impact do not seem to have occurred. Some aspects of the crisis are likely to have worsened already high pressures, others to have slightly alleviated them. The underlying pressures created by demand for more agricultural land and for timber and wood products remain.

5. Thailand

Background

Forest cover and deforestation. About 53 percent of Thailand's land area was under forest cover in 1961, but by 1989 this proportion had fallen drastically to about 28 percent (Lombardini, 1994). Between 1976 and 1989 alone, forest cover fell by 28 percent (Cropper and others, 1997). A nationwide logging ban in the country's terrestrial forest reserves was enacted in 1989. The rate of decline of forest cover has slowed from 0.9 percent per year before the ban to 0.4 percent per year just after the ban and was down to 0.2 percent per year between 1995 and 1998. However, the slowing rate of deforestation masks the continued decline in the quality of forest stands, which is more difficult to monitor (World Bank, 1999b). In 1998, forest cover in Thailand was estimated at about 25 percent of total land area.

Forest benefits. The forest sector has played a much smaller role in Thailand than in many other Asian countries. Even at its peak in the 1970s, the forest sector (including the production of timber and of major forest products) only contributed 2.5 percent of real GDP. By 1988, this share had fallen to 0.4 percent, and by 1990 to 0.2 percent (Sadoff, 1995). Here too, the recorded benefits far under-estimate the benefits provided by forests. An awareness of these other benefits has gradually grown. The role of forests in maintaining valuable ecosystems has also increasingly been recognized (Dixon and Sherman, 1990). The 1989 logging ban was prompted in part by catastrophic flooding that was blamed on deforestation of watersheds (Sadoff, 1995). The National Forest Policy sets a target of total land area under forest cover of 40 percent, including 15 percent of conservation forest and 25 percent of commercial or productive forests. It does not, however, set a date by which this target is to be achieved.

Causes of deforestation. As in the other countries of the region, there are contradictory estimates of the extent of deforestation and the relative importance of various causes. Since permanent loss of forest cover requires that forest land be converted to other uses, attention has focused on factors that determine expansion of agricultural land. Panayotou and Sungsuwan (1994) find relatively strong effects of population density and road density on deforestation in Northeast Thailand, but Cropper and others (1997), find less marked effects. Other efforts were frustrated by poor-quality data (Lombardini, 1994). Whatever the reported cause, however, an important aspect of all existing analyses of the causes of deforestation is that they use data that predates the 1989 logging ban. Even though the ban has many loopholes (Sadoff, 1995), it is likely that the relative importance of different pressure factors, and the extent to which they result in loss of forest, has changed since then. This makes it more difficult to use these results to predict how changes in various pressure factors is likely to affect forests and land use.

Mangroves. Thailand lost more than half of its mangrove forest area of about 360,000 ha between 1961 and 1993, although the rate of loss appears to be slowing (Sarraf, 1999). From a high of approximately 13,000 ha/year of mangrove forest lost nationwide between 1979 and 1986, the rate of decline decreased to 2,600 ha per year during the period 1991 to 1993. Analysis of land use using remote sensing data indicated that a large part (66 percent) of mangrove loss was due to the combined effect of clear-felling for timber, firewood, and charcoal, clearing for agriculture, salt evaporation ponds, road and port development, and mining. The single largest end use (32 percent) was shrimp farm development, although it could not be determined from the remote sensing images whether shrimp ponds were developed directly from virgin mangrove or from former mangrove areas that had already been cleared for other purposes.

Protected areas. Thailand has an ambitious program of protected areas (Dixon and Sherman, 1990; McKinnon, 1997). About 9 percent of the country is protected, with good coverage of habitat types. However, encroachment and settlement in areas designated as protected is a major problem (McKinnon, 1997).

Impacts of the Crisis

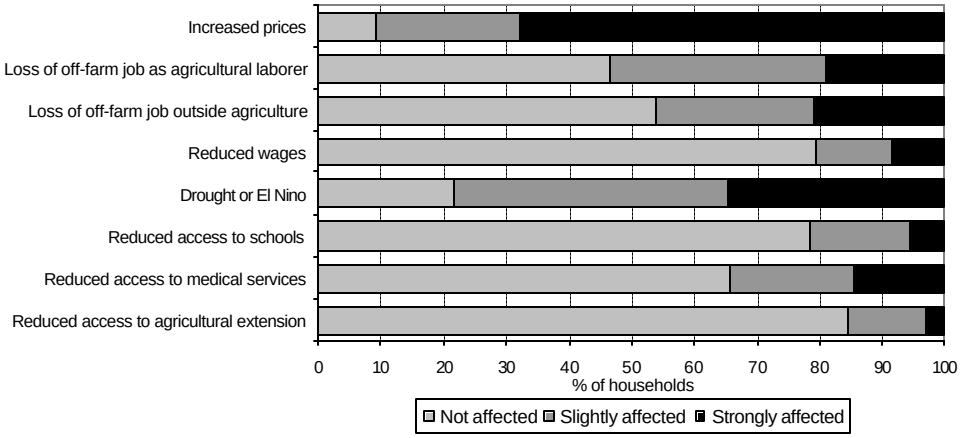
Thailand was the first country to be hit by the East Asian financial crisis; indeed, the devaluation of the Thai Baht in mid-1997 is generally taken as marking the onset of the crisis. Even though the crisis has been experienced for a longer period than in other countries, data needed to examine most of its effects on forests and land use remain scarce.

Case study. To held shed light on the impacts of the East Asian financial crisis on the rural households in Thailand, a household survey was carried out in five villages near Phu Khiew Wildlife Sanctuary and Sai Thong National Park in Chayaphum Province in Thailand's Northeast Region. The survey, carried out in March-May 1999, interviewed 237 households (Tanakanjana, 1999).

Social Impact

In Thailand the impact of the crisis appears to have been concentrated in urban areas. Unemployment has been concentrated in the Bangkok Metropolitan Area, for example. However, some rural areas, including the relatively poor Northeast Region, have also experienced substantial increases in unemployment (Gragnolati, 1999). The manner in which the effects of the crisis have been communicated to rural households is illustrated in Figure 5.1. Increased prices are the most commonly-reported problem, and that which has strongly affected the most households. It is followed by loss of jobs. A large proportion of households also report having been affected by drought or *El Niño*.

Figure 5.1. Proportion of households affected by different crisis-induced problems in study villages near Phu Khiew Wildlife Sanctuary and Sai Thong National Park, Chayaphum Province, Thailand, end 1997-mid 1999



Source: Thailand survey data

***Income shortfalls*.** Substantial price increases for rice, the main agricultural product, were experienced in the second half of 1997 and into 1998. Export demand was strong because of poor production elsewhere, and the devaluation of the Baht further increased domestic returns (EIU, 1997, 1998, 1999). This sustained rural incomes, and helped rural households cope with the return of family members who lost urban jobs (see above). There do not seem to have been instances of substantial windfall gains such as were experienced by some Indonesian export-oriented tree crop producers, however. More recently, rice prices have declined because export demand tended to focus on lower-quality varieties, while output has been hit by the effect of poor weather (partly because of continuing *El Niño* conditions). Increased prices for inputs and consumption goods have also eroded rural incomes.

Return migration. The extent and effects of return migration has been a matter of particular concern. In the case study area, migration had played an important economic role. A large proportion of households (61 percent) had family members working away (see Table 5.1). Of these, the vast majority (87 percent) were working in urban areas in Thailand, with only a very small group working abroad (3 percent). The majority of households with members working away received remittances: an average of B1,600 per month from members working in urban areas, B1,300 per month from members working in other rural areas, and B14,600 per month from members working abroad. In these villages, return migration was substantial: 61 percent of households with members working away from home–38 percent of all households–had had returnees (Table 5.1). As a result of this return migration, and of diminished income-earning opportunities for household members who did not return, the level of remittances has also declined substantially.

Table 5.1. Extent of return migration in the study villages near Phu Khiew Wildlife Sanctuary and Sai Thong National Park, Chayaphum Province, Thailand

Households with members working	Households with members away		Mean number of household members away	% of households with members away that had return migrants	Mean number of household members returning
	n	% of all households			
in urban areas	126	53.2	1.6	62.7	1.6
in other rural areas	23	9.7	1.7	60.9	1.4
in other countries	5	2.1	1.0	40.0	1.0
Total	**145**	**61.2**	**1.4**	**61.4**	**1.6**

Source: Thailand survey data

Table 5.2: Changes in household behavior induced by economic problems in villages near Phu Khiew Wildlife Sanctuary and Sai Thong National Park, Chayaphum Province, Thailand

	n	%
1. Increased collection of products from forest areas		
Hunting	8	3
Fuelwood for sale	0	0
Fruit and other products for sale	8	3
Fuelwood for family consumption	5	2
Fruit and other products for family consumption	139	59
2. Increased the area cultivated		
By re-using fallow land	6	3
By clearing unused land	0	0
By clearing forest land	3	1
By renting or buying more land	3	1
3. Changed crops being cultivated	50	21
4. Changed crop cultivation practices		
Used less fertilizer	33	14
Used less pesticide	1	0

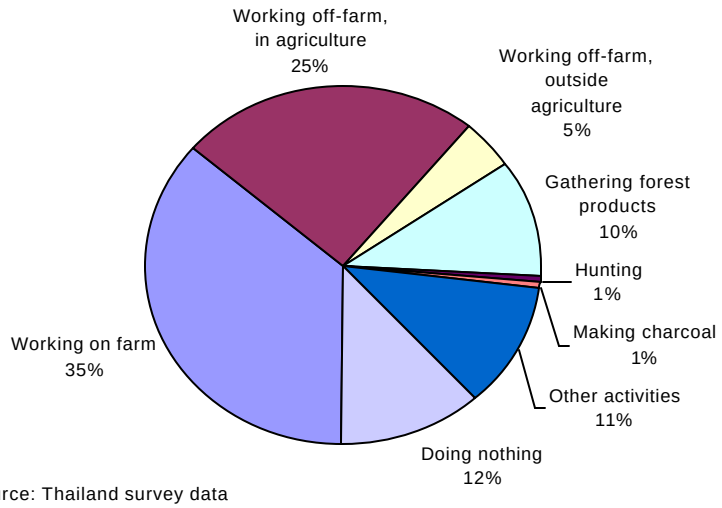
Source: Thailand survey data

Coping strategies. Because the social impact of the crisis appears to have been shifted from urban to rural areas through return migration, there was considerable fear that coping strategies of rural households would result in increased pressure on forests and other natural resources. The extent to which this has happened seems to have been limited, however. One reason is that the forest frontier has already been pushed well back from the most populated areas. Relatively few Thais live in areas in which there are substantial areas of forest still susceptible to damage. Even in forest frontier areas, there seems to have

been unexpectedly little additional pressure on forests. Table 5.2 shows the coping strategies adopted by the households in the case study villages, which are not only located in a frontier area but a particularly sensitive one due to its proximity to two protected areas. The main changes in household activities that occurred in the 18 months from the end of 1997 to early 1999 were substantial reductions in off-farm work, both within and outside agriculture (see Figure 5.1 above). Other activities remained essentially unchanged. A substantial proportion of households did increase their collection of fruit and other forest products for their own consumption. Interestingly, very few households reported increasing the amount of effort they devoted to collecting fuelwood. There was also little change in the effort devoted by households to hunting or fishing, or to charcoal production. In all of these resource-dependent activities, most households reported no change in the level of effort, and the number of households reporting increases was similar to that reporting decreases. Among the households reporting increased collection of forest products, most reported doing so for their own consumption, rather than for sale. With the exception of increased collection of some non-timber products, therefore, pressure on forests in this area appears remarkably unchanged.

Employment of return migrants. Whether return migrants would turn to resource-extracting activities as a way to earn a livelihood was an issue of significant concern. In the study villages, this fear does not appear to have been realized. As shown in Figure 5.2, the majority of return migrants are working in agriculture, either in the household's own farm (35 percent) or as agricultural laborers (25 percent). Only 11 percent are principally occupied in resource-extracting activities–primarily collection of forest products. In general, return migrants–although nominally absorbed in agriculture–appear to have mainly become dependents; by skills and inclination, few were drawn to agricultural activities (Gragnolati, 1999).

Figure 5.2. Employment of return migrants in villages near Phu Khiew Wildlife Sanctuary and Sai Thong National Park, Chayaphum Province, Thailand
(% of households with return migrants)



Source: Thailand survey data

Relative Price Changes

The second major mechanism by which the crisis might result in increased pressure on forests and other natural resources is through relative price changes. As mentioned above, the price of the main agricultural product, rice, increased substantially in the early part of the crisis, rising from 5,400B/t in May 1997 to 5,900B/t in July, and 7,100B/t in January 1998 (EIU, various dates). Rice production did expand in

response to these prices. Most of this increase occurred in irrigated areas; although rainfed upland rice can also be grown, returns are substantially lower (especially in a period of drought, as was the case at the time). Rice prices have since retreated from the high levels of 1997 and early 1998, falling to 6,200B/t in January 1999 and further to 5,400B/t in August despite the government buying significant quantities for its stockpile–with inflation eroding the real price even further. Other export crops, such as rubber, have also been afflicted by weak prices.

Table 5.2 above shows how low expansion of cultivated area has been in the case study area. Only 3 percent of households expanded the area they cultivated, and of these most did so by re-using fallow land earlier than planned rather than by converting forest land. In contrast, a much larger proportion changed their crop mix, showing that the impact of changes in relative prices was probably almost entirely on the use to which current cultivated land is put, rather than on its extent. Although these data represent only a single observation, they are nonetheless important because of their proximity to two protected areas.

Prices for shrimp were also high in 1997, and are reported to have encouraged an expansion of shrimp pond area. This is a particular concern for coastal mangrove areas, which are threatened by the expansion of coastal shrimp ponds, and for inland agricultural areas, threatened by salinity from inland shrimp ponds. The actual reported increase in shrimp pond area was small, however–less than 1 percent (Bangkok *Post*, Nov.1998). Prices have been declining since mid-1998, so incentives to expand are now likely to be lower. A ban on expansion of inland shrimp farming in several provinces in the Central Region was announced in July 1998 to prevent damage from water salinity to nearby agricultural areas.

Changes in Government Expenditures

Expenditures on environment-related activities have declined since peaking in 1997, in both real terms and in share of the overall government budget. In addition, efforts to increase transparency and accountability in government programs (while necessary and desirable in general) are at times delaying programs (Dore, 1999). What effect this might have in the long term is hard to assess. In the area where adverse effects on forests are likely to be felt most directly, there is mixed evidence. Although there is some anecdotal evidence or laxer protection of the country's protected areas, in the case study area in Chayaphum Province, at least, protection appears not have been reduced (Tanakanjana, 1999).

Political Changes

Unlike some other countries, Thailand has experienced few political changes as a result of the crisis. Although the government itself has been weak, government institutions have not crumbled as they have in Indonesia. This factor is unlikely to have affected deforestation trends, therefore.

Summary

The fears that the East Asian financial crisis would result in substantially increased pressure on Thailand's forests appear not to have been realized. While a definitive conclusion would require much better data on actual changes in land cover over time, there is little evidence that points to substantial increases in pressure. Equally, however, there is little evidence that pre-existing pressures from illegal logging and encroachment have been reduced. The most important potential source of increased pressure on the country's forests–return migration of workers who lost their urban jobs–does not appear to have resulted in a significant increased participation in resource-extracting activities. If the situation had persisted, its effects might well have been more severe; Thailand, however, was able to recovery from the crisis relatively rapidly.

6. Philippines

Background

Forest cover and deforestation. The Philippines has suffered from extensive deforestation (Kummer, 1991). In 1988, forest cover was estimated at about 7.1 million ha (24 percent of land area), a considerable reduction over the estimated 17.1 million ha of forest (57 percent of land area) in 1934.[13] The bulk of this deforestation is thought to have occurred in the postwar period. Relatively little of the remaining forest area is natural forest (0.9 to 2.4 million ha, depending on the source of the estimate). Mangrove forests have also been substantially reduced, though again the estimates of the rate of reduction and their remaining extent differ.

Causes of deforestation. The actual rates and causes of deforestation are the subject of considerable debate. Logging and conversion for agricultural use, which are often closely related, are thought to be the main forces at work, and as in many countries, accessibility has played an important role (Kummer, 1991; Liu and others, 1993). The data on the relative importance of these causes, and indeed on the actual rates of deforestation that are being experienced, are extremely weak, however. Several studies have argued that rates of forest loss are excessive. Hodgson and Dixon (1988, 1992), for example, conclude that the benefits of logging in Palawan are much lower than the on-site benefits of tourism and off-site benefits of fishery protection provided by forests.

Impact of the Crisis

The Philippines has experienced slower average growth than the regional average, punctuated by several economic crises. In part because of this, and in part because of the response to the problems of previous crises, the East Asian financial crisis has not had as severe an impact on the Philippines as on many other countries in the region. As one farmer in the Pagbilao area of Luzon put it: "Every year is a crisis year in the Philippines." Moreover, the impact of the drought conditions induced by *El Niño* is an important confounding factor. In the annual poverty indicator survey carried out by the National Statistics Office, 63 percent of households reported they had been affected by drought or *El Niño* (NSO, 1999); the proportion was even greater in the case study areas, in two of which over 90 percent of households reported being adversely affected by drought (Castro, 1999). Because of this, it is particularly difficult to separate the impact of the crisis *per se* from that of the *El Niño*-induced drought and other factors.

Case studies. To help illustrate some of the effects of the crisis, three case studies were conducted in communities adjacent to protected areas: Nagbalayong, near Bataan Natural Park on Luzon; Sag-ang, near Mount Kanlaon Natural Park on Negros; and Impasug-ong near Mount Kitanglad Range Natural Park on Mindanao. A survey of 101 households was conducted, as well as structured in-depth interviews with key informants (Castro, 1999).

Social Impact

In keeping with the limited impact of the crisis on the country, the social impact likewise appears to have been limited. Consumption, for example, held up strongly in 1998 (Gragnolati, 1999). No evidence

[13] Reliable estimates of forest cover in 1988 are available thanks to two nation-wide inventories: a World Bank-funded study based on SPOT satellite data from 1987-88 and a German-financed effort based on aerial photographs from 1979-88. However, the two surveys differ in their estimates of the type and extent of forest cover at a regional level.

has surfaced so far that any significant return migration has occurred–indeed, out-migration from rural areas seems to be continuing. In the case study communities, between 13 percent and 50 percent of households had had at least one family member return from urban areas since early 1998. Nevertheless, out-migration continued to be an important household strategy (Castro, 1999). Likewise, no evidence has surfaced so far that remittances have declined. This may be due to the high proportion of migrants working outside East Asia, in the Gulf states and the USA. In the case study areas, as in the annual poverty indicator survey, increased prices are identified as a major concern by all households (Table 6.1). It is likely that this problem is primarily due to the drought induced by *El Niño*, however, rather than to the financial crisis.

Table 6.1. Proportion of households affected by crisis-induced in Study Villages on Luzon, Negros, and Mindanao, January 1999
(% of households)

Problem	*Nagbalayong, Luzon*	*Sag-ang, Negros*	*Kibenton, Mindanao*
Increased price of food and basic commodities	100.0	100.0	100.0
Loss of job within the country	20.4	4.5	26.7
Loss of job of overseas contract workers	2.0	0.0	0.0
Reduced wages	67.3	31.8	43.3
Drought or El Niño	75.5	90.9	96.7
Reduced access to public services	93.9	77.3	73.3

Notes: Nagbalayong is near Bataan Natural Park on Luzon; Sag-ang near Mount Kanlaon Natural Park on Negros; and Impasug-ong near Mount Kitanglad Range Natural Park on Mindanao
Source: Castro, 1999

Coping strategies. As an example of the ways in which social impacts might have had an adverse impact on forest areas, Shively (1997) examines the hunting practices of people living in a forest frontier area in Palawan. Although hunting in this area is primarily for subsistence needs (rather than poaching for sale), many of the species being hunted are endangered. Shively finds that the likelihood of hunting and hunting effort were negatively related to farm size and to the share of off-farm income. If off-farm income falls, therefore, it would seem likely that hunting pressure would increase. The case studies did find evidence of increased collection of forest products as a result of recent economic problems, with households in Sag-ang increasing their collection of wild yams from nearby protected areas, and households in Kibenton likewise increasing collection of *lagutmon*, a local wild root crop, from protected areas. There are also anecdotal reports of households clearing additional land in protected areas.

Relative Price Changes

The Philippines experienced much less severe a devaluation than many other East Asian countries; trade policy changes were also much less substantial. As a result, relative prices changed much less. So far, no evidence has emerged that the changes in returns experienced as a result of the crisis are significantly different from the variations one might observe in any year–particularly when the effects of the drought are taken into account.

Mangroves. Conversion of mangrove forests to shrimp or fishponds has been a major concern in recent decades (Janssen and Padilla, 1997). This trend does not appear to have accelerated, largely because of depressed demand in Japan, the main export market.

Changes in Government Expenditures

Government expenditures on protected areas have declined steadily between 1997 and 1999, falling from P318 billion in fiscal 1997 to P246 billion in fiscal 1999 (Castro, 1999), raising fears that already inadequate protection efforts would be further compromised. Longer-term, there are worries about the effects that reduced investment in research and extension might have on productivity trends in rice (IRRI, 1998); should rice yields decline, or even fail to continue to increase, there may be increased pressure to convert additional area to rice production so as to increase production. Reduced investment in irrigation and other forms of intensification might have a similar effect. For example, Shively and Martinez (1999) find that lowland irrigation projects on Palawan can increase opportunities for upland households to work off-farm, resulting in a reallocation of time away from forest clearing and hillside farming in the uplands.[14] Nearly 6,000 hectares are targeted for irrigation within the next decade, all of them adjacent to upland communities. Cancellation or slowing of this work would mean that both their on-site benefits and the environmental benefits they might induce would be forgone or delayed. Likewise, reductions in expenditures on government-sponsored programs to rehabilitate mangrove areas may slow recovery of degraded areas.

Political Changes

The main political change likely to have affected deforestation is the on-going decentralization program, under which many functions and responsibilities formerly undertaken by the central government have been devolved to lower levels of government. This program predates the crisis by several years, however, having begun with the enactment of the Local Government Code in 1993. The lower administrative and budgetary capacity of local governments has led to a widespread perception that services have declined–a perception that is shared in the case study areas, where large proportions of households indicated they had experienced reduced access to public services. The crisis may well have exacerbated these problems by reducing budgets at all levels at a delicate period in the transition from central to local government.

As in other East Asian countries, the most commonly blamed causes of deforestation in the Philippines are logging and conversion for agricultural use. Roads have played an important role in mediating their effect, but the road system can be taken as fixed over the short period of the crisis.

Summary

As in the other countries, a scarcity of data prevents an exact assessment of the effects of the crisis on forests and land use. The overall impression from available data is that the crisis is unlikely to have had a major impact on natural resources in the Philippines. The main impact may have occurred as a result of reduced government expenditures on programs to conserve, protect, or rehabilitate natural resources.

[14] These areas are to be further studied so as to better understand the long-term interactions between lowland development and pressures on forest areas in the highlands.

7. Summary and Conclusions

Social Impact

The social impact of the crisis is summarized in a companion paper (Gragnolati, 1999). Although the crisis has affected the life of several million people in the region, the speed and severity of the impact has varied from country to country and within each country. Thailand, Indonesia, and Korea were among the first to suffer from the crisis, beginning in mid-1997, while Malaysia and the Philippines suffered a delayed impact. Indonesia has been worst hit. Throughout the region, urban households in sectors closely linked to the formal financial economy appear to have been hardest hit, while rural households appear to have been better protected. Nevertheless, many rural households have been affected by the return of family members who lost their urban jobs, by lower remittances from family members still working away from home, and by changes in the relative prices of products they produce and consume.

Reverse Migration

The possible impact of 'return migration' has been a major source of concern and an important explanation offered for much anecdotal evidence of crisis-induced environmental damage. The available data suggest, however, that the extent of return migration has been substantially smaller than initially believed, with the exception of Thailand (Gragnolati, 1999). In Indonesia, return migration has been concentrated primarily on Java, and much more limited in the outer islands, while in the Philippines outmigration from rural areas has continued to be an important household strategy.

The sectoral and regional concentration of return migration–particularly in Indonesia–are important, because to the extent that the negative impact of the crisis has been greatest in areas with the least forest cover–urban areas and Java–the potential for a consequent impact on forest is also lower than if a similar social impact had been experienced in rural areas in the outer islands. To the extent that return migration has occurred in frontier areas, a critical question concerns the employment of the returnees. Whether return migrants would turn to resource-extracting activities as a way to earn a livelihood was an issue of significant concern. In all three countries, this fear does not appear to have been realized. The majority of return migrants appear to have be working in agriculture. These results confirm Warr's finding that the agricultural sector has served as an important social safety net by absorbing labor displaced from other sectors (Warr, 1999).

Income Shortfalls

For many rural households, the crisis has resulted in marked income shortfalls, due to falls in remittances, loss of off-farm income, and in some cases reduced income from own production. Rising prices for many necessities have compounded problems. All rural households have not been adversely affected, however. In fact, changes in relative prices have resulted in substantial income increases for some households. Inflation may be eroding the benefits experienced even by this latter group, however.

To the extent that some households did experience income shortfalls, the question becomes to what extent affected households turned to resource-extraction activities as a way of compensating. Of particular interest for forests is whether rural households expanded the area they cultivated at the expense of forests, and whether they increased their use of forest products such as fuelwood.

Expansion of cultivated area. In some cases, household strategies for coping with income shortfalls did entail opening of new land for shifting cultivation. This appears to have been the case in some parts of Riau Province on Sumatra and in Central Sulawesi, for example, but not in more remote

villages in Riau and in East and West Kalimantan. In Thailand, almost none of households in the case study area expanded their area under cultivation by clearing additional forest land. Although there have been some well-publicized cases of encroachment into protected areas in Thailand, these may have been efforts to place pressure on the government so as to obtain other forms of assistance, rather than representing coping strategies in and of themselves.

Increased collection of forest products. Income shortfalls are likely to have resulted in increased collection of a variety of forest products. Such increased collection was noted in all three countries studied. However, increased collection was sometimes selective, as in the Thai case study, where almost 60 percent of households reported increasing their collection of other forest products for home consumption but almost none reported increasing collection of fuelwood. The degree to which this increased collection is likely to result in forest degradation is limited, however, by the location of the social impact of the crisis. In Indonesia, the impact was concentrated on Java, where the extent of remaining forests–and hence, opportunities to collect products from them–is limited. In Thailand the impact was more generalized, but because the forest frontier has already been pushed well back from the most populated areas, relatively few Thais live in areas in which there are substantial areas of forest still susceptible to damage. The proportional increase in pressures on forests, therefore, is likely to have been smaller than the social impact.

Changes in Relative Prices

The financial crisis, through currency devaluations, changes in trade and domestic price policies, and subsequent inflation, has resulted in substantial changes in relative prices throughout the region. Such relative price changes might encourage land users to shift from one land use to another, to clear additional forest so as to expand production of crops which have become more profitable, or to change land use practices. The effects of these changes can be either negative or positive, depending on the specific circumstances.

Time trends of output prices in nominal terms show that many export commodities experienced very rapid price increases throughout the second half of 1997 and first half of 1998. The devaluation of local currencies was a major driver in this price rise. Some policy reforms, such as export liberalization, also contributed in the case of some commodities. Since late 1998, however, many prices have begun to fall in nominal terms as currencies strengthened somewhat. In Thailand, for example, rice prices increased by half between May 1997 and January 1998, but had returned to pre-crisis levels by August 1999–indeed, to below pre-crisis levels given the intervening inflation. Likewise, coffee prices in Indonesia more than doubling in some provinces in 1997, but were often lower than before the crisis by late 1998. Only in some areas and for some crops have real prices sustained their increase.

Although real prices of export commodities have not risen as much, and as consistently, as initially expected, their rise remains significant in some cases. That the real price of coffee in Sumatra in late 1998 was about 20 percent above its level in early 1997 is significant, for example, because Sumatra accounts for about two thirds the area planted to coffee in Indonesia. Assuming that this increase is not completely eroded by inflation, one might expect that production will expand. There are some indications that Indonesian smallholders have expanded their production of oil palm, for example. Since the crops which appear to have benefited most from relative price changes are tree crops, however, the area cultivated is likely to respond less rapidly to price changes than that cultivated to annual crops might have. Tree crops are a long-term investment that take 5 to 10 years before they bring a benefit, so long-term price changes are more important than short-term fluctuations. Expanding the area under tree crops also requires substantial up-front investments, which can be a significant constraint for many smallholders. It will take some time before sufficient data are available to confirm this effect and to gauge its extent.

The consequences of such an expansion are also hard to predict. Tree crops are in many ways less damaging as a land use than annual crops. Rubber production as traditionally practiced by smallholders in Indonesia is particularly benign (Thiollay, 1995; Tomich and others, 1998). Thus, to the extent that an expansion of tree crop production has taken place, it is likely to have caused less environmental damage than a similar expansion of annual crop production would have. This is not necessarily true when tree crops are grown in large monoculture plantations, however–although here too, some benefits such as watershed protection might be preserved (Whiteman and Fraser, 1997). A final factor to consider is that the environmental consequences of increased tree crop production are very different depending on whether this expansion occurs in virgin primary forest (high negative impact), in secondary or logged-over forest, or within existing agricultural land (potentially positive impact). Unfortunately, this will be extremely difficult to ascertain using available data.

Oil Palm. The effect of the crisis on oil palm production is of particular interest since the area planted to oil palm had already been growing rapidly even before the crisis. Oil palm prices experienced a fairly substantial increase during the crisis, making an already highly profitable activity even more so. The effect of this price increase has been muted, however, by important constraints. In Indonesia, for example, large-scale developments have been hampered by the collapse of the financial sector and by political uncertainty. As a result, although official data shows the area under oil palm continuing to expand, considerable evidence points to the contrary conclusion. For example, sales of oil palm seed to plantations in 1998 were only about half the level in 1997. Given the increased profitability of oil palm, however, this may prove to be only a temporary respite. With the political situation in Indonesia becoming less uncertain and with financing mechanisms coming back on line, the interrupted growth of the oil palm sector is likely to resume.

Changes in Government Expenditures

Changes in government policies and expenditure patterns might affect both activities designed to improve environmental conditions (for example, maintenance and protection of national parks, conservation activities, and enforcement of logging regulations) and those which can have an adverse impact (for example, the Indonesian transmigration program and road construction). One can also distinguish between changes in expenditure whose impact is likely to be seen quickly, such as reductions in budgets for park protection, and those which will have a longer-term effect, such as reduced spending on research and extension. How government spending has changed is hard to determine in detail, partly because of a lag in reporting, partly because of frequent policy changes during the crisis, and partly because budgetary allocations do not always correspond to actual expenditures. Moreover, in an inflationary setting real expenditures can differ substantially from nominal ones.

Expenditures on environment-related activities have tended to decline throughout the region, both in real terms and as a share of the overall government budget. Where expenditures on specific environmental issues have been protected, they have often been maintained in nominal terms, meaning that their real value has fallen. In the Philippines, for example, the budget for protected areas has declined by about 23 percent in nominal terms between 1997 and 1999, raising fears that already inadequate protection efforts would be further compromised. There isn't necessarily a direct correlation between spending and protection, however. Even with falling budgets, protection might be maintained if patrolling is a priority. Only 13 percent of Indonesian park managers planned to target patrolling for cost savings. Conversely, protection may fall more than proportionally to spending if there are large fixed expenditures, such as for salaries. Moreover, for park rangers on a fixed salary pressures to seek supplementary sources of income are likely to increase. In Thailand, there is anecdotal evidence or laxer protection of the country's protected areas, although in the case study area in Chayaphum Province, at least, protection appears not have been reduced.

The crisis forced significant cuts in the public works programs. Although road-building expenditures do not appear to have fallen in nominal terms, in real terms they have declined. Fully assessing the effect of changes in road-building budgets on forests would require a detailed analysis of where road-building is taking place. Liu and others (1993), for example, find that distance to roads has a much greater effect on forest cover than road density. Building roads through undisturbed areas is likely to have a much greater impact on forest cover than the same expenditure devoted to densifying a road network in an area already served. In Indonesia, for example, several road projects threaten to increase pressures on forests, including the Trans-Kalimantan highway between Balikpapan and Pontianak and a major road along the border with Malaysian Borneo on Kalimantan.

Longer-term, there are worries about the effects that reduced investment in research and extension might have on productivity trends in major crops such as rice (IRRI, 1998); should rice yields decline, or even fail to continue to increase, there may be increased pressure to convert additional area to rice production so as to increase production. Reduced investment in irrigation and other forms of intensification might have a similar effect. For example, lowland irrigation projects on Palawan, in the Philippines, have been found to increase opportunities for upland households to work off-farm, resulting in a reallocation of time away from forest clearing and hillside farming in the uplands. Cancellation or slowing of a planned expansion of irrigation to 6,000ha would mean that both the on-site benefits and the induced environmental benefits would be forgone or delayed.

Political Changes

The countries of the region have experienced a great variety of political and policy changes. The bulk of the impact of these changes has already been discussed, however, in terms of their effects on relative prices and direct government expenditures. Over and above these effects, in the case of Indonesia there have also been additional effects due to the wrenching political changes that the country has undergone since the beginning of the crisis. These have had two opposite effects. On the one hand, large-scale investments such as on oil-palm plantations appear to have been delayed; despite increased profitability due to relative price changes, large-scale oil palm development may actually have slowed rather than accelerated because of the political uncertainty and difficulties in arranging financing (though data on this point as on many others are weak). On the other hand, the already weak political control over land use appears to have weakened even further, and in some cases collapsed altogether. Anecdotal evidence of increased illegal logging is rife, although some may be higher reporting of illegal logging due to the increased openness–another important political change–rather than actual increases in illegal logging.

Conclusions

The analysis shows that there has been a great diversity of effects across and within countries, depending on the extent and nature of the impact of crisis. No simple story emerges. The balance of the available evidence does not seem to support the more pessimistic scenarios that were proposed early in the crisis. Indeed, one can point to at least some evidence suggesting that some sources of pressure have been alleviated. Other evidence, conversely, suggests that some pressures may have increased. The net effect of these factors is hard to gauge, both locally and at the national level. In many cases, the pre-existing trends are likely to continue to dominate, with the crisis merely nudging them slightly higher or lower. This reinforces the need for long-term attention to these important environmental problems.

The basic conclusions that emerge are:

(a) There has been a continuum of effects, with Indonesia most heavily hit, the Philippines the least so, and Thailand somewhere in between.

(b) Within this overall pattern, there is also substantial variation in the impact within each country, across regions and across sectors.

(c) The primary mechanism through which deforestation trends are likely to have been affected is through changes in relative prices and the coping strategies of rural households. There is little evidence to support hypotheses that return migration has had a major impact. In Indonesia, the weakening of government authority and enforcement powers is also a major source of concern.

(d) There is little evidence to support the more alarmist fears of vastly accelerated deforestation processes resulting from the crisis; indeed, in some cases pressures may actually have been reduced. In the absence of data on actual land use changes, analysis is limited to examination of changes in pressures. In some cases, these changes act in opposite directions, making it difficult to predict what the net effect will be. That tree crops have been the major beneficiaries of relative price changes further complicates the assessment, since they can be less environmentally damaging than other agricultural uses. Much will depend on whether any expansion of tree crops occurs on existing agricultural land or by converting additional forest land.

The extremely high level of threats to East Asian forests that existed even prior to the crisis leave little room for complacency even if some of the more alarmist scenarios of the crisis' impact do not seem to have occurred. Some aspects of the crisis are likely to have worsened already high pressures, others to have slightly alleviated them. The underlying pressures created by demand for more agricultural land and for timber and wood products remain. These conclusions indicate that the main policy priorities remain those of improving the management of the region's forest and land resources.

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