Focusing on Cambodia's High Value Forests: Livelihoods and Management

Special Report

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Responsibility for the ideas, facts and opinions presented in this research paper rest solely with the co-authors. Their opinions and interpretations do not necessarily reflect the views of the Cambodia Development Resource Institute or of the Wildlife Conservation Society.

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Phnom Penh, August 2004

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Acronyms and Abbreviations

ADB	Asian Development Bank
CDRI	Cambodia Development Resource Institute
CF	Community Forestry
CIDSE	International Co-operation for Development and Solidarity
CIFOR	Center for International Forestry Research
CoM	Council of Ministers
DAI	Development Alternatives Incorporation
DANIDA	Danish International Development Agency
dbh	Diameter at Breast Height
DFID	Department for International Development
DFW	Department of Forestry and Wildlife
FA	Forestry Administration
FAO	Food and Agriculture Organisation
FOMACOP	Forest Management and Conservation Programme
ha	Hectare
HH(s)	Household(s)
HVF(s)	High Value Forest(s)
IAs	Investment Agreements
IFSR	Independent Forest Sector Review
IUCN	International Union for the Conservation of Nature
kg	Kilogram
km	Kilometer
m^3	Cubic meter
MAFF	Ministry of Agriculture, Forestry, and Fisheries
MDK	Mondulkiri
NA	Not Available or Not Applicable
NC	Non-Commercial
NGO(s)	Non-Governmental Organisation(s)
NTFP(s)	Non-Timber Forest Product(s)
NPV	Net Present Value
PRK	People's Republic of Kampuchea
PVH	Preah Vihear
R/Riel	Cambodian currency (4,000 R = 1 $)
RIL	Reduced-Impact Logging
SFM	Sustainable Forest Management
SFMP(s)	Strategic Forest Management Plan(s)
Shorea	Tree species that is common source of solid resin in Cambodia
UC	Unclassified
UNDP	United Nations Development Programme
VFA(s)	Village Forestry Association(s)
w/out	Without
WCMC	World Conservation Monitoring Center
WCS	Wildlife Conservation Society

WFP	World Food Programme
WWF	World Wildlife Fund
yr	Year
$	US dollars

Khmer words

General

Angruth	Plunge Basket or Cover Pot - A type of fishing gear
Bang	Doing *Chamkar* in the third year (referred in Preah Vihear)
Bos	Doing *Chamkar* in the second year (referred in Preah Vihear)
Chamkar	Shifting cultivation, involving intermixing of rice and other crops
Chhnieng	Wedge-shaped Scoop Basket - A type of fishing gear
Kduoch	A type of wild root served as food in rural areas
Kuoy	A kind of the ethnicities in Cambodia
Phnong	A kind of the ethnicities in Cambodia
Prakas	Announcements issued by the government ministries
Sre	Wetland/paddy rice cultivation

Wildlife

An-deuk	Hard-shell turtle
Chhlus	Red Muntjac
Chruk-prey	Wild pig
Kan-theay	Soft-shell turtle
Kouprey	Wild cattle
Pong-rul	Sunda Pangolin
Preus	Sambar
Puah Thlan	Python
Puah Veik	King Cobra
Tra-kuot	Bengal monitor

Executive Summary

To target Cambodia's highest value and most threatened forest areas as management priorities, it is necessary to make distinctions among forest landscapes. This study defines Cambodia's evergreen and semi-evergreen areas as "high value forests" (HVFs) because, compared to other forests, evergreen and semi-evergreen tend to offer greater commercial potential for logging interests, hold higher levels of biodiversity, and provide higher proportions of forest product income to local communities. Given the high commercial value, it is not surprising that evergreen and semi-evergreen areas face a greater threat of deforestation than other forest types. Indeed, commercial logging has sharply reduced the amount and quality of these forests across much of Southeast Asia.

Evergreen and semi-evergreen forests represent about half of Cambodia's forest cover area, with approximately 90 percent located in 11 provinces in the north-central, northeastern, and southwestern regions of the country. Almost all of these forests are in concessions, cancelled concessions, or protected areas. Although the production and protection classifications suggest nearly all HVFs are to be managed for commercial or conservation purposes, it should be remembered that many Cambodians live in these forest areas and depend on their resources. Within the 11 top forested provinces, there are 2,000 villages located within 5 km of evergreen and semi-evergreen forest. The total population in these villages is about 1.4 million people or 12 percent of the national population and many of these people are likely to have forest-dependent livelihoods.

With a focus on communities living in HVF areas, this study seeks to improve knowledge about the magnitude and characteristics of forest dependence, the status of key forest resources and competition for these resources, and the relationship between actual local use/management and official rules and regulations. In addition, a number of management scenarios are analysed to shed light on how different approaches affect the amount and distribution of timber rents[1] and other logging impacts. It is hoped that a deeper understanding of these livelihood, resource, and management issues can contribute to sounder decision-making for forest sector governance and management, and provide a stronger foundation from which to explore more effective strategies for achieving poverty reduction, rural development, and biodiversity conservation.

Field research for the study was conducted in three areas of evergreen and semi-evergreen forest located in Preah Vihear, Kompong Thom, and Mondulkiri provinces. Fieldwork consisted of a household survey, key informant interviews, and an inventory of

[1] A timber rent is equal to total revenue from timber sales minus total costs of harvesting and delivery, with these costs *including* a "normal profit" margin for those involved with harvesting and delivery (about 10-20 percent), but they exclude any royalties, licensing charges, and fees that may be charged by the government. Rent refers to the exceptional profit or "windfall" that can be captured by the logging operation (above and beyond a "normal profit") or captured by government through royalties and other charges. One reason to assess rent levels is to understand the amount of revenue that could be available for development purposes if captured in public/government accounts.

sample tree plots to assess the commercial timber potential and presence of resin trees in the area. To provide context for HVF management, a review of literature was conducted on the causes of tropical forest loss and common management responses, focusing on key drivers, themes, and dynamics with relevance in Southeast Asia and Cambodia.

Context for HVF Management

Deforestation rates from 1990-2000 worsened in all tropical regions of the world except Latin America. Asia fared worst of all, losing nearly 20 percent of natural tropical forest over the decade, compared to an average of six percent in other tropical regions. Following trends in Asia, deforestation in Cambodia has increased over the past decade. In Southeast Asia (and Cambodia), forest decline has largely been driven by the rent-seeking activities of powerful state actors and commercial timber operations. This pursuit of rents has resulted in considerable forest loss and degradation, and "opened up" remote forest areas to encroachment and conversion for agriculture.

Both conversion and degradation reduce the future productive potential of the forest and also have significant negative environmental and social impacts. These costs are often held to exceed the private benefits that can be gathered, making both clearance and degradation poor options for society as a whole. Thus alarming rates of tropical deforestation over the past few decades have inspired a range of forest management responses. All promise better management, but with differing priorities. While some approaches emphasise maintaining economic returns from the forest, others focus more on conserving biodiversity, or improving rural development and reducing poverty. In simplified form, the main approaches can be characterised as encouraging adoption of reduced-impact logging and sustainable forest management, establishing more protected areas, and expanding community forestry. In Southeast Asia (and Cambodia), as in much of the tropical world, these approaches have so far not had much success. In production forests, reduced-impact logging and sustainable management approaches remain very much the exception, not the rule. Protected areas are successful in some places, but just as often are "paper parks" with little meaningful on-the-ground protection. And community forestry has so far proven very challenging to implement effectively.

Livelihoods in Cambodia's HVF Areas

Across the three study areas, agricultural production and forest product collection are the main sources of income. Average annual household income is highest in Kompong Thom ($538), followed closely by Mondulkiri ($499), while Preah Vihear ($342) lags behind. Forest products account for nearly half of household income (42-48 percent) in each of the three HVF areas studied. This income is generated despite the constraints on local use associated with forest concession activities, legal restrictions on some commercial activity (e.g., timber and wildlife harvests), and taxes on forest product trade that depress the prices offered to collectors/producers.

Despite the high potential economic value of HVFs (see below), the proportion of households in HVF areas that are living below the poverty line is considerably higher than Cambodia's national average (36 percent). The situation is most dire in Preah Vihear where 86 percent of the study area households are living in poverty, compared to 59 percent in Mondulkiri, and 52 percent in Kompong Thom. For many households, daily subsistence involves two meals of rice with chili and salt. Only one village (Sam-ong in Kompong Thom) has less poverty than the national average (32 percent of households in poverty). Higher incomes in this village are largely correlated with access to productive soils for agriculture.

About three-quarters of households in HVF areas have experienced a "time of crisis" during the past five years. Most often the cause has been an illness or death in the family. In addition to health issues, villagers are vulnerable to rice deficits, resin tree losses, and debt

problems. For example, about 80 percent of the households in the Preah Vihear area and half the households in Kompong Thom experienced a rice deficit in 2003. On average, these households only produced enough rice to support consumption for half of the year. Resin tree losses to logging were common throughout the study areas, with 9 percent of households reporting losses in Preah Vihear, 23 percent in Kompong Thom, and 37-50 percent in Mondulkiri.

Despite the remote location of HVF villages, most villagers have some knowledge of forestry laws and regulations. But for practical reasons, many do not agree/comply with the laws and regulations. First, while villagers tend to understand that the State legally owns the forest, most assert their claim as the rightful custodians of the forest because they live in or near the forest and have used forest resources for decades. Second, while villagers are aware of the main forestry rules – no cutting timber (using a chainsaw), no hunting wildlife, and no burning of forests – they view these rules as blunt and impractical given the basis of their livelihoods. They note that wildlife is a vital part of their diet and burning forest areas is necessary when *chamkar* areas require expansion.

This study found little evidence that villagers in HVF areas currently engage in forest management. With the exception of resin trees, which are managed/protected as a private asset, access to most forest resources is open to all, or at least all within the local community. Those specific rules, restrictions, or principles that do guide forest management by villagers (such as forests or pools protected by spirits) are generally too limited in scale, strength or enforceability to cope with the high and rising levels of pressure on these resources from both inside and outside the local community. Nonetheless,, with their many trips over long distances to the forest, villagers are well aware of actions taking place that damage the forest (e.g., illegal logging, hunting, and burning large areas to flush out turtles). Despite this "monitoring", they generally do not report problems to authorities because they feel that authorities already know about the problems, enforcement is unlikely, and in some cases authorities are involved. Unless forest damage represents a direct threat to their livelihoods, villagers tend to ignore it. Such threats are most often due to logging and "land grabbing".

For villages in HVF areas, community forestry objectives and needs differ considerably from commonly held government and NGO notions. First, whereas government and many NGOs tend to view community forestry as an approach for improving long-term management of resources that are in gradual decline, villagers usually only seek to establish community forestry in response to direct and immediate resource threats from outsiders. Second, while government and NGOs identify the main community forestry need as training and local planning assistance, villagers say their main need is for a high-level patron – someone who can make their rights to forest resources more secure and support enforcement of community forestry rules.

Lastly, government and NGOs tend to focus on forest rehabilitation in degraded areas to support subsistence ("customary use") and some NTFP trade activities. If this focus remains, do not expect communities to take much interest in forest management, as the management benefits are usually limited. Villages seek more secure rights over richer natural forests, a reduction/revision of regulations that impose onerous taxes on the NTFP trade, and greater rights to benefit commercially from forest resources (both timber and NTFPs). Such benefits are central to the development of community forestry that is both environmentally and financially sustainable. And clearly, if local forestry activities were supported and the regulatory framework reformed, forest products could contribute an even greater share of household income and perhaps even move some villages out of poverty.

Timber Resources and Management Scenarios for HVF Areas

Timber resources in the three study areas are sufficient to support commercial harvests, with the greatest rents generated under conventional "cut and run" logging operations. Resin trees

represent about half of the timber volume and rent in the Preah Vihear area (and perhaps in Kompong Thom as well), suggesting that logging operations in these areas will have great incentives to cut resin trees regardless of the legal prohibition. Such actions will significantly increase poverty in the area for more than half of the households. This income cannot easily be replaced because employment alternatives are scarce.

Expecting logging companies to adopt sustainable forest management in the absence of strong law enforcement appears to be a non-starter, as rents fall dramatically under such an approach. No operation that can carry on with conventional logging will want to adhere to a management approach that reduces timber rents by nearly 90 percent, especially if there remain few enforced penalties for non-compliance. "Commercial" community forestry might be a more promising option for achieving sustainable management of timber resources while meaningfully contributing to poverty reduction for several reasons. For example, local communities have fewer livelihood options than outside investors and so have a stronger incentive to manage the resource for its long term potential, and they are also directly affected by some environmental and social impacts of logging, and so may seek to avoid them. For this approach to succeed in HVF areas, however, will require fundamental changes in the forestry sector toward a poverty reduction and rural development focus. It may also require legal changes to (or different interpretations of) the Forestry Law and Community Forestry Subdecree to allow communities to benefit commercially from timber resources. There will also need to be strong safeguards against the temptation for local communities to take a 'cut and stay' approach, analogous to that followed by concessionaires and driven by similar economic logic. Finally, there will need to be substantial support for community forestry development in order to overcome some of the major challenges to implementation.

Conclusions and Recommendations

With logging operations generally focused on timber "mining", and royalty collection ineffective, forest management in Cambodia has yet to deliver the economic, conservation, and rural development benefits envisioned. Rather, the management approach in production forests has tended to marginalise local forest users and producers. Based on experiences in Cambodia and elsewhere in the region, continuation of the current commercial forestry model will result in further forest losses with little revenue generated for government. It will not lead to poverty reduction and rural development. Indeed, findings of this study suggest some commercial operations are moving villages in HVF areas further into poverty, not out of it.

Clear policy direction on priorities for management of high value (production) forests is needed. Analysis of management scenarios makes clear that short-term, direct economic rents are substantially higher under conventional logging, but it matters greatly how these rents are distributed. At present, weaknesses in royalty collection mean that the national government captures only a small fraction of timber rents. Most of the timber windfall appears to be captured by logging operations, powerful actors, and a variety of informal fee takers. Meanwhile, as this study illustrates, villagers in HVF areas are often made poorer. And most of these households are already living below the poverty line. With this in mind, a number of recommendations are highlighted below. These recommendations are based on the assumption that the most significant sites for biodiversity conservation will remain in protected areas closed to logging. With this safeguard, significant areas of HVF would still be available for other kinds of management.

1. Make poverty reduction a higher priority of HVF management.

For all the focus on the need for poverty reduction in Cambodia, there is little evidence that commercial management of HVFs is contributing much in this regard, despite HVFs being one of Cambodia's chief national assets. In the absence of an effectively enforced legal framework, the current strategy of encouraging commercial timber operations to become

responsible forest managers appears doomed to failure due to the tremendous financial incentives against it – scenario analysis suggests rents are 6-10 times higher under "cut and run" logging compared to sustainable forest management. If Cambodia is to harness its HVF resources for poverty reduction and rural development, a greater effort is needed to explore the potential of "commercial" community forestry – local forest management that involves commercial activities including modest but sustainable timber harvests. Such an approach could provide substantial revenue for local development and a steady flow of royalties for national accounts as well. Moreover, community forestry can provide villagers with greater security over the forest resources that support nearly half of their household income.

2. Improve forest management targeting, focusing first on HVFs under threat.

With limited resources available for forest management, it is important to identify clear management priorities, taking into account current value, clearance pressures and potential value of other land uses. Maps presented in this study illustrate the correlation between forest loss/disturbance and logging, (logging) roads, soil quality, and new villages in Cambodia. Forest landscapes under multiple threats are most likely to be cleared next. Due to the threat of resource loss, these are the landscapes where villagers are most likely to be motivated to establish community management. The goal of a targeting exercise would be to identify and designate a set of such forest landscapes as management priorities (e.g., HVFs with productive soil areas nearby to villages and inappropriate for conversion). To identify HVF areas specifically for community management, targeting should begin with the 2,000 Cambodian villages located within 5 km of evergreen and semi-evergreen forests, followed by an assessment of other variables (logging operations, roads, productive soils) correlated with forest loss.

3. Prohibit commercial logging in areas of forest where resin trees represent a high proportion of standing commercial timber.

In the HVF areas studied, resin is the most significant forest product for household income. It also plays an important role in reducing the vulnerability of households to crises. Although the harvest of resin trees is prohibited under Article 29 of the Forestry Law, this may be difficult to enforce in forest areas where resin trees make up a high proportion of commercial standing timber. For instance, this study finds that resin trees represent about half the volume and rent of standing commercial timber in a sampled area of one concession, and data are presented to suggest that this is true more widely in Cambodian HVFs. Given the weaknesses of enforcement, and the enormous financial incentives to harvest resin trees, approving commercial logging plans in areas such as these will entail a very great risk of serious impacts on the livelihods of the tapping communities. Detailed mapping of areas where tapped resin trees represent a high proportion of standing timber should be undertaken, and such areas should be excluded from commercial logging for the foreseeable future, until it is sure that safeguards on the field operations of concessionaires and sub-contractors can be adequately enforced. Depending on the threshold set, such areas are likely to cover a high proportion of some concessions (including two of the three sites studied here), and may make their commercial viability doubtful.

4a. Pilot "commercial" community forestry for villages near HVF areas.

Forest products account for nearly half of household income in each of the three HVF areas studied, and these resources have the potential to contribute even more under "commercial" community forestry. Although there are numerous challenges to establishing community forestry, it must also be recognised that the impetus for greater village control of forest resources is here to stay (and consistent with Cambodia's broader efforts toward decentralisation). Three elements that will likely be necessary for successful development of community forestry in HVFs are: (1) a clear focus on local economic benefits; (2) greater

emphasis on identifying community forestry "patrons" who can ensure tenure security and enforcement and (3) safeguards to prevent 'cut and run' logging, overhunting and so on by the communities. It is recommended that these challenges should be addressed in a series of pilots to prepare the way for wider implementation.

4b. Given the timber rents involved, target "commercial" community forestry pilots in HVF areas where indications of "political will" for it are strongest.

This study finds enormous incentives for "cut and run" logging. Capacity-building efforts and technical guidance (e.g., harvesting guidelines) do not change these incentives. Indeed, without genuine political will and strong enforcement, "cut and run" practices can be expected to continue (and even with these elements, such logging may be difficult to stop). In assessing political will for community forestry, the following indicators deserve consideration: (1) Who "owns" the initiative? (2) How much effort is being taken to understand community forestry development challenges? (3) Is the pursuit of community forestry a long-term programme or a one-shot symbolic gesture? (4) What efforts are being taken to mobilise key stakeholders, especially villagers in HVF areas? (5) Are meaningful sanctions being imposed against illegal activities in (planned) community forestry areas?

Chapter 1:
Introduction

Throughout Southeast Asia, forest management has failed to deliver the economic, conservation, and rural development benefits envisioned. Under the main forestry model – large-scale logging concessions – gains have primarily accrued to industrial logging interests, powerful state actors through informal channels and, to a lesser extent, central governments.[2] These gains have been made through timber "mining", not forest management. And this approach has marginalised local forest users and producers, reducing their access to forest resources and markets. The situation has been re-enforced by laws supporting state claims on the forest estate and regulations designed with little regard for local market demand and livelihood needs. Indeed, such laws and regulations have often made commercial activity by local forest producers either a criminal act or subject to onerous taxes.

However, there are signs that the traditional industrial forestry model is becoming less viable, both economically and politically. A recent joint study by Forest Trends, the Center for International Forestry Research, and IUCN–The World Conservation Union argues that new opportunities for small-scale forest producers are emerging due to fundamental changes in market structure and demand (Scherr *et al.* 2004). At the same time, there is increasing recognition of forest user rights and greater areas of forest under community control – now more than one-quarter of the forest estate in developing countries. This local management involves sharing both regulatory responsibilities and revenue (Ferroukhi 2004). Whereas past assumptions have been that forests must be managed by vertically integrated enterprises, and that local producers cannot manage long-term rotations of forests, afford the necessary equipment, or supply the volumes demanded, the joint study suggests that times have changed.

> *In today's economy, different producers can occupy different parts of the value chain. It is not necessary for one company to control hundreds of thousands of hectares, as is the case of many industrial concessions. Small-scale, high-productivity forest harvest and processing equipment is available. Demand has diversified; supply chains are more sophisticated. Shorter-cycle wood and wood by-products are in greater demand. Thus many new opportunities have arisen for commercial forestry enterprise by low-income producers (Scherr* et al. *2004, p. 4).*

Cambodia is well positioned to explore these opportunities. According to the Independent Forest Sector Review (IFSR 2004), nearly a third of the population (3.8 million people) live within 5 km of a forest, and on average they depend on forest products for roughly 10-20 percent of their income. Cambodia's forest resources, while in decline, remain one of the nation's more valuable assets. If managed with the aim of poverty reduction, rather than to the benefit of "nexuses of control and influence" (as the IFSR diplomatically puts it), forest resources could make a significant contribution to rural development.

[2] Timber rent capture by Southeast Asian governments has generally been in the range of 5-30 percent (see Table 2.6).

A number of factors suggest there has never been a better opportunity for such a fundamental change in forest governance and management than now. Along with a government-wide commitment to decentralisation, there is widespread public support for a greater local role in forest management. At the same time, large areas of production forest are expected to become available soon for some new form of management following the anticipated termination of most concessions. Institutional changes are also underway. Reorganisation of the Department of Forestry and Wildlife into the newly constituted Forestry Administration could signal an opportunity for new approaches to the forest sector.[3] Indeed, if change is to occur, much will depend on how this restructuring unfolds and how future forest sector priorities are set.

1.1. A Turning Point?

After a tumultuous decade for the forestry sector marked by rampant logging and the various efforts to reduce it, Cambodia's industrial logging boom appears to be entering its twilight. Much of the more accessible, richer forests (i.e., low elevation evergreen and semi-evergreen) have been disturbed, degraded, or deforested.[4] Logging and encroachment have also resulted in forest fragmentation. While small-scale loggers may be able to generate considerable returns from logged-over areas and forest fragments, such areas are less viable for industrial logging operations, especially if a 25-year rotation is expected. Indicative of the status of Cambodia's forest resources, many concessions may soon be terminated, and some have already abandoned their concessions on their own accord.[5]

In addition to a shrinking and degraded forest resource base, concessionaires are exiting due to a moratorium on logging since 2002 and what appears to be a renewed assertion of control over Cambodia's forests by the Forestry Administration (FA). Following guidance from the Forestry Law of 2002, the FA has been established with a centralised structure similar to what was in place during the French colonial administration. According to the IFSR (2004), this structure provides the FA with control over both forest planning (e.g., proposing areas for harvesting) and regulation (e.g., approving areas for harvesting) with no separation of functions and few checks and balances. This provides the FA with an opportunity to take on the role previously played by concessionaires. Subcontractors who carried out most of the logging activities for concessionaires under short-term arrangements will now be able to do so for the FA through an annual coupe system.

From a rural livelihoods perspective, the major disadvantage of the changes afoot in the forestry sector are that they would simply replace the private sector claim to forest resources of concessionaires with the central state claim of the FA. There would continue to be no clear recognition that the people living in production forest areas have a valid competing claim on the resources (IFSR 2004). This issue is of central concern here – what are the prospects for

[3] The Forestry Administration was established under Chapter 2, Forestry Law (2002) and Sub-decree No. 64 Or Nor Kra. Bor Kor, 11 September 2003.

[4] According to IFSR (2004), "the area of quality forest of the type that concessionaires require to run a commercially viable operation…is now approximately 50% of the total potential. The remaining evergreen and semi-evergreen forest is partially or severely degraded" (Ch 1, p. 32-33).

[5] The Technical Review Team charged with evaluating concessionaires' Strategic Forest Management Plans (SFMPs) has indicated that it will recommend the SFMPs of four concessions for approval (Colexim, Everbright, Timas Preah Vihear, and Cherndar Plywood) and "perhaps one or two more". Termination will be recommended for all others (pers. comm. Yann Petrucci, 29 April 2004). If these recommendations are accepted by the Forestry Administration, it would represent a significant reduction in both the number of concessions (from 22 to 4) and evergreen and semi-evergreen forest under concession (from 2 million ha to 340,000 ha) (Estimates based on DFW 2003b). It is notable that three of the four concessionaires with SFMPs recommended for approval are located in the Prey Long-Stung Chinit forest area – the largest remaining contiguous area of low-elevation dry evergreen and semi-evergreen forest remaining within mainland Southeast Asia.

managing Cambodia's forests more to the benefit of local communities and rural development? If the focus going forward is on awarding annual coupes to subcontractors (often military), the current shift from concession management to more centralised FA control cannot be considered a "turning point". Instead, as was the case under the concession system, official government revenue from the forest sector will continue to be quite limited, and rural communities will be negatively affected where the logging of annual coupes reduces their forest use and income.

Furthermore, for a shift from the industrial logging model (or FA-subcontractor model) to local forest management to have a chance of success, local forest claims must be allowed in *rich* forest areas (i.e., production forests). To date, such claims have been largely ignored. For example, in its report, *Cambodia: A Vision for Forestry Sector Development* (1999), the World Bank called for a forestry sector where "reasonably well stocked" forests are available for commercial production and "small forest areas and scattered trees" are managed by local communities. Likewise, the government's Community Forestry Unit was initially established within the Reforestation Office, suggesting that community forestry initiatives should be primarily for the purpose of forest rehabilitation.[6] And this is the case. Most community forestry projects have been established in degraded forests areas where there is limited commercial potential (Fichtenau *et al.* 2002, McKenney and Prom 2002). While these projects may function as important initiatives for rehabilitating forests, increasing the local supply of forest products, and improving general welfare, most are not financially sustainable without donor/NGO-backing and have little direct impact on the management of "high value forests."

1.2. Targeting High Value Forests

High value forests (HVFs) are broadly defined here as those forest areas rich in commercial timber and biodiversity, where the proportional dependence on forest products of local communities is also substantial. In other words, the economic, ecological, and livelihood values are all high relative to other forest areas. In this study, HVFs are defined as Cambodia's evergreen and semi-evergreen forests (rather than deciduous and other forests).[7] Although Cambodia has many areas of important forest, it is the evergreen and semi-evergreen areas that offer the greatest commercial potential for logging interests, hold the highest levels of biodiversity, and provide the highest proportions of forest product income to local communities. This is not just the situation in Cambodia. Evergreen and semi-evergreen forests are internationally recognised as providing these benefits in greater measure than other forest types.[8]

Cambodia's evergreen and semi-evergreen forests are mainly located in the north-central, northeastern, and southwestern areas of the country (Map 1.1). These forests are generally dense (350-400 stems/ha), and located in humid, low elevation (<700m) areas of the country, with the exception of the Cardamom and associated mountain ranges (IFSR 2004). In combination, evergreen (3.7 million ha) and semi-evergreen (1.5 million ha) represent about half of Cambodia's forest cover area.

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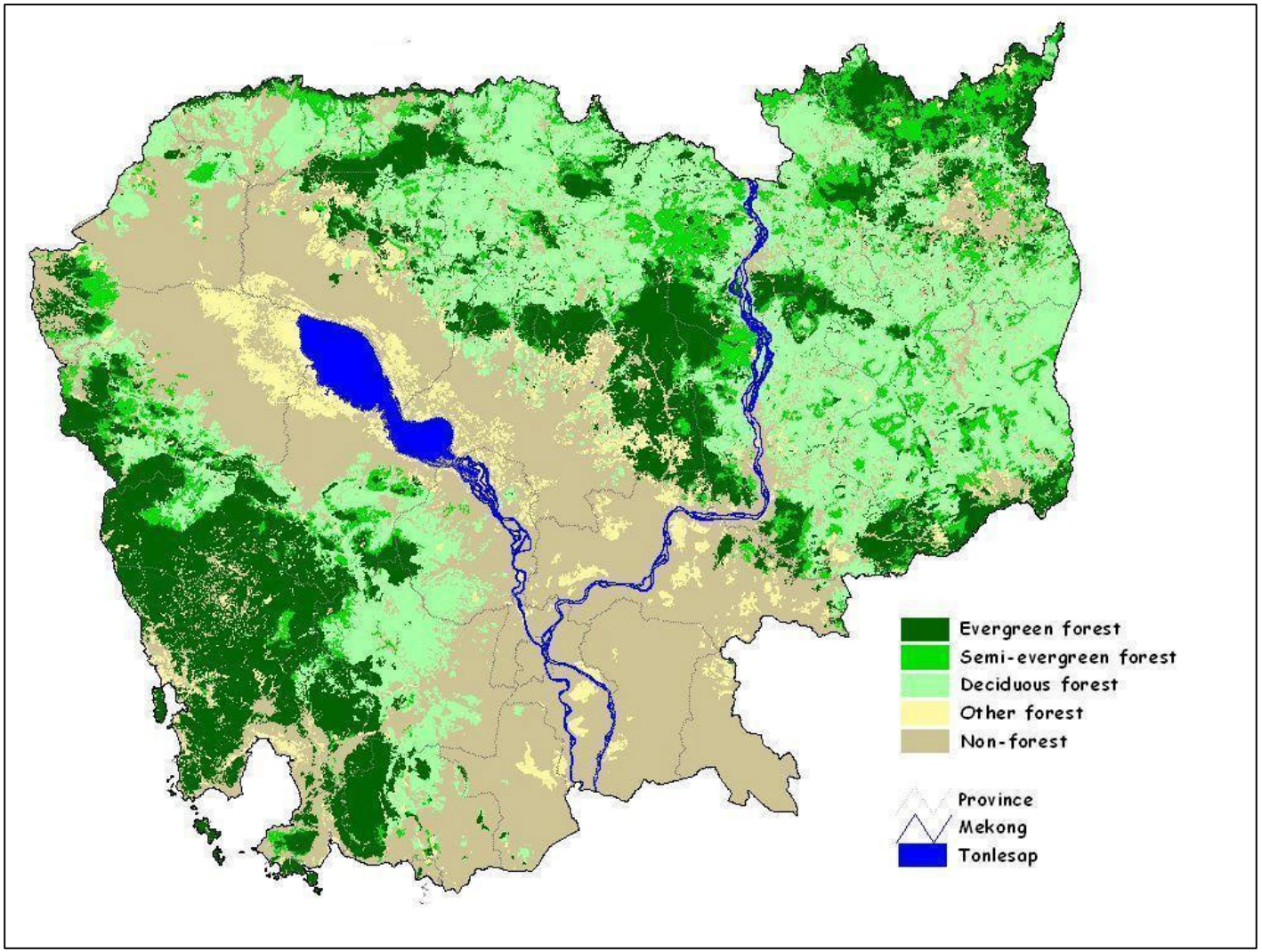
[6] More recently, however, with the restructuring of DFW into the Forestry Administration, the CF Unit has been promoted to the Office level, separate from the Reforestation Office.

[7] Clearly, it would be preferable to classify Cambodia's HVFs through a more sophisticated approach, but this is not possible due to the current limited understanding of the forest resource base. To date, no comprehensive assessment of Cambodia's forest resources has been conducted, only forest cover mapping that distinguishes broadly between evergreen, semi-evergreen, deciduous, and other forest.

[8] In recognition of this greater importance, the recent Department of Forestry and Wildlife (2003b) study of forest cover places "a more determined emphasis" on analysis of evergreen and semi-evergreen forests in Cambodia.

Map 1.1: Cambodia's Forest Cover 2002



Source: Forestry Administration 2003

Given the higher commercial value of evergreen and semi-evergreen forests, it is not surprising that they face a greater threat of deforestation than other forests types. Indeed, commercial logging in Southeast Asia has sharply reduced the amount and quality of evergreen and semi-evergreen forest in the Philippines, Thailand, Indonesia, and Malaysia over the past few decades, with commercial interests more recently turning their attention to Cambodia, Laos, and Myanmar (Chapter 2). In Cambodia, this process has been facilitated by the classification of most evergreen and semi-evergreen forest under the management category of "production forest" and located within forest concessions (past or current). Most other evergreen and semi-evergreen forest is located within some form of protected area.[9] Although the production and protection classifications suggest nearly all HVFs are to be managed for commercial or conservation purposes, this tends to ignore the fact that many Cambodians live in these forest areas and depend on their resources.

Consider Cambodia's top 11 forested provinces, which hold about 90 percent of the nation's evergreen and semi-evergreen forest. Within these provinces, there are 2,000 villages with 1.4 million people (12 percent of the national population) living within 5 km of evergreen and semi-evergreen forest (Table 1.1 and Map 1.2). Examined in reverse (proximity of forests to people), about 25 percent of Cambodia's evergreen and semi-evergreen forests are located within 5 km of a village (Figure 1.1). A high proportion of the people in these villages are expected to have forest-dependent livelihoods.

With limited resources for supporting improved forest management, it is vital to make clear distinctions among forest landscapes. This allows the targeting of the highest value and most threatened forests as management priorities. Across Cambodia's forest landscape, there is wide variance in forest type, quality, fragmentation and resource value. Despite this variance, forest management initiatives and commonly used indicators (e.g., forest cover) often make little distinction among forest areas. Thus, whether a local initiative aims to reforest a highly degraded area or manage a rich natural forest, it may be referred to equally as "community forestry". Likewise, maintaining Cambodia's forest cover may be viewed as an indicator of management success even when richer forests are rapidly being lost while degraded forest areas increase. The argument here is straightforward; as there is more at stake in the management of HVFs, they should be the top management priorities. Within HVFs, the highest management priority should for those areas facing near-term threats of deforestation due to commercial logging and road access, and/or due to their close proximity to villages.

Table 1.1: Population within 5 km of Evergreen and Semi-Evergreen Forest

Province	No. of villages < 5km from Evergreen or Semi-Evergreen	Total population of villages	Evergreen or Semi-Evergreen <5 km from a village (ha)	Population density: (person/ha)
Battambang	298	242,949	162,387	1.5
Ratanakiri	244	98,241	159,021	0.6
Siem Reap	234	215,304	60,232	3.6
Preah Vihear	206	114,941	116,882	1.0
Kompong Thom	193	109,257	93,565	1.2
Kratie	183	169,864	83,791	2.0
Oddar Meanchey	168	121,321	79,518	1.5
Pursat	133	105,553	77,661	1.4
Stung Treng	126	76,068	125,166	0.6
Koh Kong	120	122,115	108,067	1.1
Mondulkiri	95	34,472	69,014	0.5
Total	**2,000**	**1,410,085**	**1,135,302**	**1.2**

[9] "Protected area" is used as a general term in this study to refer to all types of areas under formal protection in Cambodia, including national parks, wildlife reserves, multiple land use areas, protected forests, and cultural sites.

Map 1.2: Villages within 5 km of Evergreen/Semi-Evergreen Forests in Cambodia

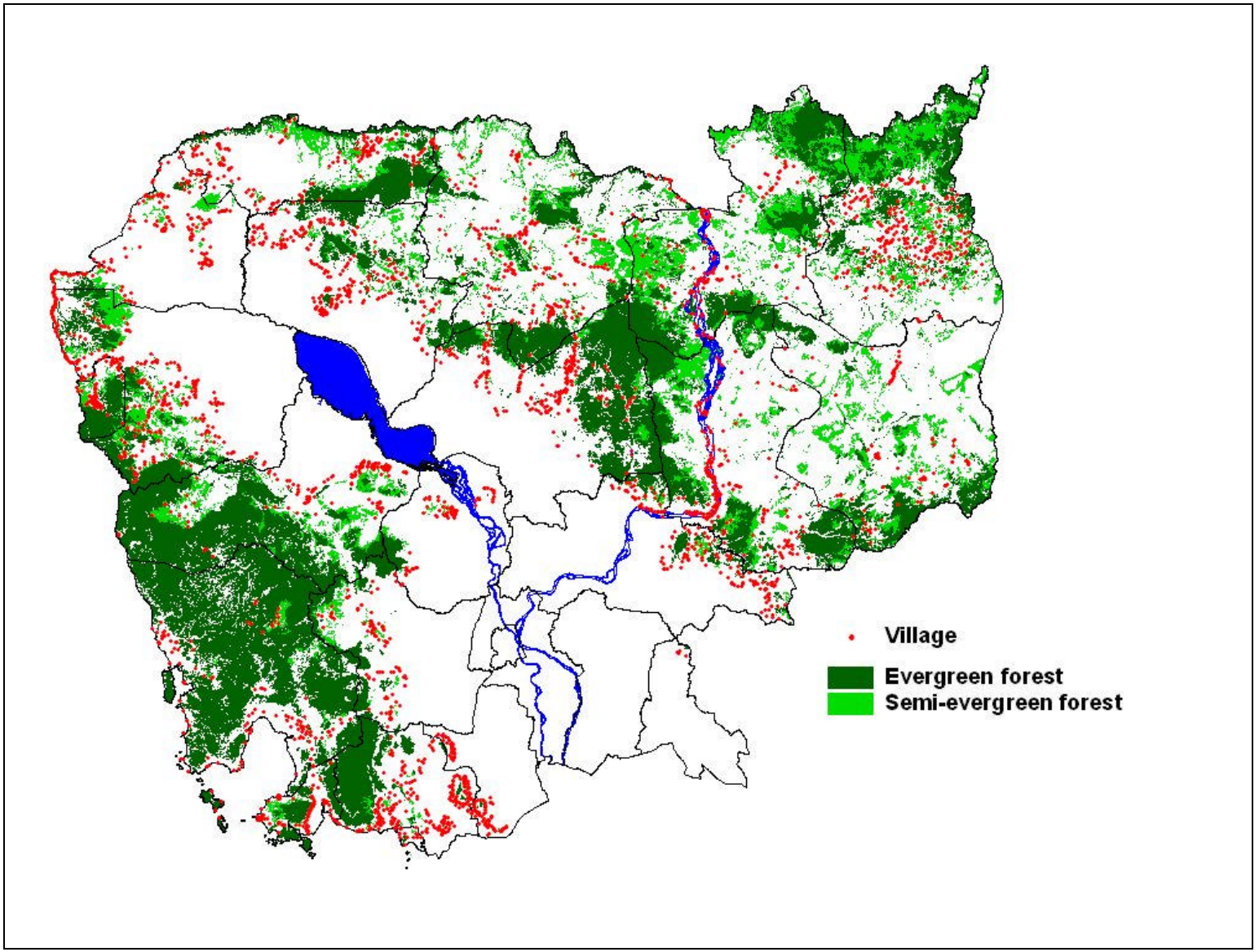
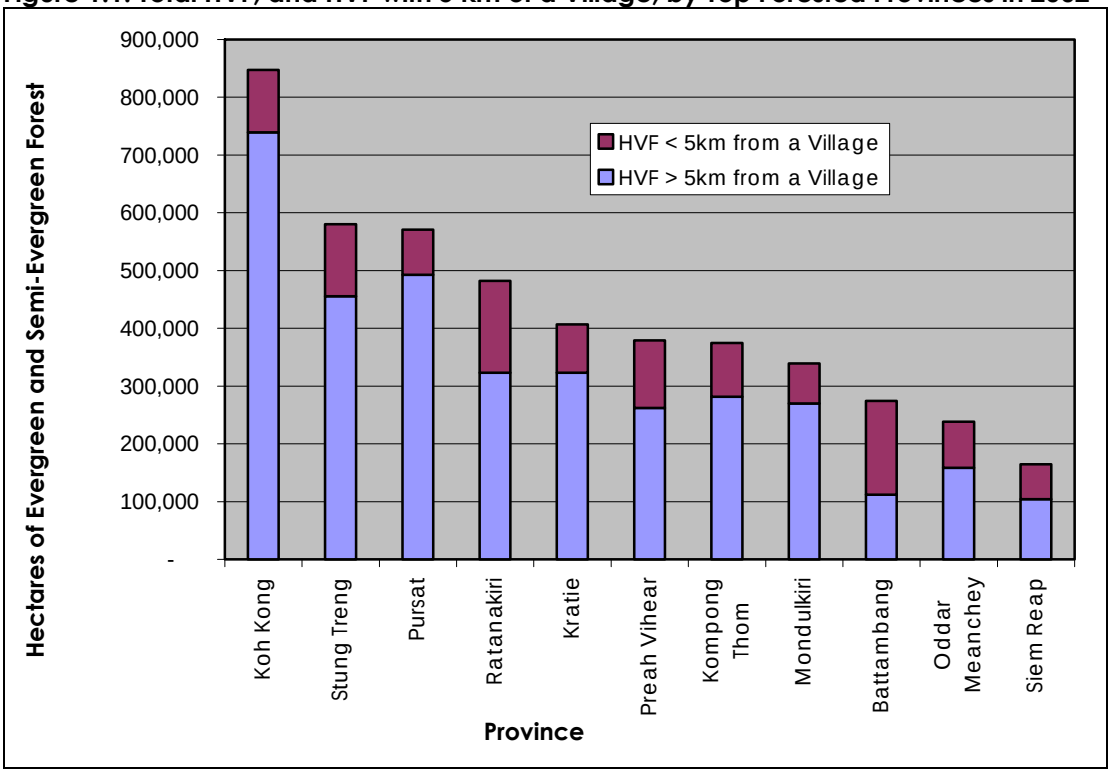


Figure 1.1: Total HVF, and HVF with 5 km of a Village, by Top Forested Provinces in 2002



1.3. Objectives of the Study

With a focus on communities living in HVF areas, this study aims to improve knowledge about the magnitude and characteristics of forest dependence, the status of key forest resources and competition for these resources, and the relationship between actual local use/management and official rules and regulations. Such an understanding can contribute to sounder decision-making for forest sector governance and management, and provide a stronger foundation from which to explore more effective strategies for achieving poverty reduction, rural development, and biodiversity conservation. Key issues addressed by the study are highlighted below.

1) What are the lessons for Cambodia from the experiences of forest loss and management responses elsewhere in Southeast Asia? **(Chapter 2)**
   - What is the current status of tropical forest resources in Southeast Asia?
   - What have been the chief causes and underlying dynamics of forest loss?
   - To what extent have the main approaches to forest management succeeded?
   - Based on this context, what are the implications for HVF management in Cambodia?
2) How much do Cambodian villages in HVF areas depend on forest resources and how is forest management understood and practiced? (**Chapter 3**)
   - What are the main occupations and income-generating activities for communities in HVF areas?
   - How important are HVFs as a contributor to livelihoods (income and household use)? Which resources contribute the most income?
   - What proportion of households in HVF areas are below the poverty line?

- How vulnerable are livelihoods in HVF areas? What are the main threats? What types of conflicts over resources are common? How are conflicts resolved (if resolved)?
- How do communities currently manage HVFs, if at all?
- To what degree are communities aware of, and in compliance with, official forest management rules and regulations? How effective/practical are the current rules?
- What are the prospects for encouraging local forest management (community forestry) in HVFs? How do legal, NGO, and villager perspectives on this differ?

3) What is the status of HVF timber resources, and how do resource benefits (total and distribution) change under different management scenarios? (**Chapter 4**)
   - What is the current status of key HVF resources (commercial timber and resin trees) in the study areas?
   - How do different management scenarios – "cut and run" logging, sustainable concession management, and community forestry management – affect incentives for management, the distribution of benefits/rents, and poverty reduction?
4) Conclusions and Recommendations (**Chapter 5**)

1.4. Methods and Study Areas

This study involved a review of literature and field research. To provide context for managing HVFs in Cambodia, a review of literature was conducted on the causes of tropical forest loss and common management responses, focusing on experiences in Southeast Asia. With a wide body of literature available, it was not the purpose here to provide a comprehensive discussion of all deforestation causes and management responses, but rather to identify key drivers, themes, and dynamics with relevance in Southeast Asia and Cambodia.

Field research for the study was conducted in three areas of evergreen and semi-evergreen forest located in Preah Vihear, Kompong Thom, and Mondulkiri provinces (see Study Area Maps 1.3-1.6). The forests in these three areas are classified within the legal management category of "production forest" and located within ongoing forest concessions, with the exception of the "Biodiversity Conservation Area" in Mondulkiri.[10] The purpose of carrying out fieldwork in each area was to assess the status of key HVF resources, and to develop a deeper understanding of the magnitude and nature in which local communities depend on HVFs. Fieldwork consisted of a household survey carried out by the Cambodia Development Resource Institute (CDRI), and an inventory of sample tree plots conducted by the Wildlife Conservation Society (WCS).

CDRI conducted a household survey in five villages bordering the Cherndar Plywood concession area in Preah Vihear and three villages located within the Colexim concession in Kompong Thom. Approximately 30 percent of the households were surveyed in each area (Table 1.2). As there are few villages in these areas from which to draw a random sample, villages were selected based on their proximity to the forest (in or nearby the forest area) and geographic dispersion around the forest area. For instance, out of 10 villages identified around the southern border of the Cherndar concession, five were selected for study – one of two villages on the southwest border, two of five villages on the south-central border, and two of

[10] The forest concessions are Cherndar Plywood in Preah Vihear, Colexim in Kompong Thom, and Samling International in Mondulkiri. Tree plot inventory work in Mondulkiri was carried out in the "Seima Biodiversity Conservation Area", a former part of the Samling International concession that was declared a conservation area by ministerial decree in 2002. More recently, it appears that Samling International has closed its operations in Mondulkiri.

three villages on the southeast border. In addition to the household survey, 55 key informant interviews were conducted with commune council chiefs (3), village chiefs (8), elder villagers (17), resin and wildlife traders/wholesalers (16), community forestry members (10), and an official from the Department of Forestry and Wildlife. A copy of the CDRI survey is provided in Annex A.

Table 1.2: Household Survey Coverage in Preah Vihear and Kompong Thom Villages

Province	District	Commune	Village	No. of HHs	No. of Interviews	% Interviewed
Preah Vihear	Cheb	Mluprey I	Kdol	87	37	43
			Poteab	98	37	38
	Choam Khsant	Pring Thom	Krala Peas	143	43	30
	Tbeng Meanchey	Po	Po	215	54	25
		Pramei	Bosthom	139	42	30
			Sub Total	**682**	**213**	**31**
Kompong Thom	Sandan	Meanrith	Choam Svay	86	26	30
			Sam-ong	124	37	30
			Rang Khnai	52	22	42
			Sub Total	**262**	**85**	**32**
Total			**8 villages**	**944**	**298**	**32**

Livelihood information for the Mondulkiri study area is drawn from two previous household surveys in HVF areas – one conducted by Evans *et al.* (2003) for WCS in four villages and the other carried out by McAndrew *et al.* (2003) for CIDSE in two communes (nine villages). Although the scope varies among the CDRI, WCS, and CIDSE household surveys, all collect similar information on demographics, rice production, income, and forest product collection. This makes it possible to include data from Mondulkiri on some key variables for comparison to Preah Vihear and Kompong Thom. Table 1.3 provides key information on each study area.

For the inventory fieldwork, WCS randomly selected sample plots (0.5 hectares per plot) to represent a block of the study area's production forest. A range of ecological information was then collected, including on all trees measuring 10 cm or greater in diameter at breast height (dbh) in each plot. In Preah Vihear, 15 plots were completed within a 2,000-hectare area in the south-centre of the Cherndar Plywood concession (Coupe 1). In Mondulkiri, 9 plots were completed within 11 blocks of Coupe 3 of the Samling International logging concession. Mondulkiri data are complemented by results from a past resin tree mapping study conducted by Evans *et al.* (2003) in the surrounding area of Coupe 3. No inventory was conducted in Kompong Thom due to resource limitations, but data from Bin Ismail (2003) on sample plots in the Colexim concession, in combination with the Colexim SFMP inventory data and interviews with key informants, provide an indication of timber resources in the area.

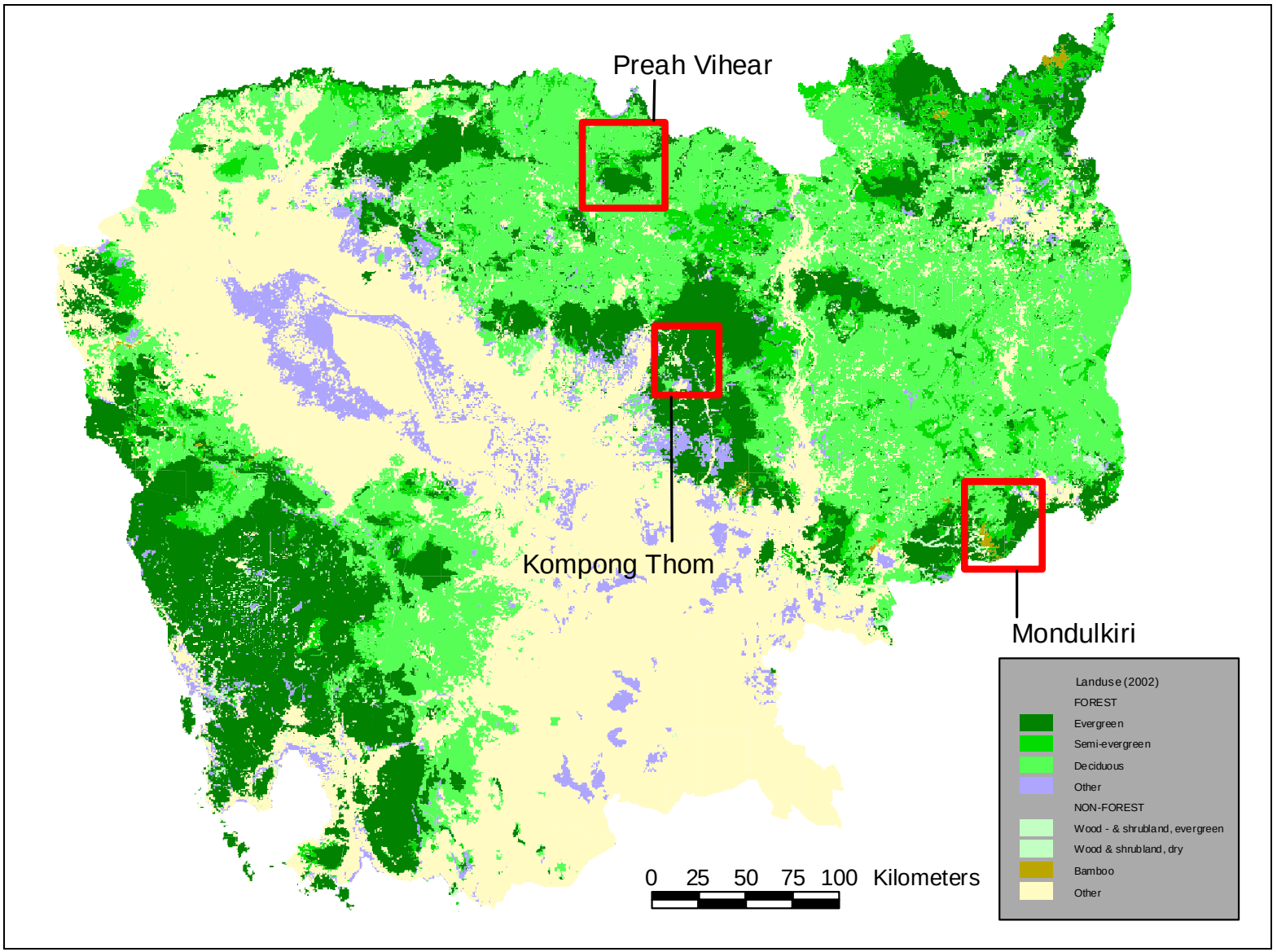
Table 1.3: Summary Information on HVF Study Areas and Methods

	Preah Vihear Area	***Kompong Thom Area***	***Mondulkiri Areas***	
No. Of villages surveyed	5 villages	3 villages	4 villages[a]	9 villages[b]
Total households and population	682 households, 3,833 people	262 households, 1,531 people	211 families, 970 people	546 households, NA
Number and percentage of households surveyed	213 (31%)	85 (32%)	189 (90%)	139 (25%)
Dates of survey fieldwork	Dec 2003	Feb 2004	Feb-Aug 2002	Nov 2002 to Jan 2003
Sources – Livelihood Data	This study (CDRI)	This study (CDRI)	Evans *et al.* (2003)	McAndrew *et al.* (2003)
Concession in close proximity to villages	Cherndar Plywood	Colexim	Samling International	
Coupe in which forest study area is located	Coupe 1	NA	Coupe 3	
No. of sample plots	15 (0.5 ha plots)	NA	9 (0.5 ha plots)	
Dates of plot fieldwork	Mar-Apr 2004	NA	Jan-Feb 2004	
Sources – Inventory Data	WCS for this study	Bin Ismail (2003), Colexim SFMP, interviews	WCS for this study and WCS (2003)	

a *Evans et al. (2003) surveyed Pu Char and Kati villages in Sre Preah commune, Keo Seima district and Andong Krolung and Roka Thmei villages in Sen Monorom commune, O Reang district.*

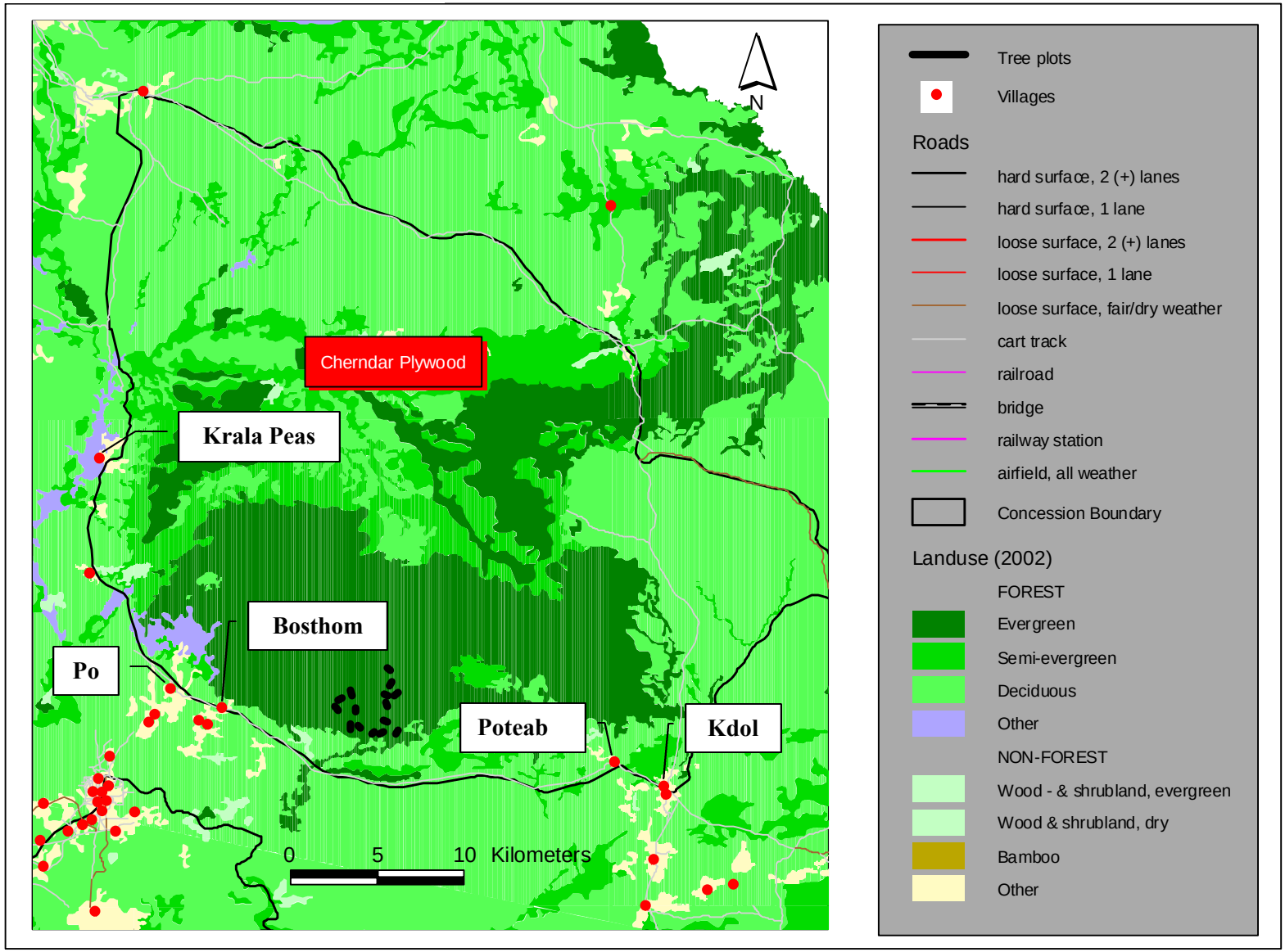
b *McAndrew et al. (2003) surveyed Pou Less, Pou Chob, and Pou Ontreng villages in Dak Dam commune, O Reang District and Pou Ya, Ochra, Pou Kong, Kati, Sre Ampil, and Sre Preah villages in Sre Preah commune, Keo Seima district. The villages of Pou Ya (Pu Char) and Kati and were surveyed by both studies.*

Map 1.3: Location of Study Area



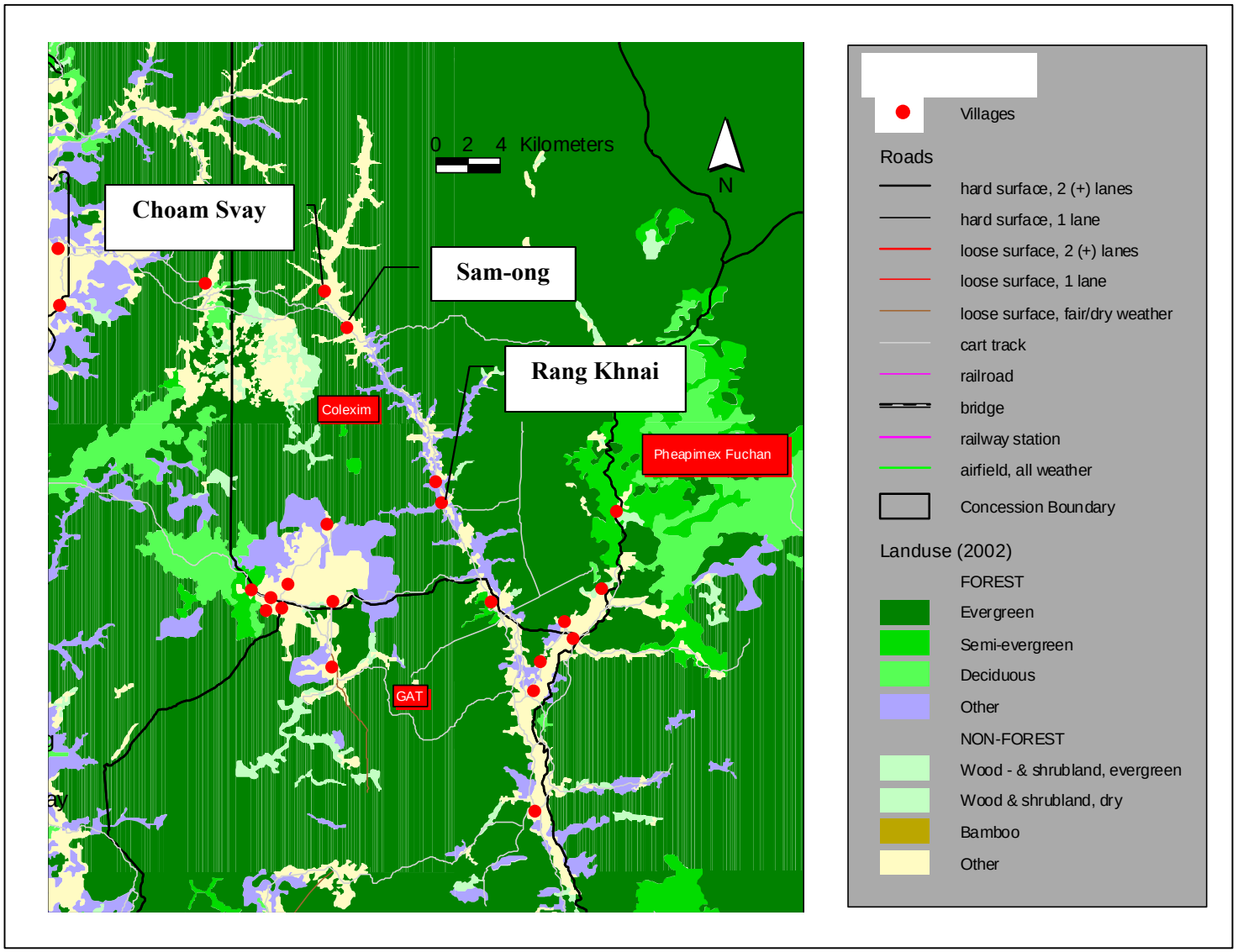
Source: WCS 2004

Map 1.4: Preah Vihear Study Site



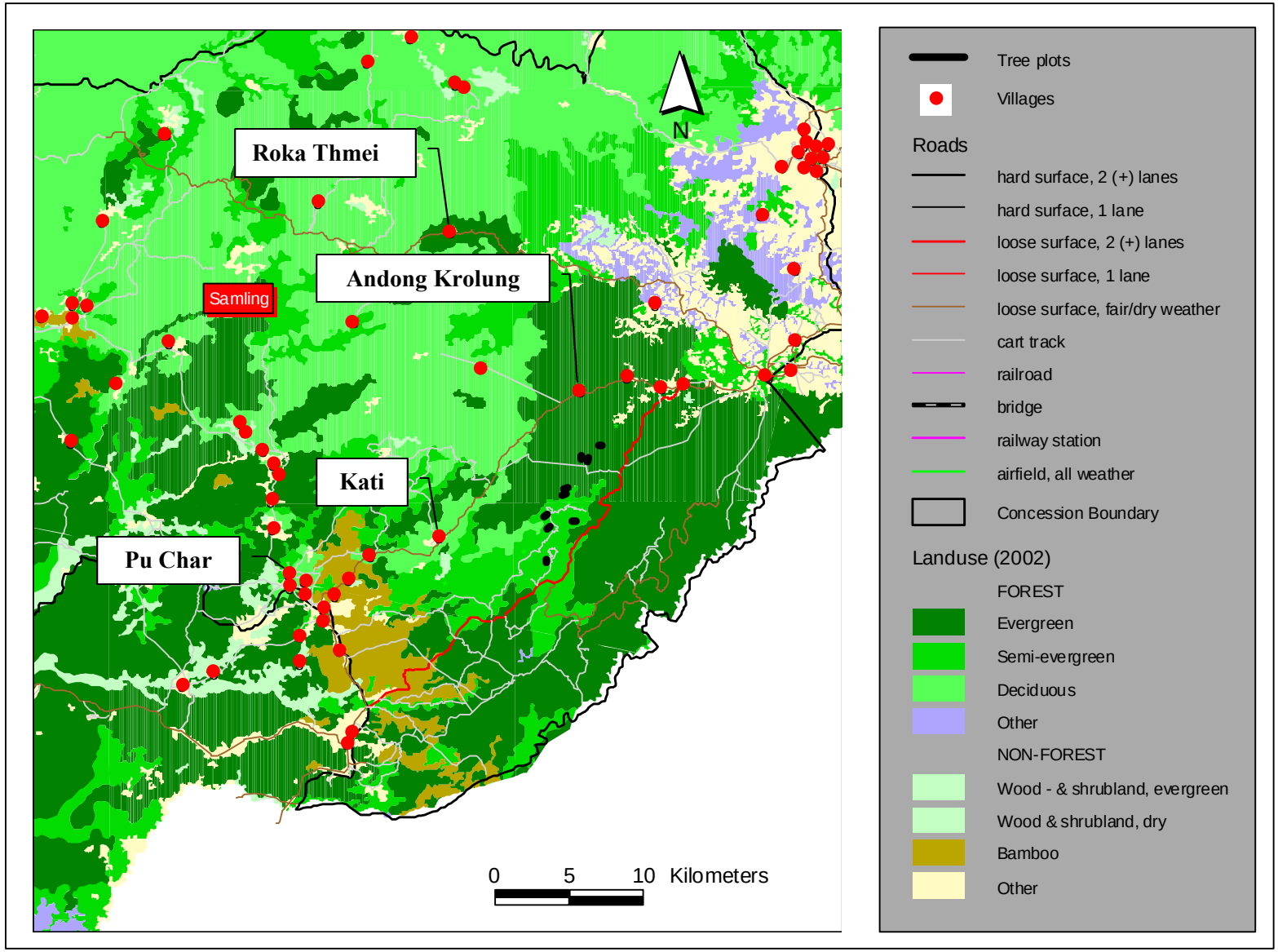
Source: WCS 2004

Map 1.5: Kompong Thom Study Site



Source: WCS 2004

Map 1.6: Mondulkiri Study Site



Source: WCS 2004

Chapter 2:
Tropical Forest Loss:
Causes and Management Responses

According to the FAO's *Forest Resources Assessment 2000*, the world's forest cover amounts to about 3.9 billion ha, or 30 percent of total land area.[11] Of this forest cover, tropical forests account for 1.9 billion ha (47 percent). Despite global efforts to improve forest management, forest loss is continuing at a rapid pace with nearly all deforestation (95 percent) occurring in tropical forests, rather than in temperate or boreal forests. The world lost over 500 million ha of tropical forest cover from 1960 to 2000, with Asia losing about one-third of its total tropical forest cover, while Latin America and Africa each lost about 20 percent.

In discussing changes in forest cover, it is important to distinguish been *natural forests* and *forest plantations*. Although most tropical forest areas remain natural (96.6 percent), forest plantations represent an increasing proportion – from 1.6 percent of total tropical forest area in 1990 to 3.4 percent in 2000. While it is useful in some instances to understand the combined forest cover of natural forests and plantations, the two types of forest are quite different. Compared to plantations, natural forests in tropical regions have greater biodiversity, larger biomass volumes (and hence higher carbon storage values), a greater range of production values (timber, firewood, and other forest products), and higher tourism and amenity values. For purposes of this study, the focus is on natural tropical forests.

Forest cover data from 1980-1990 and 1990-2000 suggest that the annual deforestation rate for the world's natural tropical forests has remained constant at 0.8 percent (Table 2.1). However, regional data indicate that deforestation rates worsened in all tropical regions except Latin America from 1990-2000. Tropical regions of Asia have fared worst of all, losing nearly 20 percent (56 million ha) of natural tropical forest over the decade – an area greater than three times the size of Cambodia. In contrast, the average deforestation rate for the decade across all other tropical regions was just over 6 percent.

Table 2.1: Natural Forest Loss in Tropical Regions[a]

Tropical Regions	*Natural Forest Cover (000 ha)*		*Total Change in Natural Forest Cover (000 ha and %)*		*Average Annual Change in Natural Forest Cover (%)*	
	1990	*2000*	*1990-2000*		*1980-1990*	*1990-2000*
Asia	289,820	233,448	-56,372	-19.5%	-1.2	-1.9
Latin America[b]	938,721	893,272	-45,449	-4.8%	-0.7	-0.5
Africa	684,772	629,536	-55,236	-8.1%	-0.7	-0.8
Oceania	36,201	34,869	-1,332	-3.7%	-0.3	-0.4
All Tropical Countries	1,949,514	1,791,125	-158,389	-8.1%	-0.8	-0.8

[a] *Natural forests represent all forest cover reported in the United Nations Food and Agriculture Organization's* Forest Resources Assessment 1990: Global Synthesis *and* Forest Resources Assessment 2000*, excluding forest plantation areas.*

[b] *Includes South America, Central America and the Caribbean.*

Source: Matthews (2001) – World Resources Institute analysis of FAO Forest Resources Assessment data

[11] Forests are defined as land with tree crown cover of 10 percent or more of the total area. Forests include both natural forests and forest plantations, but exclude stands of trees established primarily for agricultural production (e.g., fruit tree plantations).

Despite rapid deforestation rates, forests still covered close to half the land area in Southeast Asia in 2000. As indicated in Table 2.2, Indonesia and to a lesser extent Myanmar and Malaysia, have the largest areas of forest resources. More than half the land areas of these countries remain under forest. The same is the case for Cambodia and Laos. In contrast, the Philippines, Thailand, and Vietnam have lost much of their forest.

Table 2.2: Natural Forest Cover in Southeast Asia in 2000

Country	Natural Forest Cover[a] (000 ha)	Land Area (000 ha)	Natural Forest Cover as % of Land Area
Cambodia	9,245	17,652	52.4%
Indonesia	95,115	181,157	52.5%
Lao	12,507	23,080	54.2%
Malaysia	17,542	32,855	53.4%
Myanmar	33,598	65,755	51.1%
Philippines	5,036	29,817	16.9%
Thailand	9,842	51,089	19.3%
Vietnam	8,108	32,550	24.9%
Other[b]	948	2,067	45.9%
Total	191,941	436,022	44.0%

[a] *Natural forest cover excludes forest plantations. In Southeast Asia, forest plantations covered about 20,000 ha in 2000.*
[b] *"Other" includes the Southeast Asian countries of Brunei Darussalam, East Timor, and Singapore.*
Source: FAO Forest Resources Assessment 2000

2.1. Forest Cover in Cambodia

Recent estimates indicate that forest covers approximately 50-60 percent of Cambodia's land area, down from about 75 percent during the 1960s (FAO 2000, DFW 2003b) (Table 2.3).[12] Available data suggest that deforestation proceeded at an average annual rate of about 0.5 percent from the 1960s to mid-1980s, increased to about one percent from the mid-1980s to mid-1990s, and has probably risen to about 1.7 percent since the mid-1990s.[13] Although the deforestation rate in Cambodia has been increasing over the last decade, this has also been the trend across tropical Asia, as noted above.

Although much attention is focused on forest cover when evaluating the status of forest resources and deforestation trends, forest cover (by itself) remains at best a rough indicator. Forest cover estimates tend to mask the true status of forest resources in several ways. First, total forest cover estimates imply that all forests are equally important when evergreen forest is recognised across the tropics as providing much greater commercial, biodiversity, and rural livelihood benefits in comparison to other forest types, with some exceptions (e.g., inundated

[12] FAO (2000) estimates Cambodia's forest cover at 9.2 million ha (52 percent of land area), whereas DFW (2003b) estimates forest cover at 10.4 million ha (56.5 percent of land area). This difference in estimates occurs despite DFW using a more conservative crown cover threshold in its definition of forest (20 percent) than FAO (10 percent). But errors within the DFW study, in combination with significant limitations acknowledged by the authors, make the reliability of the study's estimates questionable, especially for total forest cover, deciduous, and other forest (p. 9-11). For example, DFW estimates of "forest cover as a percentage of total land cover" appear to assume Cambodia's total land area is 18.4 million ha rather than the official estimate of 17.7 million ha. This skews all the forest cover estimates downward. For deciduous forest, relatively arbitrary adjustments (10, 15, and 20 percent reductions) are made after an initial finding that deciduous forest increased by more than 0.5 million ha between 1996/97 and 2002. "Other forest" appears overestimated due to problems distinguishing between inundated shrubland and forest in remote sensing images. Faced with this problem, "all of the flooded areas were classified as flooded forest and included in the other forest category. This might have lead to an artificial increase in the extent of the total forest area" (p. 10).

[13] DFW (2003b) estimates the annual deforestation rate at 0.9 percent, whereas FAO (2000) data suggest a rate over 2 percent. After analysing forest cover estimates, and considering the problems involved with their comparability, the Independent Forest Sector Review (2004) arrives at an annual deforestation estimate for the period after 1997 of 1.7 percent.

forests). In Cambodia, approximately half of forests are categorised as "evergreen" or "semi-evergreen", while the other half are "deciduous" or "other forest".[14]

Table 2.3: Forest Cover and Rate of Forest Loss in Cambodia, 1960s to 2002

Year	1960s[a]	1973/76[b]	1985/87[b]	1992/93[b,c]		1996/97[c]	2000[d]	2002[e]
Forest Cover (000 ha)	13,277	12,711	11,852	11,284	10,859	10,638	9,245	10,379*
Forest Cover as % of Total Land Area	75.2%	71.9%	67.4%	63.6%	61.3%	60.2%	52.4%	56.5%*
Time Period of Analysis	1960s to 1985/87		1985/87 to 1996/97			1996/97 to 2000/2002		
Average Annual Rate of Deforestation	0.5%		1%			1.7%		

Sources:

[a] *Commonly referred to estimate from the French colonial era, but the original source is unknown. Reported in Report No. 2 of Ministry of Water, Forest and Hunting (1965) in Ung (1991).*

[b] *Mekong Secretariat (1994), Cambodia Land Cover Atlas 1985/87and 1992/93, UNDP/FAO in Department of Forestry and Wildlife (DFW) (2003a)*

[c] *DFW (1998) in DFW (2003a)*

[d] *FAO (2000)*

[e] *DFW (2003b).*

* *Not reliable, see footnote 12 in text for discussion.*

Second, forest cover information based on remote sensing images often reveals little about levels of forest degradation without supplementary aerial photographs and on-the-ground assessments. For instance, logging activities may be quite damaging to forest quality but not reduce crown cover below the designated threshold (10 or 20 percent). In such cases, forest cover estimates for an affected area may remain unchanged even though the forest itself has significantly changed. Likewise, logging can result in the reclassification of forest from valuable to less valuable types without significant loss of total forest cover (e.g., from evergreen to semi-evergreen, deciduous, or other forest). Although the net loss in forest cover may be zero, the change in forest quality/type can be dramatic.[15]

Lastly, national deforestation rates are poor indicators of local realities. Deforestation within a country is usually quite uneven, with some areas experiencing rapid deforestation and others unaffected (e.g., remote and inaccessible areas). Such wide variation is not reflected in a national average. For example, DFW (2003b) estimates that between 1996/97 and 2002 Cambodia lost about six percent of its evergreen and semi-evergreen forest.[16] But closer inspection of deforestation data reveal alarming rates of evergreen loss in a number of forest concessions and protected areas during this period (Table 2.4).

For concessions experiencing net losses of evergreen and semi-evergreen forest (16 of the 22 concessions), over 70 percent of this forest loss occurred in five concessions (Table 2.4). On average, these five concessions lost 25 percent of their evergreen and semi-evergreen

[14] According to DFW (2003b), "evergreen" is defined as "usually multi-storied with trees that maintain their leaves throughout the year. They are usually sited on hilly plateaus and along streams and rivers (gallery forests)." "Semi-evergreen" is defined as containing "variable percentages of evergreen and deciduous trees, the percentage of evergreen trees varying from 30% to 70%." "Deciduous" includes land cover with "dry mixed deciduous forests and dry Dipterocarp forests. Deciduous forests drop their leaves more or less completely during the dry season." "Other forests" include "regrowth, stunted forests, bamboo forests, mangrove forests, inundated forests, and industrial forest plantations."

[15] For example, Cherndar Plywood concession in Preah Vihear lost about 18,000 ha of evergreen and semi-evergreen forest between 1996/97 and 2002, but gained approximately 14,000 ha of deciduous and other forest. Although this suggests a net loss in total forest cover of 4,000 ha, this estimate only reflects about one-quarter of the actual loss of evergreen and semi-evergreen forest.

[16] DFW (2003b) forest cover estimates for evergreen and semi-evergreen are considered to be more reliable than estimates for other forest types. FAO (2000) and IFSR (2004) estimates suggest that six percent loss is probably quite conservative.

forest from 1996/97 to 2002 – a rate of deforestation more than four times the national average. Deforestation was also uneven across protected areas. For 18 of 31 protected areas, there was either no change or an increase in evergreen and semi-evergreen forest. For the other 13 protected areas, more than 80 percent of forest loss occurred in five areas (Table 2.4). While forest cover estimates are subject to high levels of error, and there are comparability problems between the 1996/97 and 2002 maps, these estimates for concessions and protected areas are generally consistent with findings from IFSR (2004) and reports on unsustainable logging in Cambodia (www.globalwitness.org).

Table 2.4: Evergreen and Semi-Evergreen Deforestation in Forest Concessions and Protected Areas, 1996/97 to 2002[a]

Forest Concessions with Net Evergreen and Semi-Evergreen Losses, 1996/97 to 2002[b]				Protected Areas with Net Evergreen and Semi-Evergreen Losses, 1996/97 to 2002[c]			
Forest Concessions	**Forest Lost (ha)**	**Remaining Forest (ha)**	**Change in Forest**	**Protected Areas**	**Forest Lost (ha)**	**Remaining Forest (ha)**	**Change in Forest**
Samling Mondulkiri	-73,199	168,139	-30.3%	Roniem Daun Sam	-35,984	75,031	-32.4%
Pheapimex Stung Treng	-33,288	112,294	-22.9%	Snoul (DFW)	-26,972	127,860	-17.4%
Mieng Ly Heng	-21,719	58,808	-27.0%	Beng Per	-22,533	147,700	-13.2%
Cherndar Plywood	-17,941	55,608	-24.4%	Botum Sakor	-14,743	117,955	-11.1%
Samrong Wood	-17,638	96,967	-15.4%	Snoul	-11,029	58,967	-15.8%
Pheapimex Ratanakiri	-12,129	192,399	-5.9%	Cardamom	-9,721	348,502	-2.7%
Silverroad Pursat	-11,973	159,137	-7.0%	Mondulkiri	-5,399	49,623	-9.8%
Timas Preah Vihear	-9,674	44,443	-17.9%	Preah Vihear (DFW)	-4,195	52,098	-7.5%
Everbright	-7,359	121,338	-5.7%	Kirirom	-3,552	21,321	-14.3%
Silverroad Koh Kong	-6,721	84,626	-7.4%	Koah Ke	-2,120	987	-68.2%
Timas Kratie	-6,123	37,484	-14.0%	Phnom Nam Lyr	-1,028	31,649	-3.1%
Casotim	-5,746	69,527	-7.6%	Preah Khan	-529	367	-59.0%
Pheapimex Kompong Thom	-2,839	51,151	-5.3%	Dong Peng	-5	84	-5.6%
Kingwood	-2,488	123,526	-2.0%				
Colexim	-1,232	122,358	-1.0%				
TPP Koh Kong	-512	18,495	-2.7%				
Total	-230,581	1,516,300	-13.2%	Total	-137,810	1,032,144	-11.8%
Total for Top 5 Concessions	-163,785	491,816	-25.0%	Total for Top 5 Protected Areas	-111,261	527,513	-17.4%

[a] *Data reported in this table is drawn directly from DFW (2003b). Some concession and protected area names could not be clarified regarding possible overlap (e.g., Snoul (DFW) and Snoul) or omission (e.g., Samling Kratie and Kompong Cham areas).*

[b] *Of the 22 concessions, the six that experienced gains in evergreen forest were Pheapimex Kratie, Samling Koh Kong, Superwood, TPP Siem Reap, You Rysaco East, and You Rysaco West.*

[c] *Of the 31 protected areas, the 18 that either had no change or experienced gains in evergreen forest were Ang Trapang Thmor, Angkor, Banteay Chhmar, Kbal Chay, Kep, Kulen Promtep, Lomphat, Peam Krasop, Phnom Aural, Phnom Bokor, Phnom Kulen, Phnom Prich, Phnom Samkos, Preah Vihear, Ream, Samlaut, Tonle Sap, and Virachey. Source: DFW (2003b)*

2.2. Major Causes of Forest Decline in Southeast Asia

Forest decline refers to deforestation, forest degradation, or a combination of both (Contreras-Hermosilla 2000). Deforestation is generally defined as long-term removal of tree cover, whereas forest degradation refers to a significant loss of productive capacity or forest quality.[17] Although both definitions are somewhat open to interpretation (e.g., what is "long-term", what is "a significant loss" and in what manner), they are generally useful concepts for

[17] FAO (2000) defines deforestation somewhat more precisely as "the conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold".

considering the direct and underlying causes of dynamic changes in forests – from undisturbed to disturbed, degraded, and deforested.

Rather than a single dominant factor, forest decline usually occurs due to a combination of factors through a chain of causation (Geist and Lambin 2002, Contreras-Hermosilla 2000, Kaimowitz and Angelsen 1998). For example, consider the difficulties of identifying the main cause of forest decline in the following example:

> *Farmers encroach on a forest area to clear and convert it for agriculture. Weak ownership and land tenure arrangements mean there are few impediments to converting the forest area. Indeed, farmers believe they will be able to claim ownership once the land is converted. Others are clearing land on behalf of wealthy land speculators. Access to this previously closed forest area was made possible by a commercial timber company, which built roads throughout the area to support its operations. Over-harvesting by the company and illegal logging by other actors degraded the forest, making it easier for conversion. Such unsustainable and illegal practices occurred in the pursuit of large timber rents, a portion of which were paid informally to the government officials and local authorities supporting/allowing the logging activities.*

What is the cause of forest decline? In such an example, many factors play a role including employment and land use options in rural areas, land tenure arrangements and enforcement, accessibility and infrastructure, market integration, unsustainable and illegal logging practices, institutional weaknesses, corruption, and the macro-policy context. This example illustrates the difficulties with identifying a single major cause of deforestation or laying the blame on one group of actors (farmers/colonists, timber companies, illegal loggers, government officials, or development planners). Nonetheless, the pattern of forest decline often follows a similar pattern that involves commercial logging operations arriving first and "opening up" forest areas, followed by encroachment and conversion for agriculture and other uses. Amelung and Diehl (1992) suggest that, for more than 70 percent of primary forests under exploitation, degradation has begun with commercial logging operations. Likewise, a study sponsored by FAO found that deforestation rates due to agricultural conversion are eight times greater in secondary (logged-over) forests compared to primary forests (Lanly 1982).[18]

Identifying the causes of deforestation has been the subject of hundreds of studies, conducted at different scales (global, regional, national, local), for different types of forest, and with emphasis on different factors (economic, ecological, tenurial, institutional, demographic, etc.). The purpose here is not to review and summarise the findings of all these studies, or to identify every factor that contributes to deforestation, but rather to draw out some of the key drivers of tropical deforestation in Southeast Asia and assess their relevance to experiences with forest loss in Cambodia. The role of timber operations, roads, rents, agricultural pressure, and property rights are highlighted in the following sections.

2.2.1. "Opening Up the Forest": The Role of Timber Operations

Across much of Southeast Asia, the entrance of commercial timber operations has signalled a period of rapid forest decline. In some areas deforestation has been the direct result of clear-felling by timber operations. In other areas timber operations have selectively logged, but in so doing have opened up and fragmented forest areas, thereby facilitating eventual conversion to agriculture. Selective logging sets the stage for conversion by removing big trees, damaging residual forest, and making areas easier to burn (e.g., gaps in the canopy reduce moisture content and damaged trees and logging debris provide fuel for fires). Studies on

[18] Secondary forests are areas of forest where heavy intervention has occurred. For tropical Asia, secondary forests can be divided into five types: (1) post-timber extraction; (2) swidden fallow; (3) secondary forest gardens; (4) post-fire; and (5) rehabilitated (CIFOR 2000).

logging impacts in tropical forests find that the proportions of both soil and residual trees damaged range from 5-50 percent depending on the harvesting intensity and management of operations (Putz *et al.* 2000). Panayotou and Sungsuwan (1994) find in their study of deforestation in Northeast Thailand that, without previous logging, it is extremely difficult for cultivators to convert primary forests into agricultural land because many trees are simply too large to be cut down with tools like machetes and small axes. Furthermore, primary forests do not burn easily because of high moisture levels and limited ground vegetation.

A study of 150 of deforestation models by the Center for International Forestry Research found consensus among the models that commercial logging has been a major source of deforestation in Southeast Asia, which has not been the case for some other tropical forests, such as those in Brazil (Kaimowitz and Angelsen 1998). Logging operations first made an impact in Southeast Asia in the Philippines, and then in Indonesia, Malaysia, and Thailand, and more recently in Cambodia, Myanmar, and Laos (Contreras *et al.* 2001, Ross 2001, Sadoff 1991). For most of these countries, there is a clear correlation between sharp increases in commercial logging (timber boom periods) and large and rapid losses of forest cover. Data on forest cover loss since the onset of timber booms in the Philippines, Indonesia, and Thailand are presented in Table 2.5, followed by a summary of timber boom experiences in these countries as well as Malaysia.[19]

Table 2.5: Forest Cover Loss Since Timber Booms in Indonesia, Philippines, and Thailand[a]

Country	Forest Cover prior to Timber Boom (000 ha and year of estimate)	Natural Forest Cover in 2000 (000 ha) [b]	Natural Forest Cover Loss since Timber Boom (000 ha and percent loss
Indonesia	146,000 (1966)	95,115	51,000 (35%)
Philippines	14,700 (1951)	5,036	9,700 (66%)
Thailand	27,400 (1961)	9,842	17,600 (64%)
Total	188,100	109,993	78,100 (42%)

[a] *Natural forest cover in Malaysia was 17.5 million ha in 2000. Forest cover data for Malaysia prior to its timber boom are not available.*

[b] *Natural forest cover excludes forest plantations. In the three countries, forest plantations covered about 17,300 ha in 2000.*

Sources: FAO Forest Resources Assessment 2000, Ross (2001), and Sadoff (1991).

- **Philippines** – In 1949, three years after gaining independence, the Philippines lifted export restrictions on timber, creating a "gold rush" of logging. With export prices significantly higher (and rising) compared to domestic prices, companies, politicians, and others sought to benefit in various ways from the logging windfall. By 1951, the Philippines had become the world's leading exporter of hardwood logs (Ross 2001). At the time, approximately half the country (14.7 million ha) was forested. In 1954, loggers harvested 3.6 million m^3, roughly what foresters believed to be the maximum sustainable yield. But by 1964, the government was authorising a harvest three times this amount. The boom period lasted until 1974, after which timber production dropped by 55 percent over the next 12 years (to 1986). From 1951 to 1986, forest cover was reduced by 55 percent (Ross 2001). Deforestation has continued at a slower pace, with more recent estimates indicating that only about one-third of forest cover (about 5 million ha) remains from 1951. Moreover, of this remaining forest cover, old growth forest only accounts for about 800,000 ha (Bantayan 2001).
- **Indonesia** – When the Suharto government came to power in 1966, about 80 percent (146 million ha) of Indonesia was forested and hardwood timber exports from Indonesia only accounted for 1.5 percent of the world market. From 1966 to 1969, Indonesian timber exports rose from 334,000 to 3.7 million cubic meters, a more than ten-fold increase (Ross 2001). By 1973, Indonesia had replaced the

[19] Seminal work by Ross (2001) provides the basis for much of this summary.

Philippines as the world's leading exporter of hardwood logs with a 36 percent share of the world market, a position Indonesia would hold until 1984 when Sarawak (Malaysia) became the world leader. During this period, over 500 companies had concessions in Indonesia (Ross 2001). Over the past two decades, deforestation in Indonesia has continued at a rapid rate – about 1.8 million ha/year from 1985-1997, and up sharply to 3.8 million ha/year following the economic crisis in 1997 (Indonesia Forest Liaison Bureau 2001, Ministry of Forestry 2001). By 2000, Indonesia was down to about 95 million ha of natural forest cover – about 50 million ha or 35 percent less than in 1966 when the timber boom period began (FAO 2000).

- **Malaysia (state of Sabah)**[20] – From 1959 to 1990, Sabah was the world's second largest supplier of hardwood logs, second to the Philippines, then to Indonesia, and finally to its neighbor Sarawak (Ross 2001). By 1967, Sabah was harvesting timber at a rate 20 percent above estimated sustainable levels, but this increased to approximately 260 percent the sustainable rate by 1976. The sharp rise in harvests corresponded with an increase in the awarding of short-term logging licenses. From 1967 to 1976, the number of annual licenses increased from 184 to 654, while special licenses rose from 16 to 35. Logging by these short-term licensees accounted for 75 percent of the Sabah's timber harvest (Ross 2001). Sabah's first accurate forest survey in 1975 found that undisturbed forest covered 4.1 million ha (or 56 percent) of the state. Of this amount, the commercially attractive undisturbed low and upland dipterocarp forest accounted for 2.8 million ha. By 1992, undisturbed dipterocarp forest was down by 85 percent to 0.4 million ha (Ross 2001).
- **Malaysia (state of Sarawak)** – Following its neighbour Sabah, Sarawak began to play a larger role in the production of hardwood logs for the international market in the mid-1970s, increasing its market share from just 3.4 percent in 1975 to 38 percent in 1985. Timber production was well beyond sustainable levels during this period. In 1978, the harvest of 6 million m^3 was 30 percent above sustainable levels. The government authorised harvests between 10.6 and 12.3 m^3 per year from 1982-86, and between 11.4 and 19.4 million m^3 from 1986 to 1991 – four to five times the sustainable rate. Sarawak became the world's leading exporter of hardwood logs in 1984 and remained so through the late 1990s (Ross 2001). Reliable data on forest cover in Sarawak are not available.
- **Thailand** – In 1961, Thailand's forest area covered more than half the country (27.4 million ha). At the time, the government set a target for the proportion of the country to remain under forest cover of 50 percent. This target was later revised in 1976 to 37 percent, but the loss of forest cover continued, dropping to less than 30 percent by 1985. During this period, most deforestation was the result of commercial logging ventures first entering and creating access into forests, quickly followed by further clearing for agricultural cultivation (Sadoff 1991). Alarmed by the rapid rate of deforestation, the government imposed a logging ban and revoked all territorial concessions in 1989. Despite these actions, deforestation rates in the years following the ban have been roughly equal to the rates during the years immediately preceding the ban (Rasmussen *et al.* 2000).

[20] Malaysian forestry policies are made at the state level. Most of Malaysia's forest resources are located in the states of Sabah and Sarawak.

2.2.2. Access to Forests and Markets: The Role of Roads

Forest decline tends to be greater where forests are more accessible. In most cases, road building is what makes forests more accessible, although rivers and railroads can also support access. Governments promote, authorise, or construct roads for a range of purposes including increasing economic development in rural areas and improving trade and market integration. For roads constructed in or through forests, providing better access to timber resources may also be a chief aim. Certainly this is the case when roads are built by timber companies.

In addition to providing physical access for timber operations, roads create other economic incentives that spur forest decline. Roads increase the profitability of agriculture by making it easier to bring products to market, which in turn provides strong incentives for people to convert forest areas for agriculture (Barbier *et al.* 1994). This is especially the case for areas with degraded forests, rich soils, and water availability. By raising the property values of surrounding areas, roads also make forest areas attractive for in-migration and land speculators.

Among studies of deforestation there is wide consensus that constructing roads near or through forests, regardless of the declared purpose of the roads, will strongly contribute to forest decline (Contreras-Hermosilla 2000, van Soest 1998, Chomitz and Gray 1996). Indeed, Kaimowitz and Angelsen (1998) support this contention in their review of 150 deforestation models, noting "numerous models from diverse contexts show that greater access to forests and markets generally leads to more deforestation. …Roads seem to have a stronger impact in regions dominated by commercial agriculture and areas with better soils…." Likewise, in a study of deforestation in Thailand, Cropper *et al.* (1997) conclude that new roads and accessibility (as measured by distance from Bangkok) played significant roles in deforestation from 1976-89. Population growth, topography, and soil quality are also noted as important factors.

Of course, in some cases roads are built to areas that have *already* been cleared and settled (Kaimowitz and Angelsen 1998). Thus, it is important to distinguish between correlation and causation when considering the links between roads and deforestation. It is also important to consider the *motivation* for the road policy in the first place. As noted by Contreras-Hermosilla (2000), roads may frequently be the result of some politically powerful group's pre-existing desire to profit from the deforestation/land of an area. In such a case, "deforestation is the result of an initial propensity to deforest, with roads being a means to that end." In this situation, the problem is more political than technical; it is not simply a problem of transportation infrastructure planning that has failed to consider environmental impacts. This leads to the next section on the role of rents.

2.2.3. Governance, Institutions, and Corruption: The Role of Rents

Numerous studies of commercial logging have highlighted the large "rents" available in primary (virgin) and some secondary forests (logged over, but with residual virgin trees).[21] A timber rent is equal to total revenue from timber sales minus total costs of harvesting and delivery, with these costs including a "normal profit" margin for those involved in harvesting and delivery (about 10-20 percent), but excluding any royalties, licensing charges, fees and so forth that may be charged by the government. Rent refers to the exceptional profit or "windfall" that can be captured by the logging operation (above and beyond a "normal profit") or captured by government through royalties and other charges. Rents are generally larger for timber stocks located in forests with easy terrain and near roads, mills, and ports. Over time, rents can increase due to expansion of roads and other infrastructure, through the development of lower-cost logging technologies, and when a greater number of species and sizes of roundwood are accepted by markets (Vincent and Gillis 1998).

[21] For a list of studies, see Vincent and Gillis (1998).

Studies of economic growth in developing countries are in broad consensus that natural resource abundance creates rent-seeking opportunities, which tends to encourage corruption and weaken governance and institutions. In many cases, this leads to slower overall economic growth and development (Ishham *et al.* 2003, Gylfason 2000, Leite and Weideman 1999, Sachs and Warner 1995). Although these studies tend to focus on the impacts of abundant oil and mineral endowments, rich timber stocks can encourage similar rent-seeking behavior and the corresponding impacts. The pursuit of these rents can lead to a sharp increase in deforestation due to rapid and highly unsustainable levels of logging.

The literature on timber rent-seeking suggests two different perspectives on the driving forces. One view is that timber companies drive the rent-seeking process. In the pursuit of windfall profits, these companies pay bribes, undermine institutions, log rapidly and wastefully, and manage to capture the majority of the rent. Another view is that state actors – high-level government and military officials – drive the rent-seeking process. They compete to gain control of timber resources that they then allocate through non-transparent means to logging operations (which may themselves be military units). It is these powerful state actors who capture the majority of the rent through large unreported payments from the logging operations that have been awarded harvesting rights. This windfall is usually used for purposes of patronage and personal/familial enrichment.

Table 2.6: Capture of Timber Rents in Southeast Asian Countries[a]

Country	Estimated timber rent captured by government, as a proportion of total rent (percentage)	Period of Analysis (year)	Reference Study
Indonesia	Fell from 25 to 5 Rose from 6 to 30-40	1973-86 1986-95	Ross 2001
	25-35	1993	Collins 1993 in Conteras-Hermosilla (C-H) 2000
	25	1997	Myers and Kent 1997 in C-H 2000
Malaysia – Sabah	46	1966-1985	Vincent 1990 in Ross 2001
	53-64	1966-1989	Vincent 1991 in C-H 1999
Malaysia – Sarawak	18	1966-1985	Vincent 1990 in Ross 2001
	35-69	1966-1989	Vincent 1991 in C-H 1999
Malaysia – Peninsular	9-49	1989	Vincent et al. 1993 in C-H 2000
Philippines	4-30 >30	Before 1981 After 1981	Bautista 1982 in Ross 2001
	11	1979-82	Boado 1988 in Ross 2001
	5 14	1960s 1970s	World Bank 1989 in Ross 2001

[a] *A timber rent is equal to total revenue from timber sales minus total costs of harvesting and delivery (including a normal profit margin, but excluding any royalties, licensing charges, fees and so forth that may be charged by the government).*

Of course, the forces driving timber boom periods have usually been a mixture of both – rent-seeking by companies and state actors. But in Southeast Asia, state actors appear to have played a more dominant role in the process. Ross (2001) argues persuasively that large timber rents in the forests of the Philippines, Sabah and Sarawak Malaysia, and Indonesia led to a pattern of "rent seizing" by powerful state actors, followed by institutional breakdown, rapid and unsustainable timber harvests, and widespread deforestation.[22] Rent seizing refers to making control of forest resources "direct, exclusive, and discretionary". In Southeast Asia, this involved gaining direct authority over harvest licenses, excluding or weakening any institution that could restrict logging or interfere with capturing the timber windfall, and ensuring that laws and regulations provided sufficient ambiguity for highly discretionary

[22] Ross (2001) provides substantial evidence to support this contention. See Chapters 4-7 covering the timber boom and institutional breakdown experiences of each country.

decisions (e.g., the assignment and withdrawal of licenses). Indeed, even in the Philippines and Malaysia (Sabah and Sarawak) where forestry departments had reputations for independence and technical competence, powerful state actors stripped the departments' authority over timber resources, abandoned sustained-yield policies, and ignored environmental and social costs. This allowed them to capture an even greater windfall (Ross 2001).

To facilitate the capture of this windfall through informal means, royalties and taxes on timber have been kept very low in Southeast Asia, especially during boom periods. As shown in Table 2.6, rent capture by Southeast Asian governments has been quite limited. For instance, despite a chronic demand for revenue, the Philippines government never managed to impose taxes on the timber industry that provided more than 5-30 percent of timber rent before the early 1980s. In the post-boom period, rent capture appears to have improved somewhat, but it is unclear how much high levels of illegal logging factor into the post-boom estimate. Contreras-Hermosilla (2000) indicates that illegal logging (both deliberate and uncontrollable) cost the Philippines $1.6 billion per year in revenue during the 1980s. Likewise, in Malaysia where official rent capture appears better, estimates may not reflect underreporting of timber harvests and exports. For example, Contreras-Hermosilla (2000) notes that Malaysian exports to Japan were underdeclared by as much as 40 percent in 1993.

2.2.4. Land Suitability and Returns to Agriculture: The Role of Agricultural Pressure

Once a forest area has been "opened up" by logging activities, a number of factors can contribute to higher rates of conversion for agriculture. First, where the land in a forest is more suitable for agriculture, the forest is more likely to be converted. This includes forests in flatter areas, with higher-fertility soil, and with adequate water and drainage (Kaimowitz and Angelsen 1998). Among these factors, soil quality is the one most often lacking. Approximately 72 percent of tropical forest areas have very poor soils for agriculture (Whitmore 1998).[23] Most tropical forests have a thin top layer of fertile soil (a few centimeters deep) consisting of decaying biomass, underneath which is low fertility, often acidic soil. As a result, when tropical forests are cleared, the thin top layer of soil is quickly lost and deforestation can become permanent. Where areas are cleared for agriculture, production levels can drop off rapidly as the top layer of soil is lost. Therefore, opening up access to forest areas with agriculturally poor soils may represent a "lose-lose" situation – deforestation and associated environmental impacts as well as low economic returns from agriculture (Chomitz and Gray 1996).

Second, returns to land and labour matter. Where returns from agriculture are high relative to other employment options, it will be difficult to stem forest conversion. Even if returns from agriculture are very low in absolute terms, forest conversion for agriculture may expand where there are no higher-value land uses or off-farm employment alternatives. Conversely, greater and higher paying off-farm opportunities tend to reduce forest loss (Kaimowitz and Angelsen 1998).

2.2.5. Security of Tenure: The Role of Property Rights

When property rights and/or the ability to enforce them are uncertain, incentives for forest degradation and conversion increase (Amacher *et al.* 2004, Bohn and Deacon 2000, Kaimowitz and Angelsen 1998). Among other reasons, timber operations tend to log rapidly and carelessly because they do not know how the situation may change and may have little assurance, even with an existing agreement or contract, that they will be able profit from future timber harvests in the area. Timber operations may worry about illegal logging in their concessions, contract termination, political instability and conflict, and the imposition of more

[23] Some areas of tropical forests have more fertile soils, but they are often highly location specific, such as alluvial soils (along rivers) or volcanic soils (Grainger 1993 as cited in van Soest 1998).

restrictive laws and regulations. Therefore, they often "cut and run", making minimum investment in forest management and reforestation activities (Vincent and Gillis 1998).

Poorly defined property rights can also provide incentives for farmers and land speculators to clear forest. If land must be cleared to obtain secure property rights, and there is no means by which secure claims can be made on (state-owned) forests, then forests will be cleared without consideration of the potential benefits of different land use options. Such approaches to tenure have been noted as an important contributing factor to deforestation in Thailand's forest reserves, where more than eight million people live and farm (Hirsch 1999, Sadoff 1991). Even in cases where land will not initially be put under production due to a lack of profitability, forests may still be cleared to secure claims in speculation that future roads, infrastructure, or other development will make it profitable. This suggests that, where tenure regimes allow private ownership of land but only state ownership of forests, land-titling programs may have the effect of spurring deforestation, especially where such programs are active in agricultural areas close to forests (Angelsen 1996).

2.3. Forest Decline in Cambodia: A Familiar Story

In reviewing experiences with tropical forest decline throughout Southeast Asia, Cambodia has thus far followed the same general pattern as its regional neighbours – high levels of commercial and illegal logging sanctioned by powerful state actors, with this logging creating conditions (e.g., road access, degraded forests) for encroachment and forest conversion. The process has been driven by rent-seeking (and rent-seizing) activity. Indicators of such activity in Cambodia include the non-transparent allocation of forest concessions and logging rights during the mid-1990s, the substantial role of the military in logging, limited capture of timber revenue in national accounts, and decline in this revenue following greater consolidation of government control over timber resources. As noted in section 2.2.3, such problems of forest governance and revenue collection have been common in much of Southeast Asia, making Cambodia's experience over the past decade neither unique nor surprising.

2.3.1. The Role of Timber Rents

The peak of timber rent seizing and allocation in Cambodia occurred from 1994 to 1997, when the government reintroduced private industrial forest concessions as the primary instrument of commercial forest management. More than 30 concessions were granted covering an area of about 6.5 million ha – equal to more than one-third of the country, over half of Cambodia's forests, and most of the evergreen and semi-evergreen areas. In line with experiences elsewhere in Southeast Asia, the granting of forest concessions in Cambodia reflects an effort by high-level state actors to make control of forest resources "direct, exclusive, and discretionary".[24]

First, although the Ministry of Agriculture, Forestry and Fisheries (MAFF) is vested with the authority to govern forest resources, concession agreements have been the purview of the Council of Ministers (CoM), especially with regard to negotiating the terms of investment agreements with investors/companies. As noted in the *Cambodian Forest Concession Review* (2000), CoM officials maintain direct authority over the financial terms for allocating forest resources, but with little supervision of how the terms are enforced.

> *The concession agreements… include investment approvals, royalty payments and royalty rates, rights to operate processing facilities, the granting of tax and duty exemptions, guarantees of contractual rights and requirements for financial reporting. These issues fall within the purview of the Council of Ministers (CoM) and thus the IAs [Investment Agreements] are executed by the co-Ministers in charge of the Office of the Council of Ministers. The problem with this arrangement*

[24] See arguments and findings of Ross (2001) in section 2.2.3 above.

> *is that the CoM is an executive rather than an implementing body and should have delegated authority to a specific agency or agencies to enforce and monitor the investment agreements. There has thus been little or no supervision or enforcement of the requirements and obligations established in those agreements. Further clouding the issue of jurisdictional control over forest harvesting is the fact that the Prime Minister and the CoM (and in some cases even Provincial Department heads, Judges, etc.) issue grant rights above the jurisdiction of an individual Ministry (Fraser Thomas* et al. *2000, p. 17).*

Second, instead of developing a clear legal context for forest concessions, the concession system was superimposed on the existing collection permit system. This lack of legal clarity provided officials with wide discretion over allocation of logging rights, which contributed to illegal logging problems. Along similar lines, individual concession contracts negotiated between the CoM and investors/companies were ambiguous with few specific binding terms. According to legal analysts supported by the World Bank-funded Forest Policy Reform Project, "concession contracts so strongly favour the concessionaire that it is questionable whether they can be considered commercially reasonable" (White and Case 1998). The analysts found the contracts to be so ambiguous and rife with problems that a line-by-line critique would be of little use. Among 42 separate problems, they pointed out "concession contracts do not specify royalty payment procedures, provide maximum revenue or other benefits to the government, or provide penalties for non-payment". Such "loose" concession contracts nested in ambiguous legal frameworks are hallmarks of the approach to rent seizing by state actors elsewhere in Southeast Asia.

Another indicator of timber rent seizing is low and declining royalty collection following seizure and allocation. The pattern in Cambodia appears consistent. Government revenue from the forestry sector has been in general decline since the awarding of forest concessions began in 1994 (Table 2.7). While investment payments for concessions resulted in higher government revenue initially, royalty collection since then has been well below expectations. In 1996, a joint report of the World Bank, UNDP, and FAO (1996) estimated that government forest revenue could eclipse $100 million annually. But since that forecast, official government forest revenue has ranged between only $6-$12 million per year.

Such poor revenue collection has occurred despite greater stability and government control over forest resources, donor-supported strengthening of forestry institutions, and considerable donor pressure on the government to improve revenue collection. Such pressure was most clearly displayed in May 1996, when in response to timber revenue diversion away from the national budget, the International Monetary Fund froze a $20 million infrastructure loan to Cambodia (Talbott and Brown 1998). Despite this pressure, revenue levels have never recovered. Rather, as noted in a number of reports funded by the World Bank, Asian Development Bank, bilateral donors, and other organisations, payments through informal channels continue to mean that large amounts of revenue never reach the national budget.[25]

[25] While the estimates vary, all suggest substantial losses of potential government revenue. In a report for the World Bank-supported Forest Policy Reform Project, DAI (1998) estimated average informal payments on timber at roughly $50 per m^3, with total payments possibly exceeding $150 million in 1997. Forest Crime Monitoring Unit (2000) estimated informal payments at $40-$80 per m^3, whereas an ADB-supported report by Fraser Thomas *et al.* (2000) placed such payments in the range of $10-$50 per m^3. More recently, the multi-donor supported Independent Forest Sector Review (2004) used a more modest average figure for informal payments of $10-$15 per m^3 in its economic model, but admitted it had little basis for this estimate and acknowledged "other reports" suggesting payments in the $10-$30 per m^3 range. Reports from Global Witness provide indicative informal payment levels across Cambodia since the mid-1990s (www.globalwitness.org).

Table 2.7: Official Government Forest Revenue, 1992 – 2001

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Government Forest Revenue (million $)	0.8	1.4	33.5	21.5	10.4	12.5	6.0	9.5	10.6	7.4

Source: Ministry of Economy and Finance (2002)

2.3.2. Other Key Factors: Logging and Access; Agricultural Pressure and Soil Quality

In Cambodia, as is the case across Southeast Asia, commercial logging creates a number of incentives for future agricultural encroachment. First, logging roads provide access to land in previously remote areas. For illustration, consider the penetration of logging roads in Colexim and Cherndar Plywood concessions – two site areas for this study (Maps 2.1 and 2.2). Second, logging and roads encourage future forest conversion by reducing land-clearing costs (since forests are already degraded from logging) and lowering the cost of bringing agricultural goods and forest products to market. These incentives are greater where soils in forest areas are more productive.

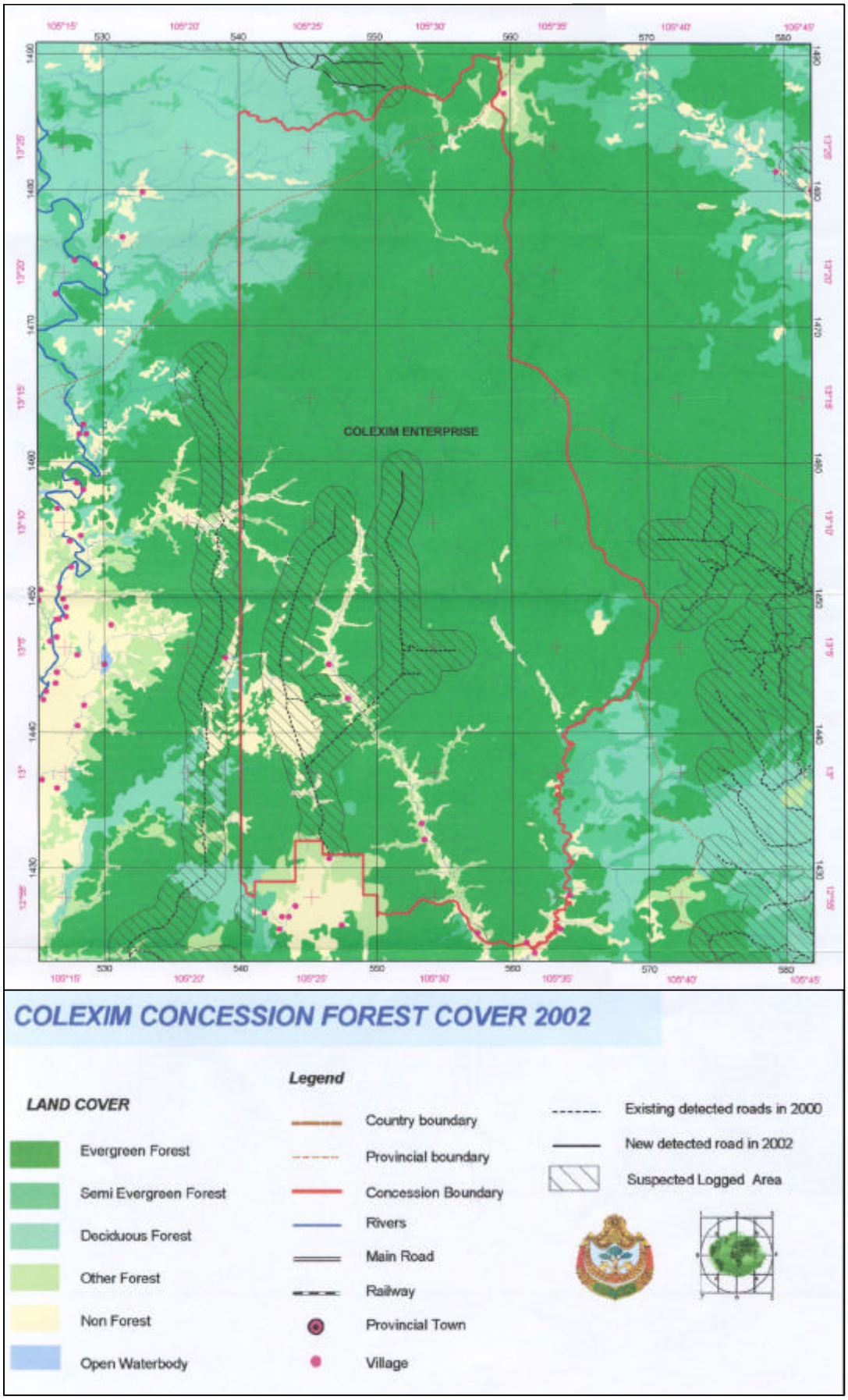
To estimate the extent of forest degradation in Cambodia, IFSR (2004) developed a model assuming that all forests within 5 km of a village or 1.5 km of a mapped road have been subject to disturbance and possible degradation (Map 2.3). The model indicates that more than 55 percent of the existing forest area is disturbed. Roads play a greater role than villages, especially in current forest concessions where restrictions on access may, for the moment, be hampering in-migration and the establishment of new villages.

In many of the other degraded areas, forests have already been cleared for agriculture. As shown in Map 2.4, although land clearing from 1993 to 1997 occurred primarily along the agriculture-forest frontier (i.e., boundary between agricultural land and forest), land clearing since 1997 has penetrated much more deeply into forest areas. IFSR (2004) cites the following evergreen and semi-evergreen areas as most affected:

- Deciduous and semi-evergreen forests of far northwest Cambodia.
- Semi-evergreen and evergreen forests of the basaltic soils in Ratanakiri.
- Evergreen forests along the newly repaired roads in the coastal hinterland.
- Evergreen forests associated with areas of good soil along National Route #4.

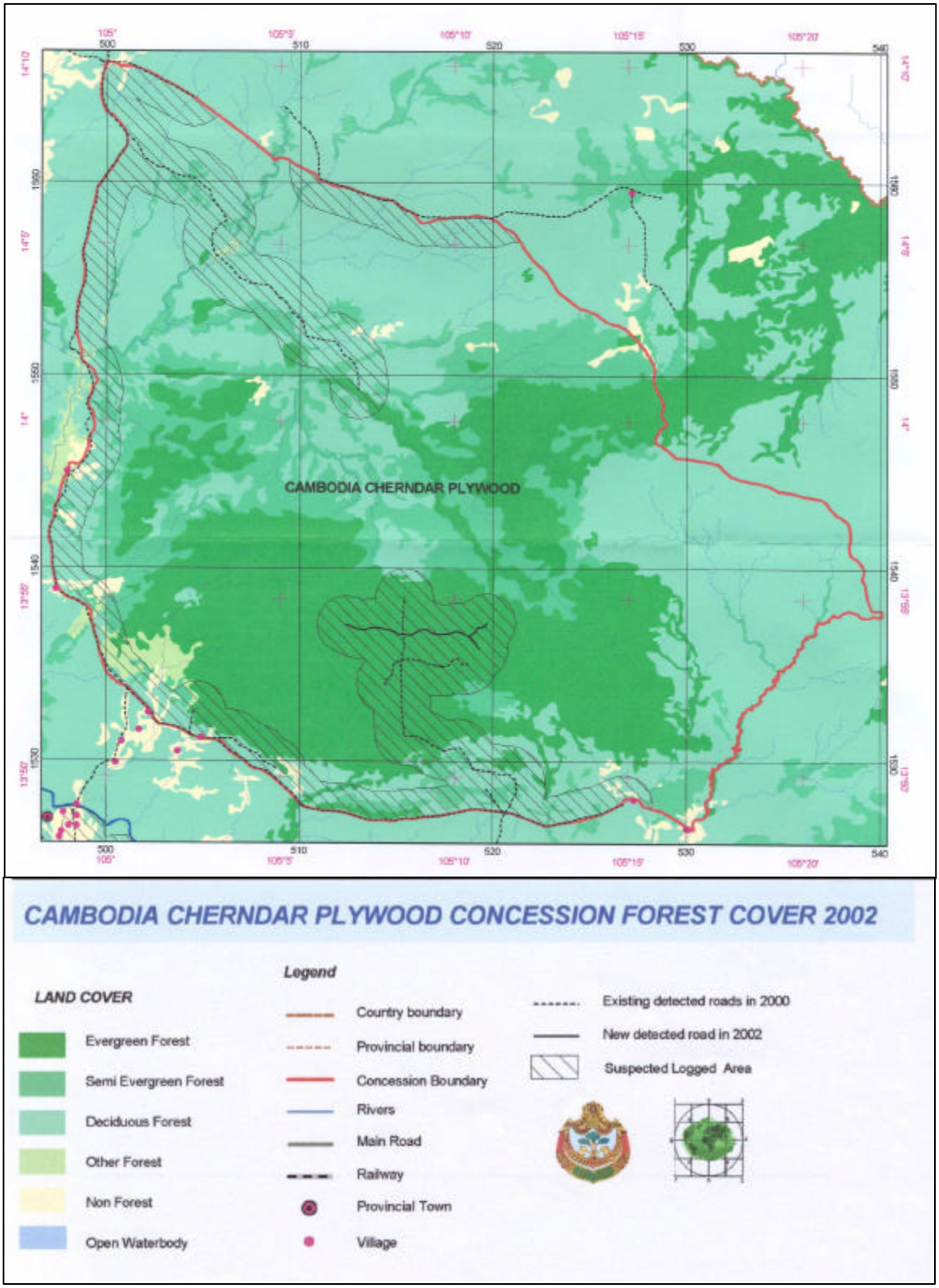
Along with logging and new/rehabilitated roads, soil quality appears to be an important factor driving forest conversion. As shown in Map 2.5, "high productivity soil" is strongly correlated with forest areas that have been recently degraded and/or cleared (Map 2.4) and the establishment of new villages since 1998 (Map 2.6). Although such encroachment on forest land is technically illegal (since forests are state-owned), weak enforcement means that farmers, land speculators, and others have strong incentives to clear forests, as doing so can lead to future claims of private land ownership.

Map 2.1: Roads Built in the Colexim Concession Forest



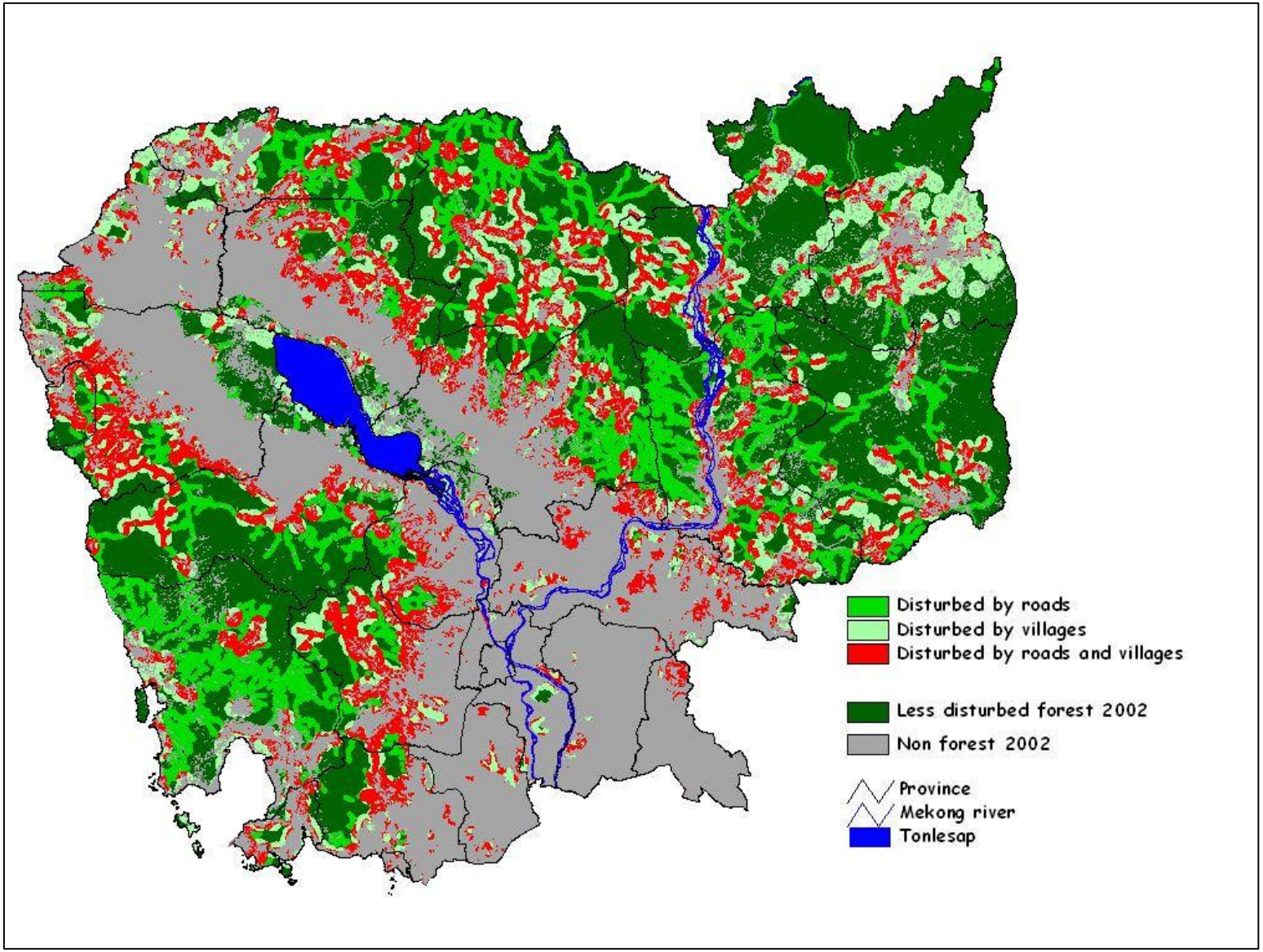
Source: Department of Forestry and Wildlife 2003b

Map 2.2: Roads Built in the Cherndar Concession Forest



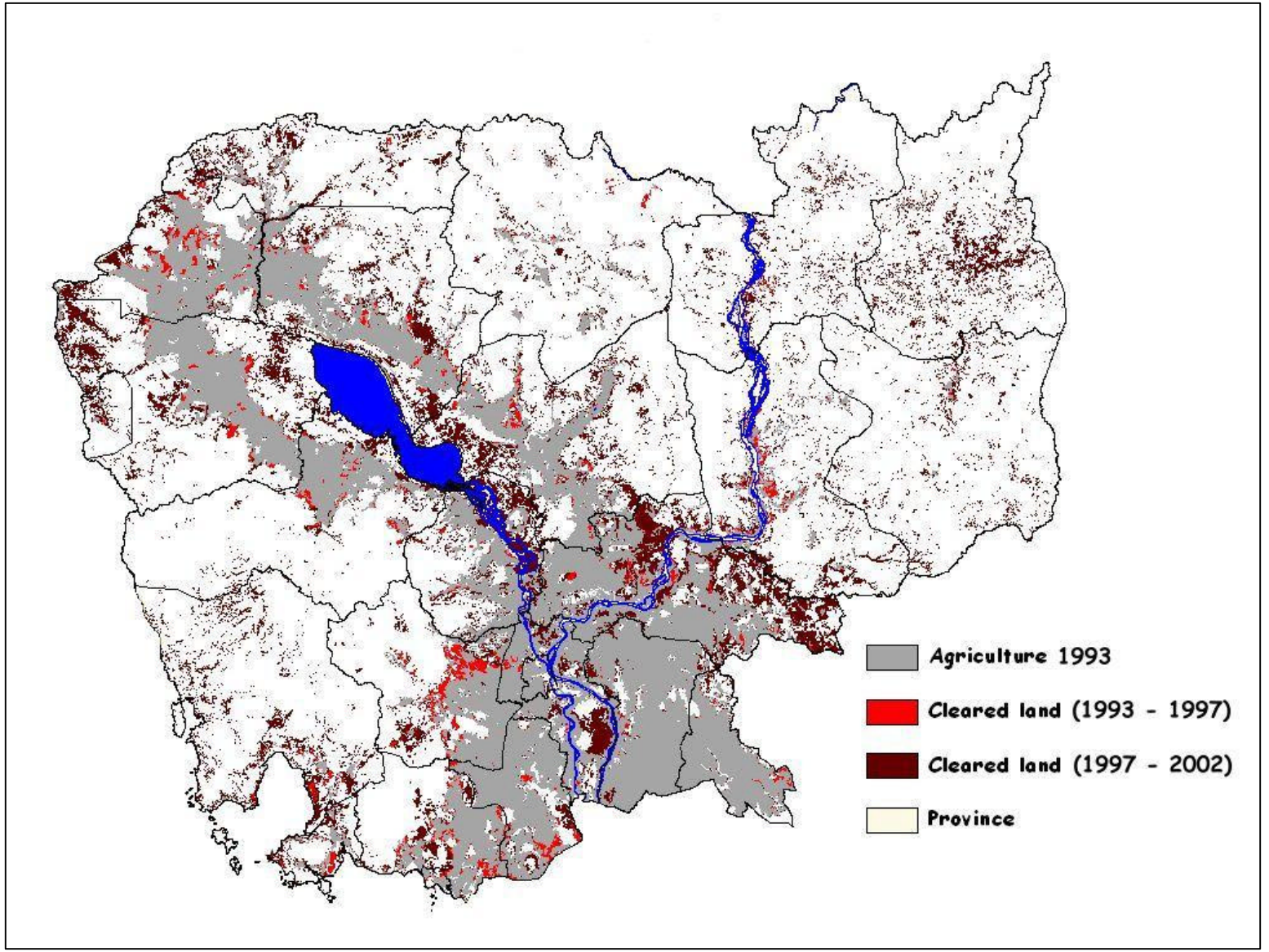
Source: Department of Forestry and Wildlife 2003b

Map 2.3: Forest Disturbance by Roads and Villages in Cambodia



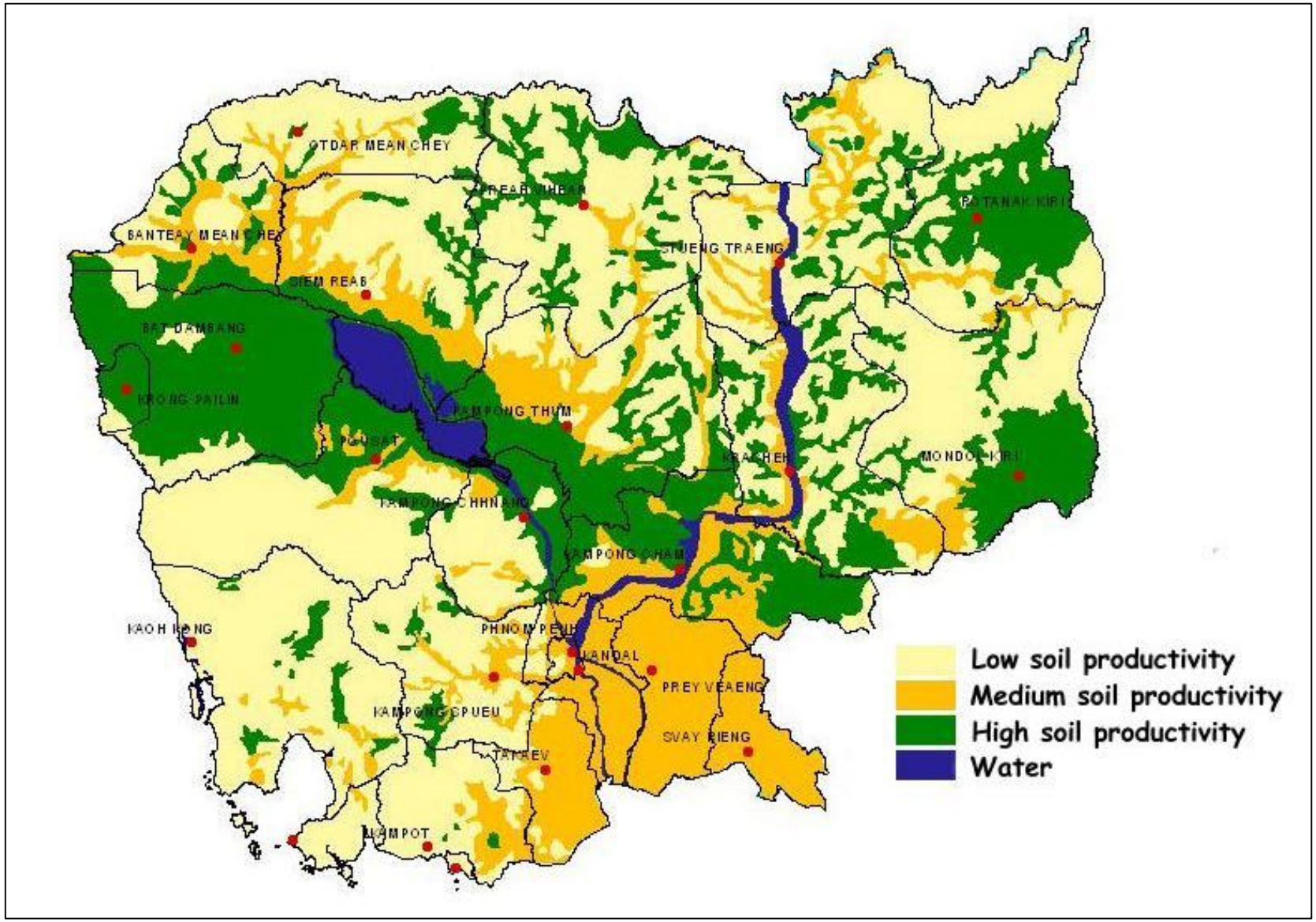
Source: IFSR 2004

Map 2.4: Forest Cover Clearance in Cambodia, 1993-1997 and 1997-2002



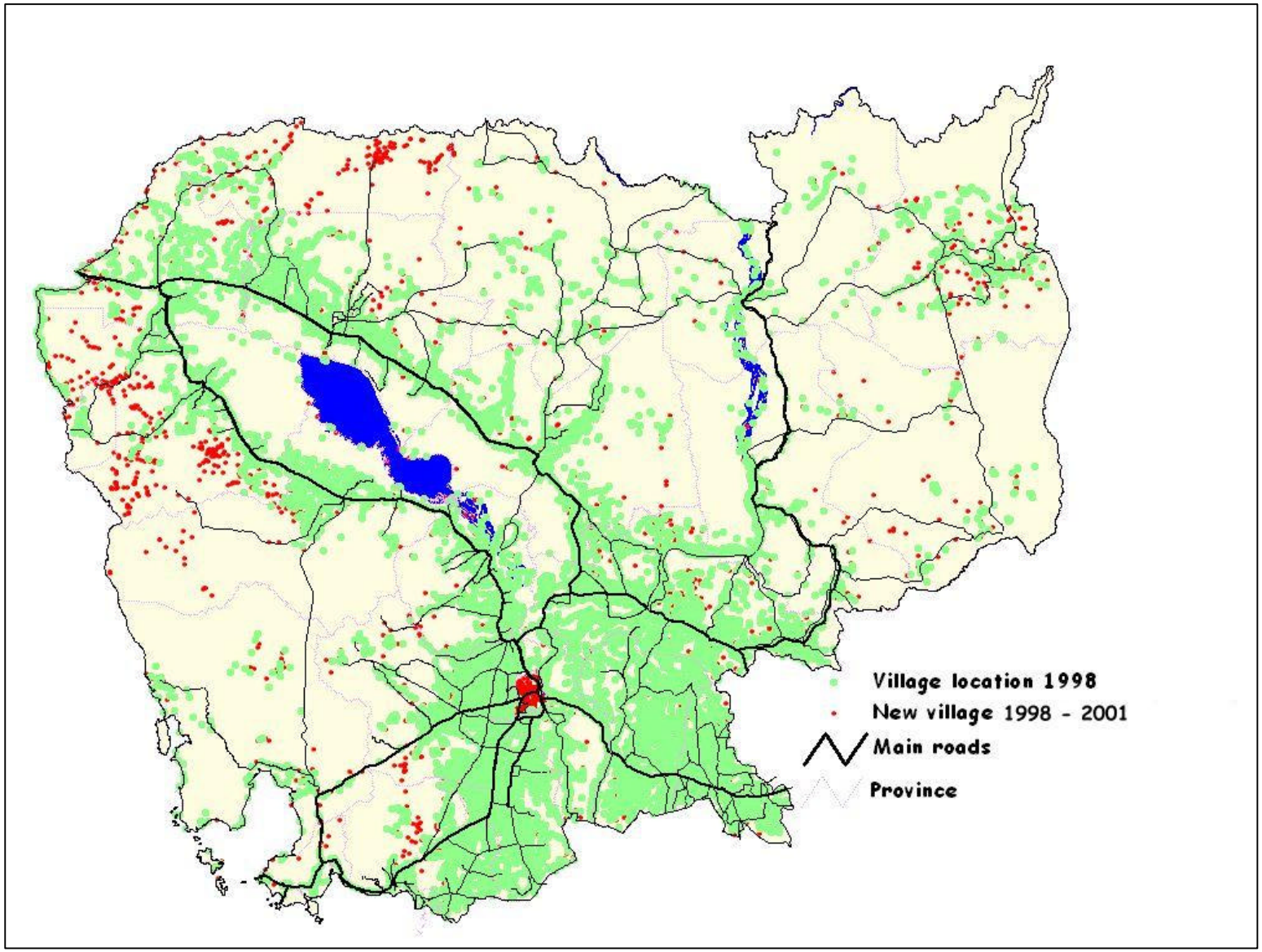
Source: IFSR 2004

Map 2.5: Soil Productivity of Cambodia



Source: Forestry Administration 2003

Map 2.6: Cambodian Village Locations 1998, and New Villages 1998-2001



Source: IFSR 2004

2.4. Management Responses to Tropical Deforestation

Forest degradation and conversion to non-forest reduce the future supply of timber and also reduce the value of the land for a range of values, both environmental (e.g. watershed protection, carbon storage) and social (e.g, harvest of non-timber forest products, cultural values). There are usually large positive benefits to those parties conducting logging or conversion, whilst the main costs are borne by local communities and by society at large. These costs are often considered to exceed the benefits, and so the alarming rate of tropical deforestation and degradation over the past few decades has inspired a range of forest management responses. All promise better management, but with differing priorities. While some approaches emphasise maintaining economic returns from the forest, others focus more on conserving biodiversity, or improving rural development and reducing poverty. In simplified form, the main approaches amount to the following:

- *Encourage Adoption of Reduced-Impact Logging and Sustainable Forest Management*: Make industrial timber exploiters into forest managers so that forests can be harvested on a regular basis in perpetuity, and so logging operations have less impact on forest ecology and local communities;
- *Establish More Protected Areas*: Protect forests outright, especially where biodiversity values are high, (since even sustainable logging causes some loss of biodiversity, and more serious indirect impacts such as hunting [Putz *et al.* 2000, Bennett and Robinson 2000] are hard to prevent), while looking for opportunities for local communities to benefit (e.g., eco-tourism);
- *Expand Community Forestry*: Secure the rights of communities to manage forests as a means to achieving sustainable management, poverty reduction, and rural development.

In Southeast Asia, as in much of the tropical world, these approaches have so far not had much success. In production forests, reduced-impact logging and sustainable management approaches remain very much the exception, not the rule. Protected areas are successful in some places, but just as often are "paper parks" with little meaningful on-the-ground protection. And community forestry has so far proven very challenging to implement effectively. The following sections examine some of the chief challenges to implementing these management approaches, with a brief summary of the current situation in Cambodia.

2.4.1. Reduced-Impact Logging and Sustainable Forest Management

Poor logging practices persist in tropical forests despite nearly a century of promoting reduced-impact logging (RIL) practices (Putz *et al.* 2000a). RIL refers to implementing a number of pre- and post-harvest guidelines intended to support more efficient logging, reduce damage to residual forest and promote regeneration, minimise soil damage, prevent harm to wildlife and non-timber forest products, and protect critical ecosystem functions. In some cases, RIL has not been adopted because it is more expensive than conventional (unplanned/uncontrolled) logging. But numerous studies of RIL carried out in tropical forests suggest conventional logging usually involves higher costs than would have occurred under RIL.[26] Indeed, this is even the case when only the financial costs of harvesting and bringing timber to the roadside are considered. When other values are added in, such as impacts to soils, biodiversity, ecosystem functions, and stand regeneration, conventional logging costs are clearly excessive (Putz *et al.* 2000a).

Despite the demonstrated savings from RIL, loggers do not practice it. Putz *et al.* (2000) hypothesise that the studies from small-scale research plots may be wrong about cost

[26] For a list of studies and discussion about whether RIL is cheaper than conventional logging, see Putz *et al.* 2000b, Box 3, p. 13.

savings when scaled up to typical industrial logging conditions, or it may be that the incentives for conducting RIL are poorly structured. That is, loggers ignore RIL because they are generally paid on the basis of log volume brought to landings, not to log efficiently with less impact. While expected RIL benefits would accrue to the owner of the logging operation (in cost savings) and to the state (in lower impacts to forests), loggers' incentives are usually to harvest as much volume as rapidly as possible. As Putz *et al.* (2000) note, when RIL reduces volumes harvested, loggers joke that it should be called reduced-*income* logging. Whatever the case, implementation of RIL and associated long-term forest management plans remains a rarity in tropical forests.

More recently, sustainable forest management (SFM) has taken centre stage as the most commonly promoted means of encouraging responsible stewardship of forest resources. While promising the benefits of a sustained timber yield into perpetuity, SFM also generally requires maintaining natural forest quality, conserving biodiversity, and protecting ecosystem functions, and goes beyond RIL in calling for maintaining local rights of forest use and preserving cultural values. Compared to conventional logging, SFM involves a range of activities that impose additional costs and require higher technical knowledge, including topographical mapping, forest inventories, boundary delimitation and demarcation, forest management plans, more intense and sophisticated silvicultural practices, and set-aside areas for local use and environmental protection purposes (Contreras-Hermosilla 1999).

Given the lack of success with RIL, and the extended requirements of SFM, it is little surprise that implementation of SFM has thus far been very limited. This is not for a lack of effort. Over the past two decades, SFM has been promoted across the tropics through hundreds of initiatives and with hundreds of millions of dollars in development assistance. Rice *et al.* (2001) indicate that approximately $750 million is spent annually on international forestry assistance in the tropics, with much of this assistance going directly to the promotion of SFM. Nevertheless, as of 2000, only 1.1 million hectares of natural tropical forest were under certified sustainable management (Rice *et al.* 2001). This is only about 0.2 percent of all natural tropical forest officially allocated for timber production,[27] and the proportion is similar within Southeast Asia.[28]

Critiques of SFM point to the lack of financial incentives for logging operations to adopt it. Although SFM can be profitable, unsustainable "cut and run" practices are *even more* profitable, especially considering the short-term perspective of most logging operations (Rice *et al.* 2001, Contreras-Hermosilla 1999, Barr 1999). Rather than adopt SFM for the promise of low annual returns (from slow tree growth rates and modest real appreciation of wood prices), logging operations have an enormous incentive to harvest as much timber as rapidly as possible, and then invest the profits elsewhere at a higher rate of return. This is especially true given the high risk that logging operations run of losing their timber assets in the future to illegal logging, contract termination, natural disasters, and so on.

In light of these disincentives, policies intended to encourage investment in SFM have had little effect (Rice *et al.* 2001). To make SFM more appealing, policy measures must find a way to make future harvests more financially attractive than current harvests. But this is no easy task. Even with more innovative policy mechanisms, encouraging reluctant logging

[27] Approximately one-third of remaining tropical forest is allocated to timber production (Johns 1997 as cited in Rice *et al.* 2001).

[28] In Southeast Asia, only 142,000 hectares were under certified sustainable management in 2000. This is in three areas of the region – PT Diamond Raya Timber (Indonesia), Deramakot Forest Reserve (Sabah, Malaysia), and Ngan, Penansalan, Pagsabangan Forest Resource Development Cooperative (Philippines). These are natural forest areas, except in the Philippines where the forest is mixed natural forest and plantation. As of 2004, the amount of certified natural forest in Southeast Asia had only expanded marginally, by 18,000 ha in the existing PT Diamond Raya Timber area, and with the addition of a 10,000 ha area in Malaysia (Perak ITC Sdn. Bhd).

operations to adopt SFM will require effective forest management regulations and strict monitoring and enforcement. Such institutional strengths tend to be lacking in most tropical forest regions, which suggests that achieving meaningful expansion of SFM is many years away (if achievable at all).

In Cambodia, efforts to enforce stricter harvesting guidelines and encourage SFM in forest concessions have had little impact. This is not surprising given the lack of progress in introducing RIL and SFM in other countries where timber industries and regulatory systems are much more mature and robust than Cambodia. Nonetheless, encouraging SFM in concessions remains a cornerstone of the Forestry Administration's approach (with support from the World Bank-funded Forest Concession Management and Control Pilot Project). For HVF management in Cambodia, much will depend on whether this approach is continued, since most of the concessions expected to survive the ongoing review process are located in a key HVF area.[29] But the strategy is under pressure. In response to the concession system's well-documented management failures, and the improbability of improving practices through reform efforts, the recent Independent Forest Sector Review (2004) calls for termination of the system altogether.

2.4.2. Protected Areas

Approximately eight percent of all tropical forests are within protected areas (WWF/WCMC 1996 as cited in Rice *et al.* 2001). In comparison, about 14 percent of Southeast Asia's tropical forests are within protected areas (Table 2.8). A protected area is "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN 1994). Although all protected areas meet this general definition, protected areas may be managed for a number of different purposes, including for scientific research, wilderness protection, ecosystem protection and recreation, conservation of specific natural features, conservation of habitat and species, protection of landscapes/seascapes, and protection of area managed mainly for sustainable use of natural ecosystems (IUCN 1994).

Table 2.8: Protected Areas in Southeast Asia

Country	Natural Forest Cover (000 ha)	Forest in Protected Areas (000 ha)	Forest in Protected Areas as % of Natural Forest Cover
Cambodia	9,245	2,240	24
Indonesia	95,115	16,798	16
Lao	12,507	2,512	20
Malaysia	17,542	1,736	9
Myanmar	33,598	1,721	5
Philippines	5,036	405	7
Thailand	9,842	3,395	23
Vietnam	8,108	589	6
Other[a]	948	-	0
Total	191,941	29,397	14

[a] *"Other" includes the Southeast Asian countries of Brunei Darussalam, East Timor, and Singapore.*
Source: FAO Forest Resources Assessment 2000

Studies of protected areas reach divergent conclusions about their effectiveness in conserving tropical forests in developing countries, from dire warnings about their inadequacies to high praise for their effectiveness. For example, according to a study of protected forest areas across ten countries, most areas are "paper parks" with little or no

[29] The World Bank-funded Technical Review Team is expected to recommend to the Forestry Administration that it approve the Strategic Forest Management Plans of four to six concessionaires. At least three of these concessions are located in the remaining largest low-elevation evergreen and semi-evergreen forest in mainland Southeast Asia (Prey Long-Stung Chinit area).

management in place (IUCN 1999).[30] Less than 25 percent of protected areas are "well managed with good infrastructure", which means only about one percent of *all* forests in these countries are securely protected against foreseeable degradation and deforestation threats. Logging and mining operations represent the primary threats to protected areas, but agriculture and overgrazing, human settlement, hunting and wildlife trade, fire, war, tourism, and invasive non-indigenous species also play a role. As a result of these factors, IUCN (1999) indicates that close to 25 percent of protected areas are somewhat or thoroughly degraded. Another 60 percent of protected areas are only secure due to their remoteness, but these areas will likely face threats in the future.

In contrast to this gloomy portrayal of protected areas, Bruner *et al.* (2001) conclude from a survey of 93 protected areas in 22 tropical countries that the "paper parks" claim is not substantiated.[31] They proclaim parks to be "surprisingly effective" in protecting ecosystems and species and preventing land clearing, especially given the context of chronic under-funding and high land-use pressure. Although 70 percent of the protected areas surveyed have people living within park boundaries, 83 percent have managed to hold their boundaries against land clearing and agricultural encroachment since establishment (on average, a 23-year period). Protected areas have been somewhat less effective at preventing logging, hunting, fire, and grazing impacts. Bruner *et al.* (2001) find a strong correlation between the density of park guards and effectiveness of conservation. The 15 most effective parks have an average of 3 guards per 100 km^2 compared with 0.4 guards per 100 km^2 in the 15 least effective parks. "Enforcement capacity" (measured as a composite of training level, equipment, and salary) was not found to correlate with effectiveness, suggesting that these elements are less important than the mere presence of guards.

In Cambodia, protected areas encompass nearly one-quarter of all forests (Table 2.8), proportionally a greater area of forest under protection than any other Southeast Asian country. Given the large area designated as protected and existing resource constraints, it is not surprising that most of Cambodia's parks lack effective enforcement. To address the problem, the protected areas system appears in dire need of "rationalisation" – a process through which greater focus can be placed on actually protecting HVF areas while some deforested, low value areas are formally removed from the system. Such measures can help to make park protection more effective and affordable in the future.

2.4.3. Community Forestry

Although the majority of tropical forest areas are managed for priorities of commercial timber production or biodiversity protection, most of these areas also have communities living within them. Over the past three decades, one of the most common policy recommendations for improving tropical forest management has been to more actively include forest users in management, not just logging operations and conservation agencies (Brown *et al.* 2002, Neumann and Hirsch 2000). This initially reflected concern about forest users losing rights to resources (usually to state forest agencies) and alarming rates of tropical deforestation, but over time a more comprehensive rationale for community forestry has evolved (Box 2.1).

[30] The study examined protected areas in Brazil, China, Gabon, Indonesia, Mexico, Papua New Guinea, Peru, Russia, Tanzania, and Vietnam.

[31] Parks were surveyed in Belize, Brazil, Cambodia, Colombia, Cote d'Ivoire, Ecuador, Ghana, Honduras, Indonesia, Laos, Liberia, Madagascar, Mexico, Paraguay, Peru, Philippines, Senegal, Tanzania, Thailand, Togo, Uganda, and Vietnam.

Community forestry refers to a process whereby villages located in and around forests participate in forest management, usually in some form of partnership or agreement with government. In practice, community forestry takes numerous different forms and goes by a variety of names, including co-management, joint forest management, participatory forestry, and social forestry. While the rationale for community forestry may be compelling, and there is evidence that it can have a positive impact on rural livelihoods and forest governance, experiences with implementation have revealed major challenges. Some key problems and obstacles include the following:

Box 2.1: Rationale for Community Forestry

Proximity to the resource: those in closest contact with forests are best-positioned to ensure its effective management.

- *Impact*: those whose livelihoods most affect the forest should be involved in its management.
- *Equity*: forests should be managed to ensure adequate resources for rural populations.
- *Livelihoods*: management by industrial timber operations may be incompatible with rural livelihood needs.
- *Capacity*: communities may be better forest managers than governments and timber companies.
- *Biodiversity*: management by communities may lead to greater conservation of biodiversity than under industrial management.
- *Cost-effectiveness*: local involvement in forest management may reduce state management costs.
- *Governance*: community involvement introduces important checks and balances in relation to state services, which tend to be mismanaged.
- *Development philosophy*: local participation and decentralisation may in themselves be considered important ends of development.

Source: Brown (1999)

- *False Premise of "Community" as Homogenous, Legally Recognised Unit* – Implicit in the promotion of community forestry is the assumption that homogenous communities will collectively manage forest resources. In reality, differences among members of a community, such as wealth, power, gender, ethnicity, and forest use often result in conflicting interests and little consensus on how to manage forests (Arnold 2001). Moreover, determining what legal or administrative entity at the local level can be equated with "community" may not be straightforward; local perceptions about what is a "community" often differ from existing administrative units (Brown *et al.* 2002).

- *Reluctance to Decentralise and Transfer Authority* – Governments often simply do not want to transfer authority to community forestry, especially where timber stocks have not been fully exploited yet. These areas are generally controlled by interests who are more powerful than local forest users (Davies and Richards 1999). Where decentralisation occurs, it may reflect donor pressure/objectives more than that of the government. As a result, genuine participation by communities in decision-making about forest management is rare; local leaders act as proxies of more powerful interests rather than as accountable representatives of local forest users (Arnold 2001).

- *Constraints on Making Community Forestry Profitable* – As noted by Brown *et al.* (2002), "communities will only manage their forests if it is in their interests to do so." Benefits need to outweigh costs. But a number of practices by forest departments in granting and overseeing community forestry make this unlikely. For instance, community forestry is often only allowed on the condition that local users do not harvest timber resources. Although this restriction may be imposed on the grounds of forest protection, it also removes a large potential revenue source and thereby reduces local incentives for participating in community forestry. Another

common practice having the same effect is to restrict community forestry to degraded, less commercially valuable forests (Arnold 2001, Davies and Richards 1999). Incentives for participation in community forestry are further reduced by requirements that lower profits and increase costs, including taxes and fees on forest products and compliance with administratively burdensome regulations on product harvest, transport, and sale.

- *Communities and Local Institutions Require Significant Support* – Where communities have had the opportunity to manage forests, they are often unable to do so without considerable assistance. It can be quite daunting for communities and local institutions to address the different needs among users and variety of claims on forest resources, work through what is often a complex legal process for establishing a community forest, and maintain community forest operations and management. While community forestry is at times promoted as a low-cost approach to forest management, it has not proven to be the case. To date, most successful community forestry initiatives have had heavy external support (Brown *et al.* 2002).

While the challenges to community forestry are daunting, it is important to separate problems inherent to the community forestry model from problems arising externally due to conflicting interests over resources. If governments do not want to allow communities to have secure rights over HVF resources (because revenue from industrial logging is too attractive), or conservation interests impose strict rules limiting potential returns from community forestry, it can hardly be viewed as a failure of the community forestry model. Rather, the model has not been given a chance to work.

Forest laws and regulations are usually stacked against communities, limiting their claims to forest resources and the benefits they can derive from them. This reflects the greater political power of constituencies supporting production, and to a lesser extent protection. Forest communities usually have few means by which to effectively voice and defend their claims to forest resources. Slow progress on community forestry must then be assessed in the light of these unsupportive socio-political conditions, as well as the more limited funding and technical support that it has received, especially compared to support for industrial-scale sustainable forest management. Indeed, despite decades of technical support for RIL and SFM and billions of dollars in donor funding, timber operations have a dismal record of adopting sustainable practices.

To date, community forestry in Cambodia has been marginalised in favour of a focus on industrial concession management. In part, what has occurred reflects the World Bank (1999) vision for a forestry sector where community forestry is focused on the management of low-value degraded forests: “Community forestry needs to be recognised as a means for achieving sustainable management for the large bulk of forest resources that are not suited to commercial production and which will be beyond the direct management capacity of Government” (World Bank 1999). Support for community forestry as a potential commercial alternative was not a significant component of the vision. This is somewhat puzzling since at the same time in neighbouring Laos the World Bank was supporting development of “Village Forestry”, a community-based management approach involving local-level commercial production (albeit many of the areas granted for village forestry were previously logged) (Box 2.2). While village forestry had some promising initial results, it has largely stalled while state-supported logging continues to dominate the sector, with corresponding negative consequences for local people.

Box 2.2: Village Forestry in Laos

With support from the World Bank, other donors, and Ministry of Agriculture and Forestry, the Laos Forest Management and Conservation Program (FOMACOP) was launched in two provinces of Laos in 1996, encompassing 60 villages, 19,000 people, and 100,000 ha of natural forest. This and other community forestry initiatives were later referred to in a joint manner as "village forestry". Support for village forestry has included assisting villagers in organizing into Village Forestry Associations (VFAs), supporting VFA interaction with the Department of Forestry to prepare acceptable forest management plans, and helping VFAs in concluding 50-year management contracts. Village forestry management plans are based on low-intensity harvesting, on felling cycles of 5-10 years, with only 1-2 trees cut per hectare. Under village forestry, villagers and Department of Forestry staff have demarcated boundaries, prepared land use maps and plans, undertaken pre-harvest inventories and tree marking, supervised log felling and grading, and undertaken post-harvest assessments.

Of the total timber revenue generated from village forestry in 1998-99, 69 percent went to government, 19 percent to logging contractors, and 12 percent went to villages. While problems of revenue sharing remain (still too skewed in favor of government), these results suggest that with more balanced revenue distribution, village forestry could play an important role in income growth and rural development. Village forestry has also received good grades for efficiency and sustainable resource use of well-stocked forests. Moreover, analysts suggest that village forestry can assure a higher payment of royalties (even with more balanced revenue sharing) to the government over the long term. In considering the possibilities for scaling up, estimates suggest that 54 percent of the production forest area in Laos could come under village forestry, with potential benefits to 1.5 million people.

Despite the potential and the initial promising results of village forestry, there have been a number of problems, including a focus on the awarding of logged/degraded areas, insecure vesting of rights for local management, and logging by outsiders in village forestry areas. For these reasons and others, village forestry efforts have been delayed during the 2001-2005 "expansion phase".

Sources: Bruce and Mearns (2002), World Bank et al. (2001)

Chapter 3:
Livelihoods in HVF Areas – Survey Results

Cambodia's HVFs are almost all located within concessions, cancelled concessions, or protected areas. The approach to future forest management in all of these areas is unclear. Remaining concessions are expected to adopt sustainable forest management, but in practice this is very unlikely. Cancelled concessions lack a management strategy. And the protected areas system, which encompasses nearly one-quarter of all Cambodia's forests, is in need of a "rationalisation" process that supports real protection of high value areas and the removal of some deforested, low value areas. In sum, the forest management challenges facing Cambodia are daunting. But such challenges also represent an opportunity for changes in approach.

In filling the current forest management vacuum, priority should be given to HVFs facing near-term threats of deforestation. Of immediate concern here is the over 25 percent of Cambodia's evergreen and semi-evergreen forest located within 5 km of a village (and often accessible by road). The combination of road access and close proximity to villages places these HVF areas under greater threat of deforestation than more remote forests. At the same time, since the resources from HVFs can provide greater benefits to villages, these areas also represent the most promising opportunities for developing local-level forest management that is both environmentally *and financially* sustainable.

Going forward, a critical question is to what extent local forest management approaches might be able to address the HVF management vacuum. Indeed, given that about 12 percent of the Cambodian population (2,000 villages, 1.4 million people) live within 5 km of Cambodia's HVF, a greater role for local management seems a necessity. To investigate the current context for local management, this section analyses the role that HVF resources play in livelihoods and the manner in which these resources are locally managed. Key issues examined include the main livelihood and income-generating activities, vulnerability of livelihoods, and approaches to resolving conflicts.

3.1. Overview of Study Areas

Findings presented in this chapter are primarily drawn from surveys conducted by CDRI in HVF areas of Preah Vihear (5 villages) and Kompong Thom (3 villages). In addition, results from two recent studies in HVF areas of Mondulkiri (4 villages surveyed by Evans *et al.* 2003, and 9 villages surveyed by McAndrew *et al.* 2003) are provided where data are available and appropriate for comparison. Table 3.1 provides a summary of key demographic information from the surveys.

Table 3.1: Demographic Data for Three High Value Forest Areas

HVF Areas	*Villages*	*No. of HHs*	*No. of individuals*	*Year Village Established*	*Ethnicity (%)*		
					Khmer	*Kuoy*	*Other*
(1) Preah Vihear	5 villages	682	3,833	N/A	56	44	6
	Kdol	87	496	Pre-1960	87	8	5
	Poteab	98	512	Pre-1953	87	8	5
	Krala Peas	143	861	Pre-1959	33	58	9
	Po	215	1,281	Pre-1970	72	21	7
	Bosthom	139	683	1960s	12	88	-
(2) Kompong Thom	3 villages	262	1,531	N/A	96	3	1
	Choam Svay	86	437	Pre-1970	92	8	-
	Sam-ong	124	763	Pre-1970	97	-	3
	Rang Khnai	52	331	Pre-1970	100	-	-
(3) Mondulkiri (Evans et al. 2003)	4 villages	211 (families)	970	Pre-1960	*Phnong (almost 100%)*		
(McAndrew et al. 2003)	9 villages	546	~3,100	Pre-1960	*Phnong (majority), also Khmer and others*		
Total	21 villages	1,701	~9,500		*Khmer, Kuoy, Phnong*		

The villages surveyed in Preah Vihear and Kompong Thom were all established prior to 1970, with most respondents indicating that they (or their families) settled in the village more than 30 years ago. All villages were isolated during the Khmer Rouge period until the end of fighting between the Khmer Rouge and the People's Republic of Kampuchea (PRK) soldiers in the early 1980s. Today, most of the older villagers are ex-soldiers of the Khmer Rouge or the PRK. In Mondulkiri, the villages surveyed were established well before 1960, but were largely uninhabited during the 1970s when Khmer Rouge controlling the area forcibly moved inhabitants to Koh Nyek district. It was not until the mid-1980s, when security improved, that families surviving the period of conflict began returning to their villages (Evans *et al.* 2003, McAndrew *et al.* 2003).

Ethnic minorities account for a high proportion of people living in HVF areas in Cambodia. Although Khmer ethnicity is dominant in the three villages surveyed in Kompong Thom, most Mondulkiri households surveyed are Phnong ethnicity, and about half of the households in Preah Vihear are Kuoy ethnicity. And the actual number of Kuoy villagers may be higher than reported here because some respondents appeared to hide their ethnic origins, perhaps because they can no longer speak Kuoy (younger generation), due to a sense that their ethnicity is "looked down on", or out of concerns about discrimination. This was not the case in Bosthom village, where Kuoy language could be heard throughout the village (including children). A textbook in Kuoy literature was observed in Krala Peas village; it is reportedly used in a number of villages in the area.

3.2. Livelihood Activities and Household Income

Across the three HVF areas studied, villagers sustain their livelihoods mainly through agricultural production, forest product collection, livestock raising, fishing, and wage labour. Agriculture is clearly the dominant activity, with nearly all households noting it as their primary occupation, regardless of production levels and income. Forest product collection is the second most important contributor to livelihoods, with resin tapping cited by most households as their key secondary occupation because of its importance for cash income. Livestock raising and fishing generally contribute in a more limited manner. And wage labour plays almost no role, since few jobs are available other than occasional short-term work associated with rice farming.

Although Table 3.2 helps to illustrate the diversified nature of livelihoods in HVF areas, some activities contribute more to livelihoods than others. To assess these differences, Figure 3.1 shows the extent to which various livelihood activities contribute to total annual

household income in each study area.[32] Agricultural production and forest product collection are the main sources of income across the three areas, with agriculture somewhat more important for income in Kompong Thom, and forest products contributing slightly more in Preah Vihear and Mondulkiri. Average annual household income is highest in Kompong Thom ($538), followed closely by Mondulkiri ($499), while Preah Vihear ($342) lags behind (Table 3.3). Sections 3.4 and 3.5 provide a more in-depth examination of agricultural production and forest production collection activities in the study areas.

Table 3.2: Percentage of Households Engaged in Livelihood Activities – HVF areas of Preah Vihear, Kompong Thom, and Mondulkiri

Activities		% of Households Engaging in Activity[a]			
		Preah Vihear	Kompong Thom	Mondulkiri[b]	Mondulkiri[c]
Agricultural Production	Rice/*Chamkar* Farming[d]	93	94	>90	>90
	Livestock Raising	75	59	N/A	>90
Forest Product Collection	Resin Tapping	59	72	86	>90
	Fuelwood Collecting	91	79	N/A	
	Other NTFP Collecting (including wildlife)[e]	81	69	N/A	
	Logging	4	4	N/A	
Fishing/ Wage Labour	Fishing	38	39	88[f]	>90
	Wage Labour	28	12	9	48

[a] *Multiple responses allowed, percentages may not sum to 100 percent.*
[b] *Evans* et al. *(2003)*
[c] *McAndrew* et al. *(2003)*
[d] Chamkar *involves the intermixing of rice and other crops.*
[e] *In addition to wildlife, NTFPs include solid resin, rattan, vine, bamboo, thatch, mushrooms, wild fruit, and medicinal plants.*
[f] *Based on estimate by Richardson (2003), not including Pu Char village.*

Outside of agriculture and forest product collection, income from other activities (small businesses, wage labour, and fishing) is minimal. There are few business and wage labour opportunities in the three study areas. In Mondulkiri, many of the households engage in food-for-work programs, receiving food in return for road repair work (McAndrew *et al.* 2003). In Preah Vihear and Kompong Thom, labour opportunities are generally limited and of a very short-term nature, such as clearing land for farming, harvesting crops, and collecting thatch and other materials for house repair. Fishing is done primarily for household consumption. About 90 percent of the households surveyed in Mondulkiri catch fish on a regular basis, with annual catches in three villages ranging from 20-100 kg per household, mainly in the dry season when streams stop flowing and fish can be caught easily in the isolated pools (Richardson 2003). Only about 40 percent of households surveyed in Preah Vihear and Kompong Thom view fishing as an important secondary occupation, with the average annual catch approximately 25 kg per household. Most fishing in these areas occurs during the rainy season, as streams and ponds become too shallow during the dry season to support fish.

[32] Income reflects the cash (or cash-equivalent) market value of a livelihood activity's output. Outputs can be classified as: (1) marketed only (e.g., resin); (2) both marketed and consumed within the household (e.g., rice, wildlife); or (3) consumed within the household only (e.g., fuelwood and many other NTFPs). For traded products, income is calculated by multiplying production amounts by actual market prices in the area. Most products consumed within the household also have market prices, making it possible to calculate their income value. In a few cases (mostly with NTFPs), no market price in the area exists. In such cases, income was calculated based on known market prices in other HVF areas or based on typical returns to labour. Despite the uncertainty involved with this last approach, it is unlikely to affect results in a significant manner because of the low levels of production involved and low values. Finally, it should be noted that although these income estimates reflect gross income per household, gross income is nearly the equivalent of net income in these areas because of the very low capital inputs (e.g., no fertilisers used for agriculture, few input costs to forest product collection).

Figure 3.1: Sources of Household Income in the Three Study Areas

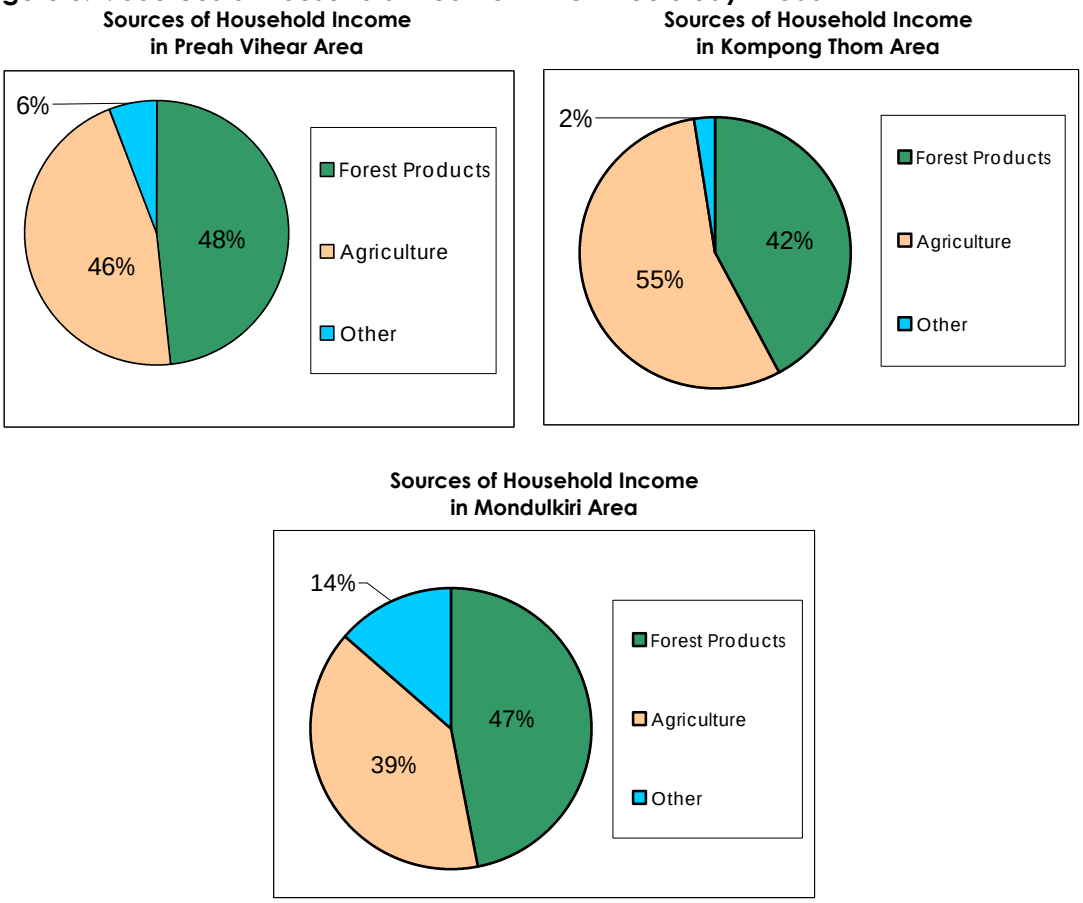


Table 3.3: Average Household Income in Study Areas

Source of Income	Preah Vihear		Kompong Thom		Mondulkiri[a]	
	Income ($)	% of total	Income ($)	% of total	Income ($)	% of total
Rice	102	30%	199	37%	68	14%
Other crops	14	4%	66	12%	54	11%
Livestock	40	12%	32	6%	74	15%
Resin	79	23%	116	22%	80	16%
Wildlife	16	5%	20	4%	83	17%
Other NTFP income	71	21%	91	17%	72	14%
Business/wage labour	16	5%	9	2%	58	12%
Fishing	4	1%	4	1%	10	2%
Total	342	100%	538	100%	499	100%

[a] *Mondulkiri data from McAndrew* et al. *(2003) study of nine villages in two communes. The study by Evans* et al. *(2003) of four villages in Mondulkiri only provides an income estimate from resin tapping and rice production, not other livelihood activities. Annual resin income is estimated to be $340 per household, well above the other study areas, while annual rice income amounted to only $40 per household, lowest of all the areas studied.*

3.3. Income Distribution and Poverty Analysis

The mean household income distribution for the study areas ranges from $169 to $1,202 in Preah Vihear, from $275 to $1,696 in Kompong Thom, and from <$250 to >$750 in Mondulkiri (Table 3.4). Although this range shows the highest-income households earning 6-7 times the amount of the lowest-income households, this must be kept in perspective. First, in some cases higher household incomes are simply a reflection of larger households with more labour available. Second, even the highest income households are only earning about $3-$5 per day, equal to less than $1 per household member in most cases.

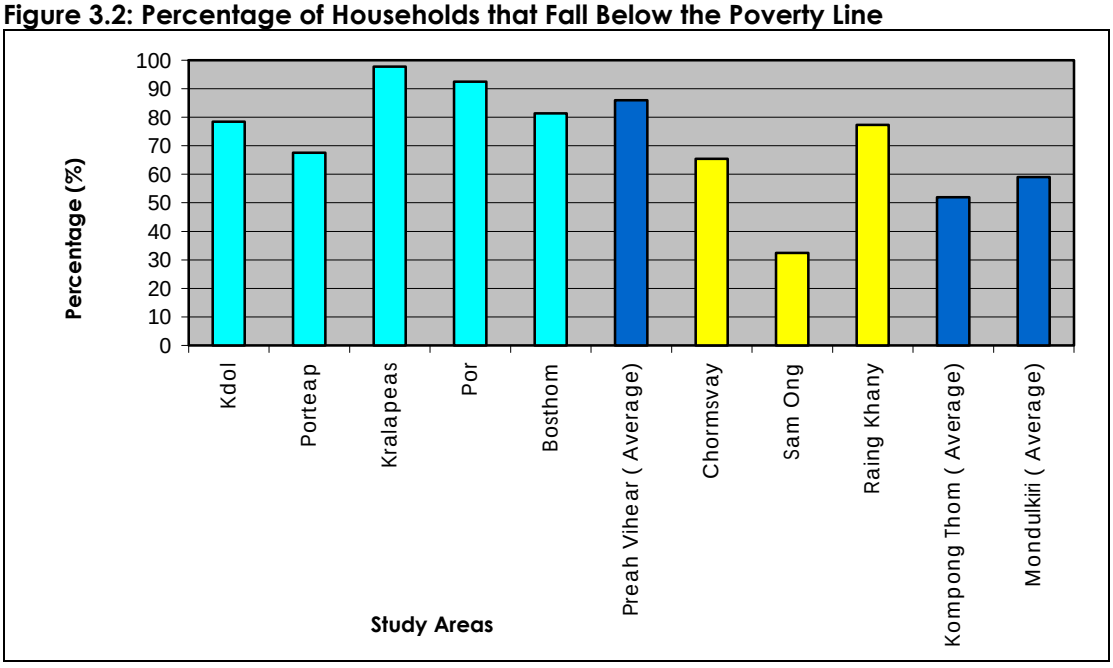
To estimate poverty levels, this study used the "redefined" poverty line developed through a synthesis of data from several national surveys (World Food Programme and

Ministry of Planning 2002).[33] In rural areas, this poverty line is R1,036 per capita per day consumption, compared to R1,629 in Phnom Penh and R1,214 in other urban areas.[34] The proportion of households in HVF areas that are living below the poverty line is considerably higher than Cambodia's national average (36 percent). The situation is most dire in Preah Vihear where 86 percent of the study area households are living in poverty, compared to 59 percent in Mondulkiri, and 52 percent in Kompong Thom. Only one village (Sam-ong in Kompong Thom) is beating the national average, with only 32 percent of households in poverty. Higher incomes in this village are largely correlated with access to productive soils for agriculture.

Table 3.4: Income Distribution in Study Areas

Percentile:	Distribution of Household Incomes ($)		
Low to High Income	Preah Vihear	Kompong Thom	Mondulkiri
10%	169	275	< 250
20%	207	305	
30%	238	411	250-499
40%	274	433	
50%	321	502	
60%	376	570	
70%	424	645	500-750
80%	500	801	
90%	637	1,030	> 750
100%	1,202	1,696	
Median HH Income	325	492	~420

Figure 3.2: Percentage of Households that Fall Below the Poverty Line



3.4. Agricultural Production

Nearly all villagers view themselves first and foremost as rice farmers. This reflects the high priority they place on food security ("my stomach would be empty without rice") and the fact that rice farming requires the greatest amount of their labour/time. The dominant farming activities are wetland/paddy rice cultivation (sre), shifting cultivation (chamkar), and

[33] The surveys include the Cambodia Socio-Economic Surveys of 1993/94, 1997, and 1999.

[34] It should be noted that the poverty line is based on estimates of consumption, whereas this study estimates income. However, the difference in approaches is not expected to affect results here in any significant manner.

livestock raising. Sre translates literally from Khmer as "rice field" and refers to the practice of wetland rice cultivation. This usually is done on flatter, lowland terrain, using draft animals for ploughing and involving transplanting activities. In the Preah Vihear and Kompong Thom study areas, nearly all farmers have at least a small wetland rice plot, usually supplemented by chamkar plots. In Mondulkiri, wetland rice is less common. Evans et al. (2003) identify only nine percent of households in four villages cultivating wetland rice, while McAndrew et al. (2003) find about one-third of the households cultivate wetland rice across nine villages, but most is concentrated in four of the villages.

Chamkar (or shifting cultivation) is a common agriculture practice in Cambodia involving the intermixing of rice and other crops (e.g., soybean, sesame, banana, maize, sugar cane, and potato). It is generally practised by villagers in upland areas where land is often not flat enough to support wetland rice. Under shifting practices, plots are usually cultivated for about three years, after which they are left fallow and a previously used plot (old fallow) is cleared through burning of trees and grasses. In Preah Vihear, villagers refer to the second year of cultivation as *Bos* and third year as *Bang*. Most households in the Preah Vihear and Kompong Thom HVF areas practice *chamkar* as a supplement to wetland rice. This is done primarily by rotating small plots within forest areas (2-3 ha) that abut their wetland rice area. In Mondulkiri, *chamkar* is the dominant agricultural activity, with nearly 90 percent of households engaged in it. Unlike in Preah Vihear and Kompong Thom, plots are often quite distant from the village.

Reflecting differences in the amount of land cultivated and soil quality, average rice production per household varied considerably from village to village in 2003 – from 0.8 to 1.6 tonnes per household in Preah Vihear, from 0.7 to 2.3 tonnes per household in Kompong Thom, and from 0.5 to 0.9 tonnes in the two study areas of Mondulkiri (2002) (Table 3.5). Correspondingly, the income value of rice ranged from about $75-$130 per household in Preah Vihear, from $80-$260 in Kompong Thom, and from $40-$70 in Mondulkiri.[35] From 2002 to 2003, weather conditions, pests, and other factors caused considerable variability in rice production in the Preah Vihear and Kompong Thom areas, with rice production falling in six villages by 15-30 percent and increasing in two villages by about 30-40 percent.

Table 3.5: Rice Production and Gross Income

HVF Area	*Village*	Year 2002		Year 2003		% Change (2002 to 2003)
		Production of Rice (kg)	Gross Income ($)	Production of Rice (kg)	Gross Income ($)	
Preah Vihear	Kdol	1,877	156	1,596	132	(15)
	Poteab	1,820	154	1,452	123	(20)
	Krala Peas	1,221	108	833	74	(32)
	Po	1,545	161	1,128	118	(27)
	Bosthom	1,101	121	913	100	(17)
	Average	**1,476**	**139**	**1,133**	**106**	**(23)**
Kompong Thom	Choam Svay	1,200	134	1,638	183	37
	Sam-ong	1,800	202	2,295	257	28
	Rang Khnai	835	94	693	78	(17)
	Average	**1,412**	**158**	**1,761**	**197**	**25**
Mondulkiri	4 villages[a]	530	40	NA	NA	NA
	9 villages[b]	910	68	NA	NA	NA

[a] *Evans* et al. *2003*
[b] *McAndrew* et al. *2003*

In addition to rice, livestock and other crops (cultivated in *chamkar* and home gardens) contribute to household income. Livestock raising is common across the three study areas, with most households raising chickens and pigs, and a few raising ducks. These livestock are

[35] Income value reflects production amount multiplied by unmilled rice price, which varied from about R290-380 per kg (or $0.08) during the dry season to R370-500 per kg (or $0.11) during the wet season.

generally sold outside the village to generate income, not consumed locally. Cows and buffaloes are raised for use in farming and transport; they are usually only sold in times of crisis. Cultivating cash crops in addition to rice is more common in the Kompong Thom and Mondulkiri study areas than in Preah Vihear. Income from cash crops is highest in Kompong Thom where many households farm on productive soils (Sam-ong and Choam Svay) and road access to markets in Kompong Thma has been improved.

3.5. Forest Product Collection

Across the three study areas, most households are engaged in forest product collection for trade (about three-quarters of the households in Preah Vihear and Kompong Thom, and 80-90 percent in Mondulkiri). These households are collecting dozens of forest products and this activity generates about half of all household income. For cash generation, resin is the most important product. But wildlife, fuelwood, and other non-timber forest products (NTFPs) are also critical to livelihoods. Before discussing these activities in greater detail, it is important to note the key factors driving forest product collection in the three study areas:

- *Market demand and access to markets* – For many products, these factors play the greatest role in dictating how collection occurs. If there is no demand among traders in the area, or no easy way in which to transport products to semi-urban provincial markets, many products that may exist in abundance are simply not collected. For example, both the Preah Vihear and Kompong Thom study areas have substantial bamboo, rattan, vines, fuelwood, mushroom, and wild fruit resources, but many more people collect these products in Kompong Thom than Preah Vihear. Improvements in the road from the Kompong Thom villages to the larger town of Kompong Thmar, and a shift from oxcarts to trucks as the means of transporting goods have dramatically reduced travel time. As a result, traders now purchase a variety of forest products from villagers and bring them to Kompong Thma for sale. In some cases, villagers bring their products directly to market. In contrast, villagers in Preah Vihear lament that poor road conditions make the transport costs of many forest products too expensive. Traders are only interested in purchasing resin.
- *Household demand* – Even where there is no wider market demand, there is often strong need within households for forest products, such as fuelwood for cooking, wildlife for consumption, bamboo, rattan, vines, and other NTFPs for household materials, resin for making torches for lighting, and so on.
- *Supply of resources* – Some products are only available seasonally. For instance, wild fruit are only collected during two months (April-May) of the dry season. And due to differences in forest resources, some products are not available in some areas. For example, many villagers in the Kompong Thom area collect solid resin (from *Shorea* species), but this tree species is less common in Preah Vihear, so few villagers in the Preah Vihear study area mention it as a product they collect.
- *Access and distance to resources* – Fuelwood and many other NTFPs are generally available in areas nearby to villages, whereas resin tapping and hunting usually require long-distance trips to the forest. These trips are more possible where (logging) roads have penetrated forest areas. Fewer trips are made during the wet season because higher river and stream levels can limit access to resources.
- *Labour availability* – During the wet season, when villagers must focus on their crops, they have less time available for trips to the forest.
- *Gender* – Women and children tend to have responsibility for collecting forest products such as fuelwood and other NTFPs from areas nearby to the village, whereas men usually have responsibility for resin tapping, wildlife hunting and

trapping, and cutting timber for house construction – activities that require more distant travel into the forest.

3.5.1. Resin Tapping

Although resin tapping for trade and export was prevalent in the Preah Vihear and Kompong Thom study areas during the 1960s, tapping was only practiced in a limited manner (for torches) during the 1970s and early 1980s due to conflict and security problems. Tapping for trade and export returned to these two areas in the mid-1980s, when traders arrived seeking to buy resin (in 1986 in Poteab village, Preah Vihear and in 1986/87 in Choam Svay village, Kompong Thom). Despite the demand, resin tapping remained limited in Preah Vihear until 1998 when agreements with Khmer Rouge in the area led to improved security. In the Mondulkiri area, it is thought that villagers did not tap resin for trade prior to the Khmer Rouge period, but as people migrated back to their villages in mid-1980s and early 1990s, they began tapping in response to market demand from Vietnam.

Tapping resin involves cutting a backward sloping hole in large resin-producing tree species, usually *Dipterocarpus* species greater than 60 centimeters in diameter at breast height (dbh). The hole is burned briefly to stimulate resin flow, which is collected in plastic containers (or in some cases in bags) after a few days. Tappers then repeat the process – briefly burning the tap and returning to collect resin on a regular basis. At present, approximately two-thirds of the households surveyed across the three HVFs areas tap resin trees. In most cases, they view this as their most important secondary occupation (after rice farming) because of the income they can earn. Average resin income per *tapping* household amounts to $100 in Preah Vihear and $160 in Kompong Thom, equal to almost one-third of total household income in each area. In Mondulkiri, average resin income per *tapping* household amounts to $150 in Sre Preah commune (McAndrew et al. 2003) and $340 in the four villages surveyed by Evans *et al*. (2003).

Across the three areas, it is customary for the first person that finds and taps a resin tree to be considered the "owner" of the tree.[36] Although this ownership is recognised by villagers, it has no formal legal basis. Indeed, the system appears unique for resin trees, since other forest resources are not "owned" or managed with any clear restrictions; rather, access is more or less open to all (see Section 3.7.3 below). On average, households in Kompong Thom own 260 resin trees, more than twice as many trees as households in Preah Vihear (110 trees) and Mondulkiri (80 trees).[37] In addition to tapped trees, most households have resin trees "in reserve" – untapped smaller resin trees growing among their currently tapped resin trees which they plan to tap in the future. On average, Kompong Thom households claim 145 trees in reserve and Preah Vihear households report 34 trees in reserve; no numerical information is available on reserve trees in Mondulkiri but numbers were relatively small in the four villages studied by Evans *et al.* (2003).

To tap their resin trees, households in Kompong Thom travel an average of 13 km from their village on trips that last four days, while households in Preah Vihear also travel 13 km from their village but take only two days to complete their tapping trip. Most households in these two areas prefer to tap during the dry season (beginning after the rice harvest), when resin quality will not be affected by rainwater and access to the forest is not made difficult by

[36] While some tappers script their names on trees or mark their areas with arrows, most feel that the fact that there is a tap in the tree tells others that it is already "owned".

[37] Possible reasons for the higher amount of trees owned in Kompong Thom include: (a) lower resin quality/prices in Kompong Thom requires households to tap more to achieve similar incomes as Preah Vihear and Mondulkiri; (b) as households in Kompong Thom have been tapping for a longer period than in Preah Vihear, they have had more time to find and claim more trees; and (c) greater market access resulting from improvements in the road to Kompong Thma may encourage higher levels of tapping.

flooding. In contrast, tappers in Mondulkiri collect resin year round, making trips averaging 6 km to collect resin within one day. On average, tappers make 14 trips per year in Kompong Thom, 20 trips per year in Preah Vihear, and about 45-50 trips per year in Mondulkiri.

Resin trees are owned by individual households and in groups. In Mondulkiri and Kompong Thom, individual ownership is more common, whereas more trees are group-owned in Preah Vihear. Group ownership usually involves 2-3 households and occurs primarily due to security concerns (when traveling to more distant trees and/or in concessions), and to pool labour resources, making it possible for different households to take part in tapping trips at different times.[38] Although resin trees are viewed as private property (owned individually or in a group), only a few instances were identified (in the Mondulkiri area) in which households had *willingly* sold their trees to a new owner. These new owners were newcomers to the village, not commercial interests.

Resin quality varies depending on the species of tree tapped. Resin tapped from the Khmer-named trees of "chhoeuteal toeuk/sar" (*D. alatus*), "chhoeuteal preng" (*D. turbinatus*), or "trach" (*D. intricatus*) is good quality and receives a higher price. These are the trees most commonly tapped in Preah Vihear and Mondulkiri. In Kompong Thom, the most commonly tapped tree has several names in Khmer – "chhoeuteal preus/krahom/bang-kuoy/neang-deng" (*D. costatus*). It produces inferior resin that receives a lower price.

Table 3.6: Overview of Resin Tapping

	Preah Vihear Area	Kompong Thom Area	Mondulkiri Area[a]
Tappers and Trees			
Percent of households tapping resin	59	70	86
Average trees per tapping household	110	260	77
Total number of tapped trees for villages surveyed	40,000	50,000	17,000
Average number of resin trees "in reserve" per household	34	145	NA
Resin Income			
Resin price received by tapper (riels per kg)	418	345	300-800
Average annual resin income per tapping household ($)	100	160	340
Collection and Labour			
Annual amount of resin collected per household (tonnes)	1.3	2.3	2.2-2.8
Average trips per year made for resin tapping	20	14	44-50
Average distance of trip (km)	13	13	6
Average number of days per trip	2	4	1
Average tapping labour days per household per year	40	56	48
Average return per labour day ($)	2.50	2.85	7.00
Form resin tree "ownership"			
Individual	43	67	>90
Group	54	33	<5
Individual and group	2	-	<5
Way in which ownership of resin tree was obtained			
Inherited from parents/given by relatives	6	39	9
Made trip to forest and claimed	87	67	80
Purchased or sold labor	6	-	11
Year when significant tapping for trade returned to area	1998	Early 1990s	Early 1990s

[a] Evans *et al.* (2003).

[38] To avoid double-counting of resin trees when interviewing households involved in group ownership, total trees were counted for a group and then that total was divided by the number of households in the group to obtain average trees owned per household.

Resin prices also vary depending on the trade route, largely due to the differing amounts of fees encountered (Prom and McKenney 2003). For instance, because resin trade from Poteab and Kdol villages in Preah Vihear faces few fees along the route to Laos, the price received by tappers is about R15,000 ($3.75) per container of 30 liters. Resin prices are about 25 percent less in the other three villages (R11,400 or $2.85 per container), largely because the resin is traded via Tbeng Meanchey and Kompong Cham to Vietnam – a route where fees amount to R7,200 (or $1.80) per container. In comparison, resin prices received by tappers in Mondulkiri can be considerably higher (R23,000 or $5.75) because of the close proximity to Vietnam and fee levels that are half of what is charged on resin from Preah Vihear.

3.5.2. Wildlife Hunting and Trapping

According to interviews with village elders and others in Preah Vihear and Kompong Thom, wildlife hunting and trapping has been common for as long as they can remember. In the 1960s, in addition to hunting activities by villagers, a few government officials received permits to hunt "big game" for recreation and consumption. During the Khmer Rouge period, skilled hunters were assigned by Khmer Rouge leaders in the area to hunt 2-3 times per month, with the bushmeat distributed for consumption among the co-operative. During the 1980s and early 1990s, hunting and trapping for consumption (not trade) continued, with bushmeat shared freely among villagers. Sometime during the early 1990s, with the arrival of wildlife traders and increasing market integration, hunters and trappers began to sell bushmeat. This trade, in combination with increasing scarcity of wildlife, has meant that wildlife is no longer freely shared within the village. Rather it is traded within and, more frequently, outside the village.

According to the interviews with key informants, each village has a small number of skilled hunters/trappers and wildlife traders. For instance, Bosthom village in Preah Vihear has 10 skilled wildlife trappers and five skilled hunters (using dogs), which means about 10 percent of the households are involved in hunting to supply the wildlife trade. Some military and police also take part in the wildlife trade, either by going hunting themselves, lending their guns to more skilled hunters, exchanging bullets for wildlife, and/or acting as wildlife traders.

Other villagers tend to play a more marginal role. While many villagers are involved in trapping wildlife (e.g., wild pigs) around their rice and *chamkar* areas, they do not typically hunt or trap in the forest. Likewise, resin tappers often catch some wildlife opportunistically during tapping trips in order to supplement consumption, but they rarely return from the forest with wildlife for trade.

Wildlife hunting and trade appears more common in Kompong Thom than Preah Vihear. About 25 percent of households surveyed in Kompong Thom note wildlife as an important source of income generation, compared to only 10 percent in Preah Vihear.[39] Likewise, nearly all households in Kompong Thom indicate that wildlife is important for household consumption compared to 75 percent of households in Preah Vihear. The higher level of wildlife hunting and trade in Kompong Thom is likely due to the greater access to wildlife markets facilitated by recent road improvements to Kompong Thma town.

Wildlife is hunted on a seasonal basis, with much of the activity occurring during the late-dry season to early wet-season period (March to July). Figure 3.3 shows eight of the most frequently hunted/trapped species in the Kompong Thom study area, with Common Muntjac deer, Bengal monitors, hard-shell turtles, and wild pigs ranking as the most commonly caught species. Prices range from R3,000 ($0.75) per kg for commonly consumed species to R70,000

[39] Because wildlife hunting is known by villagers to be illegal, some involved in hunting may not have revealed it in interviews. Therefore, these figures should be viewed as minimum estimates.

($18) per kg for wildlife traded for traditional medicines (e.g., Sunda Pangolin, King Cobra). Under existing law, hunting of all these species is prohibited, except for the hard- and soft-shelled turtles.[40]

According to Evans *et al.* (2003), hunted species in the Mondulkiri area include muntjacs, Sambar, Gaur, Banteng, bears and Tiger, with at least the first four of these still occurring in significant numbers around the study villages. Although the total numbers hunted are probably not very high, they are thought to be very significant in comparison to the already reduced populations of some of these species. Similar to the Preah Vihear and Kompong Thom areas, the most important type of animal meat for villagers comes from wild pigs, usually trapped around *chamkar* fields. Monitors, turtles, and porcupines are also trapped and usually sold in nearby towns.

Despite the close proximity to forests of villages in Mondulkiri study area, wild meat appears to be a much less important source of protein than fish. Research by Richardson (2003) found *prahoc* (fish paste) to be the dominant protein source, with about half of the meals including some *prahoc* (but commonly only five grams or less per person), compared to wild/domestic meat protein in 10 percent of meals, and no protein in 40 percent of meals. Most households reported experiencing protein shortages, often lasting about three months per year, and usually occurring during periods when people cannot fish.

Figure 3.3: Seasonal Calendar for Wildlife Hunting in Kompong Thom Study Area

Main Species Hunted/Trapped			Period of Hunting/Trapping Activities											
Type of Wildlife (Khmer Name)	Price per kg (Riels and $)	Hunting Method	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Bengal monitors (*Tra-kuot*)	R3,000 ($0.75)	Dogs			←	—	→							
Hard-shell Turtles (*An-deuk*)	R3,000 ($0.75)	Dogs			←	—	→							
Red Muntjac (*Chhlus*)	R4,000-5,000 ($1-1.25)	Traps			←	←	—	—	→	- - -	- - -	→		
Soft-shell Turtles (*Kan-theay*)	R3,000-15,000 ($0.75-3.75)	Dogs & spears				←	—	—	→					
Wild Pigs (*Chruk-prey*)	R4,000-5,000 ($1-1.25)	Traps	←	- - -	- - -	←	—	—	→	- - -	- - -	- - -	- - -	→
King Cobra (*Puah Veik*)	R10-000-15,000 ($2.50-3.75)	Traps				←	—	—	→					
Python (*Puah Thlan*)	R10-000-15,000 ($2.50-3.75)[b]	Traps				←	—	—	→					
Sambar (*Preus*)	R4,000-5,000 ($1-1.25)	Traps				←	→							
Sunda Pangolin (*Pong-rul*)	R40,000-70,000 ($10-18)	Dogs							←	—	→			

[a] *Note: Dark lines indicate hunting/trapping taking place deep in forests, while dashed lines show trapping activities common around chamkar areas. Trapping of wildlife around chamkar is not practiced in the early rainy season due to concerns about trapping draft animals.*

[b] *Price per meter, not kg.*

3.5.3. Other Forest Product Collection

In addition to resin tapping and wildlife hunting, villagers collect dozens of forest products, including fuelwood, timber (for house construction), rattan, vine, bamboo, thatch, solid resin, mushrooms, wild fruit, and medicinal plants. Most of these products are collected by women and children for household use rather than for trade. In total, these products account for about 15-20 percent of household income across the three study areas.

[40] *Prakas on Wildlife Species*, No. 359 Bro-Kor-Kor-Sar-Kor, MAFF, 01 August 1994. In total, this Prakas prohibits hunting of 106 species of wildlife.

Fuelwood is collected mainly for cooking purposes. Since it is collected and transported on foot, it is gathered from nearby forest areas where possible. During the rainy season, fewer trips are taken and greater amounts collected, which are then dried/stored beneath the house. Occasionally, men collect large amounts of fuelwood (a few weeks' supply) from richer, more distant forests and transport it to their homes by oxcart. This is more common in cases where households have chamkar plots far from their homes and the fuelwood can be brought back during a return trip.

A small number of villagers in Preah Vihear and Kompong Thom indicate that they are involved in cutting timber. Although some of these men are employed by soldiers or concessionaire's agents for commercial/illegal logging, most cut timber (using manual saws or axes) for house construction or to sell it to other villagers for this purpose, an activity that is legal under the Forestry Law.[41]

Although villagers indicate that some NTFPs were processed and sold as higher-value products in the past, most are now sold in raw form. For example, Poteab villagers used to make sleeping mats out of rattan and sell them to traders, who in turn sold them around the Preah Vihear area and into Laos. But demand among traders for sleeping mats has largely ceased, and so too has the processing activity. Villagers suspect the fall off in demand is the result of the rise of other local suppliers of sleeping mats and transportation costs. Likewise, a number of other villages used to produce traditional fishing gear from bamboo ("*Chhnieng*" and "*Angruth*"), but demand for these products has declined considerably over the years as households have shifted toward using higher technology fishing gear (batteries and rods for "electric fishing") rather than traditional gear. Among other problems, these examples illustrate the vulnerability of NTFP enterprises to competitive pressures, changes in market demand (product substitution), and the difficulties of overcoming higher marketing costs due to remote production locations.

3.6. Vulnerability of Livelihoods in HVF areas

To understand the vulnerability of livelihoods in HVFs, this section examines some of the main causes of crises and how households respond to them in the Preah Vihear and Kompong Thom study areas. A "time of crisis" was defined in household interviews as a period in which a household did not have enough food to eat or enough cash to meet household demands. Over the past five years, 62 percent of the households in the Preah Vihear area have faced a time of crisis, compared to 83 percent in Kompong Thom (Table 3.7). By far, the most common cause of crisis is a family illness (mainly malaria) or death. Other causes include crop losses, resin tree losses, and robbery or death of cows/buffaloes. In light of the drought and flood problems in both study areas over the past two years (2002-2003), surprisingly few households mention crop losses as a major factor in causing crises. This may be the case because villagers "expect" crop problems from time to time; they only view crop loss as a crisis when it is severe.

For more than half the households that faced a crisis, the first response was to borrow cash or rice from relatives, friends, resin traders, and others. Other responses included selling cows/buffaloes and oxcarts, increasing forest product collection and farming activity (especially in Kompong Thom), and seeking wage labour. Villagers in Kompong Thom were able to respond to crises by making more trips to the forest because road improvements make it possible to sell forest products in Kompong Thma town. Access to markets is much more limited in Preah Vihear.

[41] "The traditional user rights of a local community for timber products and NTFPs shall not require a permit and include the following: …The harvest of timber to build a house, stables for animals, fences and to make agricultural instruments" (Article 40.B.2).

Table 3.7: Causes of Severe Crises and Household Responses Over the Past Five Years

Main Types of Crises and Responses		% of Households[a]	
		Preah Vihear	Kompong Thom
Households that have faced a "time of crisis" in the past 5 years		62	83
Main Reasons for Crises	Family illness or death	79	89
	Crop losses due to drought/flood	17	31
	Loss of resin trees to loggers	1	11
	Loss of cows/buffaloes due to robbery/death	7	2
	Other[b]	19	8
Main Responses to Crises	Borrow cash/rice[c]	81	83
	Sell cows/buffaloes or oxcarts	21	12
	Increased number of trips to forests	1	31
	Increase rice/crop farming	6	23
	Seek wage labour	10	14

[a] *Multiple responses allowed, percentages may not sum to 100 percent.*
[b] *Includes loss of house due to fire, loss of wage labour, crop loss due to pests, and resettlement costs after crisis in previous village.*
[c] *From relatives, friends, resin traders, and others.*

3.6.1. Rice Deficits

As with other rural areas in Cambodia, rice production is central to food security for villages in HVF areas. To understand the prevalence of rice deficits (and surpluses) across and within the villages studied, this section compares rice production and consumption at the household and village level. Although 260 kg per person per year is often used as a standard rice consumption level in Cambodia, this figure was deemed too low for villages in upland/forest areas where higher levels of poverty often mean that households consume more rice as a proportion of total consumption. For this reason, this study collects primary data on the actual rice consumption of households.[42] In line with expectations of greater rice consumption in HVF areas, annual rice consumption across the eight villages surveyed averaged just over 300 kg per person (range of 290-330 kg per person).

Rice deficits/surpluses varied considerably across and within the villages surveyed in Preah Vihear and Kompong Thom (Table 3.8). Of the eight villages surveyed, seven experienced rice deficits in 2003, with only Sam-ong village in Kompong Thom enjoying a surplus. At the household level, 78 percent of Preah Vihear households had a rice deficit that averaged over one tonne, and three villages (Krala Peas, Po, and Bosthom) had especially poor rice yields. This is the result of households cultivating small agricultural plots located on low-fertility (white sandy) soils. On average, households with rice deficits only grew enough rice to support their consumption for 5-6 months of the year.

In Kompong Thom, a little less than half the households had a rice deficit (average of 0.9 tonnes) while the other households enjoyed a significant surplus (1.0 tonnes). High rice production appears to be correlated with households that farm in a nearby fertile "red soil" area. Many villagers from Sam-ong, and some from Choam Svay, have been cultivating crops in the red soil area since at least the early 1990s (and some started as far back as 1986). More recently, two companies have begun operations in the area, planting rubber (Tumring Rubber Plantation) and bananas (a company referred to by villagers as "company 91"). Villagers in Sam-ong and Choam Svay worry that, as these companies expand their operations, they may lose their farmland (see section 3.7.4, Conflict and Resolution). Unlike Sam-ong and Choam Svay, villagers in Rang Khnai cultivate crops on less productive "sandy" soils. They experienced a severe rice deficit in 2003, with 95 percent of villagers having an average deficit of 1.3 tonnes (rice production only supported household consumption for 3-4 months out of the year). One key informant reported that some households in Rang Khnai used to

[42] In interviews, villagers were well aware of their annual rice production levels, and how much rice they either had to purchase (due to a deficit), or could store/sell.

cultivate crops in the red soil area, before losing land to the companies, but this contention could not be confirmed.

Rice yields are subject to the variability of weather conditions, pests, and other factors, causing significant swings in crop yields year to year (yields were +/-30 percent in the eight villages surveyed from 2002 to 2003). Most villagers employ strategies to reduce the risk of crop loss and rice deficits. First, villagers allocate a certain amount of rice at the end of harvesting season as seed for the next season. In doing so, villagers are careful in their selection to keep a range of varieties, with some known for their drought-resistance and others for their flood resistance. By planting a range of varieties villagers could ensure that, even with erratic weather, they would be able to produce some rice. Second, as most villagers recognise that they are prone to deficits, in years when they have a surplus they stock the rice for future consumption. Only a few villagers, who are confident they will produce enough rice (or have enough cash to purchase rice if a deficit occurs), sell their surplus.

Table 3.8: Rice Deficit/Surplus (2003)

		Deficit			Surplus		Average
HVF Area	Village	% of total HH	Average per HH (kg)	Months of Deficit	% of total HH	Average per HH (kg)	Surplus /Deficit Village
Preah Vihear	Kdol	59	(704)	(4.8)	41	694	(149)
	Poteab	60	(820)	(5.7)	40	602	(268)
	Krala Peas	90	(1,188)	(7.6)	10	252	(1,050)
	Po	85	(1,082)	(6.5)	15	760	(860)
	Bosthom	79	(957)	(7.4)	21	671	(632)
	Sub Total	**78**	**(1,018)**	**(6.7)**	**22**	**637**	**(678)**
Kompong Thom	Choam Svay	60	(723)	(4.9)	40	836	(132)
	Sam-ong	17	(292)	(2.2)	83	1,080	732
	Rang Khnai	95	(1,356)	(8.3)	5	339	(1,267)
	Sub Total	**46**	**(906)**	**(6.4)**	**54**	**1,006**	**52**
Mondulkiri	(Evans *et al.* 2003)	High	(850)	(7.4)	NA	NA	NA
	(McAndrew *et al.* 2003)	High	(470)	(4.1)	NA	NA	NA

3.6.2. Loss of Resin Trees

Resin tapping generates considerable cash income for households in HVF areas. And in contrast to rice production, it is a *stable* source of income because tapping yields do not vary significantly during the year. As long as households can make the tapping trips and do not lose their trees to logging, their resin income should remain relatively constant.[43] Resin tapping also reduces the vulnerability of households by providing them a form of "collateral" to secure loans (from resin traders). Because resin trees are viewed as a privately held asset, resin traders know that households with trees will eventually be able to pay them back in resin, so traders are willing to give loans. Households without resin trees usually cannot obtain loans outside of their circle of relatives and friends.

Studies in HVF areas of Mondulkiri have noted widespread resin tree losses to logging. McAndrew *et al.* (2003) estimates that from 1993-1999, households in the six villages of *Sre* Preah commune lost 50 percent of their resin trees (20-80 trees per household) due to logging operations. Likewise, Evans *et al.* (2003) indicates that 37 percent of households in four villages lost an average of 23 resin trees in 1998-1999, resulting in an average loss of 20-30 percent of resin income ($70-$100 per year). As nearly all the large resin trees in these areas

[43] The stability of resin income also depends on resin price levels, which appear to have been relatively constant in the region since the mid-1990s (Prom and McKenney 2003), and the ability of the trees to provide steady, high flows, which appears to be good, at least through the first 5-10 years of tapping (Evans *et al.* 2003).

were already being tapped, households could not replace their lost trees. With few income generating alternatives, most households simply became poorer. Some households reported expanding their *chamkar* areas or seeking wage labour, but at best this only made up for a small proportion of lost income.

Resin tree losses to logging in the Preah Vihear and Kompong Thom areas have thus far not been as severe. Only 9 percent of tapping households have lost trees in Preah Vihear, compared to 23 percent in Kompong Thom. For one-quarter of these households, the losses were minimal (<10 trees). But losses were more substantial for the others, averaging about 100 trees per household. Most households experiencing tree losses have become poorer, as they have not been able to identify livelihood alternatives to replace lost resin income. For instance, one villager in Rang Khnai indicated that his family's loan had increased to more than ten times what it had been before he lost 125 trees. A villager in Preah Vihear reported that he had been sending his children to school in the provincial capital (Tbeng Meanchey), but could no longer afford to do so after he lost 200 trees. Some villagers received very modest cash compensation from concessionaires for lost trees of about R3,000-5,000 (or about $1) per tree. In comparison, the domestic timber price for the 4-5m3 of roundwood in a typical resin tree (60-70 cm dbh) would be about $400-$600 in Phnom Penh.

Since most tapping households had not lost resin trees in the Preah Vihear and Kompong Thom study areas, they were asked a hypothetical question about what livelihood activities they might take up if they lost their resin trees. About 80 percent replied that they would have to try and expand their wetland rice or *chamkar* production areas. For *chamkar*, this would involve clearing new areas of forest. A smaller proportion of households (especially in Kompong Thom) indicated they would try to collect larger quantities of other forest products. None of the households thought that these pursuits could replace the income that would be lost if they no longer had their resin trees.

3.6.3. Household Debt

Households living in debt are more vulnerable when a crisis arises because they may not have additional options for borrowing. Villagers typically borrow rice/cash during the rainy season – especially from June to September – when they are running out of rice, busy with farming activities, and incidences of malaria, typhoid, and dengue are higher. Debts are often repaid (at least in part) in December-January using rice/income from the rice harvest. For households tapping resin, debts are repaid in accordance with terms agreed upon between the tapper and resin trader, usually involving repayment with resin over a 1-2 month period.

In the Preah Vihear area, 58 percent of households reported being in debt, with an average debt of $57 (Table 3.9). Because interviews were conducted in Preah Vihear during the harvest period (December 2003), the estimated number of households in debt may be somewhat high, because some households will pay off their debt with their harvest. In Kompong Thom, where interviews were conducted well after rice harvests were completed (February 2004), 37 percent of households reported being in debt, with an average debt of $46. Most debt appears to be short-term in nature, with only a few households reporting that they have been in debt for more than one year. In the Mondulkiri study area, debt does not appear to be a problem, with only 8 percent of households in debt an average of $35 (McAndrew *et al.* 2003).

Table 3.9: Overview of Household Debt in Preah Vihear and Kompong Thom Areas

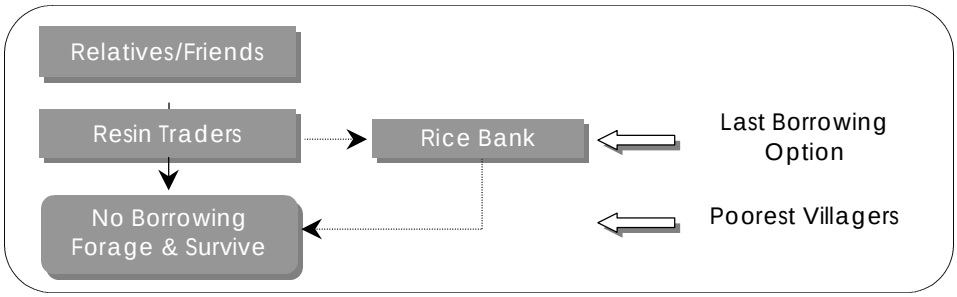
		% of Households[a]	
		Preah Vihear	Kompong Thom
Households in debt		58	37
Purpose of borrowing	Illness treatment	39	59
	Lack of food due to poor crop	42	37
	Other[b]	28	45
Type of loan	Cash	63	71
	Unmilled/milled rice	46	10
	Medical treatment on credit[c]	8	70
Sources of loan	Resin traders	51	38
	Relatives	22	38
	Villagers/neighbor	6	14
	Rice bank[d]	33	NA
	Money lenders	4	2
	Other[e]	4	16

[a] *Multiple responses allowed, percentages may not sum to 100 percent.*
[b] *"Other" includes purchases of oxcarts, bicycles, and other needs.*
[c] *Reflects borrowing households in two villages only –Krala Peas in Preah Vihear and Rang Khnai in Kompong Thom.*
[d] *For households in Po and Bosthom villages only, where rice bank is available.*
[e] *Includes village doctors, traders (other than resin), NGOs, and wholesalers (located in Tbeng Meanchey, Preah Vihear).*

Resin traders, relatives, and friends/neighbors are the major sources of loans in the study areas. In seeking loans, most villagers first approach relatives and friends/neighbors (Figure 3.4). This is the best option because usually such loans can be paid back with little or no interest. Villagers who could not borrow from relatives and friends, or had exhausted that option, tend to turn to resin traders. In return for cash or rice, tapping households agree to sell their resin to the trader at a price somewhat lower than the market price (usually about 10 percent lower) until the loan is paid off.

Whereas villagers view the terms of loans from resin traders as reasonable, other options are less attractive. For instance, households in Po and Bosthom villages in Preah Vihear can borrow from the local rice bank, but most avoid doing so if at all possible due to the 50 percent interest rate charged on loans.[44] A few households have identified miscellaneous traders/moneylenders from whom they can borrow at interest rates of 5-10 percent per month.

Figure 3.4: Hierarchy of Borrowing Strategies



[44] Having observed chronic rice deficits in Pramei commune, the World Food Programme (WFP) set up a rice bank in 1998 called the Pramei Commune Credit Association. With a start-up investment of 16 tonnes of milled rice, the rice bank aimed at lending milled rice to households with rice deficits at a low interest rate (30 percent if returned at harvest time in unmilled rice and 10 percent if returned in milled rice). According to villagers, the rice bank operated well in the beginning, but operational problems began in 2001 soon after it was transferred to local management. The rice stock fell into the hands of a few rich traders and interest rates increased to 50 percent.

The poorest villagers tend to have no borrowing options. Rather, during particularly lean times they reduce their consumption and increase their foraging for wild fruits, potatoes, roots, and other food items.[45]

3.6.4. Future Threats to Livelihoods

Looking to the future, villagers in the Preah Vihear and Kompong Thom areas identify a number of threats to their livelihoods. In Preah Vihear, households are most concerned about the impact to crops from future droughts and floods, the potential loss of resin trees to loggers, and the lack of adequate draft animals (due to past outbreaks of disease). For instance, 40 percent of the draft animals in Krala Peas died in 2002 due to disease, which forced villagers to clear more forest areas for *chamkar* because they could not plough fields for wetland rice.

Households in Preah Vihear also worry about wild pigs damaging crops (51 percent of households in Po village), restrictions on access to the forest, and security problems in the area. Surprisingly, only 20 percent of Preah Vihear households identify illness/disease as a significant threat, despite the crises caused by poor health in the past. It may be that the high incidence of disease (especially malaria) means that living with disease is simply looked at as part of life, not a significant future threat. This is not the case, however, in Kompong Thom where 63 percent of the households note illness/disease as the greatest threat to their livelihoods. The other two main concerns in Kompong Thom are droughts and floods and the potential loss of resin trees.

Table 3.10: Future Threats to Livelihoods

	% of Households[a]	
	Preah Vihear	Kompong Thom
Droughts and floods	73	56
Rice/crop destroyed by wild pigs	22	3
Resin tree logging	36	48
Lack of cattle/buffaloes	37	14
Human disease	20	63
Security problem	16	3
Restriction to access forests	17	4
Animal disease	9	4

[a] *Multiple responses allowed, percentages may not sum to 100%.*

3.7. Management in HVFs: Current Rules and Actual Practices

This section assesses the foundation from which management in HVFs might be improved in the future. Key issues addressed include how villagers understand current laws and regulations governing Cambodia's forests, how actual practices of villagers may diverge from official rules, why such non-compliance occurs, and how conflicts arise and are resolved. A greater understanding of these issues is central to any discussion about how to develop HVF management approaches that are both environmentally sustainable and beneficial to people living in the area. Findings presented in this section mainly reflect survey results from the Preah Vihear and Kompong Thom study areas (no such assessment was carried out in Mondulkiri).

3.7.1. Knowledge about Forestry Law and Regulations

Forest management problems often result from conflicting claims to forest resources. That is, more than one party claims ownership of, or the rights to, the resources. Well-defined and enforceable property rights are a prerequisite to a workable forest management approach (as

[45] Villagers note that it can be risky to consume some wild foods. For instance, "kduoch" root is commonly consumed by the poor, but if not properly prepared it can be poisonous, causing illness and discomfort.

discussed in section 2.2.5). Where property rights are weak, as they are in Cambodia, incentives for forest degradation and conversion will generally be higher as different parties seek to exploit resources before "the situation changes". For instance, logging interests have greater incentives to log rapidly (and carelessly) when they lack assurance that current access to timber resources will continue into the future. Likewise, parties might seek to convert forest areas for agriculture because they can make a stronger (private) property claim to land under cultivation than they can to forests, which are legally owned by the State.

To examine the issue of conflicting claims, households in the Preah Vihear and Kompong Thom areas were asked, "Who do you think owns the forest in the areas where you tap resin or collect forest products?" Approximately 75 percent of the households responded that forests are owned by local villagers or are common property open to everyone (Table 3.11). Only about one-quarter of respondents acknowledge that the State owns the forest. However, many respondents understand that, by law, the State owns the forest. But they seem to dispute the basis of this claim, arguing that by living in or near to the forest, and having used forest resources for decades, they should be the rightful custodians of local forests. In this sense, it is similar to farmers asserting claims to land they have cultivated over a long period of time. This view is stronger in the Kompong Thom area, where increasing resource scarcity and conflicts with concessionaires may be galvanizing opinion that resources should be managed locally (sections 3.7.3 and 3.7.4). In Preah Vihear, forest resources are relatively more plentiful and there have been fewer conflicts.

Given the remote location of villages surveyed, it is surprising that about two-thirds of the households surveyed claim to "know some" or "know a lot" about the forestry law and related regulations. They have learned mainly from local authorities, radio/TV, and NGOs working in the area. For the households claiming to know forestry regulations, the top five rules identified were as follows: (1) do not cut timber (using a chainsaw); (2) do not hunt/trap/trade wildlife; (3) do not cause fires in forests; 4) do not clear "new" forests for *chamkar*; and (5) do not enter concession areas. This reflects a sound understanding by villagers of some of the basic rules governing Cambodia's forests.

Table 3.11: Knowledge about Forestry Laws and Regulations

		% of Households[a]	
		Preah Vihear	Kompong Thom
Who do you think owns the forest in the areas where you tap resin or collect forest products?	Villagers	26	45
	Common Property, Everyone	48	28
	State	21	25
	Company	6	2
	Other[b]	5	7
	No Comment or NA	2	1
Have you ever read or learned about forest laws/regulations?	Know some and know a lot	67	60
	Do not know at all	33	40
How did you get that knowledge about forest laws/regulations?	From local authority	54	43
	From NGOs	30	52
	From radio/TV	50	33
	From other villagers	10	7
What are some important rules for using the forest?	Do not cut timber (by chainsaw)	74	68
	Do not hunt/trap/trade wildlife	74	72
	Do not cause fires to forests	58	37
	Do not clear new forests	24	35
	Do not enter concession areas	3	15

[a] *Multiple responses allowed, percentages may not sum to 100 percent.*
[b] *Includes the local authority, Ministry of Environment, "community forest", forestry authorities, and the prime minister.*

3.7.2. Non-Compliance with Impractical Rules

While villagers are aware of the main forestry rules, they do not follow them (with the exception of the rule against cutting timber by chainsaw). Villagers argue that the rules are

highly impractical given the activities they must engage in to sustain their livelihoods. During interviews, many of the villagers turned the question around on the interviewer, asking "if I did not clear forests for *chamkar* and trap wildlife, what would I do and what would I eat?" These villagers emphasized that throughout the year they eat only rice with salt and chili twice a day, with an occasional supplement of wildlife. To have less is not imaginable, and presently they do not see any livelihood alternatives. Specifically, they note the following problems with the forestry rules:

- *Do not cut timber (using a chainsaw).* Villagers need timber on occasion for house construction and repair. Rules prohibiting the cutting of timber by chainsaw should not be extended to restrict villagers from harvesting timber for local purposes. In making this point, a number of households noted that the scale of harvest by villagers is very small compared to what is cut by concessionaires.
- *Do not hunt/trap/trade wildlife.* Nearly all the households surveyed in Kompong Thom, and three-quarters of the households in Preah Vihear, consume wildlife as an important part of their diet. As access to fish can be limited, wildlife represents a low-cost and vital source of protein. In light of these consumption needs, the current blanket ban on all hunting of wildlife is clearly impractical. Many villagers also note that some wildlife, such as wild pigs, must be trapped because they can destroy crops. The drafting of a new *prakas* to address these issues is underway.
- *Do not cause fires in forests; do not clear "new" forests for chamkar.* Although villagers usually rotate among previously cultivated plots, from time to time new *chamkar* land needs to be cleared, usually to support feeding more children, to provide land for a newly married couple, or for recent migrants to the area. Clearing is done by cutting and burning, with burning contributing to soil fertility. Villagers suggest that burning for *chamkar* has little impact on the forest beyond the plot area, but burning forests for other purposes, such as to flush out turtles, can damage large areas of forest. Some villagers would like to see burning for turtles banned (and enforced), but such activity remains pervasive.
- *Do not enter concession areas*. Only a small proportion of households cite this rule, perhaps because it is not possible to comply with it. The three villages surveyed in Kompong Thom are located *within* the Colexim concession. The five villages surveyed in Preah Vihear are located along the boundary of the Cherndar Plywood concession and have accessed forest resources in the area since well before the concession was granted.

3.7.3. Customary Forest Management and Sustainability

While forest users may not follow state rules on management, it is often assumed that they engage in their own customary forest management practices. Examples of such practices have been widely reported in Cambodia, sometimes in the form of rules explicitly intended to protect or share a resource, at other times in the form of animist beliefs that have some kind of (possibly intentional) result in terms of better harvesting practices. Examples include exclusion of outsiders from village farming areas, and areas where fishing, farming or hunting is forbidden to avoid angering the spirits.

However, this study found almost no evidence to of customary management rules relevant to the management of timber resources, and few relating to other resources. In part this must be because they have not been needed: most of the villages studied have never had the capital, legal rights or, until recently the road access necessary to market the timber in their forests. The lack of a visible management response to the increased logging of modern times must also be partly attributed to the inability of politically weak villages to influence the cutting of 'their' resources by powerful outsiders, whatever their intentions. One must assume that, given the ability, villagers would at the very least choose to direct the loggers operating

in their traditional use areas away from critical sites, and to receive fees from them for the removal of village resources. This is supported by the growing prevalence of 'community forest associations' and equivalents that were set up to counter the perceived threat from loggers and so on, but such associations have yet to be tested as a way to manage, rather than defend, a forest.

A few management traditions do relate to timber/trees, but indirectly. For example, some regulations and agricultural techniques guide the siting and management of swiddens, and these are likely to minimise the conversion of additional forest by making best use of soil fertility in fallows. However, this is arguably a way to reduce labour expenditure and there was no evidence that clearance of mature forest would be avoided in times of increasing population. A second example is that the felling of resin trees is generally avoided, even in swidden fields, and as noted above, the right to tap them is treated as a private asset. However,access to most other forest resources is essentially open to all, with no specific rules, restrictions, or principles guiding their management . When forest users were asked, "Do villagers traditionally apply any rules or restrictions on forest product collection (such as limits on the amounts of products collected per trip or period of time, no hunting of specified animals, no harvesting of products in specified areas (e.g, spirit forests))?", nearly all responded that there are no such rules or restrictions.

Three "spirit forests" were identified in the Kompong Thom study area where villagers pray and clearing for *chamkar* is prohibited, and such forest also exist at most villages in the Mondulkiri study site. Although important for spiritual reasons, observation of these forests suggests they are hardly a substitute for forest conservation or management. They typically range from less than 0.5 ha to a few ha in size, sometimes contain a few trees and at times are surrounded by *chamkar* plots. No spirit forests were identified in Preah Vihear, but a handful of villagers noted traditional rules against cutting down very large trees (which are believed to have spirits) and hunting some large animals, such as elephants, *Kouprey* (wild cattle), Gaur, and Rhinoceros. However, these villagers pointed out that none of these animals have been seen in the area in decades, so the rules are now essentially meaningless.

While forest resources appear to be in decline in Kompong Thom, this is less of the problem in Preah Vihear. When asked, "How is the distance to access forest resources changing?", nearly 40 percent of Kompong Thom villagers responded that they now travel farther to collect forest products than in the past. Only 5 percent of Preah Vihear villagers responded in this manner. And to understand potential incentives for villages to support long-term forest management, villagers were asked, "Would you like to see your children earn income and maintain their livelihood from the forest as you are now doing?" About 80-85 percent of tapping households indicated they would like to see their children tap resin. Among those households collecting forest products, cutting timber, and hunting wildlife, most said they would like their children to do the same. For the households that would not like to see their children earning a livelihood from the forest, the most common reason was that it is a very difficult way to live and they are worried that resources are in decline. Therefore, these households would prefer for their children to obtain a good education and find wage employment, become traders, or start a business.

3.7.4. Conflict and Resolution

Despite the wide divergence between forestry rules and actual practices by villagers, it does not appear to be the root of conflict in the HVFs studied. While villagers may not comply with forestry rules, authorities seem to have little interest in enforcement, so conflicts do not arise. Of the households surveyed, 71 percent in Kompong Thom and 37 percent in Preah Vihear indicate that they have witnessed illegal logging and/or large-scale forest burning. But with the exception of cases where resin trees have been cut, nearly all households say that their response to seeing the damage has been to "do nothing". They indicate that local

authorities usually know about the damaging activities, so there is little point in reporting it to them. Indeed, in some instances (especially with wildlife trade and logging), local authorities may be directly involved in the illegal activities.

Rather than compliance problems with forestry rules, most conflict in the HVF areas surveyed can be traced to logging activities of concessionaires and "land grabbing". Conflicts have been much more common in Kompong Thom, where two-thirds of the households indicate they have had a conflict with concessionaires/companies in the area, including Colexim, Tumring Rubber Plantation, and another company villagers refer to as "91 company" (Table 3.12). The main conflict is over rights to forest/land with productive "red soils" and resin trees. Some of the area has already been logged (villagers indicate by Colexim and Tumring) and planted for rubber and bananas (Tumring and 91 company).

Many of the villagers from Sam-ong and Choam Svay villages in Kompong Thom farm in the red soil area. As a result, their rice production in 2003 was the highest of the eight villages surveyed (average of 2.3 tonnes/hh in Sam-ong and 1.6 tonnes/hh in Choam Svay). In contrast, the other village surveyed in Kompong Thom (Rang Khnai), located somewhat farther away from the red soil area, farms on less productive "sandy" soils and produced the worst rice yield among the eight villages surveyed (0.7 tonnes/hh). One key informant reported that in the past some households in Rang Khnai cultivated crops in the red soil area, but lost the land to the companies. However, this could not be confirmed and villagers in Rang Khnai were reluctant to discuss the issue. It is clear, however, that villagers in Sam-ong and Choam Svay are worried about losing their red soil areas as companies expand their operations.

As discussed in section 3.6.2, a significant number of tapping households in the HVF study areas have lost resin trees to commercial/illegal logging – 37-50 percent in Mondulkiri, 23 percent in Kompong Thom, and 9 percent in Preah Vihear. Where logging has caused or threatened substantial resin tree losses, there has been conflict, especially in Kompong Thom and Mondulkiri (McAndrew *et al.* 2003). In protesting the cutting of resin trees, it has been common in each study area for concessionaires and other logging operations to offer some minimal compensation (about $1 per tree) to encourage villagers to "sell" their trees. Villagers often feel they have no choice but to sell. As one villager put it, "the concessionaire agents told me, 'your resin trees will be cut anyway, whether you agree to sell them or not'".

Table 3.12: Conflict and Resolution

		% of Households[a]	
		Preah Vihear	**Kompong Thom**
Can you identify the source of conflicts over forest use in your area?	With concessionaires/companies	10	66
	With government authorities/military	2	0
	Other[b]	2	10
Whenever you have had conflicts, which measures have you taken to resolve those conflicts?	Told forestry authority	0	0
	Told village chief or elder	9	30
	Told Commune Council	30	5
	Directly negotiated with the loggers to stop	3	21
	Tried to get compensation	16	39
	Other[c]	36	18
	Did nothing	18	3

[a] *Multiple responses allowed, percentages may not sum to 100 percent.*
[b] *"Other" includes conflicts with other loggers and others villagers.*
[c] *Consult with community forestry representative, NGOs in area, or directly with villagers involved.*

In Kompong Thom, villagers have tried to resolve conflicts either through raising the issue with village chiefs/elders (30 percent), protesting to concessionaires/companies to try and get activities halted (21 percent), or direct negotiation with concessionaires/companies to try and get compensation for losses (39 percent). Only about one-third of these households actually received some compensation. Interestingly, despite the power imbalance between

companies and villagers, very few villagers (3 percent) ignored or did nothing to try to address their conflict. As there were fewer reported conflicts in Preah Vihear, findings on resolution approaches are more limited. Most villagers reported conflicts to their Commune Council, as they felt it was unlikely that the Commune Council was "on the side" of the concessionaire. Only 16 percent sought compensation from the concessionaire for lost resin trees, and about one-third of these households received it.

Because no forestry authorities are currently stationed in any of the four communes areas surveyed, they played no role in conflict resolution. Under the recent reorganisation, the Forestry Administration plans to staff at the "triage" level, with each triage covering one or more communes. While this may make it more possible for FA to play a role in local forestry issues, staffing shortfalls, resource limitations, and a general unwillingness of FA staff in Phnom Penh to be stationed in remote areas will make this a challenge. Moreover, as evidenced from the findings here, villagers feel most comfortable approaching people they trust (village chiefs, elders, and commune council members) to discuss and mediate conflicts. It will take time and much trust-building, as well as high confidence among villagers that FA will take action, before villagers report forest crimes and other problems to FA triage staff.

3.8. Prospects for Local Forest Management in HVFs

In response to high rates of tropical deforestation and concern about forest users losing rights to resources, one of the most common policy recommendations in the forest sector has been to more actively include local communities in forest management – a process often referred to as community forestry (CF). The main rationale for encouraging CF is simple: forest users and people in close proximity to the forest are in a good position to responsibly manage it. As they depend on the forest for their livelihoods, forest users have an incentive to manage the resources. And as regular users of the forest, they know the condition and availability of resources and can monitor changes.

In Cambodia, more than 200 CF initiatives have been identified, varying greatly in organisation, management approaches, problems addressed, progress toward establishment, and support levels (McKenney and Prom 2002). Illustrating the momentum for CF, about half of these initiatives were started sometime after 2000. Most CF projects have been established in degraded forest areas with limited commercial potential; they focus on rehabilitating forests (with donor/NGO support) to increase the local supply of forest products. Only a handful of projects are located in HVF areas.

To evaluate how CF might function in HVF areas in the future, this study asked households in the Preah Vihear and Kompong Thom study areas about their understanding of CF, including their views on CF objectives, the motivation and incentives for CF establishment, and overall challenges and needs. Most households were familiar with general CF concepts, as CF appears to have been introduced in all eight of the surveyed villages at one time in the past. Based on these interviews, HVF village perspectives on CF differ considerably from the views of many NGOs and the expectations of CF subdecree. These perspectives are summarised in Table 3.13 and discussed in more detail below.

Where CF is emerging in HVFs (without significant NGO support), it is in response to resource threats, losses, and conflicts. Most of these problems are due to the entry of logging and plantation operations. Indeed, when asked about the strengths and weakness of CF, the greatest identified strength (60 percent of households) was that "Forests could be protected from concessionaire/outsider." Villagers can be highly motivated to establish CF associations to monitor resources when they are threatened; in general, they are not sufficiently motivated to establish CF for the purpose of improving management of resources in gradual decline. Although many villagers would like to see their children benefit from forest resources (section 3.7.3.), notions of long-term sustainable management are usually outweighed by immediate livelihood needs.

Table 3.13: Differing Perspectives on Community Forestry: Legal, NGO, and HVF Villagers

Key Issues	CF Subdecree: Stated Expectations	NGOs: General Views	HVF Villagers: Intentions and Practices
Purpose of CF?	Sustainable forest management, poverty reduction, decentralisation	Sustainable forest management, equity, poverty reduction	Protect resources from outsiders, maintain or improve livelihood
Process/Motivation for establishing CF?	Written request from community to FA, or set up by FA	Through NGO targeting, or request from community	Village actions, in response to forest resource threats, to protect resources against exploitation by outsiders
Quality of forest resources targeted for CF management?	Degraded areas	Mostly degraded areas	Rich forest areas
Priority claim on forest resources?	State	State, CF committee and community	Local villagers, people living in the area
Main authority to address conflicts over forest resources?	CF committee, local authorities, commune council, FA, and MAFF	CF committee, commune council, FA, and MAFF	Commune council, village chiefs and elders
Property rights for forest resources?	User rights for customary purposes	Communal ownership with sharing of benefits	Private ownership (resin), open access to other resources
Modality of CF management?	Under a detailed management plan	Under a simple management plan	Associations of villagers responding to resource threats as they arise
Main needs and challenges for CF management?	Training/education of villagers about forest management	Training, planning (commune level), and regulatory reform	Lack of high-level support (patrons) to secure local rights to forest resources
Potential benefits from forest resources under CF?	Subsistence, no harvest of "forest products" for trade in first 5 years[a]	Communal benefit sharing, NTFPs for household use and some marketing/trade	Trade and household use, potential for wider commercial activity if restrictions and fees eased

[a] *The definition of "forest products" appears to refer to timber and wood products, rather than NTFPs, but the CF Sub-decree is vague in defining the term.*

Government and NGO efforts to support CF usually focus on training/educating villagers about forest management and improving/streamlining natural resource and land-use planning (usually at the commune level). Villagers in HVF areas appear to see less need for such training and planning; only 20 percent of households responded that "educating people about forest use and conservation" was a useful aspect of CF. Indeed, one researcher for this study attended a CF training in the area and found participants unmoved by its teachings. As one villager put it regarding wildlife, "yes, we know about the good forest management rules, but people do not follow them because wildlife resources are part of income generation." Villagers have a relatively good understanding of what practices can be harmful to long-term management of forest resources, but livelihood needs usually take precedence. And following good management practices has little appeal when resource rights are insecure, since outsiders could come in the future and exploit the resources that villagers have managed well.

Villagers do not want training and planning, they want a high-level patron – someone who will first make their rights to forest resources secure and then support the enforcement of CF rules. Villagers highlighted the lack of support for CF among provincial authorities as one of its main weaknesses. Where authorities are supporting CF, it appears to be working more

effectively, such as in Choam Svay village in Kompong Thom. Established in 2002, the Choam Svay CF has the support of authorities from the village to district level, and nearly 80 percent of Choam Svay households participate as CF members. The CF has had a number of successes stopping illegal logging, including the arrest of loggers on several occasions (with the help of authorities). In some cases, the arrested parties have been handed over to the commune council for resolution. And in two instances, fines have been levied amounting to R900,000 ($225). All the money was then used in Choam Svay to construct a public festival building and the walls of a primary school.

Finally, villagers in HVF areas are clearly more interested in opportunities to market and trade forest products than what is allowed under the CF subdecree, which emphasises "customary use" and restrictions on commercial activity during the first five years. It is difficult to see what incentive villages will have to establish CF management if they are not allowed to benefit commercially from the forest resources.

3.9. Summary

Agriculture and collection of forest products are the dominant livelihood activities in the three HVF study areas. Each activity accounts for nearly half of household income; other income sources and employment opportunities are very limited. Poverty is common, with a little more than half the households living below the poverty line in the Kompong Thom and Mondulkiri areas, and 80-90 percent of households in poverty in Preah Vihear. For many households, daily subsistence usually involves two meals of rice with chili and salt.

About three-quarters of the households have experienced a "time of crisis" during the past five years. Most often the cause has been an illness or death in the family. In addition to health issues, villagers are vulnerable to rice deficits, resin tree losses, and debt problems. For example, about 80 percent of the households in the Preah Vihear area and half the households in Kompong Thom experienced a rice deficit in 2003. On average, these households only produced enough rice to support consumption for half of the year. Resin tree losses to logging were common throughout the study areas, with 9 percent of households reporting losses in Preah Vihear, 23 percent in Konmpong Thom, and 37-50 percent in Mondulkiri.

Despite the remote location of HVF villages, most villagers have some knowledge of forestry laws and regulations. But for practical reasons, many do not agree/comply with the laws and regulations. First, while villagers tend to understand that the State legally owns the forest, most assert their claim as the rightful custodians of the forest because they live in or near the forest and have used forest resources for decades. Second, while villagers are aware of the main forestry rules – no cutting timber (using a chainsaw), no hunting wildlife, and no burning of forests – they view these rules as blunt and impractical given the basis of their livelihoods. They note that wildlife is a vital part of their diet and burning forest areas is necessary when *chamkar* areas require expansion.

There is little evidence that villagers in HVF areas currently engage in forest management, especially of timber resources. With the exception of resin trees, which are managed/protected as a private asset, access to forest resources is more or less open to all. There are no specific rules, restrictions, or principles guiding forest management. However, with their many trips over long distances to the forest, villagers are well aware of actions taking place that damage the forest (e.g., logging and burning). Despite this "monitoring", they generally do not report problems to authorities because they feel that authorities already know about the problems, enforcement is unlikely, and in some cases authorities are involved. Unless forest damage represents a direct threat to their livelihoods, villagers tend to ignore it. Such threats are most often due to logging operations and "land grabbing" by agricultural concessions.

For villages in HVF areas, community forestry objectives and needs differ considerably from commonly held government and NGO notions. First, whereas government and many NGOs tend to view community forestry as an approach for improving long-term management of resources that are in gradual decline, villagers usually only seek to establish community forestry in response to direct and immediate resource threats from outsiders.

Second, while government and NGOs identify the main community forestry need as training and local planning assistance, villagers say their main need is for a high-level patron – someone who can make their rights to forest resources more secure and support enforcement of CF rules. For community forestry to work, this will need to include a greater level of trust between villagers and forestry authorities. At a basic level, villagers must know that when they report illegal logging and other forest crimes, enforcement will happen. Only with such backing will forest users, who already represent the largest pool of potential "forest monitors", feel sufficiently empowered to manage forests.

Lastly, government and NGOs tend to focus on forest rehabilitation in degraded areas to support subsistence ("customary use") and minor NTFP trade activities. If this focus remains, one should not expect communities to take much interest in forest management, as the management benefits are usually limited. Villages seek more secure rights over richer natural forests, a reduction/revision of regulations that impose onerous taxes on the NTFP trade, and greater rights to benefit commercially from forest resources (both timber and NTFPs). Such benefits are central to the development of community forestry that is both environmentally and financially sustainable.

Chapter 4:
Timber Resources and Management Scenarios for HVF Areas

Cambodia's evergreen and semi-evergreen timber resources are mainly located in the north-central, northeastern, and southwestern areas of the country. These forests are generally dense (350-400 stems/ha), and located in humid, low elevation (<700m) areas of the country, with the exception of the Cardamom and associated mountain ranges (IFSR 2004). In combination, evergreen (3.7 million ha) and semi-evergreen (1.5 million ha) represent about half of Cambodia's forest cover area. Although it was not possible within the scope of this study to conduct research representative of all HVF areas, this study provides indicative information for three major categories of HVFs:

- **Large forest areas under production.** The most prominent example is the Prey Long-Stung Chinit area where it is expected that three forest concessions – Colexim, Everbright, and Timas – will be approved to continue operations, and a number of other companies operating agricultural concession are active.
  - *Three villages surveyed in Kompong Thom study area are located within the Colexim concession, in the Prey Long-Stung Chinit area.*
- **Forest fragments under production.** This category includes "small" concessions (e.g., Cherndar Plywood, which is 55,000 ha) and other areas likely to be designated as annual coupes in the future.
  - *Five villages surveyed in the Preah Vihear study area are located along the southern border of the Cherndar Plywood concession.*
- **Forest fragments formerly under production.** Many of the cancelled concessions fall into this category.
  - *Surveys carried out by Evans et al. (2003) and McAndrew et al. (2003) in the Mondulkiri study area include several villages located within and nearby the Samling International concession, which now appears to have closed operations.*

As an indication of the timber resources available in these three HVF categories, this section describes findings from tree inventory data for the study areas.[46] In light of limited resources, the intention was to collect inventory data from sample plots in the Preah Vihear and Mondulkiri areas, and use existing Forestry Administration permanent sample plot data for the Kompong Thom area. Unfortunately, the permanent sample plot data could not be obtained, so only a cursory description of timber resources in the Kompong Thom area is provided (Box 4.1).

[46] This section only addresses results on timber resources. A forthcoming report from WCS will provide more description on other findings regarding vegetation and other aspects of ecology.

After describing timber resources, two forest management scenarios are developed, namely "cut and run" logging and sustainable forest management (SFM). These two scenarios are intended to cover the range of potential logging systems – from rapid logging and poor/illegal practices under conventional methods to sustainable logging under more responsible approaches. In addition to estimating realised timber volumes and rents[47] under these scenarios, an analysis is provided of how rents and other impacts are distributed among key HVF stakeholder groups: (1) government; (2) companies and other "powerful" actors; (3) local villagers; and (4) environment. Of particular interest is the impact of different management scenarios on increasing/decreasing poverty.

4.1. Timber and Resin Trees at the Preah Vihear and Mondulkiri Study Sites

Timber resources differ markedly between the Preah Vihear and Mondulkiri study sites. Notable features of the Preah Vihear site are the presence of many commercial species and the high proportion of resin-producing trees (Table 4.1). There are also apparently strong differences in species composition between the areas near to and far from streams. As an example, for the two main resin-producing trees in the area, *Dipterocarpus alatus* is more prevalent near streams, while *d. intricatus* is more present in areas far from streams. However, thethe overall density of resin trees does not appear to vary greatly (13.3 trees/ha near to streams and 11.7 trees/ha far from streams, for stems >40 cm dbh).

Table 4.1: Top 15 Most Common Tree Species at the Preah Vihear site

Species (Khmer)	Latin Name	Family	Royalty Class[a]	Commercial Group[b]	No. of trees > 40 cm dbh /ha	
					Far from streams	<30 m to stream
Phdiek	*Anisoptera glabra*	*Dipterocarpaceae*	II	1	7.0	5.6
Chhoeuteal toeuk (resin)	*Dipterocarpus alatus*	*Dipterocarpaceae*	II	2	5.7	12.9
Koki masau	*Hopea odorata*	*Dipterocarpaceae*	I	3	5.7	4.7
Trach (resin)	*Dipterocarpus intricatus*	*Dipterocarpaceae*	II	2	5.7	0.4
Chambork	*Irvingia malayana*	*Irvingiaceae*	UC	5	4.3	1.3
Popel	*Shorea/Hopea*	*Dipterocarpaceae*	I	NC	2.7	1.8
Kakah	*Sindora siamensis*	*Fabaceae-Caesalpinioideae*	I	5	2.3	0.9
Sralao	*Lagerstroemia calyculata*	*Lythraceae*	I	5	2.0	6.7
Thlok	*Parinari anamensis*	*Rosaceae*	III	5	1.7	0.0
Koki thmor	*?*	*?*	I	NC	1.0	1.8
Rang	*Barringtonia (longipes?)*	*Barringtoniaceae*	UC	NC	1.0	0.0
Beng	*Afzelia xylocarpa*	*Fabaceae-Caesalpinioideae*	Luxury	5	1.0	0.0
Pchoeuk udom	*Shorea obtusa*	*Dipterocarpaceae*	I	5	0.7	0.4
Chrormas	*Vatica odorata*	*Dipterocarpaceae*	II	3	0.7	0.2
Chhlik	*Terminalia alata*	*Combretaceae*	I	5	0.7	0.0

[a] *UC = Unclassified*
[b] *NC = Non-Commercial*

[47] A timber rent is equal to total revenue from timber sales minus total costs of harvesting and delivery (including a "normal profit" margin of 10-20 percent, but excluding any royalties, licensing charges, and fees that may be charged by the government).

Of the larger resin trees (>60 cm dbh) that are currently being *tapped*, however, a much higher proportion (78 percent) is located near to streams than far from streams. This is consistent with results from the site's household survey in which 85-90 percent of households indicated they tap trees "along streams" and only 40-50 percent tap trees away from streams. In light of the prevalence of tapped trees near to streams, there appears to be a potential livelihood-environment "win-win" if legal requirements are enforced to leave unlogged buffers along streams.

At the Mondulkiri site, there is a higher proportion of commercial non-dipterocarp species, including two Luxury species, but the dominant tree is "sralao" (actually a pair of very similar species in the genus *Lagerstroemia, L. calyculata* and one other, as yet unidentified) (Table 4.2). Although "sralao" timber is of high quality, the trunks are rarely suitable for sawing into planks due to their fluted surface, non-straight trunks and tendency to become hollow. Thus, sawmills require special equipment to process the timber (e.g. forparquetry). When this equipment is not available, loggers for export tend to leave these trees standing, but some "sralao" is being supplied to domestic markets.

Table 4.2: Top 15 Most Common Tree Species/Species pairs at the Mondulkiri site

Species (Khmer)	Latin Name	Family	Royalty Class[a]	Commercial Group[b]	No. of trees > 40 cm dbh /ha
Sralao[c]	*Lagerstroemia calyculata and L. sp.*	*Lythraceae*	I	5	13.8
Onsauy	*?*	*?*	UC	NC	4.2
Snengproeus	*?*	*Euphorbiaceae*	UC	NC	3.6
Popoul	*Vitex pinnata (toothed)*	*Verbenaceae*	I	NC	3.3
Sokram	*Xylia xylocarpa*	*Fabaceae-Mimosoideae*	I	5	2.9
Kampulbay	*Litsea glutinosa*	*Lauraceae*	III	NC	2.9
Chambork	*Irvingia malayana*	*Irvingiaceae*	UC	5	2.2
Popoul thmor	*Vitex pinnata (toothed)*	*Verbenaceae*	I	NC	2.2
Trayoeung	*Diospyros pilosanthera*	*Ebenaceae*	Luxury	5	1.8
Tepirou	*Cinnamomum cambodiana*	*Lauraceae*	UC	NC	1.8
Chhamchha[d]	*Engelhardtia spicata/ Toona sureni*	*Juglandaceae*	II / UC	5 / NC	1.8
Beng	*Afzelia xylocarpa*	*Fabaceae-Caesalpinioideae*	Luxury	5	1.6
Popealkhe	*Terminalia bialata/calmansanai*	*Combretaceae*	UC	NC	1.6
Preahphnow	*?*	*?*	UC	NC	1.3
Pring	*Syzygium sp.*	*Myrtaceae*	III	5	1.1

[a] *UC = Unclassified*
[c] *See section 4.2; NC = Non-Commercial*
[c] *Two species in the same class are represented under this local name and were pooled on the plots.*
[d] *Two species in different classes are represented under this local name and were pooled on the plots.*

Resin is an important source of income for local communities in the Mondulkiri area, with two species commonly tapped – "chhoeuteal toeuk" and "trach". According to Evans *et al.* (2003), virtually all healthy trees of either species larger than 40-45 cm dbh are tapped irrespective of where they occur in the forest. However, these two species form a relatively small proportion of the trees on the plots – "trach" is absent and only three trees of "chhoueteal touek" >40 cm dbh (all tapped) were found, giving a density of around 0.65 tapped trees/ha. This is consistent with an estimate of approximately 0.44 tapped trees/ha found in a wider area across the surrounding landscape, based on interview surveys and

mapping of villages' resin-tapping boundaries (Evans *et al.* 2003). Thus, resin trees appear to occur at low densities and represent a small proportion of the timber resources in this area of Mondulkiri.

4.2. Standing Commercial Timber Volumes

To facilitate estimates of standing commercial timber volumes, this study adopts the Commercial/Non-Commercial Groups and Royalty Classes currently used by the Cambodian Forestry Administration (Bin Ismail 2003). Species included in Groups 1, 2, 3, and 5 are considered commercial, whereas those in 4, 6, and 7 are non-commercial (Table 4.3). To support the analysis here, Group 2 is divided between species tapped for resin and those not tapped, Group 5 is subdivided into Luxury, "Sralao" (a dominant species-pair at the Mondulkiri site), and other species, and Groups 4, 6, and 7 are combined as non-commercial. The five official Royalty Classes in Cambodia are, in descending order, Luxury, I, II, III and Unclassified. For the most part, the Commercial Groups used in this study reflect a single Royalty Class.

Table 4.3: Commercial and Non-Commercial Groupings

Group	Name	Main Royalty Classes present at study sites[a]	Remarks for approach in this study
1	Mersawa (commercial)	MDK: II PVH: II	
2	Keruing (commercial)	MDK: II PVH: II	Divided between species tapped for resin and those not tapped
3	Other commercial Dipterocarps	MDK: mainly I PVH: I	
4	Non-commercial Dipterocarps	MDK: II PVH: I	Grouped with 6 and 7 as non-commercial
5	Commercial Non-Dipterocarps	MDK: I, III, Unclassified PVH; I, III, Unclassified	Divided into three subgroups – Luxury species, "sralao" (khmer name for *Lagerstroemia calyculata*) and all other species
6	Non-Commercial Non-Dipterocarps	MDK: Luxury, I, Unclassified PVH: I+ Unclassified	Grouped with 4 and 7 as non-commercial
7	Other species (non-commercial)	MDK: Unclassified PVH: Unclassified	Grouped with 4 and 6 as non-commercial

[a] *MDK=Mondulkiri, PVH = Preah Vihear*

Standing timber species were converted to volume estimates (cubic meter) using equations provided by the Forestry Administration's *Forest Concession Management and Control Pilot Project*, which is using these equations for review of forest concession management plans. In Preah Vihear, nearly all the standing timber has commercial value. Resin trees account for more than half of the commercial standing timber volume (>60cm) (Table 4.4). "Phdiek" (*Anisoptera glabra*), which is a dipterocarp not tapped for resin (Commercial Group 1), makes up another 20 percent of the volume. Group 5 species account for an additional 20 percent of the volume, predominantly "chambork", "thlok", and "spung" species. The remaining volume is comprised mainly of "koki" (Group 3) and "sralao". No luxury species exceed 60 cm dbh, perhaps reflecting previous selective logging in the area.

Although these volume estimates are for only one part of the Cherndar Plywood concession, they appear consistent with the broader, landscape-level strategic inventory dataset produced by Cherndar Plywood for its Strategic Forest Management Plan. For its inventory, Cherndar placed multiple sample plots in each of the four main habitats of its concession, of which three (excluding deciduous forest) have significant timber densities. In all of these three the proportion of commercial timber in resin-bearing species is high, ranging from 31 percent to 57 percent across the three habitats.

In contrast to Preah Vihear, non-commercial species represent a large proportion of the standing timber volume in Mondulkiri. The dominant commercial species-pair is "sralao" (50 percent), but for reasons discussed above, harvesting this timber can be problematic. Other Group 5 species account for about one-third of the volume, followed by luxury timber (6 percent). Whereas resin trees account for 53 percent of the commercial volume in Preah Vihear, they comprise only about 3 percent of the volume in Mondulkiri.

Box 4.1: Timber Resources in Kompong Thom Area

In light of resource constraints, this study planned to develop an indicative picture of timber resources in the Kompong Thom area through analysis of inventory data from three clusters of permanent sample plots located in evergreen forest of Sandan district, Kompong Thom. Unfortunately, these data were not available from the Forestry Administration.

Nonetheless, based on inventory data from the Colexim Strategic Forest Management Plan (2002) and interviews with key informants familiar with Colexim timber resources, it appears that timber resources in Colexim are quite similar to those in the Cherndar Plywood concession. The dominant species are resin trees (chhoeuteal toeuk and trach), as well as phdiek – a dipterocarp not tapped for resin. According to Colexim inventory data, resin trees account for over 40 percent of the total standing volume (>60 cm dbh). Phdiek makes up an additional 30 percent of the volume.

Table 4.4: Estimated standing timber volumes at Preah Vihear and Mondulkiri sites

	Preah Vihear site				Mondulkiri site			
Minimum dbh:	**>40cm**	**>60 cm**			**>40 cm**	**>60 cm**		
Commercial group	Mean volume (m^3/ha)	Mean volume (m^3/ha)	+/-*	% of commercial volume	Mean volume (m^3/ha)	Mean volume (m^3/ha)	+/-*	% of commercial volume
1	22.5	16.4	14.3	**19.7**	1.4	1.4	2.8	**1.9**
2 (non resin)	0.0	0.0	0.0	**0.0**	1.5	0.0	0.0	**0.0**
2 (resin)	62.1	43.7	36.5	**52.7**	3.3	2.7	5.3	**3.4**
3	11.8	6.1	6.6	**7.3**	2.1	1.5	2.1	**2.0**
5 (other)	25.0	16.4	11.6	**19.8**	36.3	28.2	14.8	**36.2**
5 (luxury)	2.0	0	0	**0**	*9.4*	*4.5*	*3.9*	**5.8**
5 (sralao)	3.4	0.4	1.3	**0.5**	*48.7*	*39.5*	*21.0*	**50.7**
Non commercial	11.7	4.7	3.8		*81.4*	*43.4*	*21.7*	
Grand total	138.4	87.7	41.4		184.0	121.3	44.0	
Commercial total	126.7	**83.0**			102.7	**77.9**		

* *95% confidence interval. While confidence intervals are broad due to the fairly small number of sample plots, the pattern of timber volume is clear.*

4.3. Harvestable Timber Volumes and Rents Under Two Management Scenarios

This section estimates harvestable timber volumes and their associated rents at the Preah Vihear and Kompong Thom sites under two scenarios: (1) "cut and run" (conventional logging), and (2) sustainable forest management (responsible logging). A number of factors can affect the volume of timber harvested from an area, including species, access, suitability of the tree for processing, efficiency of harvesting methods, laws and regulations, and market demand. The two scenarios seek to cover the range of potential logging systems – from rapid logging and poor/illegal practices under conventional methods to sustainable logging under more responsible approaches. The main assumptions underpinning these two scenarios are as follows:

- **Scenario 1: "Cut and Run" (conventional logging)** – All commercial trees (Groups 1, 2, 3, 5, including Luxury) greater than >40cm dbh are considered harvestable, despite legal prohibition on logging of resin and luxury species and restrictions on harvesting many of the species if <60 cm dbh. Of these commercial species, only 70 percent are deemed suitable for harvesting (because some trees are not structurally amenable to processing, accessible, or currently marketable). In the logging of the trees considered attractive for harvest, 30 percent of volume is lost/wasted. This is due to standard harvesting inefficiencies (20 percent), as well as additional loss/waste resulting from the speed and carelessness of operations (10 percent).
- **Scenario 2: Sustainable Forest Management (responsible logging)** – Harvestable timber includes all commercial trees legally allowed for logging (Groups 1, 2, 3, 5, excluding Luxury and resin trees) and >60cm dbh. In accordance with Forestry Administration harvesting regulations, only 50 percent of these trees may be harvested. An additional 10 percent is subtracted for biodiversity areas (5 percent) and buffers around streams (5 percent). In the logging of the remaining harvestable timber, 20 percent of volume is lost/wasted due to standard harvesting inefficiencies.

Timber rents were estimated based on price and production cost information provided by confidential sources familiar with timber harvesting in Cambodia and domestic/export marketing, and with due consideration of rent estimates developed by IFSR (2004). Rent estimates are as follows: \$80/m^3 for Groups 1 and 2, \$90/m^3 for Group 3, \$300/m^3 for Group 5 (luxury), \$30/m^3 for Group 5 (sralao), and \$70/m^3 for Group 5 (other species).

Before proceeding with scenario estimates, a word of caution is required. It is important to note that the following scenario projections are merely indicative, because of the broad confidence intervals inherent in the stocking estimates and the sensitivity of the calculations to key assumptions such as the choice of species for harvesting, proportion of trees unattractive for felling and wastage, and rent estimates for Commercial Groups. Nonetheless, such scenarios provide a useful illustration of incentives and impacts under different forms of forest management.

4.3.1. Scenario Results for Preah Vihear Study Area

Under the "cut and run" scenario for the Preah Vihear area, realised timber volume is 62 m^3/ha and timber rents are about \$5,000/ha (Table 4.5a). Resin trees account for nearly two-thirds of the realised volume and half of the rent. Clearly, logging operations in this area have enormous incentives to not comply with the prohibition on harvesting resin trees, as doing so would severely reduce profits. Indeed, rent falls to \$2,600/ha if resin trees are not logged, and to \$1,500/ha if only stems greater than 60cm dbh are harvested.

The results of Scenario 2 make it clear why logging operations shun SFM compliance in favor of "cut and run" logging. At 16m^3, the realised volume under SFM is only about one-quarter of what is harvested under Scenario 1, and timber rents are correspondingly much lower at \$1,100/ha (Table 4.5b).

Table 4.5a: Estimated timber rent/ha at the Preah Vihear site under Scenario 1

Scenario 1: "Cut and Run" (conventional logging)					
Commercial group	**Standing volume >40 cm dbh (m^3/ha)**	**Volume attractive for harvest (@70%) (m^3/ha)**	**Realised felling volume[a] (m^3/ha)**	**Realised Rent ($/ha)**	**% of Total Rent**
1	22.5	18.0	14.4	882	17.5
2 (non resin)	0.0	0.0	0.0	0	0.0
2 (resin)	62.1	49.7	39.7	2,433	48.3
3	11.8	9.4	7.6	521	10.3
5 (luxury)	2.0	1.6	1.3	292	5.8
5 (other)	25.0	20.0	16.0	857	17.0
5 (sralao)	3.4	2.7	2.2	50	1.0
Non-commercial	11.7	9.4	7.5	0	NA
Total commercial volume (with resin)	126.7	88.7	**62.1**	**5,034**	100
Total commercial volume (w/out resin)	64.7	45.3	31.7	2,601	NA

[a] *After subtracting wastage at 30 percent.*

Table 4.5b: Estimated timber rent/ha at the Preah Vihear site under Scenario 2

Scenario 2: Sustainable Forest Management (responsible logging)					
Royalty Class	**Standing volume >60 cm dbh (m^3/ha)**	**Volume allowed to harvest[a] (m^3/ha)**	**Realised felling volume[b] (m^3/ha)**	**Realised Rent ($)**	**% of Total Rent (without resin)**
1	16.4	7.38	5.90	472	43.4
2 (non resin)	0.0	0.00	0.00	0	0.0
2 (resin) – not cut, shown for illustration	43.7	19.67	15.73	1,259	NA
3	6.1	2.75	2.20	198	18.2
5 (luxury)	0	0.00	0.00	0	0.0
5 (other)	16.4	7.38	5.90	413	38.0
5 (sralao)	0.4	0.18	0.14	4	0.4
Non-commercial	4.7	2.12	1.69	0	NA
Total commercial volume (with resin)	87.7	39.47	31.57	2,346	NA
Total commercial volume (w/out resin)	44.0	19.80	**15.84**	**1,088**	100

[a] *Following FA harvesting regulations, and deducting buffers along streams and biodiversity areas.*
[b] *After subtracting wastage at 20 percent.*

4.3.2. Scenario Results for Mondulkiri Study Area

Under the "cut and run" scenario for the Mondulkiri area, realised timber volume is 50 m^3/ha and timber rents are about $3,700/ha (Table 4.6a). Nearly 40 percent of the rent comes from the illegal harvest of luxury timber (beng), while another third of the rent is generated mainly through the harvest of two Group 5 species (sokram and kakah). Although sralao species account for about half of the realised volume, the inefficiencies involved with processing it and the lower market value (since it is currently only sold to domestic consumers), mean it only accounts for about 20 percent of overall rent, and even this may well be an overestimate. Resin trees represent only a marginal amount (3 percent) of the rent.

As with the Preah Vihear area, the results of the SFM scenario in Mondulkiri make it clear why logging operations have large incentives to resist SFM in favor of "cut and run" logging. At 25 m^3, the realised volume under SFM is only half of what is harvested under Scenario 1, and timber rents ($1,200/ha) (Table 4.6b) amount to only one-third of what is generated under Scenario 1. The disproportionate reduction in rent occurs because no luxury timber is harvested.

Table 4.6a: Estimated timber rent/ha at the Mondulkiri site under Scenario 1

Scenario 1: "Cut and Run" (conventional logging)					
Commercial group	**Standing volume >40 cm dbh (m^3/ha)**	**Volume attractive for harvest (@70%) (m^3/ha)**	**Realised felling volume[a] (m^3/ha)**	**Realised Rent ($/ha)**	**% of Total Rent**
1	1.4	1.0	0.7	57	1.5
2 (non resin)	1.5	1.0	0.7	58	1.6
2 (resin)	3.3	2.3	1.6	128	3.5
3	2.1	1.5	1.1	95	2.6
5 (luxury)	9.4	6.6	4.6	1,376	37.4
5 (other)	36.3	25.4	17.8	1,246	33.9
5 (sralao)	48.7	34.1	23.9	716	19.5
Non-commercial	81.4	56.9	39.9	0	0
Total commercial volume (with resin)	102.7	71.9	**50.3**	**3,674**	100
Total commercial volume (w/out resin)	99.4	69.6	48.7	3,547	NA

[a] *After subtracting wastage at 30 percent.*

Table 4.6b: Estimated timber rent/ha at the Mondulkiri site under Scenario 2

Scenario 2: Sustainable Forest Management (responsible logging)					
Commercial Class	**Standing volume >60 cm dbh (m^3/ha)**	**Volume allowed to harvest[a] (m^3/ha)**	**Realised felling volume[b] (m^3/ha)**	**Realised Rent ($/ha)**	**% of Total Rent (without resin)**
1	1.4	0.72	0.52	42	3.4
2 (non resin)	0.0	0.00	0.00	0	0.0
2 (resin) – not cut, shown for illustration	2.7	1.34	0.97	77	NA
3	1.5	0.77	0.56	50	4.1
5 (luxury)	4.5	0.00	0.00	0	0.0
5 (other)	28.2	14.08	10.14	710	57.8
5 (sralao)	39.5	19.75	14.22	427	34.7
Non-commercial	*43.4*	*21.72*	*15.64*	0	
Total commercial volume (with resin)	121.3	58.4	42.05	1,306	NA
Total commercial volume (w/out resin)	75.2	35.3	**25.4**	**1,228**	100

[a] *Following FA harvesting regulations, and deducting buffers along streams and biodiversity areas.*
[b] *After subtracting wastage at 20 percent.*

4.4. Rent Distribution and Logging Impacts Under an Extended Scenario Analysis

The scenario analysis is extended here to assess potential rents and other impacts under different forms of HVF management for a 5,000-hectare area at the Preah Vihear and Mondulkiri study sites. This is a similar size to the forest in the southern region of the Cherndar Plywood concession that villagers in the Preah Vihear study area would like to take out of timber production by the concession and bring under community management for resin tapping and other basic livelihood activities. Under Scenario 1 ("cut and run"), it is assumed that logging operations complete their timber harvesting from the 5,000-ha area in five years (1,000 ha/year). Scenario 2 (SFM) assumes a 25-year period of harvesting (200 ha/year).[48]

In addition to these two scenarios, two variants are added. First, Scenario 1a considers rents and impacts from "cut and run" logging if only trees >60 cm dbh are harvested (rather than trees >40cm dbh). This variant is provided to illustrate rents and impacts for somewhat

[48] A discount rate of 10 percent is applied to calculate net present rent values for these scenarios and the two variants.

more selective/responsible logging operations. Second, Scenario 2a considers the management option of Community Forestry where the community is following SFM guidelines. This scenario assumes the same rent as provided under SFM, but with additional rent from harvesting some resin trees deemed non-productive by the community. Based on an estimate that eight percent of resin trees in tappable size classes are non-productive (Evans *et al.* 2003), this scenario allows for the harvest of half of these trees (four percent). No tapped resin trees or resin trees "in reserve" are harvested. Annex B provides more information on assumptions and calculations.

In addition to estimates of rent under these scenarios, this section assess how rents and other impacts from logging are distributed across four major HVF stakeholder groups: (1) government (royalties)[49]; (2) companies and other "powerful" actors; (3) local villagers; and (4) environment. Of particular interest is the impact of different management scenarios on poverty creation/reduction.

It should be noted that there is a third, plausible scenario that is not considered here; an unsustainable 'cut and stay' approach by local communities. The financial picture would probably be similar to that in Scenario 1, although with perhaps a greater capture of revenue by the state through royalties etc. Just as with concessionaires and sub-contractors, there is a strong financial incentive for communities put in charge of their own forests to opt for liquidation of the resource in exchange for maximum short term profits. There are several factors favouring this option, including doubt over the long-term security of tenure, heavy discounting of future income, the ease with which strong external actors can apply pressure, and a wish to obtain capital quickly to enable a move into another sector. There are also some strong factors operating in favour of SFM by communities (as compared to concessionaires), notably greater susceptibility to law enforcement, lower capital availability for machinery etc, greater vulnerability to any local environmental impacts, reliance on other productive resources in the forest, lack of alternative livelihoods once the forest resource is gone and (in places) a traditional cultural respect for the forest. In some places around the world, community management of rich timber resources is showing signs of success (e.g. in Mexico, Bray *et al.* 2003) but this is the exception rather than the rule.

4.4.1. Extended Scenario Results for Preah Vihear Study Area

As expected, scenario results indicate that logging operations and associated powerful actors have tremendous incentives to log as many commercial species as possible (>40cm dbh) in a rapid fashion, rather than harvest more selectively or in a sustainable manner. Indeed, total rent generated in the Preah Vihear study area under Scenario 1 is twice that of Scenario 1a, and 8-10 times that of Scenarios 2 and 2a (Table 4.7). And the harvesting of resin trees plays a major role. Resin trees account for about half the rent generated under Scenarios 1 and 1a, adding $9.2 million and $6.5 million, respectively.

While the royalty amounts collected by government only vary slightly under the different management approaches, ranging from $1 million (Scenario 2) to $1.9 million (Scenario 1), rent levels accruing to logging operations and associated powerful actors vary dramatically. Under Scenarios 1 and 1a, logging operations and other powerful actors capture most of the rent ($17 million) due to weak royalty collection. Their share of the rent falls dramatically under Scenario 2 (to $ 1 million), because they are less involved in management, harvesting levels are lower, and rent collection and regulatory control is more effective. Rent to logging companies and other actors is further reduced under Scenario 2a because, in return for community management, a proportion of the rent goes toward local development.

[49] Under Scenarios 1 and 1a, government royalty collection is assumed to be 10 percent of total rent, consistent with past collection effectiveness. Royalty collection improves to 50 percent of total rent under Scenarios 2 and 2a due to more transparent procedures and better monitoring of logging activity.

About 400 tapping households (2,300 people) in the five villages studied (and perhaps others in the area not surveyed) experience major negative impacts to their livelihoods under Scenarios 1 and 1a. These households lose 50 percent of their resin income, equal to $50/yr or about 15 percent of total household income. With 86 percent of these households already living below the poverty line, Scenarios 1 and 1a move most households even deeper into poverty. For these households, the net present value of resin lost due to logging under Scenario 1 and 1a is about $200,000.[50]

Under Scenario 2, villages in the study area see no change in their livelihoods since forest resources are not significantly affected and villagers do not receive a share of the rent (because they are not actively involved in management). This changes under Scenario 2a, where it is assumed that villages manage and monitor their forests, supervising subcontractors as they carry out SFM logging activities. In return for this management, the villages receive 25 percent of the rent – equal to an annual inflow of $65,000 in revenue for local development.

Although no attempt is made here to quantify the impacts to the environment under the scenarios, it is possible to arrive at some general conclusions. Scenarios 1 and 1a lead to high levels of forest degradation and loss, with severe impacts to biodiversity and ecological services in the area. Residual forests are at high risk of conversion and wildlife is threatened due to hunting by loggers, better access to areas for other hunters, and habitat destruction. Ecological services, such as the stabilisation of watersheds to regulate flooding, are reduced due to clear felling and logging along streams. In contrast, Scenarios 2 and 2a only affect the environment in a more modest manner, as sustainable logging "opens up" some previously less accessible areas and it is assumed that adherence to wildlife protection laws will be somewhat better than in Scenario 1.

4.4.2. Extended Scenario Results for Mondulkiri Study Area

Scenario results in Mondulkiri follow largely the same pattern as in Preah Vihear, with the exception that resin trees play a much lesser role in timber rents (Table 4.8). Reflecting the lower volume of standing commercial timber, total rent under the Scenarios 1 and 1a in Mondulkiri is somewhat less than in Preah Vihear. Nonetheless, logging operations and associated powerful actors still have enormous incentives to log as much as possible in a rapid manner, rather than harvest more selectively or responsibly, as doing so would reduce their rent capture by a considerable amount.

The different scenarios have little effect on the level of government royalties collected, but a significant impact on local livelihoods. Resin trees represent a small proportion of the timber harvest under Scenarios 1 and 1a, due to their low density in the Mondulkiri site area, but each individual resin tree in Mondulkiri contributes considerably more to household income in Mondulkiri than a resin tree contributes in Preah Vihear. This is because resin prices in Mondulkiri are about twice as high as resin prices in Preah Vihear, and Mondulkiri tappers collect greater resin volumes from each tree by making collection trips throughout the year (2-3 times the number of trips taken in Preah Vihear). As a result, the loss of a small number of resin trees in Mondulkiri can have a big effect on household income. Under Scenarios 1 and 1a, roughly 300 households (1,500 people) lose 10 percent of their resin trees, resulting in a loss of $30/yr equal to a 5-10 percent drop in total income. About 60 percent of these households are already living below the poverty line. The net present value of resin lost due to logging is about $100,000.

As was the case in Preah Vihear, Scenario 2 has no effect on livelihoods, but when villagers take on forest management responsibilities under Scenario 2a, they gain a share of

[50] When a resin tree is harvested, all future resin income from that tree is lost. This estimate reflects the net present value of this lost income for a 25-year period at a discount rate of 10 percent.

the rent. This rent amounts to an annual inflow of $60,000 in revenue for local development. Impacts to the environment of the area follow the same pattern as described above for the Preah Vihear study area.

4.5. Summary

Timber resources in the three study areas are sufficient to support lucrative harvests, especially under conventional “cut and run” logging operations. Resin trees represent about half of the timber volume and rent in the Preah Vihear area (and perhaps in Kompong Thom as well), suggesting that logging operations in these areas will have great incentives to cut resin trees regardless of the legal prohibition. Such actions will significantly increase poverty in the area for more than half of the households. This income cannot easily be replaced because employment alternatives in the area are scarce.

Expecting logging companies to adopt sustainable forest management appears to be a non-starter, as rents fall dramatically under such an approach. No operation that can carry on with conventional logging will want to adhere to a management approach that reduces timber rents by nearly 90 percent, especially if there remain few enforced penalties for non-compliance. "Commercial” community forestry offers one promising option under which sustainable management can be achieved while timber resources meaningfully contribute to poverty reduction. For this approach to succeed in HVF areas, however, will require fundamental changes in the forestry sector toward a poverty reduction and rural development focus. It may also require legal changes to the Forestry Law and Community Forestry Subdecree to allow for communities to benefit commercially from timber resources and a strong set of safeguards to prevent communities choosing to 'cut and stay' in return for quick profits.

Table 4.7: Preah Vihear Study Area: HVF Management Scenario Results for 5,000 Hectare Area

	Rents from Logging		**Distribution of Rents and Logging Impacts by Stakeholder**				
Scenarios	*Rent ($/ha)*	*Total rent from logging of 5,000 ha forest area (NPV)*	*Government Royalties*	*Companies and other powerful actors*	*Local households, villages, and rural development*[a]	*Environment*	*Main Assumptions*
Cut and Run Logging I: Commercial species >40cm dbh	$5,000	$19.1 million	$1.9 million	$17.2 million	About 400 HHs (2,300 people) lose half their resin trees. In turn, their income falls by $50/yr (15% drop in total income). With 86% of HHs already below the poverty line, losses move most HHs deeper into poverty. Net present value of resin lost due to logging is about $200,000. Other villages in the area (not surveyed) may be affected.	Forest is highly degraded/deforested after 5 years, severe impact to biodiversity and ecological services	Forest is logged in 5 years (1,000 ha/yr), 70 percent of resin trees cut, government royalty collection = 10% of rent, which is consistent with past collection effectiveness
Results if resin trees not cut	$2,600	$9.9 million	$1 million	$8.9 million			
Cut and Run Logging II: Commercial species >60cm dbh	$3,200	$12.1 million	$1.2 million	$10.9 million			
Results if resin trees not cut	$1,500	$5.6 million	$0.6 million	$5 million			
Sustainable Forest Management (Logging conducted by companies)	$1100	$2.0 million	$1 million	$1 million	Status quo.	Quality and integrity of forest remains, minor impacts to biodiversity and ecology.	SFM in accordance with government requirements (analysis shows 25 yr period, 200 ha/yr), government royalty collection = 50% of rent, reflecting more transparent practices
Community Forestry – SFM (Subcontractors work under supervision of Community Forest)	$1,300[b]	$2.3 million	$1.2 million	$0.6 million for subcontractors and others	$0.6 million for local development, annual inflow of $65,000 across 10 villages		

[a] *Only impacts to resin are quantified here; other forest resources are likely to be affected as well. In addition, other benefits/losses associated with scenarios are not quantified, such as impacts from the influx of logging labour, local employment opportunities, changes in access to markets, and so on.*

[b] *Assumes the same rent level as under SFM, plus the additional logging of 0.5 exhausted/non-productive resin trees per ha. With inventory estimates indicating 12.5 resin trees per ha in the Preah Vihear area, harvesting 0.5/ha would be equal to about four percent of all resin trees. CF supervision can ensure that only exhausted/non-productive resin trees are allowed for harvest. The four percent estimate appears conservative, based on previous work by Evans et al. (2003), which by observation found that eight percent of resin trees (208 out of 2,555) were either "non-starter trees" or "exhausted trees" in Mondulkiri.*

Table 4.8: Mondulkiri Study Area: HVF Management Scenario Results for 5,000 Hectare Area

	Rents from Logging		**Distribution of Rents and Logging Impacts by Stakeholder**				
Scenarios	*Rent ($/ha)*	*Total rent from logging of 5,000 ha forest area (NPV)*	*Government Royalties*	*Companies and other powerful actors*	*Local households, villages, and rural development*[a]	*Environment*	*Main Assumptions*
Cut and Run Logging I: Commercial species >40cm dbh	$3,700	$13.9 million	$1.4 million	$12.5 million	Although a small fraction of the harvest, resin tree losses still have significant impact. About 300 HHs lose 10% of their resin trees. Income falls by $30/yr (5-10% drop in total income). About 60% of these HHs are already below the poverty line. The net present value of resin lost due to logging is about $100,000.	Forest is highly degraded/deforested after 5 years, severe impact to biodiversity and ecological services	Forest is logged in 5 years (1,000 ha/yr), 70 percent of resin trees cut, government royalty collection = 10% of rent, which is consistent with past collection effectiveness
Results if resin trees not cut	$3,500	$13.4 million	$1.3 million	$12.1 million			
Cut and Run Logging II: Commercial species >60cm dbh	$2,400	$9.2 million	$0.9 million	$8.3 million			
Results if resin trees not cut	$2,300	$8.9 million	$0.9 million	$8.0 million			
Sustainable Forest Management (Logging conducted by companies)	$1200	$2.2 million	$1.1 million	$1.1 million	Status quo.	Quality and integrity of forest remains, minor impacts to biodiversity and ecology.	SFM in accordance with government requirements (analysis shows 25 yr period, 200 ha/yr), government royalty collection = 50% of rent, reflecting more transparent practices
Community Forestry – SFM (Subcontractors work under supervision of Community Forest)	$1,200[b]	$2.2 million	$1.1 million	$0.6 million for subcontractors and others	$0.6 million for local development, annual inflow of $60,000.		

[a] *Only impacts to resin are quantified here; other forest resources are likely to be affected as well. In addition, other benefits/losses associated with scenarios are not quantified, such as impacts from the influx of logging labour, local employment opportunities, changes in access to markets, and so on.*

[b] *As with Preah Vihear, this assumes the same rent level as under SFM, plus additional logging of exhausted/non-productive resin trees (equal to four percent of resin trees/ha). But because there is a very low density of resin trees in the Mondulkiri study area, this logging adds very little to the rent estimates.*

Chapter 5:
Conclusions and Recommendations

With logging operations generally focused on timber "mining", and royalty collection ineffective, forest management in Cambodia has yet to deliver the economic, conservation, and rural development benefits envisioned. At the same time, the management process has tended to marginalise local forest users and producers, reducing their access to forest resources and markets. Based on experiences in Cambodia and elsewhere in the region, continuation of the current commercial forestry model will result in further forest losses with little revenue generated for government. It will not lead to poverty reduction and rural development. Indeed, findings of this study suggest some logging operations (and some agricultural concessions) are helping to move villages in HVF areas into poverty, not out of it.

Here lies the fundamental issue that requires clear policy direction. For what purpose should high value (production) forests be managed – primarily for economic rent, national government revenue, or rural development and poverty reduction? Scenario analysis makes clear that economic rents are substantially higher under conventional logging. But it matters how these rents are distributed. Whereas one would expect national welfare to improve if rents are retained in the country, foreign-owned logging companies are repatriating a substantial portion of Cambodia's timber rents. Moreover, weaknesses in royalty collection mean that the national government captures only a small fraction of timber rents. Most of the timber windfall appears to be captured by powerful actors and a variety of informal fee takers. Meanwhile, as this study illustrates, villagers in HVF areas are often made poorer. And most of these households are already living below the poverty line.

With a focus on communities living in HVF areas, this study assesses the magnitude and characteristics of forest dependence, examines the status of key forest resources and competition for these resources, and analyses timber rent levels, rent distribution, and other impacts under different forest management scenarios. Drawing on these findings, a number of recommendations are highlighted below. These recommendations are based on the assumption that the most significant sites for biodiversity conservation will remain in protected areas closed to logging and open to some forms of traditional use. With this safeguard in place, significant areas of HVF would still be available for other kinds of management.

1. Make poverty reduction a higher priority of HVF management.

For all the rhetoric about the need for poverty reduction in Cambodia, there is scant evidence that commercial management of HVFs is contributing much in this regard, despite HVFs being one of Cambodia's chief national assets. Royalty collection has been minimal, and is in any case captured at the national level; it is unlikely that much returns to villages in commercial logging areas. Jobs and infrastructure (logging roads) developed by timber operations can benefit some villages in HVF areas, but the contribution of logging jobs tends to be modest and short-term, and roads are usually developed for timber extraction rather than

according to any regional development plan. In addition, trucks overloaded with timber often damage road and bridge infrastructure.

To date, the main response to poor logging practices has been to strengthen the legal framework and encourage commercial timber operations to adopt sustainable forest management (SFM). As argued here (section 2.4.1) and elsewhere (IFSR 2004, McKenney 2002), this strategy appears doomed to failure due to the tremendous financial incentives to avoid SFM. According to scenario analysis (section 4.3 and 4.4), rents are 6-10 times higher under "cut and run" logging compared to SFM. With this in mind, there should be no illusions of "win-win" SFM schemes under which logging companies manage forests for a modest return while fulfilling their responsibilities to village welfare and conservation. Rather a "cut and run" logging scenario should be assumed where commercial logging is allowed, unless regulation and enforcement (and incentives for them) improve dramatically.

If Cambodia is to harness its HVF resources for poverty reduction and rural development, a greater effort is needed to develop and explore the potential of "commercial" community forestry – local forest management that involves commercial activities including modest but sustainable timber harvests. As this study shows through scenario analysis, such an approach could provide substantial revenue for local development and a steady flow of royalties for national accounts as well. Moreover, community forestry can provide villagers with greater security over the forest resources that support nearly half of their household income. A model in line with "village forestry", which has been piloted in Laos, looks to be the most promising starting point (Box 2.2).

2. Improve forest management targeting, focusing first on HVFs under threat.

With limited resources available for forest management, it is important to identify clear management priorities, taking into account current value, clearance pressures and potential value of other land uses. This allows for the targeting of the highest value and most threatened forests as management priorities. Across Cambodia's forest landscape, there is wide variance in forest type, quality, fragmentation, resource value, and so on. Despite this variance, forest management initiatives and commonly used indicators (e.g., forest cover) often make little distinction among forest areas.

Maps presented in this study illustrate the correlation between forest loss/disturbance and (logging) roads, soil quality, and new villages in Cambodia (Maps 2.1-2.6). In addition, a simple mapping exercise to show villages located within 5 km of evergreen and semi-evergreen forest reveals 2,000 villages with 1.4 million people (12 percent of the national population). Clearly, additional targeting analysis is needed to identify HVF areas where multiple threat factors are present (commercial logging, roads, good soil quality, and new villages). Areas under multiple threats are most likely to be cleared next. Due to the threat of resource loss, these are the landscapes where villagers are most likely to be motivated to establish community management. In addition, due consideration should be taken of the variance in resources values (economic and environmental) within HVFs, together with an objective assessment of the benefits of forest conversion as an option on sites with good soils and good accessibility. Additional resource assessments similar to those undertaken for this study would help in understanding the richness of HVF assets.

With a better understanding of forest resources and threatened areas, it is possible to hold a meaningful debate about how best to manage different landscape categories. For example, companies and villagers are competing for resources in a forest landscape of Kompong Thom that has productive "red soils" as well as resin trees (section 3.7.4). Companies are moving forward with agricultural concession activities while villagers want to continue using the area for their agricultural production and resin tapping. There are probably dozens of landscapes in Cambodia facing (or soon to face) similar management issues. As a first step toward developing HVF management priorities, additional targeting analysis is

needed to identify the main categories of forest landscapes requiring immediate management attention.

3. Prohibit commercial logging in those areas of forest where resin trees represent a high proportion of standing commercial timber.

In the HVF areas studied, resin is the most important forest product for household income. Resin tapping also reduces vulnerability because the flow (and resulting income) is more stable than agriculture, the other main livelihood activity. In addition, the legally protected right to tap resin trees can also help households secure loans during times of crisis. Although the harvest of resin trees is prohibited under Article 29 of the Forestry Law, this may be difficult to enforce in forest areas with high proportions of resin trees growing among other commercial species. For instance, this study finds that resin trees represent about half the volume and rent of standing commercial timber in a sampled area of one concession, and data are presented to suggest that this is true more widely in Cambodian HVFs. Given the weaknesses of enforcement, and the enormous financial incentives to harvest resin trees, approving commercial logging plans in areas such as these will entail a very great risk of serious impacts on the livelihoods of the tapping communities. Such areas should be excluded from commercial logging for the foreseeable future, until it is sure that safeguards on the field operations of concessionaires and sub-contractors can be adequately enforced. These areas are likely to cover a high proportion of some concessions (including two of the three sites studied here), and may make their commercial viability doubtful.

4a. Pilot "commercial" community forestry for villages near HVF areas.

Forest products account for nearly half of household income in each of the three HVF areas studied. This occurs despite concession management activities, legal restrictions on some commercial activity (e.g., timber and wildlife), and taxes on forest product trade that depress the prices offered to collectors/producers. Clearly, if local forestry activities were supported and the regulatory framework reformed, forest products could contribute an even greater share of household income and perhaps even move some villages out of poverty.

With forest products such an important part of livelihoods, community forestry in HVF areas deserves to be supported. While this study acknowledges the numerous challenges to establishing community forestry (section 2.4.3), it must also be recognised that the impetus for greater village control of forest resources is here to stay (and consistent with Cambodia's broader efforts toward decentralisation). Drawing on the findings of this study, three elements that will likely be necessary for successful development of community forestry in HVFs are:

- *A clear focus on local economic benefits.* Government and NGOs tend to focus on forest rehabilitation to support "customary use" and some NTFP trade activities. If this focus remains, one should not expect communities to take much interest in forest management, as the management benefits are usually limited. To make community management more attractive, supporters need to place a greater emphasis on commercial activities. Two key elements of this focus should be on reducing onerous taxes on the NTFP trade and making it possible for communities to benefit commercially from timber resources under simple but sustainable approaches. Such benefits are central to the development of community forestry that can be both environmentally and financially sustainable and contribute meaningfully to poverty reduction.
- *Greater emphasis on identifying community forestry "patrons" who can ensure tenure security and enforcement.* While government and NGOs identify the main community forestry need as training and local planning assistance, as well as continuing legal development, villagers say their main need is for high-level patrons who can make their rights to forest resources more secure (against threats from

companies and "outsiders") and support enforcement of community forestry rules. Villagers primarily have district and provincial authorities in mind here, but clearly there should be a role for the Forestry Administration. However, for the Forestry Administration to play an effective role, it will need to view local government and community forestry as potential allies in forest management, not competitors for forest resources. Such a change would allow for trust building between villagers and forestry authorities, which in turn could be the foundation for reducing regulatory costs and forest crimes under community forestry. Indeed, one the Forestry Administration's largest challenges (staffing in remote areas) could be largely surmounted if resin tappers and other forest product collectors, who regularly go long distances into the forest, could be relied on as forest monitors. For such an approach to work, villagers must know that when they report illegal logging and other forest crimes, enforcement measures will be taken. Only with such backing will forest users feel sufficiently empowered to manage forests. Such trust and effectiveness is possible, as evidenced by the reporting and enforcement actions of community forestry in Choam Svay village (section 3.8).

- *Safeguards to prevent 'cut and stay' logging, overhunting and so on by the new forest managers.* The economic pressures to overharvest in return for short term gains are arguably as great for local communities and their sub-contractors as they are for concessionaires and their subcontractors. To overcome this, attention needs to be paid to the development of a system of checks and balances, counteracting the negative pressures and aiming to build on some of the factors that favour community-based management.

It is recommended that these challenges should be addressed in a series of pilots to prepare the way for wider implementation.

4b. Given the timber rents involved, target "commercial" community management pilots in HVF areas where indications of "political will" for it are strongest.

This study finds enormous incentives for "cut and run" logging. Capacity-building efforts and technical guidance (e.g., harvesting guidelines) do not change these incentives. Indeed, without genuine political will, "cut and run" practices can be expected to continue (and even with political will they may be difficult to stop). With limited resources for poverty reduction initiatives, support for community management in HVF areas should only be forthcoming where political will can be demonstrated. In assessing political will, the following indicators deserve consideration:

- *Who are the "patrons" of the initiative?* Who are the main supporters of community management of HVFs? Is this a government initiative, or is it being pushed by NGOs/donors with the hope of government commitment and "ownership"?
- *How much effort is being taken to understand the issues?* How much study and debate is taking place within government to credibly analyse community forestry development challenges? Is this analysis being used to design a technically adequate and politically feasible program of action?
- How can the pursuit of community forestry in HVF areas best be characterised, as a long-term programme or a one-shot symbolic gesture?
- What efforts are being taken to mobilise the key stakeholders – villagers in HVF areas?
- Are sanctions against illegal logging operations in (planned) community forestry areas of HVF occurring, and are they meaningful or symbolic?

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Annex A:
Household Questionnaires

A. Demographic Information

Name of interviewer:.....

Date: (dd/mm/yy) .....
Name of interviewee: ..... Age:.....years Sex: ☐ Male ☐ Female
Number of members in the household:..... persons
Address: ..... Village, ...Commune, ...District.
Year of first settlement in the village .....
Your ethnicity: ..... Your grandparent's ethnicity: .....

B. Employment

1. Main occupations (Tick only one except *sre*, *chamkar*, and shifting cultivation)

☐ shifting rice and/or crop cultivation ☐ *sre* ☐ *chamkar*
☐ resin tapping ☐ fishing ☐ logging timber ☐ salaried employee
☐ handicraft ☐ small business ☐ sell labour ☐ other (specify) .....

2. Secondary occupations (Tick as many as apply)

☐ shifting rice and/or crop cultivation ☐ *sre* ☐ *chamkar* ☐ resin tapping
☐ firewood collecting ☐ other forest product collecting
☐ logging timber ☐ fishing ☐ livestock raising ☐ sell labour
☐ handicraft ☐ small business ☐ salaried employee ☐ other (specify).....

3. Permanent Rice Cultivation

3.1. How much land do you own for permanent rice cultivation (not shifting)? .....ha
3.2. How much of this land was cultivated for rice in 2002? .....ha and 2003?.....ha
3.3. How many cattles/buffaloes do you currently own? ..... heads (2002-03).
3.3.1 Among these total heads, how many can be used to plough?.....heads
3.3.2 Did you hire and/or borrow cattle/buffalo to plough your land?
☐ hire ☐ borrow ☐ other (specify) .....

4. Shifting Cultivation

4.1. Have you been practicing shifting cultivation?
☐ yes ☐ no **[Go to 5.]**
4.2. How many plots are under shifting practice? .....plots
4.3. How much land have been planted? .....ha
4.4. How much land is kept as fallows in turn for next cultivation? .....ha
4.5. How long will you shift from one plot to another? .....months or.....years
4.6. Did you ever need to clear new forests areas for rice or crops in the last five years?
☐ yes ☐ no **[Go to 5.]**

4.7. If yes, what type of forest areas did you clear out?
- ☐ many trees, not logged previously
- ☐ not many trees, but not logged previously
- ☐ logged to some extent previously, degraded forest area
- ☐ other (specify) .....

4.8. Why did you have to clear new forest areas [instead of using old plots]?
- ☐ need more land for crops/rice
- ☐ old plots not productive enough anymore, soil less rich
- ☐ old land given to the new marriage
- ☐ sold out your old land due to severe shock/crisis
- ☐ land grab of your old land
- ☐ other (specify) .....

5. Rice Production and Consumption 2003, 2004 (planned)

5.1. How much unmilled rice did you produce in **2002** and consume in **2003** from your permanent and/or shifting cultivation? What was the market price of unmilled rice in **2002** in your village?

Production (kg)	Consumption (kg)	Surplus (kg)	Deficit (kg)	Strategy for Surplus/Deficit
				☐ store ☐ sell ☐ borrow ☐ buy ☐ seed ☐ other.....
				This row is for calculation purpose only.
Price (in 2002): ☐ dry season..... riel/kg ☐ wet season.....riel/kg (ask a few interviewees only in a village)				

5.2. How much unmilled rice did/will you harvest this year (**2003**)? How much do you plan for your consumption in **2004**? What is the market price of unmilled rice this year (**2003**) in your village?

Production (kg)	Consumption (kg)	Surplus (kg)	Deficit (kg)	Strategy for Surplus/Deficit
				☐ store ☐ sell ☐ borrow ☐ buy ☐ seed ☐ other.....
				This row is for calculation purpose only.
Price (in 2003): ☐ dry season..... riel/kg ☐ wet season.....riel/kg (ask a few interviewees only in a village)				

6. Forest Products for Income and Household Use

6.1. What are the five most important NTFPs that you collect for income generation? (Rank from 1-5 by amount of income generated, 1 is most income)

☐ resin	☐ timber logging	☐ bamboo/shoot
☐ rattan	☐ firewood	☐ wildlife (hunting)
☐ vine	☐ mushroom	☐ choeur chong
☐ medicinal plants/herbs	☐ wild fruits	☐ no, do not collect anything
☐ other (specify)		

6.2. What are the five most important NTFPs that you collect for home consumption?

☐ resin	☐ timber logging	☐ bamboo/shoot/rattan/vine/fuel wood
☐ wildlife (hunting and trap)	☐ mushroom	☐ no, do not collect anything
☐ medicinal plants/herbs	☐ wild fruits	☐ other (specify) .....

INTERNAL USE: Check the category of the interviewee:
- ☐ Resin tapper plus other NTFPs collection (GO TO C)
- ☐ No resin tapping, but collector of other NTFPs (GO TO D)
- ☐ No resin tapping, no collection of NTFPs (GO TO E)

C. For Resin Tapping Households

7. Trips, Tapping, and Income

7.1. How many trips per month do you make to get resin and how many months per (season) year? (Work with the below table)
7.2. What is the average distance to travel to your trees? How many days do you spend in each trip to go, collect resin, and come back? (Work with the below table)
7.3. What is the quantity and price of resin that you get (seasonally)? (Work with the below table)

Seasonal Base		(Last) Year Base
Dry season [2002-03]	Wet season [2003]	
.....trips/month	.....trips/month	.....trips/month
.....months/season	.....months/season	.....months/year
..... km to trees	..... days/trip (by walk) ..... days/trip (by oxcart)	
a. alatus/trach:....kan (30 litre)/trip b. other:.....kan (30 litre)/trip c. other: .....kan (30 litre)/trip d. average:..... kan (30 litre)/trip	a. alatus/trach:.....kan (30 litre)/trip b. other:.....kan (30 litre)/trip c. other:..... kan (30 litre)/trip d. average:..... kan (30 litre)/trip	a. alatus/trach:.....kan/trip b. other:.....kan/trip c. other: .....kan/trip d. average:..... kan/trip
a. alatus/trach:.....riel/kan b. other:..... riel/kan c. other: ..... riel/kan d. average:..... riel/kan	a. alatus/trach:.....riel/kan b. other:..... ..... riel/kan c. other:..... ..... riel/kan d. average:..... ..... riel/kan	a. alatus/trach:.....riel/kan b. other:.....riel/kan c. other: .....riel/kan d. average:..... riel/kan

7.4. Do you sell your resin to one trader only?
☐ yes
☐ no, sell to whichever trader offers the best price **[Go to 7.5.]**
☐ no, sell to whichever trader lends bags/kans **[Go to 7.5.]**
☐ no, sell to whichever trader lend rice/money/medical treatment **[Go to 7.5.]**
☐ no, other (specify) .....
7.4.1. If yes, why?
☐ debt ☐ only a trader serving village ☐ both cases (debt & one trader only)
☐ the trader is your relative ☐ the trader is your friend ☐ other (specify).....
7.5. Do you have any knowledge about the resin prices that tappers in other areas of Cambodia receive for their resin?
☐ yes ☐ no **[Go to 8.]**
7.5.1. If yes, is it higher or lower than your prices? ☐ higher ☐ lower ☐ same
7.5.2. What are those areas where you obtain prices of the resin? .....

8. Ownership

8.1. Are resin trees that you tap owned individually, by group, by businessman, or by the village?
☐ individually ☐ by group When did this practice happen and why? .....
☐ by businessman What are the terms of tapping?.....**[Go to 8.3.]**
☐ by village When did this practice happen and why? .....**[Go to 8.3.]**
8.2. How many trees do you own? (Work with the below table)

Individually	By group
a. alatus/trach:..... trees b. other: ..... trees c. other: ..... trees d. total: ..... trees	a. alatus/trach:..... trees b. other: ..... trees c. other: ..... trees d. total: ..... trees

8.2.1. *Use all (100%) most (75-99%), many (50-74%), some (25-49%), few (1-24%)* to indicate percentage of resin trees currently owned by various ways. (Work with the below table)

Ways of obtaining resin trees ownership	***Percentage***	***When (First Ownership)***
☐ inherited from parents		
☐ went into forest and claimed		
☐ purchased/traded		
☐ sold labour at the beginning		
☐ other (specify)		

8.3. Are there marks/tags on the (tapped**)** trees to indicate that they belong to you?
☐ yes -- What kind of marks/tags do you make? (specify) .....
☐ no -- How do other villagers recognize they are your resin trees?
☐ see tree tap hole, customary rule not to tap ☐ other (specify) .....

8.4. Do you have untapped trees as a "reserve" that you could tap in the future?
☐ yes, How many? ..... trees (Individually owned) ..... trees (Owned by group)
☐ no, tapped all **[Go to 9.]**
☐ if I want more, I purchase **[Go to 9.]**
☐ if I want more, I search in new forest area **[Go to 9.]** ☐ other (specify) .....

8.4.1. If yes, how do you ensure that no one will tap your reserved resin trees?
☐ reserved trees are in the tapped area, and no one enter to tap them
☐ reserved trees are marked/tagged, What are those marks/tags? .....
☐ other (specify) .....

9. Transactions of Trees

9.1. Have you ever sold some of your trees (for being cut down)?
☐ yes ☐ no **[Go To 9.4.]**

9.1.1. If yes, how many and when? List each transaction: (Notice: *the trees were then cut down***)**

(1).....trees .....year (2).....trees .....year (3).....trees .....year

9.2. What price did you charge for an average tree?
From.....R/tree to .....R/tree or average .....R/tree

9.3. Why did you decide to sell trees?
☐ debt or family crisis ☐ offered a good price ☐ other (specify) .....

9.4. Have you ever sold the rights to tap your trees? (Notice*: the trees were not cut down but tapped by the purchaser*) ☐ yes ☐ no **[Go To 10.]**

9.4.1. If yes, how many? .....trees

9.4.2. What were the terms.....riel per tree.

9.4.3. For how long? .....years or..... months or .....seasons

9.5. Why did you decide to sell rights to your trees?
☐ debt or family crisis ☐ offered a good price ☐ other (specify) .....

10. Debt

10.1. Are you in debt? ☐ yes **[Go to 10.2]** ☐ no

10.1.1. If no, have you paid off debt recently? ☐ yes **[Go to 10.2]** ☐ no **[Go to 11]**

10.2. Who are/were you in debt to?
☐ resin trader ☐ relative ☐ other moneylender ☐ villager/neighborer
☐ rice bank ☐ other (specify).....

10.3. For what purpose did you borrow?
☐ family member(s) got serious illness/death
☐ lack of food as the result of poor crops due to flood/drought
☐ food/ingredients (sugar, meats, vegetable, ...) ☐ other (specify) .....

10.4. How did you originally borrow?
☐ in cash, How much?.....riel
☐ in rice How much in cash?.....riel
☐ in food/ingredients How much? .....riel
☐ in medical treatment How much? .....riel
☐ other (specify) .....

10.5. When did you borrow this amount? Date (mm/yy) .....

10.6. What are/were the terms for paying back this debt?
☐ pay debt by resin sale ☐ pay debt by rice
☐ pay in cash [☐ interest rate ☐ no interest rate]
☐ other

10.7. Would you be able to let us know how much is your current debt? **(Not valid for those who have paid off debt recently)**
..... kans in resin .....kg in rice
..... riel in cash .....(other, specify)

10.8. When do you expect to/did you finish paying off this debt? Date (mm/yy).....

11. Forest Management, Monitoring, and Sustainability Issues

11.1. How would you describe the location of your resin trees?
☐ located close together in groups ☐ scattered, not many trees close together ☐ mainly along streams, some close together and some not ☐ other (specify)....

11.2. Do you usually collect other NTFPs in these areas when you tap resin?
☐ yes ☐ no **[Go to 11.3.]**

11.2.1. If yes, do you "own" the resources in these forest areas, or can anyone take products from here?
☐ no, resources are shared, except resin
☐ yes, I own and no one can ☐ other (specify) .....

11.3. When you go on trips for resin tapping or to collect other forest products, have you ever noticed damage to the forest?
☐ yes Specify (if important) ..... ☐ no **[Go To 11.4.]**

11.3.1. If yes, what did you do about it?
☐ did nothing/ignore ☐ talked with other villagers ☐ told village chief or elder
☐ told commune council ☐ told forestry authority
☐ directly asked those causing the damage to stop ☐ other (specify) .....

11.3.2. What was the result of this action? .....

11.4. Do you know of other tappers in the village who commonly hunt wildlife on trips to get resin?
☐ yes ☐ no **[Go to 11.5.]**

11.4.1. If yes, why? ☐ for consumption (Which wildlife? .....)
☐ for sale (Which wildlife? .....)

11.5. Is wildlife important to your livelihood?
☐ yes, spirit/religious significance Specify (if necessary) .....
☐ yes, served as food ☐ yes, income from trade
☐ no, not important to livelihood ☐ no comment or N/A
☐ other (specify).....

11.6. Do villagers traditionally apply any rules or restrictions on forest product collection? (eg. 50 poles of bamboo are allowed to be cut down per person per trip, no hunting of specified animals, no harvesting of products in specified areas [spirit forests], etc.)
☐ yes -- 11.6.0. What are the rules?.....
☐ no -- 11.6.1. Why? ☐ plenty of resources for all ☐ no comments
☐ no plan with rules developed, but need one
☐ rules will not be followed, even if plan is developed
☐ other.....

11.7. Would you like to see your children earn income and maintain their livelihood from the forest as you are now doing?
☐ yes ☐ no -- 11.7.0. Why is that? .....**[Go To 12]**

11.7.1. If yes, which forest product collection activities would be most important to maintain for your children? (Rank top three, 1 indicates most important)
☐ resin ☐ timber logging ☐ bamboo(shoot), rattan, vine, firewood
☐ wildlife (hunting) ☐ mushroom ☐ medicinal plants/herbs
☐ wild fruits ☐ other (specify) ...

12. Conflicts, Losses, and Resolution

12.1. Have you had an experience where resin has been stolen from your trees by others?
☐ yes ☐ no **[Go to 12.2.]**

12.1.1. If yes, how often does this happen?
☐ often ☐ sometimes ☐ rarely

12.2. Did you ever cut some of your resin trees for sale?
☐ yes ☐ no

12.3. Did you ever see or hear about resin trees being cut (by concessionaires or illegal loggers)?
☐ yes 12.3.1. When did you see or hear about it? ..... ☐ no

12.4. Have you lost some resin trees to logging in the past?
☐ yes ☐ no **[Go to 12.7]**

12.4.1. If yes, how many resin trees were lost?
(1).....trees.....year (2).....trees.....year (3).....trees .....year
(4) total .....trees so far.

12.5. Why were your trees lost?
☐ cut down by concessionaires ☐ cut down by illegal loggers ☐ other (specify) .....

12.6. How has this loss of resin trees changed your livelihood? (Rank top three)
☐ focus on clearing more land for farming (*sre*/*chamkar*)
☐ collect more forest products or cut wood/trees for sale ☐ wage labour
☐ migrate ☐ take children out of school to work
☐ no change in activities, just less income ☐ other (specify) .....

12.7. Can you identify the source of conflicts over forest use, including resin in your area?
☐ concessionaires/companies ☐ government authorities/military
☐ land tenure problems ☐ villagers from my village ☐ outside villagers
☐ never had serious conflicts **[Go to 12.10.]** ☐ other (specify) ....
Describe the problems! .....

12.8. Whenever you have had conflicts (such as resin trees cut or indication that resin trees will be cut), which measures have you taken to resolve those conflicts?
☐ told forestry authority ☐ told village chief or elder ☐ told commune council
☐ directly negotiated with logger to stop ☐tried to get compensation, not successful
☐ got compensation
12.8.1. [price:.....riel/tree] ☐ did nothing ☐ other (specify).....

12.9. Were past conflicts successfully solved with satisfaction?
☐ Resolved successfully to satisfaction
☐ Not resolved, but some compensation/satisfaction
☐ Not resolved at all, no satisfaction ☐ other (specify) .....

12.10. If all of your (remaining) resin trees were cut down and you could no longer tap, how would you change your livelihood? (Rank top three)
☐ (focus on) clearing more land for farming (*sre*/*chamkar*)
☐ collect more forest products or cut wood/trees for sale ☐ wage labour ☐ migrate
☐ take children out of school to work ☐ no comment or N/A
☐ no change in activities, just less income ☐ other (specify) .....

13. Other NTFPs Income

13.1. Do you go to the forest to collect NTFPs (other than resin) for income generation (last year)?
☐ yes ☐ no **[Go to 14]**

13.2. If yes, what is the distance and/or time to go and come back from the forest for the above purpose?
..... km ..... days (by walk) ..... days (by oxcart)

13.2.1. How often do you go collect NTFPs? .....Trips/year

13.3. How is the distance to access forest resources changing?
☐ go to the same forest area for many years
☐ go to different forest areas but about the same distance
☐ go to more distant forest areas compared to before. 13.3.1. Why?.....

13.4. How much income do you generate from NTFPs (other than resin) each year? (List down 4 items at maximum)

NTFPs	Quantity	Unit	Price/Unit	Total Value	Remarks

Note: Try to get information on a per year/season basis

14. Time of Crisis

14.1. Have you faced severe shocks/crises in the past 5 years when you did not have enough cash/food to meet household needs?
☐ Yes ☐ No **[Go to 14.3.]**
14.1.1. If yes, what was the main reason for the crisis?
☐ flood ☐ drought ☐ wild pig destruction ☐ family illness/death
☐ loss of resin trees ☐ pest ☐ Other.....

14.2. What did you have to do to overcome your recent shocks/crises? (Rank from 1-3 by primary actions, 1 indicates first action)
☐ borrow cash/rice from resin trader
☐ borrowed cash/rice from relatives/neighbors/money lenders
☐ sold out agriculture land or house
☐ sold out cattle/buffalo or transportation means (eg. oxcart, moto, etc.)
☐ increased number of trips to the forest/intensified forest products collection
☐ got help from NGOs ☐ sold out some/all resin trees
☐ family members sold labor ☐ worked harder on rice/crop farming
☐ other (specify) .....

14.3. In looking toward the future, what do you believe are the greatest threats to your livelihood? (Rank them 1-3 at maximum, 1 indicates most serious threats)

☐ flood	☐ drought	☐ wild pig destruction
☐ someone/company cutting my resin trees	☐ restrictions on forest access	☐ lack of cattle/buffalo
☐ security problem, robbery	☐ poor road	☐ human disease/death
☐ animal disease/death	☐ land grabbing	☐ pest

☐ other (specify) .....

15. Knowledge of Laws, Regulations, and Community Forestry

15.1 Who do you think owns the forest in the areas where you tap resin or collect forest products?
☐ villagers ☐ common property, everyone ☐ the State ☐ companies
☐ no comment ☐ other (specify).....

15.2 Have you ever read or learned about forest laws/regulations (rules)?
☐ yes, know a lot ☐ know some, but not too much
☐ no, do not know at all **[Go to 15.5.]** ☐ other (specify) .....

15.3 How did you get that knowledge about forest laws/regulations (rules)?
☐ from radio/TV ☐ from government officials/local authorities
☐ from other villagers ☐ from NGOs ☐ no comment ☐ other (specify) .....

15.4 What are some important rules for using the forest? Please tell us three if you are able:
1. ..... 2. ..... 3. .....
[Do not tell villagers the below list]

☐ not to cut timber	☐ report to forestry officials, village chief, or commune council of any damage to forests or wildlife noticed
☐ not to hunt/trade wildlife	
☐ not to enter concession areas	☐ (forests) customary use is allowed
☐ not clear new forests	☐ other (specify) .....
☐ not to cause forest fires	

15.1. Have you ever heard about a community forestry?
☐ yes ☐ no **[End Interview with the Resin Tapper plus FPs]**
15.1.1. If yes, in your opinion, what are the potential strengths of community forestry? (Rank top two strengths, 1 indicates most important)
☐ forests could be protected from outsiders/concessionaires
☐ villagers getting stronger in forest use and management
☐ more income from the forest to my community
☐ villagers voices are listened to more by authorities
☐ educate people about forest use/conservation
☐ other strengths (specify) .....

15.1.2. If yes, in your opinion, what are the potential weaknesses of community forestry? (Rank top two weaknesses, 1 indicates most important)

☐ effort put into community forest is just a waste of time, no benefits to me
☐ only a small number of villagers support CF activities, but others are inactive
☐ management and enforcement is too difficult, cannot do it well
☐ community management rules cause conflicts with neighboring villages and others
☐ lack of support from provincial authority
☐ other weaknesses (specify) .....**[End Interview with the Resin Tapper plus FPs]**

D. For Forest Users Who Are Not Tappers

16. Past Ownership of Resin Trees

16.1. Why do you not own resin trees?

☐ parents did not inherent ☐ no labor/manpower/skills for tapping
☐ busy with *sre*/*chamkar*/no interest ☐ new settlement
☐ sold trees [Price: .....riel/tree] To whom: .....
☐ cut down trees for sale [Price: .....riel/tree] To whom: .....
☐ resin trees cut down by others **[Go to 16.1.1. and 16.1.2.]** ☐ other (specify).....

16.1.1. *If trees cut down by others*, did you get some compensation?

☐ yes How much was the compensation? .....riel/tree ☐ no

16.1.2. How has the loss of your resin trees affected your livelihood today? (Rank top three, 1 indicates the first action)

☐ clear more land for farming ☐ collect more forest products or cut wood/trees for sale
☐ wage labour ☐ migrate ☐ take children out of school to work
☐ no change in activities, just less income ☐ other (specify) .....

17. NTFPs Collection for Income

17.1. Do you go to the forest to collect NTFPs for income generation (last year)?

☐ yes ☐ no **[Go to 18]**

17.2. If yes, what is the distance and/or time to go and come back from the forest for the above purpose?

..... km ..... days (by walk) ..... days (by oxcart)

17.2.1. How often do you go collect NTFPs? .....Trips/year

17.3. How is the distance to access forest resources changing?

☐ go to the same forest area for many years
☐ go to different forest areas but about the same distance
☐ go to more distant forest areas compared to before. 17.3.1. Why?.....

17.4. How much income do you generate from NTFPs each year? (List down 4 items at maximum)

NTFPs	Quantity	Unit	Price/Unit	Total Value	Remarks

Note: Try to get information on a per year/season basis

18. Debt

18.1. Are you in debt? ☐ yes **[Go to 18.2]** ☐ no

18.1.1. If no, have you paid off debt recently? ☐ yes ☐ no **[Go to 19]**

18.2. Who are/were you in debt to?

☐ resin trader ☐ family member ☐ other moneylender ☐ villager/neighborer
☐ rice bank ☐ other (specify).....

18.3. For what purpose did you borrow?

☐ family member(s) got serious illness/death
☐ lack of food as the result of poor crops due to flood/drought
☐ food/ingredients (sugar, meats, vegetable, ...) ☐ other (specify) .....

18.4. How did you originally borrow?
- ☐ in cash How much?.....
- ☐ in rice How much in cash?.....
- ☐ in food/ingredient (sugar, meat, vegetable,...) How much in cash?.....
- ☐ in medical treatment How much in cash? .....
- ☐ other (specify) .....

18.5. When did you borrow this amount? Date (mm/yy) .....

18.6. What are/were the terms for paying back this debt?
- ☐ pay debt by forest product sales ☐ pay debt by rice/crop sales
- ☐ pay debt by both forest products and crop sales
- ☐ pay debt by cash (☐ interest rate ☐ without interest rate) ☐ other (specify) .....

18.7. Would you be able to let us know how much is your current debt? **(Not valid for those who have paid off the debt recently)**
.....R in cash .....kg in rice .....(other, specify)

18.8. When do you expect to/did you finish paying off this debt? Date (mm/yy) .....

19. Forest Management, Monitoring, and Sustainability Issues

19.1. For areas where you collect forest resources, do you "own" any of the resources?
☐ yes, I own ....., no one can take this ☐ no, all resources are shared

19.2. When you go on trips to collect forest products, have you ever noticed damage to the forest?

☐ yes ☐ no **[Go to 19.3.]**

19.2.1. If yes, what did you do about it?
- ☐ did nothing/ignore ☐ talked with other villagers ☐ told village chief or elder
- ☐ told commune council ☐ told forestry authority
- ☐ directly asked those causing the damage to stop ☐ other (specify) .....

19.2.2. What was the result of this action? .....

19.3. Do you know of anyone in the village who commonly hunts (traps) wildlife?
☐ yes ☐ no **[Go to 19.4.]**

19.3.1. If yes, why? ☐ consumption (Which wildlife? .....)
☐ for sale (Which wildlife? .....)

19.4. Is wildlife important to your livelihood?
- ☐ yes, spirit/religious significance Specify (if necessary) .....
- ☐ yes, served as food ☐ yes, income from trade
- ☐ no, not important to livelihood ☐ other (specify) .....

19.5. Do villagers traditionally apply any rules or restrictions on forest product collection? (eg. 50 poles of bamboo are allowed to be cut down per person per trip, no hunting of specified animals, no harvesting of products in specified areas, etc.)
- ☐ yes -- 19.5.0. What are the rules?.....
- ☐ no -- 19.5.1. Why?
  - ☐ plenty of resources for all
  - ☐ no plan with rules developed, but need one
  - ☐ rules will not be followed, even if plan is developed
  - ☐ other.....

19.6. Would you like to see your children earn income and maintain their livelihood from the forest as you are now doing?
☐ yes ☐ no -- 19.6.0. Why is that? ..... **[Go To 20.]**

19.6.1. If yes, which forest product collection activities would be most important to maintain for your children? (Rank top three, 1 indicates most important)
- ☐ resin ☐ timber logging ☐ bamboo/shoot, rattan, vine, firewood
- ☐ medicinal plants/herbs ☐ mushroom ☐ wildlife (hunting)
- ☐ wild fruits ☐ other (specify) .....

20. Conflicts, Losses, and Resolution

20.1. Did you ever see or hear about trees being cut (by concessionaires or illegal loggers)?
☐ yes 20.1.1. When did you see or hear about it? ..... ☐ no

20.2. Can you identify the source of conflicts over forest use in your area?
☐ concessionaires/companies ☐ government authorities/military
☐ land tenure problems ☐ villagers from my village ☐ outside villagers
☐ never had serious conflicts **[Go to 20.5.]** ☐ other (specify) .....
Describe the problems! .....

20.3. Whenever you have had conflicts over forest resources, what measures have you taken to resolve those conflicts?
☐ told forestry authority ☐ told village chief or elder ☐ told commune council
☐ directly negotiated with logger to stop ☐ tried to get compensation, not successful
☐ got compensation 20.3.1. [price:.....riel/tree] ☐ did nothing ☐ other (specify).....

20.4. Were past conflicts successfully solved with satisfaction?
☐ Resolved successfully to satisfaction
☐ Not resolved, but some compensation/satisfaction
☐ Not resolved at all, no satisfaction ☐ other (specify) .....

20.5. If your access to the forest was blocked and you could no longer generate income from forest products, how would you change your livelihood? (Rank top three)
☐ clear more land for farming ☐ wage labour ☐ migrate
☐ take children out of school to work ☐ no change in activities, just less income
☐ other (specify) .....

21. Time of Crisis

21.1. Have you faced severe shocks/crises in the past 5 years when you did not have enough cash/food to meet household needs?
☐ Yes ☐ No **[Go to 21.3.]**

21.1.1. If yes, what was the main reason for the crises?
☐ flood ☐ drought ☐ pests ☐ family illness/death
☐ loss of (access to) forest resources ☐ wild pig destruction ☐ other.....

21.1.2. What did you have to do to overcome your recent shocks/crises? (Rank from 1-3 by primary actions, 1 indicates first action)
☐ borrowed cash/rice from resin traders
☐ borrowed cash/rice from relatives/neighbors/money lenders
☐ sold out agriculture land or house
☐ sold out cattle/buffalo or transportation means (eg. oxcart, moto, etc.)
☐ increased number of trips to the forest/intensified forest products collection
☐ got help from NGOs
☐ sold out some/all resin trees
☐ family members sold labor
☐ worked harder on rice/crop farming
☐ other (specify) .....

21.2. In looking toward the future, what do you believe are the greatest threat to your livelihood? (Rank top three, 1 indicates most serious threats)

☐ flood	☐ drought	☐ wild pig destruction
☐ someone/company cutting my resin trees	☐ restrictions on forest access	☐ lack of cattle/buffalo
☐ security problem, robbery	☐ poor roads	☐ human disease/death
☐ animal disease/death	☐ land grabbing	☐ pest
☐ other		

22. Knowledge of Laws, Regulations, and Community Forestry

22.1. Who do you think owns the forest in the areas where you collect forest products?
☐ villagers ☐ common property, everyone ☐ the State ☐ companies
☐ the military ☐ no comment ☐ other (specify).....

22.2. Have you ever read or learned about forest laws/regulations (rules)?
☐ yes, know a lot ☐ know some, but not too much ☐ no, do not know at all **[Go to 22.5.]** ☐ other (specify) .....

22.3. How did you get that knowledge about forest laws/regulations (rules)?
☐ from radio/TV ☐ from government officials/local authorities
☐ from other villagers ☐ from NGOs ☐ no comment
☐ other (specify) .....

22.4. What are some important rules for using the forest? Please tell us three if you are able:
1. ..... 2. ..... 3. .....
[Do not tell villagers the below list]
☐ not to cut timber
☐ not to hunt/trade wildlife
☐ not to enter concession areas
☐ not clear new forests
☐ not to cause forest fires
☐ report to forestry officials, village chief, or commune council of any damage to forests or wildlife noticed
☐ (forests) customary use is allowed
☐ other (specify) .....

22.5. Have you ever heard about community forestry?
☐ yes ☐ no **[End Interview with the Collector of NTFPs here]**

22.5.1. If yes, in your opinion, what are the potential strengths of community forestry? (Rank top two strengths, 1 indicates most important)
☐ forests could be protected from outsiders/concessionaires
☐ villagers getting stronger in forest use and management
☐ more income from the forest to my community
☐ villagers voices are listened to more by authorities
☐ educate local people about utilize and conserve forest ☐ other strengths (specify) .....

22.5.2. If yes, in your opinion, what are the potential weaknesses of community forestry? (Rank top two weaknesses, 1 indicates most important)
☐ effort put into community forest is just a waste of time, no benefits to me
☐ only a small number of villagers support CF activities, but others are inactive
☐ management and enforcement is too difficult, cannot do it well
☐ community management rules cause conflicts with neighboring villages and others
☐ lack of support from provincial authority
☐ other weaknesses (specify) .....

[End interview with the Collector of NTFPs here]

E. For Non-Forest Users

23. Past Activities in Forest Product Collection

23.1. Why don't you go to the forest to collect products?
☐ no good forest resources anymore
☐ family members are old-age
☐ access is prohibited
☐ no (man) labour available
☐ have other business in the village
☐ insecurity going to forest
☐ your current job(s) makes more income than forest product
☐ other (specify) .....

23.2. Did you ever go to the forest in the past?
☐ yes ☐ no **[Go to 24.]**

23.2.1. If yes, what did you collect? (Rank top three products, 1-3)
☐ resin ☐ timber logging ☐ wildlife (hunting)
☐ mushroom ☐ wild fruits ☐ collected nothing
☐ medicinal plants ☐ bamboo/shoot, rattan, vine, firewood ☐ other (specify) .....

24. Debt

24.1. Are you in debt? ☐ yes **[Go to 24.2.]** ☐ no

24.1.1. If no, have you paid off debt recently? ☐ yes ☐ no **[Go to 25]**

24.2. Who are/were you in debt to?
☐ resin trader ☐ relative ☐ other moneylender ☐ villager/neighborer
☐ rice bank ☐ other (specify).....

24.3. For what purpose did you borrow?
☐ family member(s) got serious illness/death ☐ poor crops due to flood/drought☐
food ingredients (sugar, salt, meat,...) ☐ other (specify) .....

24.4. How did you originally borrow?
☐ in cash How much?.....
☐ in rice How much in cash?.....
☐ food ingredients (sugar, salt, meat,...)How much in cash? .....
☐ medical treatment How much in cash? .....
☐ other (specify) .....

24.5. When did you borrow this amount? Date (mm/year) .....

24.6. What are/were the terms for paying back this debt?
☐ pay debt in cash ☐ pay debt by rice/crop sales ☐ other (specify) .....

24.7. Would you be able to let us know how much is your current debt? **(Not valid for those who have paid off debt recently)**
.....R in cash .....kg in rice .....(other, specify)

24.8. When do you expect to/did you finish paying off this debt? Date (mm/yy) .....

25. Time of crisis

25.1. Have you faced severe shocks/crises in the past 5 years when you did not have enough cash/food to meet household needs?
☐ Yes ☐ No **[Go to 25.3.]**

25.1.1. If yes, what was the main reason for the crisis?
☐ flood ☐ drought ☐ wild pig destruction ☐ family illness/death
☐ loss of resin trees ☐ pest ☐ other (specify) .....

25.2. What did you have to do to overcome your recent shocks/crises?
(Rank from 1-3 by primary actions, 1 indicates first action)
☐ borrowed cash/rice from resin traders
☐ borrowed cash/rice from relatives/neighbors/money lenders
☐ sold out agriculture land or house
☐ sold out cattle/buffalo or transportation means (eg. oxcart, moto, etc.)
☐ borrowed cash/rice-milled rice from relative/neighbor/money lender
☐ increase the number of trips to forest for forest products collection
☐ got help from NGOs ☐ family members sold labor
☐ worked harder on rice/crop farming ☐ sold out some/all resin trees
☐ other (specify) .....

25.3. In looking toward the future, what do you believe are the greatest threat to your livelihood? (Rank top three, 1 indicates most serious threats)

☐ flood	☐ drought	☐ wild pig destruction
☐ someone/company cutting my resin trees	☐ restrictions on forest access	☐ lack of cattle/buffalo
☐ security problem, robbery	☐ poor road	☐ human disease/death
☐ animal disease/death	☐ land grabbing	☐ pest
☐ other (specify)		

26. Knowledge of Laws, Regulations, and Community Forestry

26.1. Who do you think owns the forest?
☐ villagers ☐ common property, everyone ☐ the State ☐ companies
☐ no comment ☐ the military ☐ other (specify).....

26.2. Have you ever read or learned about forest laws/regulations (rules)?
☐ yes, know a lot ☐ know some, but not much
☐ no, do not know at all **[Go to 26.5.]** ☐ other (specify) .....

26.3. How did you get that knowledge about forest laws/regulations (rules)?
☐ from radio/TV ☐ from government officials/local authorities
☐ from other villagers ☐ from NGOs
☐ no comment ☐ other (specify) .....

26.4. What are some important rules for using the forest? Please tell us three if you are able:
1. ..... 2. ..... 3. .....

[Do not tell villagers the below list]

- ☐ not to cut timber
- ☐ not to hunt/trade wildlife
- ☐ not to enter concession areas
- ☐ not clear new forests
- ☐ not to cause forest fires
- ☐ report to forestry officials, village chief, or commune council of any damage to forests or wildlife noticed
- ☐ (forests) customary use is allowed
- ☐ other (specify) .....

26.5. Have you ever heard about community forestry?

☐ yes ☐ no **[End Interview with the Non-Forest User here]**

26.5.1. If yes, in your opinion, what are the potential strengths of community forestry? (Rank top two strengths, 1 indicates most important)

- ☐ forests could be protected from outsiders
- ☐ villagers getting stronger in forest use and management
- ☐ more income from the forest to my community
- ☐ villagers voices are listened to more by authorities
- ☐ educate local people about forest use/conservation
- ☐ other strengths (specify) .....

26.5.2. If yes, in your opinion, what are the potential weaknesses of community forestry? (Rank top two weaknesses, 1 indicates most important)

- ☐ effort put into community forest is just a waste of time, no benefits to me
- ☐ only a small number of villagers support CF activities, but others are inactive
- ☐ management and enforcement is too difficult, cannot do it well
- ☐ community management rules cause conflicts with neighboring villagers and others
- ☐ lack of support from the provincial authority
- ☐ other weaknesses (specify) .....

Thank you for your co-operation.

Annex B:
Scenario Calculations

Preah Vihear Scenario Only

Scenario 1: Cut and Run >40 cm

Commercial group	Standing volume >40 cm dbh (m^3/ha)	Volume attractive for harvest (@70%) (m^3/ha)	Realised felling volume* (m^3/ha)	Realised Rent ($/ha)	% of Total Rent
1	22.5	15.7	11.0	882	17.5
3	11.8	8.3	5.8	521	10.3
2 (non resin)	-	-	-	-	-
2 (resin)	62.1	43.4	30.4	2,433	48.3
5 (lux)	2.0	1.4	1.0	292	5.8
5 (other)	25.0	17.5	12.2	857	17.0
5 (sralao)	3.4	2.4	1.7	50	1.0
Non-commercial	11.7	8.2	5.7	-	
Total commercial	126.7	88.7	62.1	**5,034**	
Total without resin	64.7	45.3	31.7	2,601	
Grand Total	138.4	96.9	67.8	5,034	

Scenario 1a: Cut and Run >60 cm

Commercial group	Standing volume >60 cm dbh (m^3/ha)	Volume attractive for harvest (@70%) (m^3/ha)	Realised felling volume* (m^3/ha)	Realised Rent ($/ha)	% of Total Rent
1	16.4	11.5	8.0	643	20.1
3	6.1	4.3	3.0	269	8.4
2 (non resin)	-	-	-	-	-
2 (resin)	43.7	30.6	21.4	1,713	53.6
5 (lux)	-	-	-	-	-
5 (other)	16.4	11.5	8.0	563	17.6
5 (sralao)	0.4	0.3	0.2	6	0.2
Non-commercial	4.7	3.3	2.3	-	
Total commercial	83.0	58.1	40.7	**3,193**	
Total without resin	39.3	27.5	19.3	1,480	
Grand Total	87.7	61.4	43.0	3,193	

Scenario 2: SFM

Commercial group	Standing volume 60+	trees not cut (50%, 0 for luxury)	Minus conservation /roads %	Minus wastage % = realised harvest volume	Realised Rent ($/ha)	% of Total Rent (without resin)
1	16.4	8.2	7.4	5.9	472	43.4
3	6.1	3.1	2.7	2.2	198	18.2
2 (non resin)	-	-	-	-	-	-
2 (resin)	43.7	21.9	19.7	15.7	1,259	-
5 (lux)	-	-	-	-	-	-
5 (other)	16.4	8.2	7.4	5.9	413	38.0
5 (sralao)	0.4	0.2	0.2	0.1	4	0.4
Non-commercial	4.7	2.4	2.1	1.7	-	
Total commercial	83.0	41.5	37.4	29.9	2,346	
Total without resin	39.3	19.7	17.7	14.1	**1,088**	
Grand Total	87.7	43.9	39.5	31.6	2,346	100.0

Mondulkiri Scenario Only

Scenario 1: Cut and Run >40 cm

Commercial group	Standing volume >40 cm dbh (m^3/ha)	Volume attractive for harvest (@70%) (m3/ha)	Realised felling volume* (m^3/ha)	Realised Rent ($/ha)	% of Total Rent	
1	1.4	1.0	0.7	57	1.5	
3	2.1	1.5	1.1	95	2.6	
2 (non resin)	1.5	1.0	0.7	58	1.6	
2 (resin)	3.3	2.3	1.6	128	3.5	
5 (lux)	9.4	6.6	4.6	1,376	37.4	almost all from 1 species
5 (other)	36.3	25.4	17.8	1,246	33.9	almost all from 2 species
5 (sralao)	48.7	34.1	23.9	716	19.5	
Non-commercial	81.4	56.9	39.9	-		
Total commercial	102.7	71.9	50.3	**3,674**		
Total without resin	99.4	69.6	48.7	3,547		
Grand Total	184.0	128.8	90.2	3,674		

Scenario 1a: Cut and Run >60 cm

Commercial group	Standing volume >60 cm dbh (m^3/ha)	Volume attractive for harvest (@70%) (m^3/ha)	Realised felling volume* (m^3/ha)	Realised Rent ($/ha)	% of Total Rent
1	1.4	1.0	0.7	57	2.3
3	1.5	1.1	0.8	68	2.8
2 (non resin)	-	-	-	-	-
2 (resin)	2.7	1.9	1.3	105	4.3
5 (lux)	4.5	3.2	2.2	663	27.2
5 (other)	28.2	19.7	13.8	966	39.6
5 (sralao)	39.5	27.7	19.4	581	23.8
Non-commercial	43.4	30.4	21.3	-	
Total Commercial	77.9	54.5	38.2	**2,440**	
Total without resin	75.2	52.6	36.8	2,335	
Grand Total	121.3	84.9	59.4	2,440	

Scenario 2: SFM

Commercial group	Standing volume >60	Trees not cut (50%, 0 for luxury)	Minus conservation /roads %	Minus wastage% = realised harvest volume	Realised Rent ($/ha)	% of Total Rent (without resin)	
1	1.4	0.7	0.7	0.5	42	3.4	
3	1.5	0.8	0.7	0.6	50	4.1	
2 (non resin)	-	-	-	-	-	-	
2 (resin)	2.7	1.3	1.2	1.0	77	-	
5 (lux)	4.5	-	-	-	-	-	
5 (other)	28.2	14.1	12.7	10.1	710	57.8	mainly 2 species
5 (sralao)	39.5	19.8	17.8	14.2	427	34.7	
non-commercial	43.4	21.7	19.6	15.6	-		
Total commercial	77.9	36.7	33.0	26.4	1,306		
Total without resin	75.2	35.3	31.8	25.4	**1,228**		
Grand Total	121.3	58.4	52.6	42.0	1,306	100.0	

Preah Vihear Scenario Calculations

Cut & Run I >40cm

			Year				
		NPV	**1**	**2**	**3**	**4**	**5**
ha logged - 5 yrs	1,000		1,000	1,000	1,000	1,000	1,000
rent $/ha	5,034		5,034	5,034	5,034	5,034	5,034
NPV rent (10%)	0.1	**$ 19,082,821**	$ 5,034,000	$ 5,034,000	$ 5,034,000	$ 5,034,000	$ 5,034,000
Royalties 10%	0.1	**$1,908,282**	$ 503,400	$ 503,400	$ 503,400	$ 503,400	$ 503,400
If no resin trees cut			Year				
Cut & Run I >40cm		NPV	**1**	**2**	**3**	**4**	**5**
ha logged - 5 yrs	1,000		1,000	1,000	1,000	1,000	1,000
rent $/ha	2,601		2,601	2,601	2,601	2,601	2,601
NPV (at 10% rate)	0.1	**$9,859,836**	$ 2,601,000	$ 2,601,000	$ 2,601,000	$ 2,601,000	$ 2,601,000
Royalties 10%	0.1	**$985,984**	$ 260,100	$ 260,100	$ 260,100	$ 260,100	$ 260,100

Cut & Run II >60cm

			Year				
		NPV	**1**	**2**	**3**	**4**	**5**
ha logged - 5 yrs	1,000		1,000	1,000	1,000	1,000	1,000
rent $/ha	3,193		3,193	3,193	3,193	3,193	3,193
NPV (at 10% rate)	0.1	**$12,103,982**	$ 3,193,000	$ 3,193,000	$ 3,193,000	$ 3,193,000	$ 3,193,000
Royalties 10%	0.1	**$1,210,398**	$ 319,300	$ 319,300	$ 319,300	$ 319,300	$ 319,300
If no Resin Trees Cut			Year				
Cut & Run II >60cm		NPV	**1**	**2**	**3**	**4**	**5**
ha logged - 5 yrs	1,000		1,000	1,000	1,000	1,000	1,000
rent $/ha	1,480		1,480	1,480	1,480	1,480	1,480
NPV (at 10% rate)	0.1	**$5,610,364**	$ 1,480,000	$ 1,480,000	$ 1,480,000	$ 1,480,000	$ 1,480,000
Royalties 10%	0.1	**$561,036**	$ 148,000	$ 148,000	$ 148,000	$ 148,000	$ 148,000

Preah Vihear Scenario Calculations (continued)

SFM-Company

			Year							
		NPV	**1**	**2**	**3**	**4**	**5**	**6**	**…**	**25**
Area (ha)	200		200	200	200	200	200	200	200	200
SFM logging ($/ha)	1,083		1,083	1,083	1,083	1,083	1,083	1,083	1,083	1,083
NPV at 10%	0.1	**$ 1,966,087**	$ 216,600	$ 216,600	$ 216,600	$ 216,600	$ 216,600	$ 216,600	$ 216,600	$ 216,600
Royalties 50%	0.5	**$ 983,043**	$ 108,300	$ 108,300	$ 108,300	$ 108,300	$ 108,300	$ 108,300	$ 108,300	$ 108,300

SFM-CF

			Year							
		NPV	**1**	**2**	**3**	**4**	**5**	**6**	**…**	**25**
Area (ha)	200		200	200	200	200	200	200	200	200
SFM logging ($/ha)	1,083		1,083	1,083	1,083	1,083	1,083	1,083	1,083	1,083
Non-productive resin trees logged ($/ha)	200		200	200	200	200	200	200	200	200
Total	1,283		1,283	1,283	1,283	1,283	1,283	1,283	1,283	1,283
NPV@10%		**$ 2,329,168**	$ 256,600	$ 256,600	$ 256,600	$ 256,600	$ 256,600	$ 256,600	$ 256,600	$ 256,600
Royalties 50%-gov't	0.50	**$ 1,164,584**	$ 128,300							
Royalties 25%-CF	0.25	**$ 582,292**	$ 64,150							
Royalties 25% other	0.25	**$ 582,292**	$ 64,150							

Mondulkiri Scenario Calculations

Cut & Run I >40cm

			Year				
		NPV	**1**	**2**	**3**	**4**	**5**
ha logged - 5 yrs	1,000		1,000	1,000	1,000	1,000	1,000
rent $/ha	3,674		3,674	3,674	3,674	3,674	3,674
NPV (at 10% rate)	0.1	**$13,927,351**	$ 3,674,000	$ 3,674,000	$ 3,674,000	$ 3,674,000	$ 3,674,000
Royalties 10%	0.1	**$1,392,735**	$ 367,400	$ 367,400	$ 367,400	$ 367,400	$ 367,400
If no Resin Trees Cut							
Cut & Run II >40cm			Year				
		NPV	**1**	**2**	**3**	**4**	**5**
ha logged - 5 yrs	1,000		1,000	1,000	1,000	1,000	1,000
rent $/ha	3,547		3,547	3,547	3,547	3,547	3,547
NPV (at 10% rate)	0.1	**$13,445,921**	$ 3,547,000	$ 3,547,000	$ 3,547,000	$ 3,547,000	$ 3,547,000
Royalties 10%	0.1	**$1,344,592**	$ 354,700	$ 354,700	$ 354,700	$ 354,700	$ 354,700

Cut & Run II >60cm

			Year				
		NPV	**1**	**2**	**3**	**4**	**5**
ha logged	1,000		1,000	1,000	1,000	1,000	1,000
$/ha	2,440		2,440	2,440	2,440	2,440	2,440
		$9,249,520	$ 2,440,000	$ 2,440,000	$ 2,440,000	$ 2,440,000	$ 2,440,000
Royalties 10%	0.1	**$924,952**	$ 244,000	$ 244,000	$ 244,000	$ 244,000	$ 244,000
If no Resin Trees Cut							
Cut & Run II >60cm			Year				
		NPV	**1**	**2**	**3**	**4**	**5**
ha logged	1,000		1,000	1,000	1,000	1,000	1,000
$/ha	2,335		2,335	2,335	2,335	2,335	2,335
		$8,851,487	$ 2,335,000	$ 2,335,000	$ 2,335,000	$ 2,335,000	$ 2,335,000
Royalties 10%	0.1	**$885,149**	$ 233,500	$ 233,500	$ 233,500	$ 233,500	$ 233,500

Mondulkiri Scenario Calculations (continued)

SFM-Company

			Year							
			1	**2**	**3**	**4**	**5**	**6**	**…**	**25**
Area (ha)	200		200	200	200	200	200	200	200	200
$/ha	1,228		1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
NPV at 10%	0.1	**$ 2,229,321**	$ 245,600	$ 245,600	$ 245,600	$ 245,600	$ 245,600	$ 245,600	$ 245,600	$ 245,600
Royalties 50%	0.5	**$ 1,114,661**	$ 122,800	$ 122,800	$ 122,800	$ 122,800	$ 122,800	$ 122,800	$ 122,800	$ 122,800

SFM-CF

			Year							
			1	**2**	**3**	**4**	**5**	**6**	**…**	**25**
Area (ha)	200		200	200	200	200	200	200	200	200
SFM logging ($/ha)	1,228		1,228	1,228	1,228	1,228	1,228	1,228	1,228	1,228
Non-productive resin trees logged ($/ha)	11		11	11	11	11	11	11	11	11
Total	1,239		1,239	1,239	1,239	1,239	1,239	1,239	1,239	1,239
NPV@10% SFM	0.1	$ 2,248,492	$ 247,712	$ 247,712	$ 247,712	$ 247,712	$ 247,712	$ 247,712	$ 247,712	$ 247,712
	$2,112	$ 19,171	$ 2,112	$ 2,112	$ 2,112	$ 2,112	$ 2,112	$ 2,112	$ 2,112	$ 2,112
NPV@10% CF	0.1	**$ 2,267,662**	$ 249,824	$ 249,824	$ 249,824	$ 249,824	$ 249,824	$ 249,824	$ 249,824	$ 249,824
Royalties 50%-gov't	0.50	**1,124,246**	$ 123,856							
Royalties 25%-CF	0.25	**562,123**	$ 61,928							
Royalties 25% other	0.25	**562,123**	$ 61,928							

Focusing on Cambodia's High Value Forests: Livelihoods and Management

High value forests (evergreen and semi-evergreen) are one of Cambodia's chief national assets. Compared to other forests, evergreen and semi-evergreen tend to offer greater commercial potential for logging interests, hold higher levels of biodiversity, and provide higher proportions of forest product income to local communities. Given their commercial value, it is not surprising that evergreen and semi-evergreen areas face a greater threat of deforestation than other forest types. Indeed, commercial logging has sharply reduced the amount and quality of these forests across much of Southeast Asia.

With a focus on high value forest areas in Preah Vihear, Kompong Thom, and Mondulkiri, this study examines the magnitude and characteristics of forest dependence, the status of key forest resources and competition for these resources, and the relationship between actual local use/management and official rules and regulations. In addition, a number of management scenarios are analysed to shed light on how different approaches affect the amount and distribution of timber rents and other logging impacts. The study seeks to provide a deeper understanding of these livelihood, resource, and management issues as a basis for developing more effective strategies for achieving poverty reduction and rural development.

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