

SECONDARY FORESTS IN THE LOWER MEKONG SUBREGION: AN OVERVIEW OF THEIR EXTENT, ROLES AND IMPORTANCE

A. Mittelman

Eco-logic Consulting, D./Agricultural Extension and Community Development, Chiang Mai University, Chiang Mai 50202, Thailand

MITTELMAN, A. 2001. **Secondary forests in the Lower Mekong Subregion: an overview of their extent, roles and importance.** Much of mainland Southeast Asia's primary forest has been converted into secondary vegetation types in the past several decades. In the Lower Mekong Subregion, nearly 100 million ha of forest were significantly altered or removed, with depletion in terms of areal percent most severe in Thailand and Vietnam. Timber extraction and conversion of forest land to agriculture are the two principal causes of forest degradation in the region. Logged sites are often later occupied by migrant homesteaders. The current regional focus of logging has shifted to Laos, Cambodia and Myanmar. Secondary forests, despite their frequently degraded status, continue to play direct and supportive roles with respect to socio-economic development. Widespread removal of primary forests has made secondary forests the principal source of supplemental livelihood products for millions of poor rural households. Given the critical role of forests in supporting sustainable development, regional governments and a range of non-government, research and donor organisations are exploring, developing and supporting strategies for reforestation and natural forest regeneration. There is growing acknowledgement that governments on their own are inadequately equipped to achieve sustainable forest management, and new policies delegate greater decision-making authority and forest management responsibility to local communities. Most of the area which policies now envision giving over to community-based sustainable management is secondary forest.

Key words: Lower Mekong Subregion - secondary forests - logging - swidden agriculture - Myanmar - Cambodia - Laos - Thailand - Vietnam

MITTELMAN, A. 2001. **Hutan sekunder di Subkawasan Mekong Rendah: gambaran keseluruhan tentang luas, peranan dan kepentingannya.** Banyak hutan primer di kawasan darat Asia Tenggara ditukar kepada penanaman sekunder beberapa dekad yang lepas. Di Subkawasan Mekong Rendah, hampir 100 juta ha hutan telah diubah atau dialih, dengan penyusutan peratusan kawasan sangat teruk di Thailand dan Vietnam. Pengekstrakan balak dan penukaran tanah hutan kepada pertanian merupakan dua sebab utama pendegradan hutan di kawasan ini. Tapak-tapak pembalakan kemudiannya diduduki oleh penduduk hijrahan. Kawasan tumpuan pembalakan kini berpindah ke Laos, Cambodia dan Myanmar. Hutan sekunder, walaupun dengan status usang berulang kali, terus memainkan peranan secara langsung dan menyokong pembangunan sosio-ekonomi. Kehilangan hutan primer secara besar-besaran menjadikan hutan sekunder sumber utama dalam menghasilkan mata pencarian sampingan bagi berjuta-juta isi rumah luar bandar yang miskin. Oleh sebab hutan berperanan menyokong pembangunan berkekalan, pertubuhan kerajaan dan bukan kerajaan, serta pertubuhan penyelidikan dan penyumbang derma sedang

meneliti, membangun dan menyokong strategi penghutan semula dan pemulihan hutan semula jadi. Semakin diakui bahawa kerajaan sendiri tidak mempunyai kelengkapan yang cukup untuk mencapai pengurusan hutan secara mapan, dan polisi-polisi baru memberikan kuasa membuat keputusan dan tanggungjawab pengurusan hutan yang lebih besar kepada penduduk tempatan. Kebanyakan kawasan yang dijangka akan diserahkan kepada pengurusan mapan berasaskan penduduk ialah hutan sekunder.

Introduction

During the past several decades, the five Lower Mekong Subregion (LMS) countries (Cambodia, Laos, Myanmar, Thailand and Vietnam) combined have lost approximately half of their remaining primary forest area. Much of this area, totalling in the millions of hectares, is now covered by a wide variety of secondary successional vegetation types ranging from early recovery stages, comprising grasses, shrubs and tree seedlings, to open canopy (< 20% cover) forests. These include extensive areas of secondary forest comprising the fallow fraction of swidden agricultural systems, fire-damaged sites, and logged areas. Secondary forests are defined here as “forests regenerating largely through natural processes after significant human disturbance of the original forest vegetation at a single point in time or over an extended period, and displaying a major difference in forest structure and/or canopy species composition with respect to nearby primary forests on similar sites” (Chokkalingam *et al.* 2000).

Despite being simplified in terms of structure and function, secondary forests continue to provide a wide array of goods and services for the LMS countries. The area in secondary forest now appears to exceed significantly than in primary forest. However, despite enormous existing and potential benefits, secondary forests are largely overlooked in terms of research and development, emphasis being focused instead on the region’s rapidly diminishing area of primary forests.

Sustainable management and development of secondary forests in the five LMS countries could potentially enhance the economic and ecological benefits they currently provide. However, with information sorely lacking regarding secondary forest extent, location, condition, conversion processes, as well as current and potential uses, the systematic formulation of programs to optimise benefits accruing from these areas is not yet possible.

This paper provides an overview of the current area, status, dynamics and uses of secondary forests in the five LMS countries using the limited information available. Analysis of the pressures and processes leading to secondary forest formation and transformation, and socio-economic and environmental benefits can enhance secondary forest management planning. The paper also provides a brief overview of national forest policies governing secondary forest uses in the five LMS countries.

Formation and transformation of secondary forests in the LMS

In lower elevation zones, secondary forests result primarily from large-scale intensive and smaller-scale illegal commercial logging activities. In upland and higher elevation areas, shifting cultivation and logging play a role in the transformation of primary forests to secondary forests. Pressures on existing secondary forests include ongoing product exploitation, agricultural in-migration and expansion of export cash cropping.

Commercial logging and agricultural settlement

Intensive commercial logging followed by smaller-scale illegal logging results in the conversion of primary forests to post-extraction secondary forests in the five LMS countries (Figure 1). Post-extraction secondary forests are defined here as “forests regenerating largely through natural processes after significant reduction in the original forest vegetation through tree extraction at a single point in time or over an extended period, and displaying a major difference in forest structure and/or canopy species composition with respect to nearby primary forests on similar sites” (Chokkalingam *et al.* 2000). The commercial logging is driven by national economic development strategies and domestic and international demand for forest products.

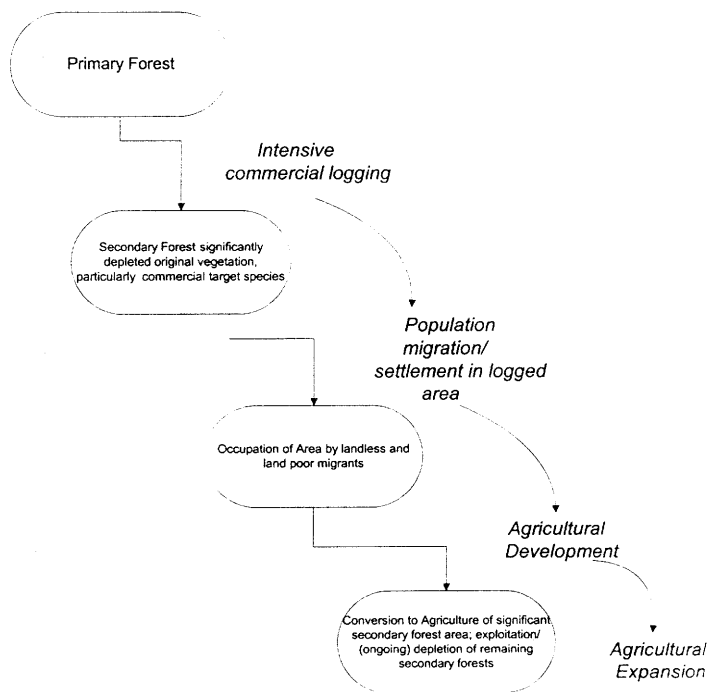


Figure 1 Formation and transformation of post-extraction secondary forests in the LMS

Most of the logged areas are then cultivated by farmers, often prior or current timber operations labourers and their immediate and extended families, as well as in-migrants to the new settlement area. New fields are often cultivated on a short-rotational swidden basis initially. It is worth noting that despite widespread condemnation of minority hill peoples for destruction of forests by swidden agriculture, many of the families involved in the scenario mentioned here are actually of the dominant ethnicity, whether this is Thai Khon Muang, Lao Teung and Khmer in Cambodia, or Kinh in Vietnam.

Small-scale illegal logging operations, fires escaping from fields, and foraging for construction timber, fuelwood and other forest products gradually leads to significant disturbance of surrounding primary forests and regenerating secondary forests. With increased demand for temperate climate vegetables and perennial cash crops (for example, coffee) and adequate transport routes, remaining forests are further eroded by conversion to commercial cash crops. Policies encourage such conversion, and longer-term land tenure security may be available through forest conversion to agricultural tree plantations. Such areas are favoured targets for urban speculation. This process continues with forest degradation and conversion moving upslope. At the same time, middle elevation and highland communities often have a tradition of maintaining local forest areas and continue to attempt to do so for utilitarian and cultural reasons despite commercial pressures to open new lands to cultivation. Consequently, it is common to find small community protected forests, particularly in areas protecting village water resources. Success in preserving remaining local forests depends on population density and the relative efficiency of community governance systems.

Thailand, which has proceeded furthest in terms of economic modernisation, provides an example of what may occur throughout the region in the future. After transformation of forests through commercial logging, farmers were provided with subsidies and credit to develop previously forested areas for export cash cropping (primarily maize and cassava). Similar scenarios appear to be unfolding in Vietnam, particularly in the Central Highlands (though the currently favoured crops are sugar and coffee).

Swidden agriculture

Swidden agriculture has been a traditional and productive form of land use over a large area of Southeast Asia. Until relatively recently, long-fallow swidden agricultural systems as practised by indigenous groups permitted natural regeneration in swidden fallow secondary forests of most or all plant species present in the original forest cover. Swidden fallow secondary forests are defined here as 'forests regenerating largely through natural processes in woody fallows of swidden agriculture for the purposes of restoring the land for cultivation again' (Chokkalingam *et al.* 2000).

However, reduced fallow periods associated with population increase and government efforts to reduce the swidden area have led to a decreased area of swidden fallow secondary forests and an increased area of barren land, particularly

in Laos and Vietnam. Also, there is a trend towards replacement of swidden fallow secondary forests by commercial agricultural tree crop plantations, particularly in northern Thailand and Vietnam's Central Highlands. Minority swidden agriculturists have been displaced to remote forest areas due to the occupation and development of their land by the dominant lowland groups. Schmidt-Vogt (2000) provides a more detailed analysis of swidden agriculture and related secondary forest development in some of the Mekong countries.

Land abandonment and fire

In Thailand, the pronounced move away from swidden agriculture to permanent cash cropping and agroforestry during the past 20 years has resulted in the formation of some post-abandonment secondary forests. Post-abandonment secondary forests are defined here as 'forests regenerating largely through natural processes after total abandonment of alternative land use on formerly forested lands' (Chokkalingam *et al.* 2000).

Post-fire secondary forests are primarily found in pine forest areas of the southern Central Highlands, Vietnam, but are also present throughout the region in areas where swidden fires of lowland in-migrants escape into adjacent forests. Such burning also helps to expand cultivation into surrounding forest areas. Post-fire secondary forests can be defined here as 'forests regenerating largely through natural processes after significant reduction in the original forest vegetation due to a catastrophic human-induced fire or succession of fires, and displaying a major difference in forest structure and/or canopy species composition with respect to nearby primary forests on similar sites' (Chokkalingam *et al.* 2000).

Overview of secondary forest cover and changes in the Lower Mekong Subregion

FAO's 1990 Forest Resources Assessment (FRA) presents data for annually logged and deforested area during the 10-year period from 1981–1990 in the five LMS (continental Southeast Asia) countries (Table 1). Well over 1 million ha of primary forest in each of the five countries were removed and perhaps mostly transformed into secondary vegetation. Given the relatively small percentage of the total deforested area in each of the countries where the cause is attributed to logging (exceptions being Myanmar with 49.4% and Vietnam 42.3%), deforestation appears primarily to be the result of direct agricultural expansion. This has implications for deforested areas left to regenerate into secondary forests.

However, the relatively minor importance attributed to logging as a cause of deforestation in Thailand, Laos and Cambodia may be debatable. FRA 1990 utilised national and sub-national surveys ("existing reliable data") as key data sources (FAO 1996). Possible reasons for underestimation are that a significant percentage of logging may be illegal (Leungaramsri & Rajesh 1992, Brunner *et al.*

Table 1 Total annual deforestation (000 ha) in five LMS countries 1981–1990

Countries	Deforestation (annual)	Evergreen	Moist deciduous	Dry deciduous	Hill and montane	Logged (annual)
Cambodia	131.4	18.3	39.0	73.2	1.0	3
Laos	129.4	39.6	42.7	20.6	26.5	9
Myanmar	400.6	161.6	169.7	4.2	46.3	198
Thailand	515.3	150.8	195.8	122.3	17.9	37
Vietnam	137.0	47.7	55.7	15.7		58

(Source: FAO 1993)

1998, World Bank 1995 cited in Friends of the Earth 1999), and may involve corruption, collusion, ineffective control, and fear of moratoria on international loans with disclosure.

The following subsections examine secondary forest cover status and changes from 1993 to 1997 in four LMS countries (Cambodia, Vietnam, Thailand and Laos) by reviewing data available from the MRC/GTZ Forest Cover Monitoring Project (FCMP) (1998) which is restricted to the Mekong catchment area. GTZ/MRC FCMP data are currently the most detailed available for forest cover change in the LMS and show a region-wide conversion pattern from more complex and dense forest cover to less complex and sparser cover. Secondary forests are not considered as a specific category in the GTZ/MRC FCMP data but are probably contained within the two less complex and sparser forest cover categories, 'medium-low cover density' and 'forest mosaic'. In the absence of more detailed information, medium-low cover density and forest mosaic are equated with secondary forests in this paper. Plantations comprise a small fraction of 'medium-low cover density'. Emrich *et al.* (2000) use a similar interpretation of FAO (1996) data taking the sum total in open forest, fragmented forest, and long fallow to derive potential cover of secondary forests in the tropics. Preliminary analysis of GTZ/MRC FCMP data permits general, or in some cases, more specific, conclusions regarding secondary forest area, condition, composition, location and causes for reversion in each of the LMS countries. MRC/GTZ FCMP data are complemented by other sources.

Cambodia

Cambodia's forests have been significantly disturbed as a result of intensive logging, swidden agriculture, fire, charcoal production and foraging for wood and other forest products. More than 11 million ha of the country's forest estate has been converted into secondary vegetation types since 1973 (IFFN 1999a). Remaining forests are under continuous pressure from fuelwood collection, charcoal production, and the increasing expansion of agriculture and aquaculture, the latter on inundated forest land.

In 1993, 9.8 million ha or 54% of the total land cover in Cambodia was in secondary forest, or medium-low cover density forest and forest fragments (Table 2). High-density cover forest totalled only 1 million ha or 5.8% of land cover. Thus most forest cover in Cambodia may be secondary. Table 2 indicates that from 1993 to 1997, 2.8% of Cambodia's high-density forest cover was fragmented or converted to medium-low cover. Both high-density cover (1.75% or 18 591 ha) and secondary forests (2.2% or 0.2 million ha) were converted to non-forest land, primarily agricultural (MRC/GTZ FCMP 1998). A sizeable proportion of shrublands was also converted to agriculture over the five-year period.

Table 2 Land cover change from 1993 to 1997 in Cambodia

Cover characteristic	1993 (ha)	Conversion of cover type to other categories from 1993 to 1997 (ha)				
		(1)	(2)	(3)	(4)	(5)
High cover density (1)	1 060 634	1 012 777	27 391	1874	18 591	-
Medium-low cover density (2)	9 119 898	834	8 836 021	94 010	189 031	-
Mosaic (3)	680 758	-	8	652 343	28 406	-
Non-forest (4)	7 291 872	-	13 046	-	7 278 825	-
Clouds (5)	1496	-	1496	-	-	-
1997 (ha)		1 013 611	8 877 962	748 227	7 514 853	

Lao People's Democratic Republic

Most of Laos' forest cover (*ca.* 7.7 million ha in 1993) falls under the medium-low cover density and forest fragment status, and can be typed secondary (Table 3). High-density forest cover occupied about 1.5 million ha in 1993, and 0.4% of it was fragmented or converted to open cover density, and 0.6% to non-forest cover by 1997. Of the low-cover density forest, 1.2 percent was fragmented and 2% converted to non-forest cover over the five-year period, probably due to a combination of logging and swidden agriculture. Plantations comprised a very small proportion of low-cover density forest and remained the same over the five years (MRC/GTZ FCMP 1998).

Fragmented forest forms a larger proportion of forest cover in Laos than in Cambodia (Tables 2 and 3), and 4% of the fragmented mosaic was converted to non-forest cover by 1997. A considerable portion of Laos' upland area, particularly in the north of the country (though not confined to it), is comprised of a complex of forest fragments ranging from small to larger size plots sometimes exceeding 1000 ha, but averaging between 100–300 ha. Amid these forest fragments are a network of upland settlements in which swidden agriculture is the principal form of agriculture. It is suggested that 1.6 million ha of forests are affected by swidden agriculture with an estimated 277 000 families involved (IFFN 1999b). Analysis of non-forest cover (MRC/GTZ FCMP 1998) suggests a sizeable reduction (2 million ha) in land under swidden agriculture (cropping mosaic) and conversion to mixed wood- and shrubland in the (Mekong Basin's) evergreen forest zone between 1993 and 1997, perhaps a result of land degradation.

Table 3 Land cover change from 1993 to 1997 in Laos

Cover characteristic	1993 (ha)	Conversion of cover type to other categories from 1993 to 1997 (ha)				
		(1)	(2)	(3)	(4)	(5)
High cover density (1)	1 559 131	1 540 795	2068	4924	9780	1563
Medium-low cover density (2)	5 088 271	208	4 894 420	59 744	104 523	29 375
Mosaic (3)	2 674 107	-	-	2 551 461	105 841	16 804
Non-forest (4)	13 656 814	-	10 353	7	13 317 393	329 060
Clouds (5)	280	-	-	-	79	201
1997 (ha)		1 541 003	4 906 841	2 616 136	13 537 616	377 003

Vietnam

Two-thirds of Vietnam is sloping hill and mountain land. Most of the country was covered by a variety of biodiverse primary forests until a period of very rapid deforestation and forest conversion beginning several decades ago. Wars, large-scale commercial timber exploitation, fire and conversion to agriculture have since damaged more than half of Vietnam's forest area (World Bank 1995). Throughout the country, but particularly in the northern region and Central Highlands, nearly 10 million ha of former primary forests are now under a range of secondary succession types in various stages of degradation and recovery.

MRC data also indicate that the majority (about 1.37 million ha) of the forest cover in Vietnam may be secondary (Table 4), i.e. of medium-low cover density or fragmented. From 1993 to 1997, 77 500 ha of medium-low and high-cover density forests as well as forest mosaic formations were converted to non-forest cover, perhaps mostly agricultural. Agricultural land expanded by *ca.* 80 000 ha (MRC/GTZ FCMP 1998) over the five-year period. As a result of the country's ambitious Program 327 reforestation efforts (see, for example, Mittelman 1997), and recovery in swidden agricultural fallows, 29 100 ha of non-forested area recovered to dense and medium-low cover forests including plantations (a 15 000 ha increase). There was a decrease in most degraded vegetation types except for wood- and shrubland in the evergreen zone which increased by 20 000 ha (MRC/GTZ FCMP 1998).

Table 4 Land cover change from 1993 to 1997 in Vietnam

Cover characteristic	1993 (ha)	Conversion of cover type to other categories from 1993–1997 (ha)				
		(1)	(2)	(3)	(4)	(5)
High cover density (1)	287 165	262 891	3	2282	21 988	-
Medium-low cover density (2)	1 112 384	-	1 070 339	5892	34 572	1579
Mosaic (3)	266 033	-	-	245 168	20 865	-
Non-forest (4)	5 080 064	3285	25 806	-	5 050 553	419
Clouds (5)	-	-	-	-	-	-
1997 (ha)		266 176	1 096 148	253 342	5 127 978	1998

Thailand

A 1990 assessment of total forest cover in Thailand indicated that 53% of the total forest area or 7530 km² was comprised of open-canopy broad leaf (or secondary) vegetation, much of it recovering after logging, burning and swidden agriculture. Much of the degradation began with logging, followed by settlement and agricultural cultivation on former forest lands (Fehr 1993). An additional large area, confined mostly to the north, has been disturbed, fragmented and converted to agriculture under a range of hill tribe and ethnic northern Thai swidden agricultural systems. Sedentarising swidden agriculture by substituting temperate climate vegetables for opium contributed significantly to land conversion since substitute crops required more land to achieve similar financial returns. Some of converted area has been developed subsequently under agricultural tree plantations including primarily coffee, lychee and longan, and more recently, tea.

Table 5 indicates that the majority of forest cover in Thailand (Mekong catchment) in 1993 comprised low cover density forests and fragments, or secondary forests (2.2 million ha). A relatively small percentage (< 0.5 %) of Thailand's high density forest area was altered between 1993 and 1997, the five years subsequent to the permanent enactment of the prior temporary official ban on commercial logging in 1989. Overall 50 000 ha of high and low cover forest and forest mosaic were converted to non-forest cover during this time, likely a result of agricultural expansion and increased degradation in shrubland in the evergreen zone (Table 6) due to fire and small-scale illegal logging.

The 20 000 ha decrease in the category "cropping mosaic, cropping area < 30%", and the increase in "cropping mosaic, cropping area > 30%" and "agricultural land" (Table 6) suggest a decline in long rotation swidden agriculture and related secondary forests, with a shift to shorter rotation cultivation and more permanent agriculture. During the five-year period, plantations increased by 1000 ha and the mixed mosaic increased by about 3200 ha, perhaps the result of abandoned agricultural land and recovering shifting fallows. There was also a 28 000 ha increase in shrublands in the evergreen zone from 1993 to 1997, perhaps a result of land degradation.

Table 5 Land cover change from 1993 to 1997 in Thailand

Cover characteristic	1993 (ha)	Conversion of cover type to other categories from 1993–1997 (ha)				
		(1)	(2)	(3)	(4)	(5)
High cover density (1)	816 744	811 691	881	1133	3 038	-
Medium-low cover density (2)	1 999 484	-	1 951 628	8067	39 788	-
Mosaic (3)	222 542	-	303	215 083	7155	-
Non-forest (4)	15 789 205	146	1150	-	15 787 908	-
Clouds (5)	-	-	-	-	-	-
1997 (ha)		811 837	1 953 962	224 283	15 837 889	

Table 6 Disaggregated forest and land cover (ha) in Thailand in 1993 and 1997

Forest Type	1993	1997	+ / (-)
<i>High cover density</i>			
Evergreen	432 370	431 394	(976)
Mixed (evergreen and deciduous)	384 148	380 218	(3930)
<i>Medium - low cover density</i>			
Evergreen	281 443	279 594	(1849)
Mixed (evergreen and deciduous)	719 811	702 710	(17 101)
Deciduous	968 529	941 534	(26 995)
Regrowth	3156	2520	(636)
Plantations	26 542	27 605	1063
<i>Mosaic</i>			
Evergreen	34 707	34 653	(54)
Mixed	87 367	90 579	3212
Deciduous	100 467	99 051	(1416)
<i>Non-forest cover</i>			
Wood- and shrubland, evergreen	430 949	458 872	27 923
Wood- and shrubland, dry	120 137	120 586	449
Bamboo	81 379	77 975	(3404)
Grassland	2906	3401	495
Cropping mosaic, cropping area < 30%	175 208	155 297	(19 911)
Cropping mosaic, cropping area > 30%	224 536	226 957	2421
Agricultural land	14 485 736	14 494 290	8554
Barren land	3004	4203	1199
Urban or built-over area	17 277	17 436	159

(Source: MRC/GTZ FCMP 1998)

FAO (1997) estimated that between 1990 and 1995, forest conversion in Thailand averaged 329 000 ha/year (despite a nationwide ban on commercial logging since 1989). This equates to an annual rate of change of 2.6%. WRI *et al.* (1998) calculated Thailand's 1990–1995 area conversion at 2.8 percent per annum, a rate which is higher than the annual loss of forest cover estimated for the preceding decade during which commercial logging was legal. Large areas along Thailand's western boundary with Burma (Mae Hong Son, Tak, Kanjanaburi and Ratchburi Provinces), and in several northern provinces (Phrae, Lampang, Chiang Mai and Chiang Rai) are important centres of illegal logging.

Myanmar

Political concerns regarding the present governance of Myanmar have inhibited foreign aid programs. Data otherwise available from regional LMS projects are often lacking for Myanmar.

Myanmar has, by far, the largest total forest area of all the LMS countries with 28.8 million ha. However, recent deforestation in Myanmar has been severe and has been increasing steadily since 1970 (Brunner *et al.* 1998). Significant discrepancies

in country import vs. Myanmar export figures for hardwood timber appear to mask the actual extent of deforestation caused by commercial logging (Brunner *et al.* 1998). Table 7 shows forest loss according to type based on comparison of original and remaining habitats. Much of the area representing loss of original cover is currently under secondary forest at various stages of recovery.

The Myanmar Ministry of Forestry in 1997 estimated the productive forest compared to unproductive forest area for different vegetation types (FAO 1997) (Table 8). The estimates, while incomplete, provide an indication of area where broadleaf forests (evergreen, deciduous and mixed) have been transformed from closed primary to degraded secondary forest cover.

Three hundred thousand km² or more than a third of Myanmar's vast forest area has been disturbed to varying degrees. Disturbance ranges from minor perturbation resulting from selective logging, to total removal of forest cover by clear cutting or conversion to (permanent or shifting) agriculture. Nearly 12 million ha of former forest are categorised as "unproductive". Between 1989 and 1996, sixty-six percent of forest degradation was attributed to swidden agriculture. Swidden agriculture is practised throughout Myanmar's extensive upland area. Logging was responsible for the remaining 34 percent of the area converted to secondary forest. The Myanmar Ministry of Forestry (1997) indicates that nearly 51 000 km² of the country's forests are in degraded condition, and an additional 154 389 km² are impacted by swidden agriculture.

Table 7 Historical forest loss by forest type in Myanmar

Forest type	Original ('000 ha)	Remaining ('000 ha)	Difference ('000 ha)	Percent remaining
Lowland evergreen	261 655	142 104	119 551	54
Lowland deciduous	172 484	74 926	97 558	43
Montane evergreen	95 888	59 236	36 652	62
Montane deciduous	81 970	42 044	39 926	51
Swamps	32 692	4791	27 901	15

(Source: MacKinnon 1996)

Table 8 Forest area in Myanmar by type and productivity

Type	Productive ('000 ha)	Unproductive ('000 ha)
Closed broad leafed	20 655	11 908
Mangrove	382	403
Bamboo	963	-
Conifer	113	-

(Source: Myanmar Ministry of Forestry 1997)

Socio-economic benefits associated with secondary forests

With the progressive demise of primary forests throughout continental Southeast Asia, dependence on secondary forests for products and services once provided by primary forests has increased. In addition to a wide range of foods, secondary forests are often the main source of fuel and construction timber, medicine, fibre, resin, forage and fodder, household utensils, green manure, stall bedding, and products for ornamentation and rituals (Mittelman *et al.* 1997). Some secondary forests may be richer with respect to the occurrence of certain target species associated more with secondary successional forest development stages. These products include, for example, bamboo, some rattan species, mushrooms, and certain vegetables and medicinal herbs.

Simple management practices (for example, frequent use of fire) are used to manipulate forest structure and species composition to encourage an abundance of user-preferred species. When bamboo is a favoured product, its occurrence is encouraged by the removal of shade canopy and repeated burning. When maintaining the multiple uses provided by diverse multi-storey forest vegetation is preferred, management is aimed at protecting secondary forests to enable natural regeneration. Where settlements are of long duration (as opposed to recent immigrants), beyond the domain of active state control, or where the protection of water sources is a broadly held community objective, community management arrangements regulating forest product off-take volume and seasonality can be extremely effective (Poffenberger 1990). The aim of these management systems is generally to ensure sustainable resource management, equal access to benefits among community members, or in some cases, adequate livelihood for the poorest and landless households. Forest areas may also be actively enriched by local communities, user groups or individual households with use rights to particular products or areas. In other cases, community agreements to reduce pressure on local forest areas have impelled collectors to cultivate target forest species in home gardens (Mittelman 1998). Increasing acknowledgement of the effectiveness of community management arrangements aimed at facilitating sustainable community forest management has become a significant factor impelling community forestry policy and legislation in all of the LMS countries.

In some parts of Laos, Cambodia and Vietnam, late secondary succession forest fragments are found in areas where significant quantities of unexploded ordnance remain buried. Since people are aware of the danger in entering these areas, forests damaged by carpet bombing have been left relatively unexploited, enabling them to regenerate. Under growing population pressure, however, even these areas have begun to be exploited, mostly by landless and near landless farmers who risk life and limb to access products which provide their principal or, in some cases, sole source of livelihood.

Remote populations and others whose agricultural production levels fall far short of subsistence requirements are particularly dependent on secondary forests. Secondary forests are particularly important during the long dry season when they provide critical sources of supplemental foods and other products for local

subsistence, sale and barter. The survival strategies of millions of farmers in the five LMS countries depend on access to these supplemental products (Mittelman *et al.* 1997). Exploitation, however, is often poorly controlled and is leading increasingly to product scarcity and potentially to the extinction of some target species. This is especially the case when products are exploited for commercial purposes and enjoy ready commercial markets. Merchants purchasing raw materials from local collectors can easily move from one source area to another as resources are depleted, and they often have little concern for the sustainability of local resources (Dove 1994, de Beer & McDermott 1996, Mittelman *et al.* 1997).

Dependence on and the intensity of secondary forest exploitation can fluctuate significantly based on seasonal employment alternatives, availability of urban wage work and alternatives to forest products. The regeneration status of secondary forests in Thailand improved significantly with the shift from wood fuel to cooking gas. When the Asian economic crisis caused massive job layoffs, secondary forests came under significant pressure from returning labourers dependent upon forests as emergency sources of food and income.

Ecological status and environmental values of different secondary forest types

Secondary forests are of very diverse type as determined by the environmental conditions and the original vegetation complex which preceded them. This is reflected in their structure and extent of vegetative cover, as well as their composition in terms of dominant and secondary species. Most secondary forests in the five countries are in poor condition as a result of careless felling and haphazard extraction practices with little regard for site protection. Most of the logged area also suffers from frequent burning, and regeneration of fire-adapted species is favoured.

Despite frequent reference to rural communities as forest destroyers, many are actively engaged in sustainable forest management (Jamarik *et al.* 1996). Many such areas can be found throughout the region and play an important function as genetic reservoirs for species whose numbers have been severely reduced by damage to primary forests (Poffenberger 1990). Management and manipulation of secondary forests aimed at maximising and sustaining their use value, as well as their protective functions, are often based on highly developed local knowledge systems (Poffenberger 1990, Warner 1991). Local or indigenous knowledge systems are encountered more often in areas where farmers have a long settlement history or long-term experience in managing particular environments. It can be extremely useful when applied to efforts aimed at collaboratively planning sustainable forest management, including the rehabilitation of secondary forests (Fisher 1995, Borini-Feyerabend 1996). Examples of this kind of local knowledge include:

- (1) The associations between specific vegetation communities and faunal complexes.
- (2) Specific feeding preferences, habitats and life cycles of forest fauna.

- (3) The response of forest vegetation and soil organisms (for example, mushroom spore) to controlled burning.
- (4) Management practices and vegetation associations which favour robust growth and abundance of particular species (such as rattan).
- (5) The biodiversity benefits of secondary forest patches within primary forest areas, and of maintaining a mosaic of secondary succession forest development phases.
- (6) Soil fertility benefits obtained by farming downslope of well-developed forest vegetation.

Secondary forest complexes, primarily the result of human intervention, are often contiguous with primary forests at higher elevations. With the exception of multi-canopy home gardens and forest fragments maintained in and around settlements, landscape vegetation and structural complexity generally increase from lower to higher elevations and increasing distance from settlement areas. It is also common for many villages to maintain complex secondary forests adjacent to their settlement areas or in areas conserved to protect community water resources.

With the expansion of their area and the depletion of primary forests, secondary forests have become increasingly important for maintaining the larger habitat for biodiversity conservation. Secondary forests are especially vital in conserving biodiversity when they provide the last remaining corridors between otherwise fragmented primary forests.

Institutional and political aspects

Institutional and political aspects strongly affect whether secondary forests are open to further degradation, or their rehabilitation is effectively enabled. There is widespread and growing recognition that, because of the vast extent of forest degradation, the state can no longer realistically envisage addressing the problem effectively without the cooperation of local communities. Experience during the past several decades indicates that local communities are prepared to accept responsibility for sustainable forest management in exchange for socio-economic development and forest use benefits.

Throughout the LMS at present, policies and legislation now aim to motivate and provide incentives which can mobilise the potential role of rural communities in forest management, protection and rehabilitation. In Thailand, public advocacy and citizens' groups have been particularly active in encouraging final enactment of pending community forestry legislation.

However, the extent to which these policies are adequately tailored to achieve their goals, or are implemented at ground level, differs significantly.

This section outlines current policy initiatives in the five LMS countries and other institutional and framework conditions affecting the management, use and development of secondary forests. Most of the discussion in this section is based on a recent review by IUCN's Asia Regional Forest Conservation Programme under the supervision of D. Gilmour.

Cambodia

Cambodia's Ministry of Agriculture, Forestry and Fisheries (MAFF) and its Department of Forestry and Wildlife (DFW) are legally the main players in forest management. However, in reality, many decisions concerning access to and use of forests are taken by other government branches, often with little accountability or transparency (ARD 1998 cited in Ath *et al.* 1999). The complex and confused national administrative setup with respect to forest management, lack of coherent policy, and weak capacity in MAFF and DFW have led to rapid and substantial forest loss and degradation in Cambodia. Attempts to control the situation through on-and-off logging export bans have been ineffective.

Concerned by the rapid rate of deforestation in Cambodia, the international community supported a review of national forest policy and the major findings were accepted by the Government. Donor agencies and NGOs are actively supporting and promoting a range of community forestry and community-based sustainable resource management projects. A forest crime monitoring and reporting project conceived with World Bank, UNDP and FAO assistance will provide independent monitoring with direct reporting to the Council of Ministers. Bilateral donors have contributed funds to mobilise people's participation in forest conservation, and build up the institutional capacity of DFW and the Ministry of Environment in forest law enforcement and conservation.

Unclear and unstable land and resource tenure pose serious obstacles to sustainably managing the estimated four to five million ha of secondary forest lands lying outside of forest concessions and protected areas. These forests are generally located in areas of high population density and are degraded due to lack of control over exploitation. Community management agreements are one way of potentially establishing arrangements for rehabilitative and sustainable forest management. However, currently there is a lack of cohesiveness among the vast majority of Cambodian communities, an outcome of 30 recent years of civil strife and widespread dislocation. NGOs experience in Cambodia indicates that participatory land allocation and land use planning must be preceded by local development activities that catalyse community solidarity and institution building necessary for undertaking successful, community-based forest management.

Laos

According to the Department of Forestry's "Vision 2020", two million ha of degraded forest land would be rehabilitated, the principal mechanism for which would shift from larger enterprises to small farmers on one- to five-ha plots. The Forestry Law of 1996 emphasises allocation of forests and forest lands to individuals and organisations for management and use. Three ha of barren or degraded forest land can be allocated per individual in each household unit for forest tree planting or regeneration. It is forbidden, however, to use "well-developed" natural forest or swidden agricultural fallows which can regenerate naturally for tree planting. Credit and tax exemptions provide incentives for forest tree planting and forest

protection. Local forest agencies are responsible for developing reforestation and forest regeneration plans for the area under their jurisdiction. The Ministry of Agriculture and Forestry is responsible for providing technical guidelines for planting and maintaining trees, and for enhancing natural regeneration. The strategies outlined above and the Forestry Law of 1996, if successfully implemented, could work towards preventing the degradation and inappropriate conversion of productive secondary forests.

The Land Law of 1997 aims to contribute to national socio-economic development and environmental protection. It enables families to obtain inheritable use rights linked with responsibilities for land protection. Citizens are permitted to lease land for up to 30 years with requests for extension considered on a case-by-case basis. Use rights are divided between agricultural and (degraded or barren) forest lands. Permanent tenure for both agricultural and forest land can be granted following a 3-year period during which the user demonstrates lawful use of allocated land as a prerequisite for granting of tenure. Smaller scale household and cooperative led forest development is seen as a basis for establishing a diverse, multi-species landscape mosaic in contrast to prior plantation development which has focused on one or two tree species. The strategies and laws outlined above suggest that there is much scope for the development of productive rehabilitated secondary forests on degraded lands in the future. Current government capacity required to effectively implement forest management and rehabilitation plans is considered low.

Myanmar

The Ministry of Forestry is the main arm of the government responsible for forestry sector policy and implementation in Myanmar. The new 1995 Myanmar Forest Policy (Myanmar Ministry of Forestry 1997) aims to harness efficiently the full economic potential of the forest through increased productivity while controlling unacceptable socio-economic and environmental side effects. People's participation in forestry activities and plantation establishment aims to provide local populations with non-farm income through agro- and community forestry. Technically, the lease of barren and degraded lands is provided for under the Community Forestry Instruction of 1995. Communities able to fulfil a fairly stringent set of requirements are eligible to obtain land development rights for a period of 30 years, with renewal dependent upon performance. In reality, however, community involvement in forest management does not have substantial legitimacy in Myanmar at present.

Brunner *et al.* (1998) suggested that there are reasons for scepticism regarding initiatives claimed as providing for any shift of power away from the state in Myanmar. Evidence points to great difficulties in obtaining community rights to forest usufruct and that, overall, the idea that villagers have such legal rights is not fundamentally understood by local representatives of the regime. Uncompensated labour contributions to many government-sponsored programmes add to anecdotal evidence suggesting that villages are unlikely to

have either the means or motivation to engage in community forestry in anywhere near the manner in which it is currently developing throughout the rest of the region.

Thailand

Thailand's Royal Forest Department (RFD) under the Ministry of Agriculture and Cooperatives (MOAC) is primarily responsible for managing the kingdom's forests. A 1989 directive banned tree felling in natural forests and remains in effect, having been made permanent in 1992. The decision may well have been facilitated by the fact that alternative sources of industrial timber from Laos, Cambodia and Myanmar were plentiful.

The forestry component of the current (1996–2001) national economic and social development plan encourages people's participation in reforestation and forest management, buffer zone demarcation and development, and agro- and community forestry. RFD has been less active in developing these initiatives than Thai civil society (NGOs and local community organisations). NGOs and international donors have been supporting integrated conservation and development projects for the past 15 years.

Local rights to plan, manage and benefit from community-based sustainable resource management have recently been given legitimacy under Article 46 of Thailand's new National Constitution. There is currently a tug-of-war between factions reluctant to grant sweeping rights to rural communities, and those convinced that local management is the only way to ensure conservation, rehabilitation and sustainable management of Thailand's remaining forests.

The Constitution provides for decentralising Thailand's entire national bureaucracy, with planning to be focused at sub-district administrative levels. Sub-district councils have begun submitting sustainable resource management plans for inclusion in national budget considerations. In several cases, local councils representative of rural communities have had their plans approved and funded. This process likely represents the future of decentralised governance, planning and community-based resource management in Thailand, as well as auspices under which local communities would assume responsibility for managing and rehabilitating degraded secondary forests in their localities.

Vietnam

The Government of Vietnam has acknowledged that accomplishing national forestry sector objectives depends on satisfying the needs of the rural population. Based on the current understanding that unstable tenure poses a disincentive to environmentally sound and sustainable land and resource use, a serious effort has been underway to allocate farm and forest lands to farmers and cooperatives.

Decree 327 (providing the mandate for Program 327) was the first step towards allocating forest land to households for reforestation and protective natural

regeneration. The program successfully jump-started an ambitious reforestation campaign throughout the country. A “5-million-ha programme” now targets an enormous area of degraded forest land for rehabilitation up until the year 2010. Devolution of rights to local households, major programmes to initiate reforestation efforts, and successful adaptive management approaches enhance opportunities for the development of productive secondary forests on degraded lands and their sustainable management by local users.

Conclusion

More than half of the remaining forests in the LMS were removed or degraded during the last several decades. Commercial logging, swidden agriculture, and expansion of agriculture were the main causes of conversion from primary to secondary forests. The areal extent of secondary forests in the LMS now exceeds the remaining area of primary forests.

Overriding concerns regarding the rapid depletion of primary forest cover have overshadowed the importance of managing the vast area now under a variety of secondary forest succession types in the region. Attention paid to the potential for secondary forests to fulfil a wide range of ecological and economic uses has been scant, despite that fact that they continue to play extremely important roles with respect to both ecology and economy. Programs aimed at bringing secondary forests under improved management to maximise their potential values are at a very early stage of development. The design of such programmes is disadvantaged by a lack of specific data regarding secondary forest types, location, areal extent, condition and the causes underlying both continued degradation as well as rehabilitation.

LMS governments, donor agencies and research institutions have begun taking serious note of the potential for secondary forests to contribute to accomplishing sustainable watershed and forest management, biodiversity conservation and socio-economic development objectives. Recently revised forest policies have been designed in response to forest management research and successful pilot initiatives, both of which clearly indicate the potential benefits of active rural community involvement in sustainable forest management. Reflecting a growing consensus that governments on their own are inadequately equipped to achieve sustainable forest management, new policies delegate greater decision making authority and forest management responsibility to local communities. Though the policies indicate a remarkable similarity in terms of their commitment to community involvement in sustainable forest management, the *modus operandi* as well as the capacity for implementing them remain underdeveloped.

Most of the area which policies now envision giving over to community-based sustainable management is secondary forest. Input to developing appropriate methodologies for involving rural communities in sustainable forest management depends on continued efforts to understand under what conditions decisions to rehabilitate rather than further degrade secondary forests occur, and what site-

specific technical options are available to optimise a mix of benefits including contributions to improving watershed hydrological status, biodiversity habitat, and the socio-economic development status of poor rural communities.

Acknowledgements

Thanks to P. Hillegers and P. Pasicolan for providing useful comments on this paper.

References

- ATH, U. S., SARUN, V. & RAVUTH, S. 1999. *National Assessment of Cambodia's Forest Rehabilitation Policy and Practice*. Phnom Penh: Department of Forestry and Wildlife, MAFF.
- BORINI-FEYERBEND, G. 1996. *Collaborative Management of Protected Areas: Tailoring the Approach to the Context*. IUCN, Gland, Switzerland.
- BRUNNER, J., TALBOTT, K. & ELKIN, C. 1998. *Logging Burma's Frontier Forests: Resources and the Regime*. World Resources Institute, Washington, D.C.
- CHOKKALINGAM, U., DE JONG, W., SMITH, J. & SABOGAL, C. 2000. Tropical secondary forests in Asia: introduction and synthesis. Paper prepared for the "Tropical secondary forests in Asia: Reality and perspectives" workshop". 10–14 April 2000. Samarinda, Indonesia. Center for International Forestry Research, Bogor, Indonesia.
- DE BEER, J. H. & McDERMOTT, M. J. 1996. *The Economic Value of Non-Timber Forest Products in Southeast Asia*. 2nd edition. Netherlands Committee for IUCN, Amsterdam.
- DOVE, M. R. 1994. *Marketing the Rain Forest: Green Panacea or Red Herring*. Asia-Pacific Issues 13. East-West Center, Honolulu.
- EMRICH, A., POKORNY, B., & SEPP, C. 2000. *The Significance of Secondary Forest Management for Development Policy*. TOB Series No. FTWF-18e. Draft version. GTZ, Eschborn.
- FAO. 1993. *Forest Resources Assessment 1990: Tropical countries*. Food and Agriculture Organization of the United Nations, Rome.
- FAO. 1996. *Forest Resources Assessment 1990: Survey of Tropical Forest Cover and Study of Change Processes*. Food and Agriculture Organization of the United Nations, Rome.
- FAO. 1997. *State of the World's Forests*. FAO, Rome.
- FEHR, C. 1993. *Forest Fires in Thailand*. International Forest Fire Network Bulletin No. 9. July 1993.
- FISHER, R. J. 1995. *Collaborative Management of Forests for Conservation and Development*. Issues in Forest Conservation. IUCN Forest Conservation Programme, Gland, Switzerland.
- FRIENDS OF THE EARTH. 1999. *Made in Vietnam, Cut in Cambodia: Impacts of Logging on the Forests and Biodiversity of Cambodia*. Friends of the Earth, USA.
- IFFN (International Forest Fire Network). 1999a. *Forest Fire Prevention in Cambodia*. IFFN No. 20.
- IFFN (International Forest Fire Network). 1999b. *Forest Fires in Lao PDR*. IFFN No. 20 March 1999.
- JAMARIK, S., SANTAMBAT, Y., UWANNNO, B., KHAMPHIRAPHAP, J. & PHANITYAKHUL, P. 1996. *Community Forestry in Thailand: Paths to Development*. 3 volumes. Local Development Institute, Bangkok. (In Thai)
- LEUNGARAMSRI, P. & RAJESH, N. 1992. *The Future of People and Forests in Thailand After the Logging Ban*. Project for Ecological Recovery, Bangkok.
- MACKINNON, J. 1996. *Review of Biodiversity Conservation in the Indo-Malayan Realm*. Draft report prepared by the Asia Bureau for Conservation in collaboration with the World Conservation Monitoring Center. In Brunner *et al.* 1998. *Logging Burma's Frontier Forests: Resources and the Regime*. World Resources Institute, Washington, DC.
- MITTELMAN, A. 1998. *Rapid Appraisal and Site Reconnaissance in Eight Core Subproject Areas*. (mimeo). ADB-Vietnam Forestry Sector Project, Hanoi.
- MITTELMAN, A., LAI, C. K., BYRON, N., MICHON, G. & KATZ, E. 1997. *Non-Wood Forest Products: Outlook Study for Asia and the Pacific*. FAO Regional Office for Asia and the Pacific, Bangkok.

- MITTELMAN, A. 1997. *Agro- and Community Forestry in Vietnam: Recommendations for Development Support*. Forests and Biodiversity Programme. Royal Netherlands Embassy, Hanoi.
- MYANMAR MINISTRY OF FORESTRY. 1997. *Country Report – Union of Myanmar*. Asia Pacific Forestry Sector Outlook Study. FAO and FAO/RAP, Rome and Bangkok.
- MRC/GTZ FCMP (Forest Cover Monitoring Project). 1998. *Forest Cover Data Set for the Lower Mekong Basin*. Forest cover monitoring project. Mekong River Commission and German Agency for Development, Phnom Penh.
- POFFENBERGER, M. A. (Ed.) 1990. *Keepers of the Forest*. Kumarian Press, Connecticut, USA.
- SCHMIDT-VOGT, D. 2000. Secondary forests in swidden agriculture in the highlands of Thailand. Tropical secondary forests in Asia: introduction and synthesis. Paper prepared for the “Tropical secondary forests in Asia: Reality and perspectives’ workshop”. 10–14 April 2000. Samarinda, Indonesia. Center for International Forestry Research, Bogor, Indonesia.
- WARNER, K. 1991. *Shifting Cultivators: Local Technical Knowledge and Natural Resource Management in the Humid Tropics*. Community Forestry Note 8. Forests, trees and people programme. FAO, Rome.
- WORLD BANK. 1995. *Vietnam Environmental Program and Policy Priorities for a Socialist Economy in Transition*. The World Bank, Agriculture and Environment Operations Division, Washington, D.C.
- WRI, UNEP, UNDP & WORLD BANK. 1998. *World Resources 1998–1999*. Oxford University Press, New York.