Assessment of land use, forest policy and governance in Cambodia

Working paper

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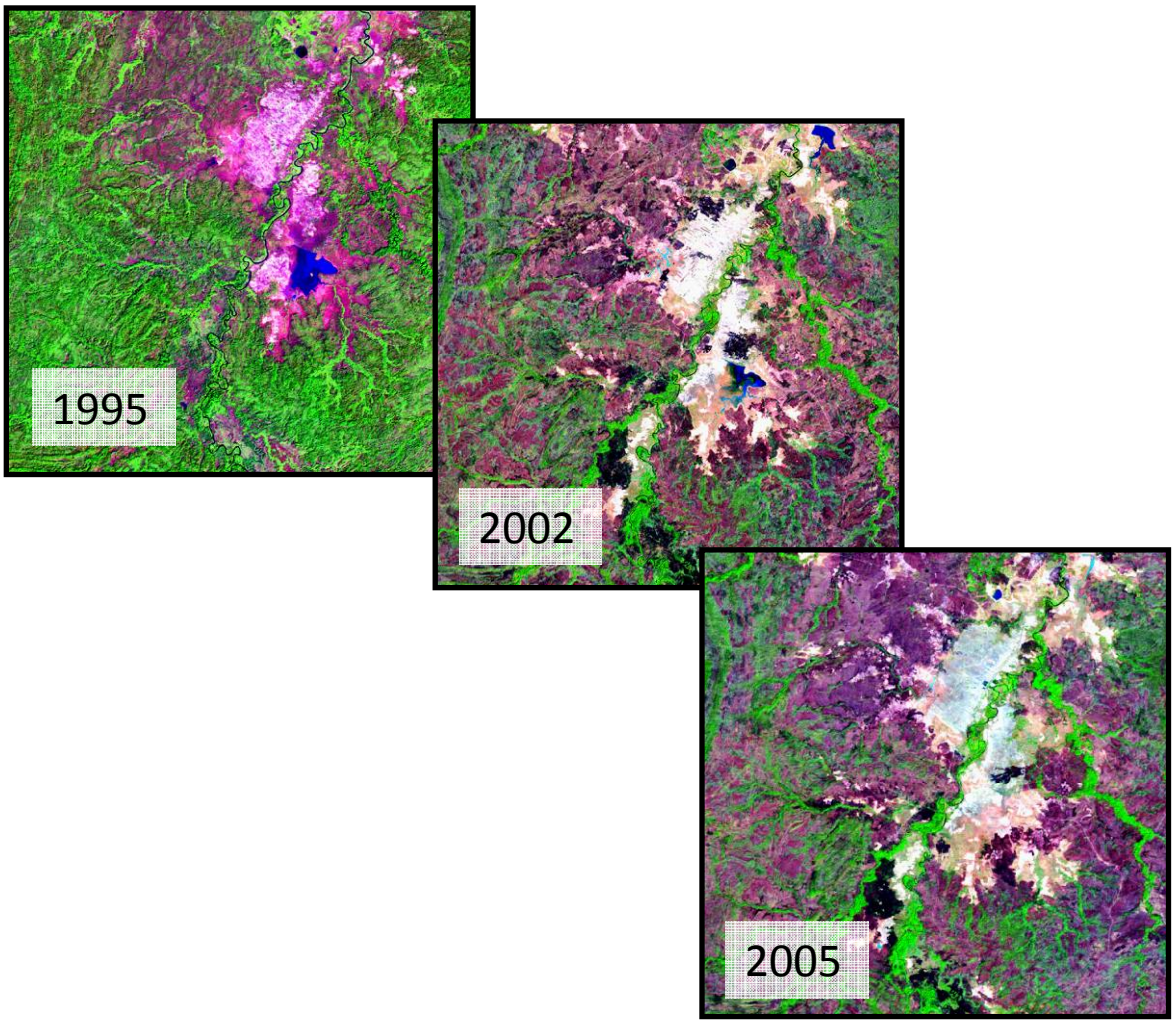

Food and Agriculture Organisation

Regional Office for Asia and the Pacific

Country Representation, Cambodia

Cover shows Landsat images of Sokh Sant commune, Mondulkiri (E107°00' N13°00') for 21 Dec 1995, 13 Feb 2002 and 01 Apr 2005. This lowland rice growing area falls between Phnom Prich Wildlife Sanctuary and Mondulkiri Protection Forest and is well known for the quality of its rice. During Khmer Rouge times, people were moved from the surrounding areas to Sokh Sant but have since moved back into the hills, and in-migration to the area has slowed. The water body visible in the 1995 image is a reservoir that has fallen into disrepair but which may be rehabilitated (Edward Pollard pers comm.). http://globalmonitoring.sdstate.edu/projects/fao/pages.land/e107n13.html

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Summary

Cambodia has few areas of significant topographic relief, a low population density and high rural proportion of the total population (85%). Population is projected to increase at 1.7% per annum between 2005 and 2020 (the highest rate in Southeast Asia; UN Population Division 2006). Rural population is, however, expected to rise at below the rate of overall population growth as rural-urban migration takes place. Over 60% of the population are dependent on agriculture and the country is a net rice exporter and generally food self-sufficient (GTZ 2009). Large proportions of the population are employed in agriculture although shifts in employment towards industry and services are taking place - 78 percent of the population was employed in agriculture in 1990 compared to 60 percent in 2004 (World Bank 2009). Foreign investment in agriculture has expanded rapidly in recent years with the primary cash crop being rubber (GTZ 2009). At the same time, landlessness has risen steeply and demand for "unclaimed" land has thus risen. Road networks are increasingly bisecting the country and providing greater access to rural areas and higher paying international markets. Major road building programmes are stimulating economic development and increasing opportunity costs of land but been criticized for inadequacy of social and environmental safeguards (AMRC 2006).

Cambodia is surrounded by fast growing resource poor emerging and middle income countries – Viet Nam, China and Thailand in particular. The economy is heavily reliant on export markets and saw a steep drop in GDP growth following the 2008/09 economic crisis. Unemployment increased while wage rates and demand for land and natural resources fell. Foreign direct investment also fell sharply. Cambodia's Human Development Index has, however, risen during the last decade and in 2007, Cambodia ranked 139 out of 182 countries, falling between Congo and Myanmar. In 2008, Cambodia's corruption percentile ranking was 8.6, between Venezuela and Guinea-Bissau.

All forests in Cambodia are recorded as being under public ownership. The Permanent Forest Estate is managed and regulated by the Forestry Administration under MAFF while Protected Areas are under the Ministry of Environment. Inundated forests are managed and regulated by the Fisheries Administration, which also comes under MAFF. Institutional jurisdictions currently lack clarity, however, and policy measures in forestry have been weakly implemented in past years. World Bank governance indicators show low and either stable or falling standards of governance, although political stability has increased markedly in the past decade. Together, these factors have contributed to high rates of deforestation and forest degradation.

Cambodia has one of the highest levels of forest cover in Southeast Asia with over 10 million hectares in 2010 (FAO 2010). Government reports submitted to FAO indicate an increase in the rate of deforestation from 1.1% before 2000 to 1.3% up to 2010 (FAO 2010). Between 1990 and 2010 forest cover in Cambodia fell from 73 to 57% of the total land area (12 944 to 10 094 thousand hectares). Over the same period, the area of forest designated for conservation increased from 2 776 thousand to 3 985 thousand hectares (23% of the total land area and 39% of the forest area). Available figures also show that between 1997 and 2007, the area of agricultural land in Cambodia expanded from 4 580 to 5 455 thousand hectares (26 to 31% of land area).

In Cambodia most areas of forest loss are in the hilly zones and along the mountain ranges where evergreen and semi-evergreen forests are located. Changes to both evergreen and deciduous lowland forests have also been recorded in the flatlands. Additionally, forest change hotspots are frequently located in areas bordering Lao PDR, Viet Nam and Thailand (Stibig et al. 2007). Production of rubber, sugar cane and biofuel crops has been a major cause of forest conversion. Land privatisation for cultivation and granting of economic land concessions – mostly for wood, agro-fuel and food production – has been closely related to deforestation. Over 1 million hectares (6% of Cambodia's land area) have been granted as economic land concessions, not counting concessions granted at the province level. A recent study suggests that although forest is generally cleared only 10% of concessions are in active production. Concessions have been granted in forested areas and former forest concessions contrary to the forestry law and forestry regulations.

Major direct and indirect drivers of deforestation and forest degradation are summarised in the table below.

Drivers of deforestation and forest degradation

	Within the forest sector	Outside the forest sector
Direct	• High impact and illegal logging.	• Agricultural expansion; • Low agricultural yields; • Expansion of settlements; • Infrastructure development; • Fire; • Timber demand; • Woodfuel demand.
Indirect	• Low institutional capacity and weak policy implementation; • Weak forest sector governance o Weak enforcement and control; o Low levels of stakeholder participation and involvement; o Corruption, clientelism and nepotism; o Lack of transparency and accountability; o Lack of assessment of social and environmental impacts. • Lack of demarcation of forest areas; • Low awareness of forestland management rights and responsibilities • Lack of sustainable or alternative supply of wood and energy; • Lack of incentives promoting sustainable management of forests; • Low efficiency of wood use; • Inadequate information and statistics on forest resources and products.	• Population increase; • Rising incomes and demands for resources; • Increasing accessibility of forest areas; • Low agricultural yields; • Migration into forest areas; • Military activity; • Large scale agri-industrial development (ELCs and SLCs); • Lack of information on national land use and land use plans; • Governance o Overlapping/unclear jurisdictions; o Weak land tenure – tenure is weakest in forests and other areas outside residential or farming zones; o Weak enforcement of the law; o Lack of a fair and transparent conflict resolution mechanism; o Chronic incidence of high-level interministerial and interagency disputes. • Social norms (claiming land through utilisation); • Low awareness of environmental roles of forests.

Social norms have also contributed to deforestation in that land forest land not under active management is traditionally seen as an open-access resource that can be claimed by clearing the forest. The 2001 Land Law legalised ownership of land possessed prior to enunciation while restricting further possession of state public land after promulgation of the law. Although land titling improves local rights and natural resource conservation, this law has not been systematically implemented and communal titling is extremely sluggish.

In many forested areas in Cambodia, in-migration is having major impacts on demand for land and resources and is driving deforestation and degradation. Annual population growth rates in some forest areas have been recorded at up to 5-16%. In various provinces in-migration has been encouraged in past years with the opportunity for secure land being offered. Migrants generally clear farm land for themselves and may also open forest land to sell on. In recent years, migration has primarily involved demobbed military and others from land poor provinces including Svay Rieng and Takeo.[1] Migrant populations generally have less interest in sustainability and maintaining forest

[1] Poffenberger, M. 2009. Forests and climate change: mitigating drivers of deforestation. Community Forestry International.

resources for livelihoods benefits and while showing greater interest in financial gain or rapidly securing farmland. Migration rates do, however, seem to have been falling since 2008, due to the global economic slowdown or the belief that no more land is available.

Uncontrolled and illegal logging have resulted in widespread forest degradation in Cambodia. In recent years, industrial roundwood production in Cambodia, which itself has very limited wood processing capacity, has increasingly supplied the region's wood product manufacturing centres in Viet Nam and China (Katsigris et al. 2004; EIA/Telapak 2008). Figures submitted to FAO by the Government of Cambodia suggest very low roundwood production – just 114 000 m3 in 2006. The figures do not, however, reflect illegal logging which continues at unknown levels. Since the logging moratorium and cancellation of logging concessions, a system has been established to supply domestic wood demand in which annual coupes are auctioned and monitored by the Forestry Administration. It is, however, not yet clear whether this system can sustainably supply domestic demand and the sources of a large proportion of nationally consumed timber remain unaccounted for.

Current and future demand for woodfuel (fuelwood and wood for charcoal) is seen as a potential cause of forest degradation and deforestation. Woodfuel provides the primary energy source for most rural and some urban households in Cambodia and is also a major source of energy for some industries. Although domestic use of woodfuel is not usually associated with deforestation, high levels of commercial demand and the lack of alternative energy sources is causing some concern (Top et al 2004; Top et al 2006). Currently, a significant proportion of commercial woodfuel supply is in the form of wood residues derived from the clearance of senescing rubber plantations. The brick making and garment manufacturing industries are particularly important users. While woodfuel use is a cause for concern in relation to deforestation and degradation, woodfuel can also contribute to reducing emissions where supply is sustainably managed and low carbon alternatives are not available.

Despite sustainability having been at the centre of forestry policy in Cambodia for over a decade, progress with implementation has been slow. A log export ban has been in place since 1996 and various declarations have been made regarding illegal logging and forest encroachment (Forestry Administration 2009). Policy adopted in 1998 emphasized balancing harvesting with tree planting and forest growth while controlling illegal logging. In 2002, however, failures in the production forest management system resulted in the suspension of concession licences and forestry in Cambodia embarked upon a period of revision. A new law on forestry was implemented in 2002 and a National Forest Policy Statement was issued by the Prime Minister. The Department of Forest and Wildlife was reorganized into the Forest Administration in 2003 to create a single line of authority for forestry at the national level. Local forest management has become increasingly important and a community forestry sub-decree implemented in 2003 has been widely supported.

Presently, there are more than 420 community forestry sites covering around 400 000 hectares, although only 94 sites covering 113 544 hectares are legal recognized and have signed an agreement (Database of the Forestry Administration, February 2010). Evidence on the performance of community forestry initiatives to reduce deforestation and forest degradation remains inconclusive, however (Blomley et al 2010). This partly results from the short period since community forestry became formally recognized in Cambodia - community forestry implementing regulations were issued in 2006. When legally registered and approved, however, community forestry reportedly "appears to increase local tenure right and reduces the risk that forests will be appropriated by external interests and converted to alternative uses." While positive effects in some sites have been observed, many sites are still seeking formal recognition and registration. Community forestry currently provides only limited economic benefits due to the degraded condition of allocated forests. Coordination between government and organisations supporting forestry has been mixed and approval processes for community forestry are lengthy. Allocation of economic land concessions

within proposed CF sites also poses threats both to forest resources and human rights (Blomley et al 2010; UN 2007).

Protected areas cover approximately 21% of the land area in Cambodia and an estimated 40% of the total forest area (ICEM 2003). Limited capacity and relaxed enforcement at the local level means that most protected areas are multiple-use areas. However, in similarity with community forestry, a protected areas law was not in place until 2008 and implementing regulations are yet to be issued. A long list of threats faces these areas including illegal logging, encroachment, poaching, shifting cultivation, infrastructure development and mining. Increased access, and particularly road development, is a major driver behind land encroachment in protected areas. Protected areas are threatened mainly by external commercial interests supplying distant markets and, as such, protected areas adjacent to development zones are especially threatened (Corbett 2008). The trend may worsen with investments close to protected areas such as roads, dams and electrification schemes without additional attention to resource management, law enforcement and governance capacity. Additionally, encroachment by local communities and commercial interests is reducing the size of protected areas and some parts of protected areas have been degazetted in recent years to provide land for economic land concessions. At present protected areas lack management plans, objectives and zonation and many have not been demarcated. There is also a general lack of financial and human resources at all levels and communication and infrastructure need to be improved. Despite many small-scale logging infringements within protected areas, however, and notwithstanding a number of serious exceptions, destruction within protected areas has been less than that in surrounding landscapes (ICEM 2003).

Mangrove forests, which are under the jurisdiction of the Fisheries Administration, are of particular interest to climate change mitigation due to their high rates of carbon sequestration and export, and exceptionally high carbon storage in relation to associated deep organic soils.[1] In Cambodia, mangroves are found only around Veal Renh and Kompong Som Bays and north of Kas Kong up to the border with Thailand, and only in residual form as narrow, broken strips (Løyche Wilkie and Fortuna 2003). Since the 1990s, large areas of mangroves have been clear-cut for charcoal production and conversion to shrimp farms has also resulted in the loss of mangroves. Annual rates of mangrove loss exceed the background rate of forest loss and have accelerated from 1.6 percent between 1990 and 2000 to 1.9 percent between 2000 and 2010. According to RGC figures submitted to FAO In 2010 only 56 000 hectares of mangrove forest or 70 percent of the area present in 1990, remained in Cambodia (FAO 2010). The flooded forest around Tonle Sap Lake, also under FiA jurisdiction, has been reduced in size and degraded by agricultural expansion and wood cutting (FA 2009b). McKenny and Tola (2002) reported that most flooded forest areas had been cut and/or converted for agricultural use. From over one million hectares in 1973, flooded forests declined to an area of about 450 000 hectares in 1997, of which roughly 30 percent was considered as degraded forest, either mosaic and regrowth forest. More recently there have been further significant reductions.

Strengthening implementation of forestry policy and improving forest law enforcement and governance have been priority issues since 1998 (Savet and Sokhun 2003). A number of obstacles confronting forestry, including corruption and clientelism have, however, remained untouched by the technological fixes promoted by donors (Rotha 2009). The 2001 logging moratorium resulted in closure of mills and a reduction in illegal logging but also shifts in the focus of illegal logging from commercial to small-scale operators, from few players to many and from export to domestic markets. Key factors determining the future success of forest law enforcement and governance efforts include the degree of responsibility allocated to the Forest Crime Monitoring Unit and the capacity provided to implement direct action (Rotha 2009). Alternative livelihoods for military groups

[1] "Exceptionally high carbon storage in Indo-Pacific mangroves: Implications of sea level rise, land use, and global carbon markets": http://eco.confex.com/eco/2010/techprogram/P22816.HTM

and greater regulation of harvesting and environmental management are likely to reduce illegal logging although current road network expansion is at the same time liable to expand opportunities.

According to this analysis, efforts to reduce emissions from deforestation and forest degradation in Cambodia need to address the following issues at the national level:

- Overlapping/unclear jurisdictions;
- Weak land tenure in rural areas;
- Land concessions in forest areas;
- Agricultural expansion;
- Migration into forest areas;
- Weak law enforcement;
- Infrastructure development adjacent to forest areas;
- Lack of alternatives to woodfuel.

Within the Permanent Forest Estate, Protected Areas and inundated forests, current or planned policy documents guide development and many of the component activities aim to increase sustainability of natural resource use and reduce deforestation and forest degradation. Areas of particular importance include forest law enforcement and governance, sustainably supplying domestic timber demand and improving the efficiency of wood and wood energy use. Additional areas that warrant attention include fire management and research into the effects of fire and fire frequency on forest carbon density.

1. Introduction

Cambodia has few areas of significant topographic relief, a low population density and a large proportion of the total population live in rural areas (85%). Areas of higher population density run in a diagonal swath across the country from the northwest, across the Tonle Sap region and southeast towards the Mekong Delta and border with Viet Nam. Population is projected to increase at 1.7% per annum between 2005 and 2020 - the highest rate in Southeast Asia (UN Population Division 2006). Rural population is forecast to rise at below the overall rate of population growth (1.2%) as rural-urban migration takes place although migration between provinces plays an important role in Cambodia, especially with relation to forest areas which are traditionally seen as free land.

Over 60% of the population of Cambodia is dependent on agriculture and the country is a net rice exporter, and generally food self-sufficient (GTZ 2009). Large proportions of the population are employed in agriculture although shifts in employment towards industry and services are taking place - 78 percent of the population was employed in agriculture in 1990 compared to 60 percent in 2004 (World Bank 2010). Foreign investment in agriculture has expanded rapidly in recent years with the primary cash crop being rubber (GTZ 2009). At the same time, landlessness has risen steeply as commercial agriculture and demand on rural land have risen.

Cambodia is surrounded by fast growing resource poor emerging and middle income countries – Viet Nam, China and Thailand in particular. Road networks are increasingly bisecting the country, linking with neighbouring countries and providing greater access to rural areas and higher paying international markets. Major road building programmes are stimulating economic development and increasing opportunity costs of land but been criticized for inadequacy of social and environmental safeguards (AMRC 2006). Opening up of previously isolated areas and zones adjacent to borders constitutes a particularly acute threat to Cambodia's forests.

Cambodia's economy is heavily reliant on export markets and saw a steep drop in GDP growth following the 2008/09 economic crisis. Unemployment increased while wage rates and demand for land and natural resources fell. Foreign direct investment also fell sharply. Notwithstanding recent economic setbacks, Cambodia's Human Development Index has risen during the last decade and in 2009, Cambodia ranked 137 out of 182 countries, falling between Republic of the Congo and Myanmar. Cambodia's corruption percentile ranking in 2008 at 8.6 fell between those of Venezuela and Guinea-Bissau.

Forest cover in Cambodia is mainly located towards the north and east, and in the Southwest of the country where population densities are lower. Forests are important in terms of the support they provide for subsistence livelihoods, economic production and environmental services. Forests are a source of food for local consumption, fuel for domestic and commercial use, timber for construction and export, and also produce a wide array of non-wood forest products supplying domestic and export markets. Indigenous peoples often depend on forests for a lesser or greater proportion of subsistence needs as do migrants that have moved into forested areas in recent years. Increased attention from the Forestry Administration and from international NGOs has resulted in a proliferation of community forestry in recent years and there are currently more than 420 community forestry sites covering around 400 000 hectares (Database of the Forestry Administration, February 2010).

Forests are also essential in biodiversity conservation and watershed and coastline protection. Cambodia contains many key global biodiversity areas and forms part of the Indo-Burman

biodiversity Hotspot.[1] Three of the "Global 200" priority ecoregions are also represented in Cambodia.[2] The national protected area system in Cambodia comprises 23 protected areas created through a Royal Decree in 1993 and managed by the Ministry of Environment (MOE; ICEM 2003b). The network constitutes one of the largest by proportion of national land area in Southeast Asia.

Forests are of importance in global climate change mitigation and on a global scale, land-use change and forestry – mostly deforestation – are estimated to account for 17.4 percent of greenhouse gas emissions (IPCC 2007). With one of the highest rates of deforestation in the Asia-Pacific region, Cambodia counts as a significant contributor and important potential source of emissions reductions through forestry (FAO 2010a). Cambodia has gone further than any other country in Southeast Asia in developing project scale pilot REDD projects and the Government and partner agencies have taken significant initiative in establishing mechanisms to develop "REDD readiness".

Cambodia's recent history and policy have had a deep impact on the use of forests and land. In the 1990s, a logging concession system was introduced and over four years (1994-1997), the Royal Government of Cambodia (RGC) granted 36 forest concessions covering 7 million hectares, or close to 70% of Cambodia's forests (FA 2009b; Figure 1.1). Uncontrolled logging, lack of enforcement, concerns from local communities and low realisation of government revenues precipitated introduction of a logging moratorium in 2002. Institutional reform was initiated while a forest policy statement and a new forestry law (2002 Forestry Law) were launched in the same year.

Although reinstatement of logging is technically possible following approval of forest concession management plans; environmental and social impact assessments and re-negotiation of concession agreements, all concession licenses currently remain suspended (FA, 2009; FA 2009b). A system to supply domestic wood demand has since been established in which annual coupes are auctioned and monitored by the Forestry Administration. Since 2008, the Forestry Administration has allocated nine logging coupes outside forest concession areas to meet domestic wood consumption amounting to about 261 270m^3 (RGC 2010). A significant amount of wood also comes from clearance of Economic Land Concessions (ELCs).

Since the cessation of forest concessions the forestry sector is reported to have contracted and now contributes only 10% to agricultural GDP (TWGAW 2010). Much of the 2.7m hectares of post concession areas now remain in a management vacuum making them vulnerable to degradation (Hansen and Top 2006; FA, 2009). Remaining networks of logging roads also make them a target for poachers and illegal loggers and land encroachment has also taken place (Tola 2010). With greater international demand for forest products and land for agricultural production, greater accessibility and tensions with neighbouring countries in some areas, forests all over the country but particularly in border zones are now coming under increasingly pressure.

[1] See http://www.biodiversityhotspots.org/Pages/default.aspx. Conservation International define 34 global biodiversity hotspots as regions containing at least 1 500 species of endemic vascular plants (> 0.5 percent of the world's total), and having lost at least 70 percent of their original habitats.

[2] Eastern Indochina Dry & Monsoon Forests, Cardamom Mountains Moist Forests and Mekong River. An ecoregion is defined as a large area of land or water that contains a geographically distinct assemblage of natural communities that (a) share a large majority of their species and ecological dynamics; (b) share similar environmental conditions, and; (c) interact ecologically in ways that are critical for their long-term persistence. WWF has identified the Global 200 -- the most biologically distinct terrestrial, freshwater, and marine ecoregions of the planet (http://www.worldwildlife.org/science/ecoregions/item1847.html).

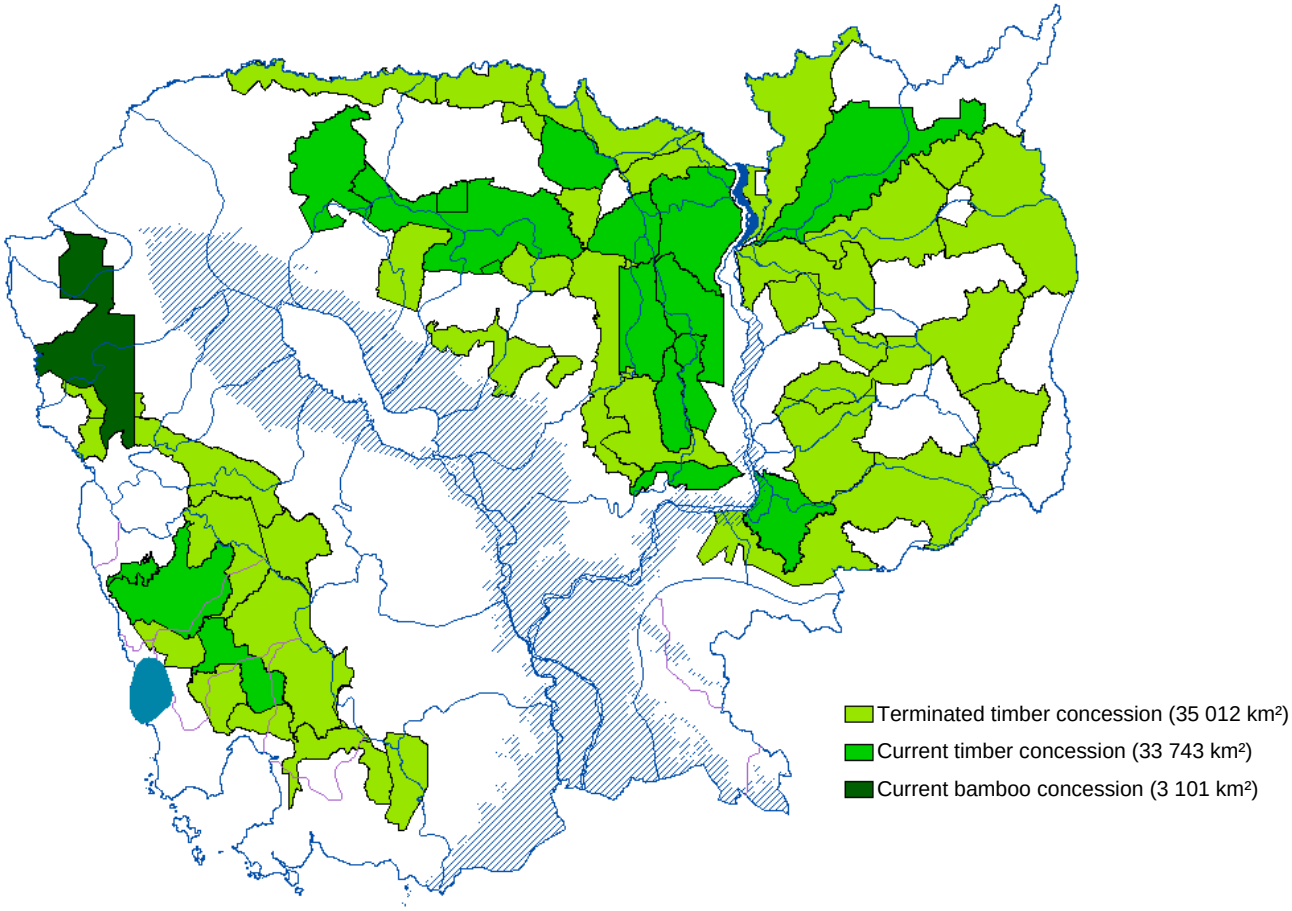


Figure 1.1. Map of forest concessions, by DANIDA 2006

Source: DANIDA, Natural Resource and Environment Programme.

In spite of the difficulties faced in forest management in Cambodia there have been many positive changes since peace broke out. The 1990s were a critical period in forestry and huge progress has been made since then. While there are still considerable challenges, this trend deserves recognition.

1.1. OBJECTIVES AND METHODOLOGY

The purpose of this assessment is to assist identification of key drivers of deforestation and/or forest degradation in Cambodia and review past efforts to reduce deforestation and forest degradation, in order to identify promising approaches for the national REDD strategy. The report focuses on drivers of deforestation and forest degradation and additional components covered under REDD+, i.e. conservation, sustainable forest management and enhancement of carbon stocks, other than in the extent to which these aspects contribute to reducing deforestation and forest degradation.

The methodology for this assessment included three complementary approaches:

- Desk based study based on secondary sources;
- Consultations with forestry experts in Phnom Penh and FAO regional office;
- Questionnaire distribution to ~115 potential informants and responses analysed (see Appendix II).

The final draft document was submitted for review to RGC, UN-REDD, FAO, UNDP and NGO staff members relevant to REDD in Cambodia.

2. Current and historical rates of land-use change[1]

Cambodia has one of the highest rates of forest cover change in Southeast Asia (Stibig, H.J. *et al*. 2007; FAO 2010). Cambodia's forests include evergreen, semi-evergreen, deciduous, inundated and mangrove forests in a range of conditions from closed to disturbed and mosaic formations. Re-growth and planted forests also exist, as well as open forest types, such as evergreen and dry deciduous shrub land. Ninety six percent of Cambodia's forest are characterised as "other naturally regenerated" with small proportions of primary (3%) and planted forest (1%; FAO 2010).

The extent of both forest and other wooded land in Cambodia has fallen rapidly over the last 20 years as agricultural land has expanded. In 1969, forests represented more than 74% (13.2 million hectares) of the land area and by 1990 this percentage had changed only marginally to 73% (12.9 million hectares; Savet and Sokhun 2003; FAO 2010a). By 2000 forest cover had fallen to 65% and forest cover currently stands at 57%[2] (10.1 million hectares; FAO 2010a).

RGC data submitted to FAO indicate an increase in the rate of deforestation from 1.1% before 2000 (140 000 hectares per year) to 1.5% between 2000 and 2005 (163 000 hectares per year; FAO 2010a). In the past five years, the rate of deforestation has been estimated to have attenuated to 1.2% per annum (127 000 hectares per year). Based on UN population projections, forest cover in Cambodia is forecast to fall to 50% by 2020 under a business as usual scenario (Figure 2.1). A target has, however, been set by RGC to maintain 60% forest cover through 2015.

A separate set of figures published by the Forestry Administration (2007) show that forest cover, using a 20% minimum crown cover, remained more or less constant over the period 1992/93 to 2005/6 (Figure 2.1). Between 2002 and 2006, 373 510 hectares were estimated to have been lost, equating to 0.5% per annum or 93 377 hectares per year.[3] (FA 2007). The lack of fluctuation in the FA forest cover figures and the differences between the data sets for the points during the 90s result from different analysis methods and revision of land cover data sets and collection of additional data will be undertaken as a part of REDD readiness activities (Walker et al. 2010).

[1] Figures from the 2010 FAO Global Forest Resources Assessment have been drawn upon in this section as the only globally standardised source of national forest statistics. Information on the reporting process, definitions used and reports for individual countries are available here: http://www.fao.org/forestry/45515/en/

[2] FAO definition of forest uses a crown cover minimum limit of 10%.

3 FA (2007) Forest Cover Changes in Cambodia 2002-2006. Paper prepared by the TWG Forestry & Environment for the Cambodia Development Cooperation Forum, 19-20 June 2007.

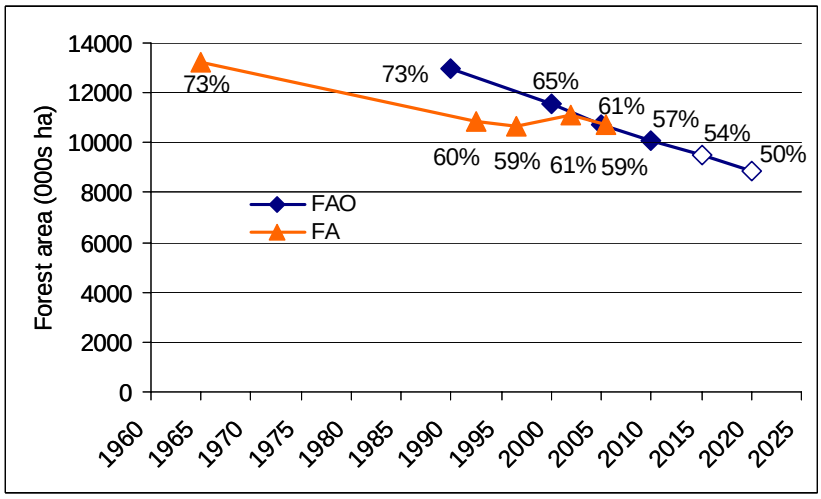


Figure 2.1. Forest cover and projected forest cover, 1965-2020

Source: FAO 2010a; FAO 2010b; FA 2007

With respect to management designation, most of the national forest area in Cambodia is designated for conservation (39.5%) and production (33.4%). The area of forest designated for conservation increased to 3 985 thousand hectares in 2010 (FAO 2010a). A small proportion of forest has also recently been designated for protection (5.5%), while the area designated for multiple use, other uses or unknown use has fallen steadily over the years (Figure 2.2). The area of forest in protected areas fell slightly from 3 277 thousand hectares in 1990 to 3 092 thousand hectares in 2010 (FAO 2010).

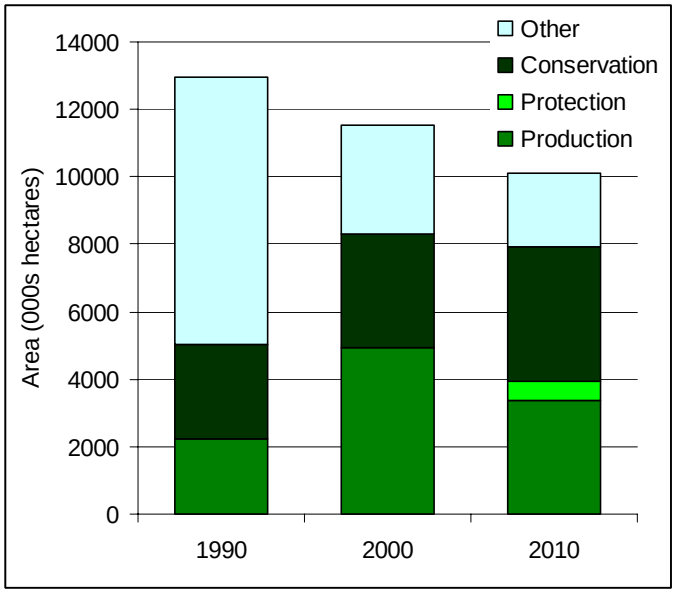


Figure 2.2. Forest area by designation (FAO 2010a)

Primary forest[1] area fell at 31 000 hectares per year between 1990 and 2000 and then at 26 800 per year to 2005 since when the rate of loss of primary forest has reported to have fallen to zero (Figure 2.3; FAO 2010). In 1990, primary forests accounted for 5.9% of forests in Cambodia and 4.3% of the land area. In 2010 at 322 000 hectares they represent less than 3.2% of forests and 1.8% of the land area. By forest type, The Department of Climate Change estimates average annual

[1] Naturally regenerated forest of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed (http://www.fao.org/forestry/14119-1-0.pdf).

reductions between 1992 and 2008 at 23 000 hectares for evergreen forest, 10 000 hectares for semi-evergreen forest, 21 000 hectares for deciduous forest, 2 000 hectares for inundated forest and 1 000 hectares for mangroves[1] (DCC, 2010).

With respect to planted forests, there has been negligible expansion in response to diminishing supplies of wood from natural forests as timber stocks have declined and forest protection measures have been imposed. After expanding at 1 200 hectares per year between 1990 and 2000, the area of planted forests has been falling at a reported rate of 1 000 hectares per year for the past 10 years (Figure 2.3). Reported rates of reforestation have, however, risen from 732 hectares per year in 2000 to 5 855 hectares per year in 2005.

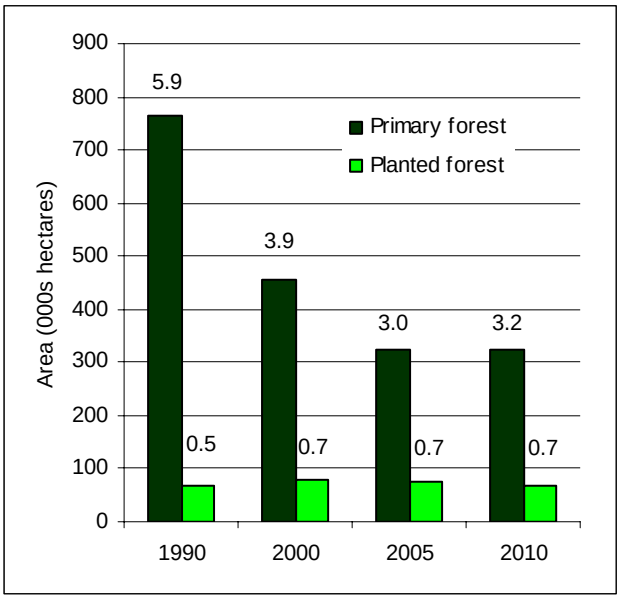


Figure 2.3. Trends in primary and planted forest area 1990-2010 (quantities are given as percentages of the total forest area next to bars)

Source: FAO 2010

Figure 2.4 shows forest biomass and carbon stocks corresponding to forest area figures submitted by RGC to FAO (FAO 2010). According to these figures, 7.3 million tonnes of carbon were lost from forests annually between 2000 and 2010.

[1] Figures from the Second National Communication to the UNFCCC GHG analysis conducted by the Climate Change Office and the Forestry Administration

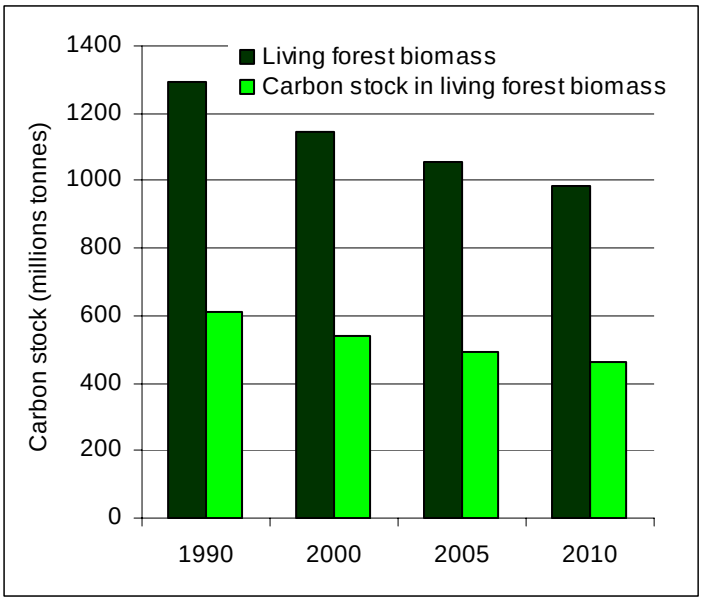


Figure 2.4. Living forest biomass and carbon stock in living forest biomass 1990-2010

Source: FAO 2010

Figure 2.5 shows changes in forest cover between 1976 and 2006. In addition to the reduction in area of forest, some areas of evergreen forest have also been reclassified as semi-evergreen and deciduous forest as stresses on ecosystems have mounted due to increasing population pressure and forest resource exploitation.

Currently, evergreen forests and semi-evergreen forests are located mainly in the north-central, north-eastern, and south-western areas of the country. These forests currently contain considerably higher quantities of above ground biomass than deciduous forests and in an undegraded state may contain 3 to 4 times as much due to their greater height and higher tree densities (Leng et al. 2010; source reference to be included). Dry evergreen forests are found on deeper alluvial soils that are also attractive for agriculture while on shallower sandy soils, deciduous and semi-evergreen forests are usually found. Wet evergreen forests are 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 hectares) and semi-evergreen (1.5 million hectares) represent around half of Cambodia's forest cover (McKenney, Chea, Tola, and Evans 2004; Rundel 1999).

Mangrove forests are of particular interest to climate change mitigation for their high rates of carbon sequestration and export, and exceptionally high carbon storage in relation to associated deep organic soils.[1] In Cambodia, mangroves are found only around Veal Renh and Kompong Som Bays and north of Kas Kong up to the border with Thailand, and only in residual form as narrow, broken strips (Løyche Wilkie and Fortuna 2003). Since the 1990s, large areas of mangroves have been clear-cut for charcoal production, with Thailand providing an important export market. Conversion to shrimp farms has also resulted in the loss of mangroves, particularly close to the Thai border although many of these have now been abandoned (Spalding, Kainuma and Collins 2010). Urbanisation and resort development have also had significant impacts and although it has been illegal to cut mangroves since 1994 as a fisheries protection measure, enforcement has been weak and charcoal production has continued within protected areas. Annual rates of mangrove loss exceed the background rate of forest loss and have accelerated from 1.6 percent between 1990 and 2000 to 1.9 percent between 2000 and 2010. According to RGC figures submitted to FAO In 2010 only 56 000 hectares of mangrove forest or 70 percent of the area present in 1990, remained in

[1] "Exceptionally high carbon storage in Indo-Pacific mangroves: Implications of sea level rise, land use, and global carbon markets": http://eco.confex.com/eco/2010/techprogram/P22816.HTM

Cambodia (FAO 2010). Village level management committees have, however, had some success in reducing deforestation (Spalding, et al 2010).

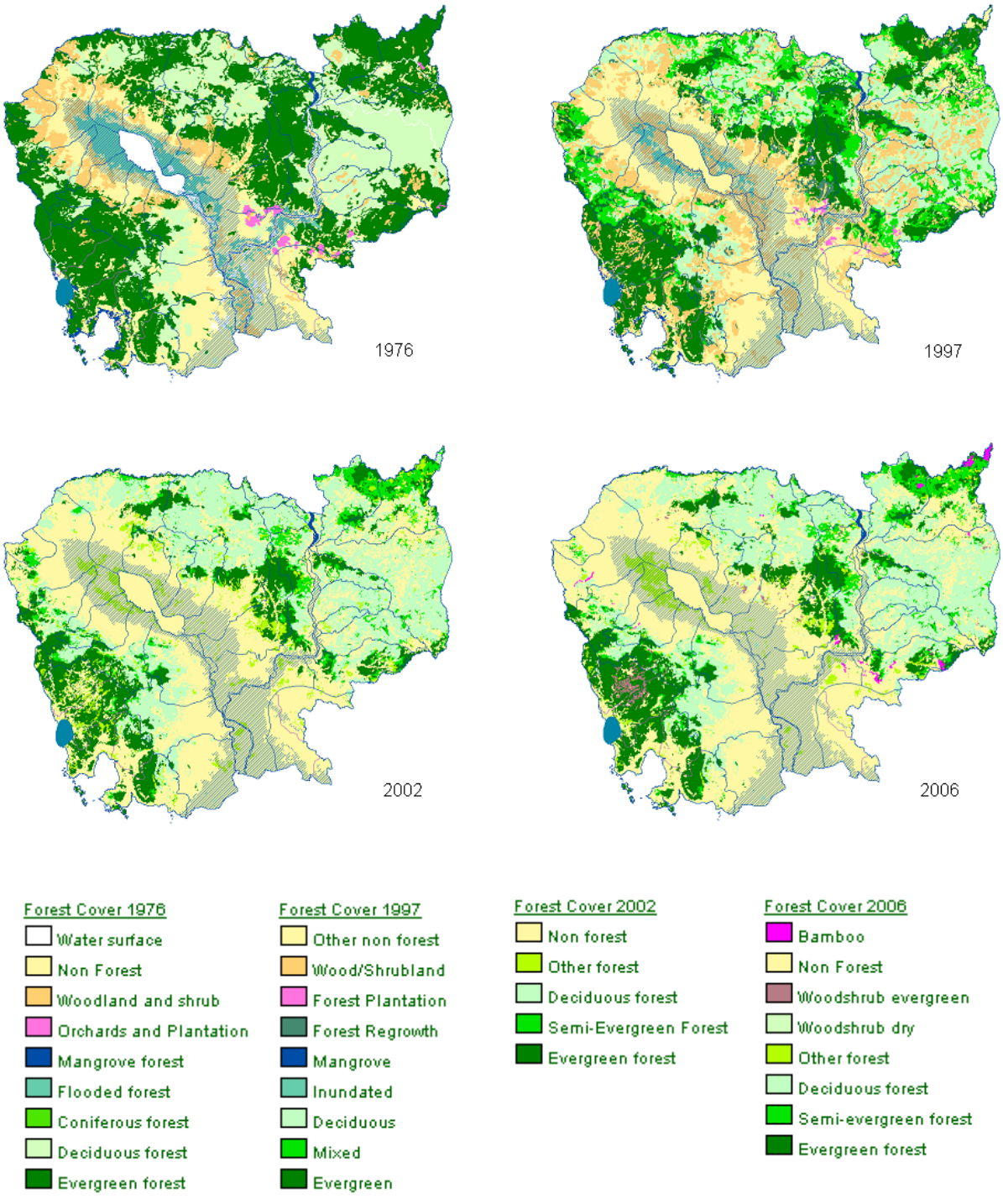


Figure 2.5. Changes in forest cover, 1976-2006.

Source: http://www.cambodiaatlas.com/

The flooded forest around Tonle Sap Lake has been reduced in size and degraded by agricultural expansion and wood cutting (FA 2009b). McKenny and Tola (2002) reported that most flooded forest areas had been cut and/or converted for agricultural use. From over one million hectares in 1973, flooded forests declined to an area of about 450 000 hectares in 1997, of which roughly 30 percent

was considered as degraded forest, either mosaic and regrowth forest. More recently there have been further significant reductions (Reference to be included).

Figure 2.6 shows deforestation hotspots derived from remote sensing. Each polygon corresponds to an area deforested between 1988/89 and 2005/06. Darker shades on the left-had map, corresponding to areas that have contributed a greater proportion of national deforestation, include zones along the edge of the central plains rice growing areas and also smaller areas in the north east and southwest of the country. The largest areas of deforestation between 2002 and 2006 were recorded in Battambang, Siem Reap and Kampong Cham provinces as shown in Figure 2.7.

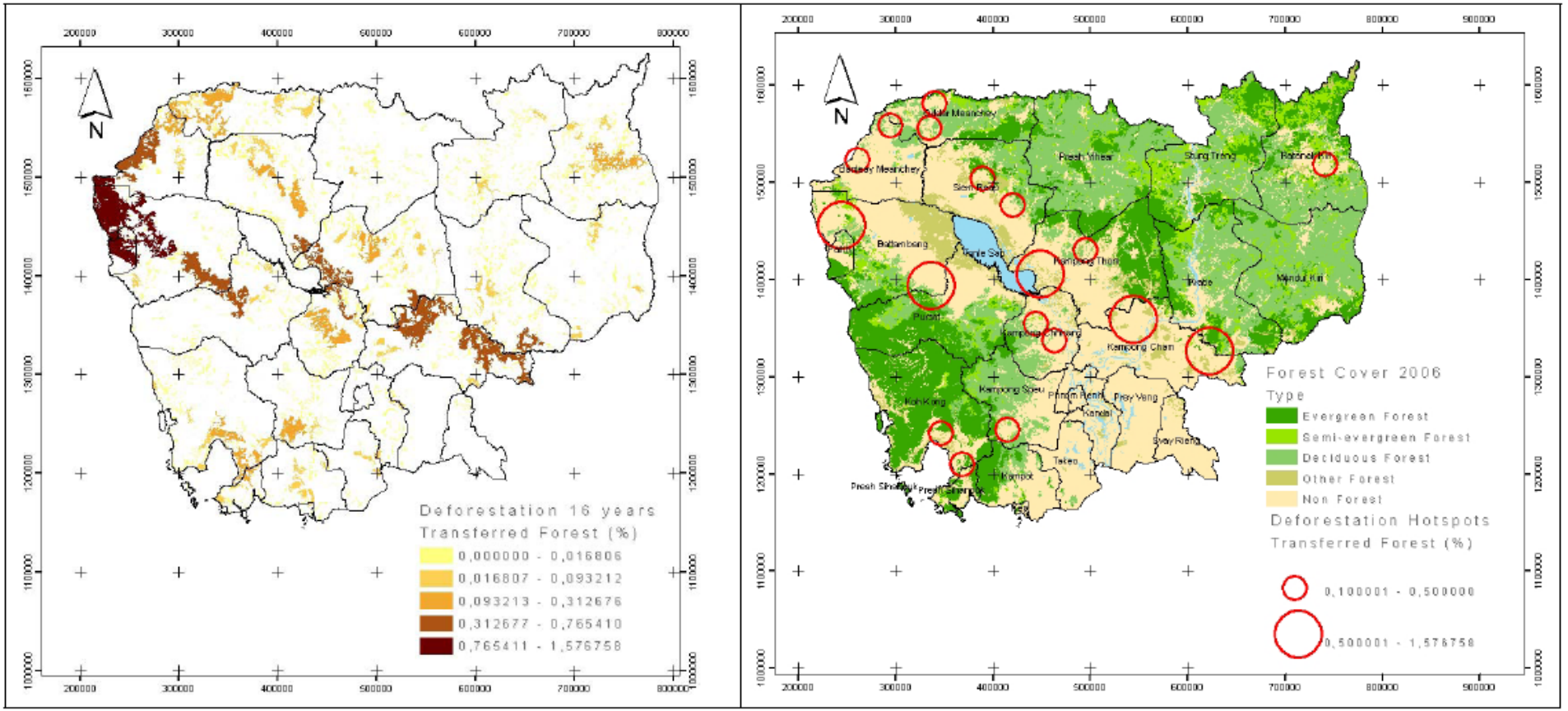


Figure 2.6. Deforestation hotspots in Cambodia between 1988/89 and 2005/06

Source: Brun (2009).

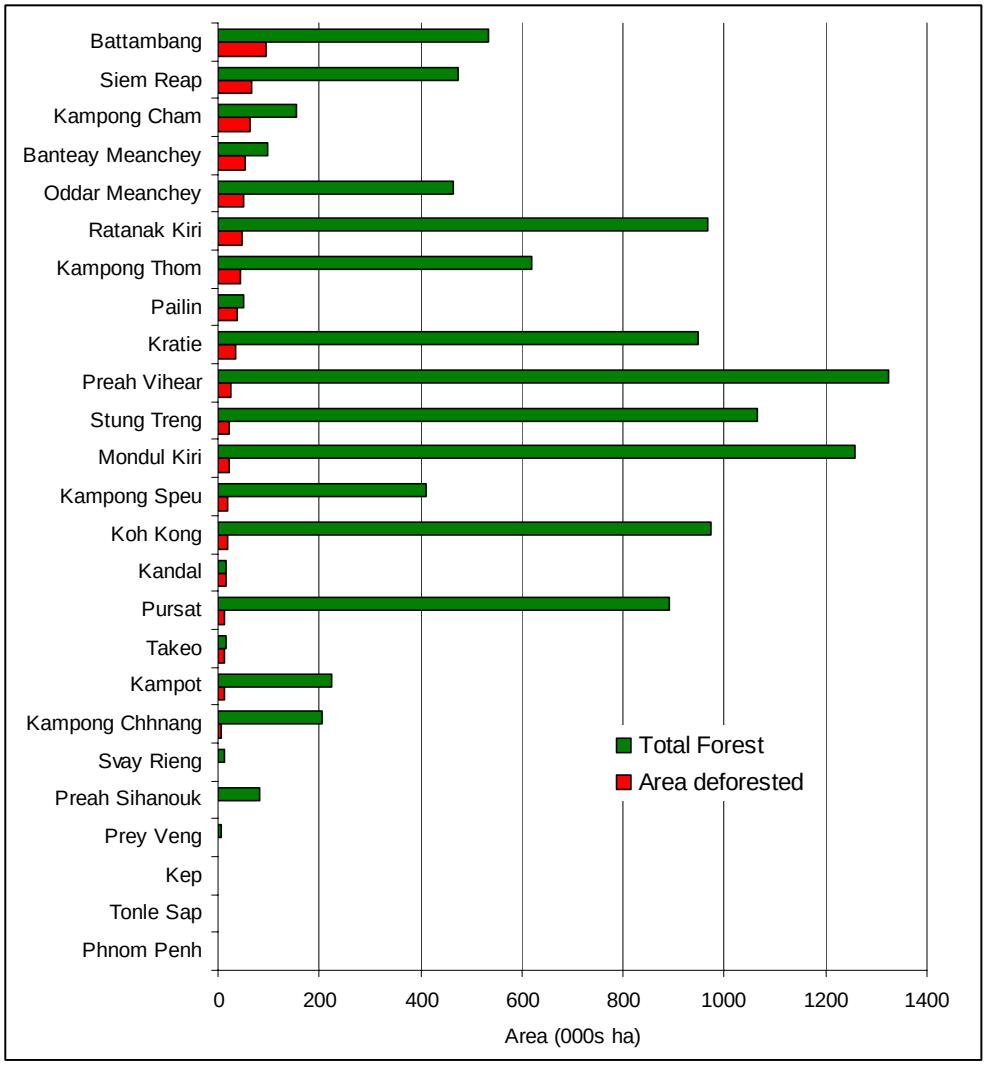


Figure 2.7. Forest area and area converted to non-forest between 2002 and 2006 by province.

Source: Brun 2009

An assessment of areas of forest change identified and delineated by a team of national and regional experts is shown in Figure 2.8 and Table 2.2Table 2.2 (Stibig et al. 2007). Many areas of forest loss are in the hilly zones and along the mountain ranges where evergreen and semi-evergreen forests are located (e.g. Cardamom Mountains). Changes to both evergreen and deciduous lowland forests have also been recorded in the flatlands of Cambodia, and mangrove and swamp forest areas in the river deltas and the Tonle Sap lake area have also seen change. Additionally, forest change hotspots are frequently located in areas bordering Lao PDR, Viet Nam and Thailand (Stibig et al. 2007).

Identified areas of change include Botum Sakor protected area in Koh Kong, areas to the north and west of Tonle Sap, Phnom Kulen national park in Siem Reap/Oddar Meanchey, areas in central Kampong Thom and many areas adjacent to the Viet Nam border in Kampong Cham, Kratie and Mondulkiri provinces. The main reason for the forest cover changes shown in Figure 2.8 is agricultural expansion and the majority of areas converted is listed as having been primary forest (Table 2.2; Stibig et al. 2007). Almost half of the sites recorded were in protected areas or national parks.

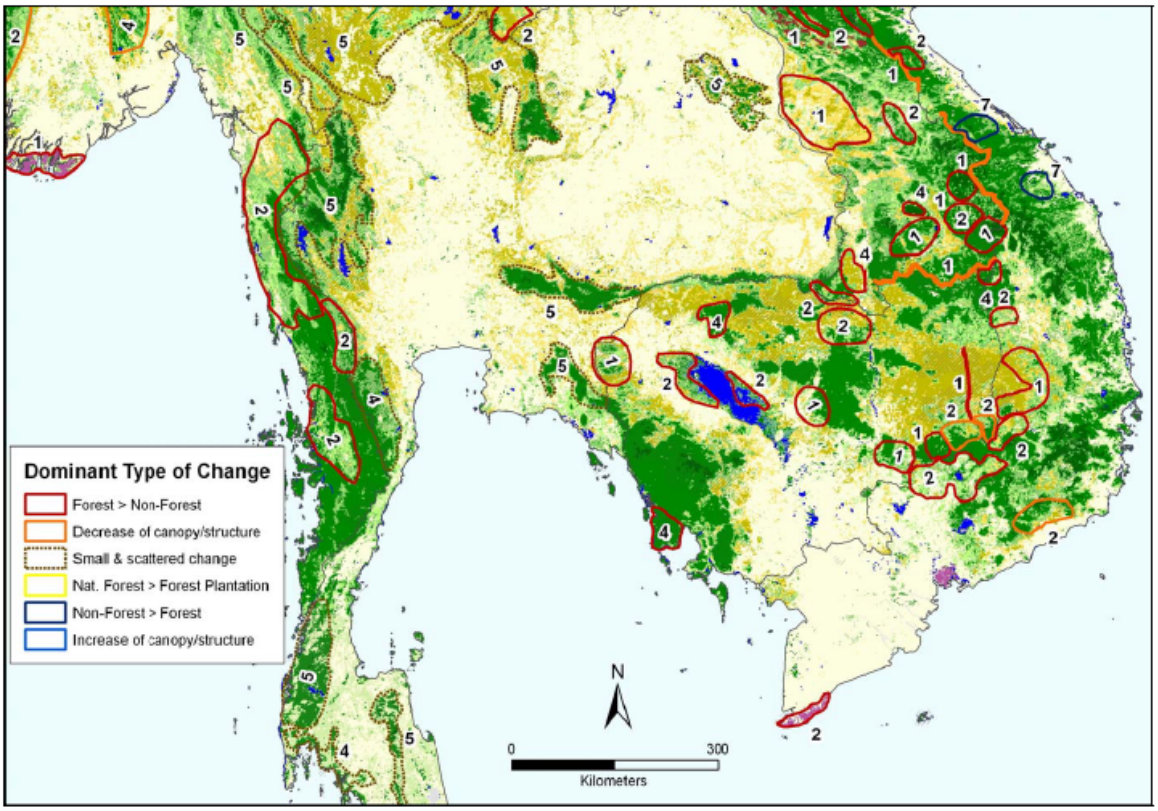


Figure 2.8 Change pattern Cambodia and surrounding regions[1]

For numerical coding = see Table 2.1.

Legend of background map: evergreen and semi-evergreen forests = dark green; dry deciduous forests = orange; mangrove forests = deep purple; woodland, shrub-land, mosaics = light green, yellow; other land cover = white & beige; Protected Areas = hatched.

Table 2.1 Coding of change processes

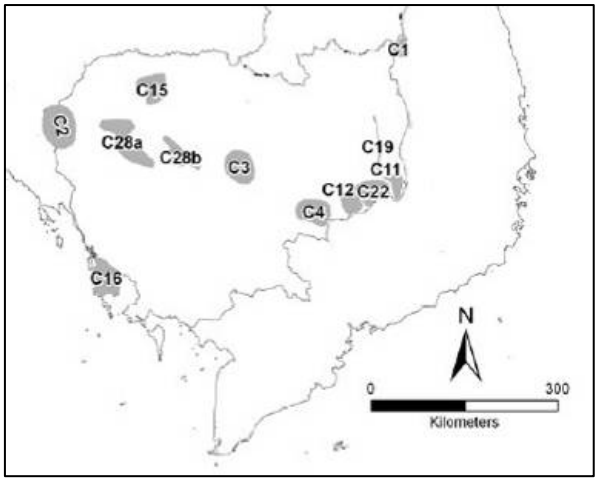
Outline colour code: Type of change		Numerical Code: Time and speed of change	
	= conversion: forest → non-forest	**1**	= now, ongoing at fast speed
	= decrease of canopy / structure	**2**	= now, ongoing at moderate speed
	= small & scattered change	**3**	= within next years
	= natural forest → forest plantation	**4**	= last 3-5 years
	= conversion: non-forest → forest	**5**	= now, small & scattered
	= increase of canopy / structure	**6**	= mainly 1990-2000, now slow speed
	= no change at present	**7**	= now, (re-)growing

[1] The area numbered '2'in northern Cambodia near the Lao border (Preah Vihear) is incorrect and resulted from a land cover classification error. Since 2008/9 there has, however, been extensive deforestation in northern Preah Vihear although to the west of area 2 due to the construction of new military bases and migration of military families (Tom Clements, pers comm.).

Table 2.2. Overview of forest change processes in Cambodia

ID	ICC	LOCATION	CHANGE				FOREST STATUS							TIME SCALE					TYPE			CAUSES										REMARKS
	Int. Country Code	Abbr. used for '*Change*': **A** =afforestation; **R** = reforestation; **G** =protected for natural regrowth; **P** =Fo→Fo. Plant.	Fo -NoFo	No Fo > Fo	Decrease CC./ Fragm.	Other	Primary	Secondary	Degraded	Other	Production	Non-Production	Protected (PA or NP)	Last 3-5 Years	Ongoing-fast	Ongoing-moderate	Within 3 Years	Other	Controlled	Un-Controlled	In formerly unused Fo	> Agriculture	> Oil Palm	> Rubber	> Coffee Tea	> Infra /Settlement	Shifting Cultivation	> Forest Plantation	>Clear Cut & Regrwoth	Selective Logging	Fire	Aqua Culture / Shrimp	Other	Abbr. used for '*Causes*': **a** = *Acacia mangium* plantations; **d** = dam construction (hydropower); **e** = *Eucalyptus* plantations; **i** = illegal logging; **m** = Mining; **p** = *Pinus* plantations; **r**= resettlement; **v** = vegetables plant. & fruit orchards; **o** (other) = see remarks; **Fo** = forest; **Ag** = agriculture; **Rd** = road
C1	KHM	Virachey Rattanakiri	x				x							x						x									i				
C2	KHM	Roniem Daun Sam	x				x	x						x	x					x		x											
C3	KHM	Kampong Thom	x				x	x						x	x				x	x				x									
C4	KHM	Kamphong Cham	x					x	x					x	x				x	x		x		x									
C11	KHM	Mondulkiri (PA)			x		x						x			x	x		x	x													proposed. conversion of 50k ha
C12	KHM	Snoul (Wildlife S.)	x					x					x	x	x				x	x		x							x				de-gazetted - illeg. logged in past
C15	KHM	Phnom Kulen N.P.	x		x		x	x						x						x		x								x			concession
C16	KHM	Botum Sakor PA	x				x						x	x					x				x											
C19	KHM	Mondolkiri	x				x						x		x				x	x						x								highway Mondolkiri – Ratanakiri
C22	KHM	Mondolkiri Plateau		A	x	P		x	x				x	x			x	x	x									p				m	a)Fo-Grassl.>Pinus plant b)Bauxit
C28	KHM	Tonle Sap	x				x							x		x				x		x											seasonally flooded forest → paddy

Key to areas of change:



3. Policies and institutions

3.1. OVERARCHING POLICY AND LEGISLATION

Many areas of public policy may impact upon forests and forestry (Broadhead and Dubé, 2002). Schmithüsen, Bisang and Zimmermann (2001) divide public policy into the following areas:

(i) Public policies establishing the institutional framework, e.g. Macro-economic policy, privatisation/role of the state, land use and tenure, rural development, social policy;

(ii) Public policies related to special economic sectors, e.g. agriculture, mining, energy, transport, tourism;

(iii) Public policies promoting development, e.g. environmental, nature protection, technology, education.

Important plans and processes promoting development in Cambodia include the National Strategic Development Plan, the Rectangular Strategy. The Land Law and policy on "Decentralization and Deconcentration" constitute changed to the institutional framework that are of considerable relevance to forestry and rural sectors. Other areas of importance are agriculture and nature conservation, mining, transport and energy related developments. Several of these areas are covered separately in section 5.

The National Strategic Development Plan update, 2009-2013 and the "Rectangular Strategy",[1] state that: "The Royal Government's forestry policy is to ensure sustainable forestry management and the use of forests to improve the livelihoods of people living in rural areas and to contribute to economic growth" (RGC 2010; Hun Sen 2008). Furthermore, forest communities are considered to be an important element in forest management and the private sector is encouraged to establish commercial forest plantations in degraded forest land based on agreed technical standards. The plan also mentions enhancing management of reserved forests and protected areas, and supporting efforts to address climate change.

Prime Minister Hun Sen reiterated that increasing agricultural productivity and promoting agro-industries will remain an RGC priority in 2008 (Hun Sen 2008). Shifting from extension of cultivated areas to intensification of farming on existing land was also given priority as was "partnership between small land holders and large-scale agricultural farms or corporations, and between economic and social land concessionaires, especially those involved in agro-industries such as rubber plantation in accordance with the Strategic Plan for the Development of Rubber, Cashew, and Sugarcane". The Rectangular Strategy additionally prioritises rehabilitation and reconstruction of transport networks within Cambodia and connecting with neighbouring countries, and maintaining national roads and reconstructing provincial and rural roads.

The Land Law of 2001 defines the national system of land classification and land ownership rights and includes provisions on social and economic land concessions (ELCs), indigenous land rights, land registration, and dispute resolution. The law distinguishes between state land in the public domain, such as forests and PAs, and state land in the private domain, which is used to provide land for economic and social development. Indigenous property is a communal title, which is vested in an incorporated community with rights equal to those of a private property holder. Communal lands in the PFE may either be converted to state private property or remain as state public property, in which case the government can take back the land[2] (FA 2009b).

[1] The RGC's socio-economic agenda

[2] Some contention exists in relation to this right

Cambodia follows a systematic land-titling programme for smallholder farmers while granting economic land concessions to private investors to support agribusiness development. Land titling efforts are focused mainly in rice-growing areas in the Mekong and Tonle Sap river basins, while ELCs tend to be granted in frontier and forested areas. A crucial policy question concerns the process of expanding agricultural frontiers by assigning state land to agricultural uses under a development strategy that promotes sustainable land use and secure tenure for agricultural producers (TWGAW, 2010).

Land titling for indigenous communities has gradually been moving ahead in recent years and currently 44 communities are in the process of obtaining collective land title. By July 2010 31 Indigenous Communities had been certified by the Ministry of Rural Development and 13 were registered as legal entities. At least 80 other communities are applying for registration and another 89 indigenous communities are applying in Ratanakiri and Mondulkiri (Sek Sophorn per Tom Evans pers comm.).

In recent years, an increasingly important tool driving change in rural areas has been the system of land concession allocation. The 2001 Land Law authorises the granting of land concessions of a maximum of 10,000 hectares for social or economic purposes. There are three main types of land concessions:

- social land concessions – for residential constructions and/or subsistence agriculture;
- economic land concessions – for industrial or agricultural businesses;
- use, development or exploitation concessions – for fishing, mining, ports, airports or industrial development.

Proposals for ELC, which of the three concession types have had the most significant effects on forests, are evaluated against the following criteria:

- Increase in agricultural and industrial-agricultural production by using modern technology;
- Creation of increasing employment;
- Promotion of living standards of local and indigenous people;
- Continuous environmental protection and NRM;
- Avoidance or minimisation of adverse social impacts;
- Linkages and mutual support between social land concessions and ELCs;
- Processing of raw agricultural materials, to be specified in the concession contract.

The Sub-Decree on ELCs (2005) provides criteria for granting ELCs as follows:

1. A land use plan has been adopted by the Provincial-Municipal State Land Management Committee and the proposed land use is consistent with the plan;
2. ESIA has been completed and a development plan has been produced;
3. Solutions for resettlement issues have been developed in accordance with the existing legal framework and procedures and no involuntary resettlement of lawful land holders will take place while access to private land shall be respected
4. Public consultations have taken place with local territorial authorities and residents.

According to the sub-decree, ELCs must be exploited within 12 months of being granted, or will be considered cancelled. ELCs of over 10 000 hectares granted prior to passing of the Land Law are to be reduced to comply with the area limit, although an exemption may be granted if the reduction will compromise exploitation in progress. Many of these criteria for evaluating and granting ELCs and

rules associated with concession utilisation are of importance to forestry although in previous years seeming to be observed more often in the breach.

The Statement of the RGC on Land Policy (RGC, 2009) highlights the need for "coordination of land use planning with NRM of forests […] in a harmonised legal framework" directed towards enabling the achievement of national goals of economic development, poverty reduction and good governance. The objectives are to: strengthen land tenure security and land markets, and prevent or resolve land disputes, manage land and natural resources in an equitable, sustainable and efficient manner, and promote land distribution with equity (FA 2009b).

Changes in the institutional framework are also taking place through the RGC policy of "Decentralization and Deconcentration", which is aimed at stimulating local level economic growth and promoting economic inclusiveness, environmental and natural resource management and public service delivery, particularly to the rural poor and vulnerable groups. The overall policy is supported by measures aimed at fiscal decentralization and deconcentration and the assignment of revenue collection and expenditure rights to provincial/municipal, district/khan, and commune/sangkat administrations. Sectoral policies on transference of responsibility to each level are also to be developed. Decentralisation and deconcentration has been in progress for a number of years but lack of clarity and adoption of different approaches between different line ministries and departments has been experienced in nearly all sectors. Delegation of responsibilities is not generally being accompanied by allocation of rights where deconcentration is happening and unclear relationships between the centre, provinces and districts has hindered progress (Hobley 2004).

The national protected area system comprises 23 protected areas created through the Royal Decree on Creation and Determination of Nature Reserves 1993 and managed by the Ministry of Environment (MOE; ICEM 2003b). The Environmental Protection and Natural Resources Law (1996) and the 2008 Protected Areas Law are also of relevance for forests in Protected Areas. Importantly, the Protected Areas Law created two new zones within protected areas: community and sustainable-use zones. These new zones may be used for development purposes while the core and conservation zones are reserved for biodiversity conservation. The National Biodiversity Strategy and Action Plan (NBSAP, 2002) is aimed at sustainable protection, use and management of all wild plant, including trees and woodlands and the MOE has also prepared a master plan on protected areas, which makes provision for boundary demarcation, and has produced protected area maps for 18 locations (RGC 2010). The National Protected Area Strategic Management Plan is currently being completed and will include measures related to climate change. Subsidiary regulations under the Protected Areas Law will also be issued including Prakas completed in 2006 which relate to Community Protected Areas.

Key indicators for MAFF programs relevant to REDD are presented in Table 3.1. Importantly, the area under crops is projected to increase by 75 thousand hectares per year while the cultivated paddy area is expected to remain constant while increased yields are focussed upon to provide productivity improvements. Rubber plantation establishment is expected to increase at 15 thousand hectares per year while forest cover is also expected to increase at around 70 thousand hectares per year. These combined increases account for expansion equal to around 0.9% of Cambodia's land area per year although it is not made clear which land categories will absorb the expansion.

Table 3.1 Key indicators for agriculture, fisheries, and forestry

INDICATOR	Unit	2008 Actual	2010 Projected	2013 Projected
Land under crops (cash & industrial)	000 Ha	596	774	1000
Paddy: cultivated area	million Ha	2.61	2.65	2.65
Yield per hectare	tons	2.74	2.80	3.00
Cultivated area of rubber	000 Ha	111.4	143.4	188.4
Forest cover	%	59.00	57.99	59.19
Reforested (cumulative since 1985)	000 Ha	10.81	73	73
Fuel wood dependency	% of households	73	61	54
Forest boundary demarcation	km	321	413	500
Community forests	No.	124	300	450

Source: RGC 2010

3.2. FORESTRY POLICY

Despite sustainability having been at the centre of forestry policy in Cambodia for over a decade, implementation has was initially slow while more recent progress has been hampered by new challenges. The RGC's policy platform adopted by the National Assembly in 1998 emphasized balancing harvesting with tree planting and forest growth while controlling illegal logging (Savet and Sokhun 2003). Specific objectives included planting fast growing trees for woodfuel production; controlling timber-processing capacity; and encouraging modernization of wood-processing equipment and employment generation. Provision was made for reviewing the legality of forest concessions with cancelled concessions to be classified as protected areas or classified forests. Well performing concessions were encouraged to follow management plans and abide by the Cambodian Code of Practice for Forest Harvesting, which became effective in 1999 (Savet and Sokhun 2003; Forestry Administration, 2009).

Following enunciation of the Millennium Development Goals in 2000, a statement in 2002 indicated forestry sector support for national social economic development, poverty reduction and governance. Objectives include conserving and sustainably managing forest resources for socio-economic development with maximum involvement of the private sector and participation of the local population to ensure food security, poverty reduction and socio-economic development. Support for forestation of arable land was also included.

In 2002, failures in the production forest management system resulted in the suspension of concession licences and forestry in Cambodia embarked upon a period of policy reform. A new law on forestry was implemented in 2002 and a National Forest Policy Statement was issued by the Prime Minister (as above). In 2003, the Department of Forest and Wildlife was reorganized into the Forest Administration to create a single line of authority for forestry at the national level as a response to the problems faced by the sector (Rotha 2009; Forestry Administration, 2009).

The 2002 Forestry Law provides rights to the Forestry Administration to establish community forests. The government adoption of the *Sub-Decree on Community Forestry Management* in 2003 provides a basis for agreements for communities to manage an area of forest for 15 years. The Forestry Law also authorises the granting of forest concessions. The sub-decree on the Management of Forest Concessions states that cancelled or revoked forest concessions shall revert to natural forest protected areas and cannot be converted into an ELC or awarded to other companies (GTZ 2009). According to FA there are 12 forest concession that are pending while all others have been cancelled (Tola 2010).

A new system to supply domestic wood demand has now been established in which annual coupes are auctioned and monitored by the Forestry Administration (Forestry Administration, 2009). The coupe areas of are generally over 1,000 hectares and the highest bidder is given permission to

harvest timber for one year following sustainable management practices (Tola 2010). Although it is not clear whether the system has been successful, it has been reported that high fees, taxes and expensive transportation costs have reduced bidder's interest.

Despite sustainability having been a central policy theme in Cambodia, performance with respect to thematic elements related to sustainable forest management[1] has been poor, both in absolute terms and in comparison with Southeast Asia as a whole (Table 3.2). The thematic elements shown in the Table 3.2 are derived from regional and international processes on criteria and indicators for SFM (FAO 2005).[2] Comparative analysis of different elements provides an indication of balance – and degree of sustainability – in sector development. In Cambodia there are few positive trends although area of forest designated for protection and conservation has increased over the last decade.

Table 3.2. Trends towards SFM in Southeast Asia 2000-2010

THEMATIC ELEMENT	Cambodia Annual change %	Cambodia Annual change Absolute	SE ASIA(2) Annual change %	SE ASIA(2) Annual change Absolute	UNIT
EXTENT OF FOREST RESOURCES					
Area of forest	-1.3	-145	-0.4	-898	1 000 ha
Area of other wooded land	-7.8	-17	0.4	207	1 000 ha
Growing stock of forests	-1.4	0	-1.1	0	M m^3
Carbon stock in forest biomass*	-1.5	-7	-1.2	-274	MT
BIOLOGICAL DIVERSITY					
Area of primary forest	-3.4	-13	-0.4	-230	1 000 ha
Area of forest designated primarily for conservation of biodiversity	1.7	60	0.9	318	1 000 ha
Total forest area excluding area of planted forests	-1.3	-144	-0.6	-1178	1 000 ha
PRODUCTIVE FUNCTIONS OF FOREST RESOURCES					
Area of forest designated primarily for production	-3.7	-155	-0.5	-545	1 000 ha
Area of productive forest plantations**	-0.8	-1	1.9	164	1 000 ha
Total wood removals	-28.6	-41	-3.6	-2.4	M m^3
PROTECTIVE FUNCTIONS OF FORESTS					
Area of forest designated primarily for protection	57.1	55	-0.4	-190	1 000 ha
SOCIO-ECONOMIC FUNCTIONS OF FOREST RESOURCES					
Area of forest under private ownership**	0.0(1)	0(1)	-1.1	-194	1 000 ha

1 – No private forest in Cambodia
2 – Countries with no data available excluded from estimation of trends for Southeast Asia
* – Forest carbon in living (above- and belowground) biomass
** – Trend between 1990-2005
- (dash) – no data available
0 or 0.0 – no change

= Positive change (greater than 0.5%)
= No major change (between -0.5 and 0.5%)
= Negative change (less than -0.5%)

Sources: FAO (2005); FAO (2010).

[1] "Sustainable forest management aims to ensure that the goods and services derived from the forest meet present-day needs while at the same time securing their continued availability and contribution to long-term development." (http://www.fao.org/forestry/sfm/en/)
[2] http://www.fao.org/forestry/24447/en/

While the overall picture is one of declining forest cover, areas such as establishment of community forestry, where Cambodia could score more highly are not included among the thematic elements. In relation, community forestry is expanding rapidly and in recent years has receiving increasing support from the Forestry Administration. The government's target is to increase coverage of community forestry to 2 million hectares by 2030 (MAFF 2010). Additionally 1.4 million hectares of Protection Forests have been declared since 2002, as reflected in the table above and although not yet adopted, the 2008 Protected Areas Law mandates a large number of subsidiary regulations aimed at improving Protected Area management.

Additionally, the Protected Areas Law, Forestry Law and Fisheries Law all allow decentralised natural resource management through community forests and community fisheries (which include flooded forest management) and community protected areas. The level of recognition of the importance of local management of natural resources, including the contribution towards conservation stands ahead of that in much of the rest of Southeast Asia.

4. Forest governance in Cambodia

4.1. JURISDICTION OVER FOREST RESOURCES

All forest resources, water courses, natural lakes, seashores and banks of navigable and floatable rivers are considered state property (article 15, 2001 Land Law). Forests in Cambodia are under the management and governance of three separate government agencies (2002 Forestry Law, 2005 Fisheries Law, 2008 Protected Areas Law):

- Permanent Forest Estate is under the jurisdiction of the Forestry Administration (FA), which is a department of the Ministry of Agriculture, Forestry and Fisheries (MAFF). The Permanent Forest Estate includes state forests (the Permanent Forest Reserve) and private forests.
- Flooded forests, including mangroves, are under the management of the Fisheries Administration (also under MAFF).
- Protected Areas and Ramsar sites are under the jurisdiction of the Ministry of Environment, as per the Protected Area Law (2008)

The Forestry Law of 2002 is the major legal instrument for managing the Permanent Forest Reserves (PFRs). Key aspects of the Forestry Law include (Rotha 2008):

- Establishment of the roles and powers of the government forest agency;
- Classification of forest lands including the establishment of a permanent forest estate;
- Establishment of the rights and obligations of forest users;
- Provision for private sector and community participation in forestry;
- Provision for the conservation and protection of forests and wildlife.

Most forests are classified as State Public Property held by the State in public trust. The Permanent Forest Estate comprises the Permanent Forest Reserve (PFR, which is State Public Property) and private forests. The Forest Administration (FA) is responsible for the PFRs and the Ministry of Environment (MoE) for Protected Areas, which are not included within the PFR. The PFR comprises Production Forest, Protection Forest, and Conversion Forest (Table 4.1; TWGAW 2010).

Conversion forests are considered part of the Permanent Forest Reserve and are State Public Property under the 2001 Land Law. On conversion, they may be reclassified, most likely as State Private Property, and sold or used as land concessions.

With respect to utilisation of forest resources, any individual or legal entity harvesting forest products in the Permanent Forest Reserves should pay royalties and premiums although the state does not require payment from harvesting in private forests (as per 2002 Forestry Law article 52). At the village level, limited surveys have suggested that local understanding of the forestry law is good (Box 4.1).

Management of flooded forest is not considered in the 2002 Forestry law, as specified in Article 3. Management of Cambodia's 1.2 million hectares of inundated forests (including flooded forests and mangroves) and protected inundated areas is covered by the 2006 Fisheries Law. Ministry of Agriculture, Forestry and Fisheries (MAFF) issued the sub-decree on Community Fisheries Management in 2005 and a prakas on Guidelines for Community Fisheries in 2007 (Blomley 2010). Flooded or inundated Protected Areas are considered State Public Property under the jurisdiction of the MoE under the 2008 Protected Areas Law.

Box 4.1. Local level knowledge of the forestry law

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. 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.

Source: McKenney, Chea, Tola, and Evans (2004) Survey results from 5 villages in Preah Vihear and 3 villages in Kompong Thom.

Implementation of 2005 Sub-Decree #53 on the Mechanism for Establishment, Classification and Registration of the Permanent Forest Estate is continuing and it is expected to take many years before the boundaries of Cambodia's forest estate is clearly demarcated or registered (FA 2009b). According to Sokha (2007), access to land has been increasingly difficult for villagers since issuance of the Forestry Law and the Forestry Administration's pursuit of legal cases against encroachment.

Table 4.1. Classification of the permanent forest estate in Cambodia

PERMANENT FOREST ESTATE **Objective**: to increase to the maximum extent the social, economic, environmental and cultural heritage benefits for the Kingdom of Cambodia, according to the principle of a sustainable forest management. **Jurisdiction**: MAFF, through the Forestry Administration.			
Classification	**Category**	**Function**	**Type**
Permanent forest reserve (Designated and managed according to the National Forest Management Plan)	Production forest	Sustainable production of forest products and by-products. Protection function is considered secondary.	Forest concession Production forest not under concessions Rehabilitated forests Reserved forestland for reforestation or tree plantation Reserved forestland for forest regeneration Degraded forestland Community forests under agreement
	Protection forest	Protection of forest ecosystems and natural resources therein. (Local communities have customary user rights to collect forest products and by products with minor impact in the forests).	Reserve forests for special ecosystems Research forests Forests for regulating water resources Forests for watershed protection Recreation forests Botanical gardens Religious forests
	Conversion forestland	Other development purposes	Idle land comprised mainly of secondary vegetation.
Private forests		Owners hold the right to manage, develop, harvest, use, sell and distribute forest products.	

Source: 2002 Forestry Law and Oberndorf, 2003.

Provision for the establishment of Protected Areas was promulgated through the 1993 Royal Decree on Creation and Determination of Nature Reserves. Four types of protected area are included: national parks, wildlife sanctuaries, protected landscapes and multiple use management areas. Twenty three sites covering a total area of 3 327 200 hectares were established under the decree and the 2008 Protected Areas Law added four additional types of protected area: Ramsar sites, biosphere reserves, natural heritage sites and marine parks. In 2001 a Royal Decree on the Tonle Sap Biosphere Reserve was announced and several Ramsar sites have also been declared. The core areas of the Tonle Sap Biosphere Reserve but not the sustainable-use or transition zones are now assigned as Protected Areas (2008 Protected Area Law).

Development and investment activities inside protected areas may be permitted by the RGC following a request from the MoE (article 11 of the 2008 Protected Areas Law). Activities are restricted to sustainable use within community zones. Construction of public infrastructure can also be permitted (article 36 of the 2008 Protected Area Law). In accordance with the 2008 Protected Areas Law, the National Protected Area Strategic Management Plan will include management plans for individual protected areas. The National Plan is currently being drafted by MoE with support from UNDP.

4.2. TRENDS IN GOVERNANCE

All forests in Cambodia are recorded as being under public ownership although institutional jurisdictions lack clarity and policy measures in forestry have been weakly implemented in past years. Factors that have proven to be preconditions for tackling illegal logging are political stability and the effective rule of law.[1] In Cambodia, governance indicators are low and mostly either stable or falling shown in Figure 4.1. However, political stability has increased markedly in the past decade which constitutes at least some reassurance that improved forestry sector control is a potential. Rule of law has, however, declined marginally.

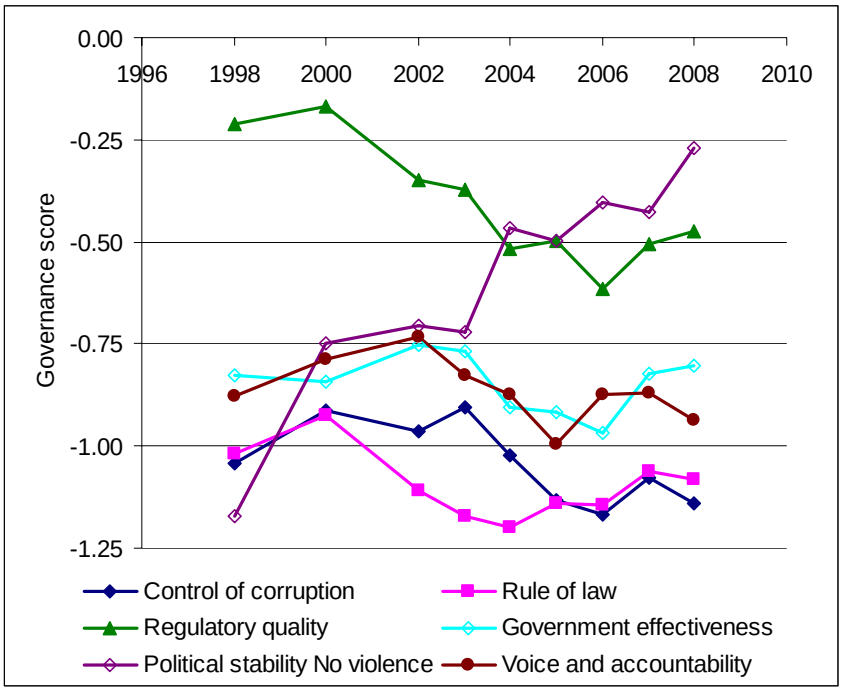


Figure 4.1. Governance indicator scores 1998-2008 (scores potentially range from -2.5 to +2.5)

Source: World Bank World Development Indicators.

Earlier in the decade, Hobley (2004) listed reasons for failure of institutional reform initiatives to have included promotion of technical solutions where the main obstacles were socio-political, including:

- Clientelism in the forestry and environment public services;
- Forest sector decisions are largely determine by narrow interest groups including the military, the public bureaucracy, the private sector (generally a few powerful individuals), NGOs and donors;
- Corruption – i.e. the use of public office for private gain, and the major discrepancy between the private agendas of the principal public actors and their formal public agendas.

Some of the particular elements that were recorded as underpinning these issues were:

- Low civil service salaries;
- Interference in the affairs of the Judiciary with systemic corruption at all levels;

[1] "Illegal Logging and Related Trade: Indicators of the Global Response": http://www.chathamhouse.org.uk/research/eedp/papers/view/-/id/911/

- The absence of an inventory and classification of state-owned land together with disagreements between ministries over jurisdiction;
- Low government revenues;
- Audit offices, the courts and inspection offices within ministries generally do not have sufficient independence and are subject to political interference;
- Centralised decision-making;
- Lack of public confidence in the judicial system.

Many of these issues remain to be fully resolved although advances have been made in some areas such as in relation to civil servant's pay.[1]

[1] New plan for civil servant salary top-up. The Phnom Penh Post, Thursday, 22 July 2010. http://www.phnompenhpost.com/index.php/2010072240649/National-news/new-plan-for-civil-servant-salary-top-up.html

5. Drivers of change

There are many different forces driving deforestation and degradation in Cambodia, most if not stem from increasing demand for land and resources. While some drivers have international links, others are attached to rural life and domestic wants and needs. Forests have been increasingly at risk, particularly during the past decade, as a result of expanding demand for agricultural land and timber in combination with infrastructure development, land encroachment, illegal logging, development projects, fuelwood consumption and poverty (Rotha, 2008). Poffenberger (2009) identifies nine forces driving deforestation in Oddar Meanchay, which are also encountered in other parts of Cambodia:

1. Land concessions (National level)
2. Military personnel (National level)
3. Land speculation (Sub-National level)
4. Migrant encroachment (Sub-National level)
5. Local government officials (National level)
6. Illegal logging (National level)
7. Forest fires (Sub-National level)
8. Agriculture expansion (National level)
9. Firewood consumption (National level)

The first four drivers are considered to be the most significant and most causes of deforestation and degradation are located at the national level. Most drivers may cause either deforestation or degradation although some are more of a concern in relation to deforestation. The overarching key drivers of change are assumed to be rising demand for land and resources also there are also natural drivers of change, including fire. Major direct and indirect drivers of deforestation and forest degradation are listed in the table below

The main reason for the forest cover changes shown in Figure 2.8 and Table 2.2 is agricultural expansion. Production of rubber, sugar cane and, more recently, biofuel crops has been a major cause (Stibig et al. 2007; GTZ 2009). In relation, a great contribution to forest loss has been from powerful people grabbing and buying land, and from economic land concessions (Rotha 2008). Stibig et al 2007 report forest change areas related to uncontrolled land 'grabbing' and encroachment, for example in Cambodia's southern and Siem Reap provinces. These instances are partly driven by land speculation. Forest change in relation to road construction connecting the northern part of Cambodia to Phnom Penh has also been recorded. In addition, illegal logging is frequently found along the borders and in the area where Laos, Vietnam and Cambodia join, including in protected areas (Stibig et al 2007).

Social norms have also contributed to deforestation because forest land not currently under management is traditionally seen as an open-access resource that can be claimed by clearing. Such claims were confirmed by the 2001 Land Law, which at the same time restricted further possession of state public land after promulgation of the law. Although land titling improves local rights and natural resource conservation, the land law has not been implemented systematically - communal titling has been extremely sluggish for example - and has become "one of a number of competing norms and practices to which people may turn in their struggles to secure land rights" (Adler, Porter and Woolcock 2008).

Table 5.1. Drivers of deforestation and forest degradation

	Within the forest sector	Outside the forest sector
Direct	• High impact and illegal logging.	• Agricultural expansion; • Low agricultural yields; • Expansion of settlements; • Infrastructure development; • Fire; • Timber demand; • Woodfuel demand.
Indirect	• Low institutional capacity and weak policy implementation; • Weak forest sector governance o Weak enforcement and control; o Low levels of stakeholder participation and involvement; o Corruption, clientelism and nepotism; o Lack of transparency and accountability; o Lack of assessment of social and environmental impacts. • Lack of demarcation of forest areas; • Low awareness of forestland management rights and responsibilities • Lack of sustainable or alternative supply of wood and energy; • Lack of incentives promoting sustainable management of forests; • Low efficiency of wood use; • Inadequate information and statistics on forest resources and products.	• Population increase; • Rising incomes and demands for resources; • Increasing accessibility of forest areas; • Low agricultural yields; • Migration into forest areas; • Military activity; • Large scale agri-industrial development (ELCs and SLCs); • Lack of information on national land use and land use plans; • Governance o Overlapping/unclear jurisdictions; o Weak land tenure – tenure is weakest in forests and other areas outside residential or farming zones; o Weak enforcement of the law; o Lack of a fair and transparent conflict resolution mechanism; o Chronic incidence of high-level interministerial and interagency disputes. • Social norms (claiming land through utilisation); • Low awareness of environmental roles of forests.

At the field level, multiple threats combine to effect change in the landscape. In Mondulkiri Protected Forest, a multitude of trends suggest that reductions in the rate of deforestation and forest degradation will be hard won (Box 5.1).

Box 5.1. Deforestation and degradation threats in Mondulkiri Protected Forest.

In the Mondulkiri Protected Forest, threats to biodiversity that are also relevant to deforestation and degradation include:

1. Unmonitored exploitation of resources (timber poaching, fuel wood and charcoal production);
2. Habitat change as forest land is converted for agriculture and settlement;
3. Economic development with little consideration of environmental impacts, e.g. mining exploration and infrastructure development, including plans to improve roads passing through the northern portion of the MPF to Vietnam.

While population density is low at 4 people per square kilometre in the MPF, there is an increase in the pace of habitat loss due to rising demand for land for agriculture and settlement. Population increase in the area, including births, deaths and in-migration, is very high at 16% per year. The rates of habitat loss is thought unlikely to abate due to:

- rapid economic development;
- improving accessibility;
- no knowledge of family planning;
- slow or non-existent land use planning;
- perceived openness of the province to migrants and investors;
- illegal land grabbing and speculation;
- absence of an appropriate land management framework; and
- lack of political will to implement and enforce land laws.

The situation is considered likely to lead to unsustainable resource utilization which poses a grave threat to the biological diversity of MPF.

Source: Maling, 2007.

5.1. INFRASTRUCTURE DEVELOPMENT

Infrastructure development and construction of roads, dams and mines in particular, poses direct and indirect threats to forests. Indirect threats to forests are usually considerably greater than direct impacts due to the multiplicative effects of accompanying economic development - with roads in particular. Figure 5.1 shows the current road network in Cambodia and the higher road densities across the central plains. New arterial roads from Kampong Cham to Kratie and from Kratie to Stung Treng built as part of the GMS system of economic corridors are likely to have major effects on adjacent forests and on the opportunity costs of land (Figure 5.2). In Koh Kong Province new roads and bridges are also being constructed in close proximity to forest areas.

The expansion of roads into new areas and the improvement of existing roads affect both legal and illegal activities. For example, the opening up of the road through Ratanakiri into Vietnam will make access to the coast easier for a large part of the Northeast, and hence will change the economics of acacia plantations for woodchip production. In relation, the increasing opportunity cost of land resulting from greater accessibility is likely to drive illegal logging. This is especially the case since high value forests cover a proportion of the land to which access will be improved. Infrastructure development may also take place close to the border with Thailand where the military are keen to open a road - ostensibly for security purposes although logging opportunities may also play a role (Rotha 2008)

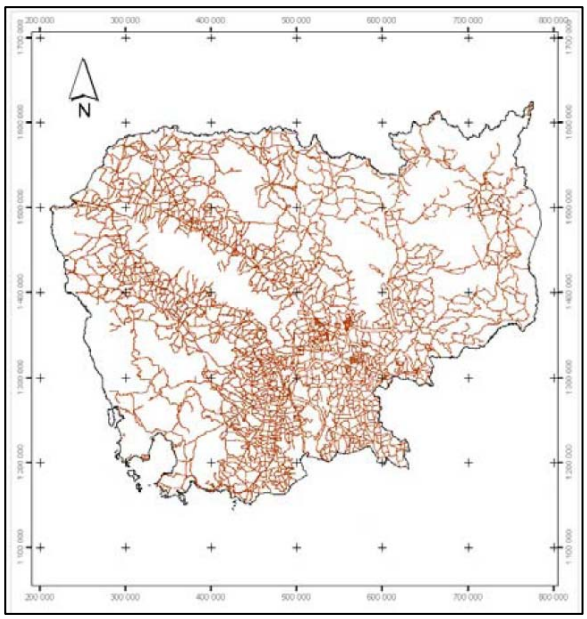


Figure 5.1. Cambodia road network (Brun 2009)

Figure 5.2. Greater Mekong Subregion "economic corridors" in and around Cambodia (ADB)

Many dams are proposed for construction in Cambodia, mainly within forest areas to the north and east of the country and also in the southwest (Figure 5.3). Transmission lines, also shown in Figure 5.3, generally follow the routes of major roads shown in Figure 5.2.

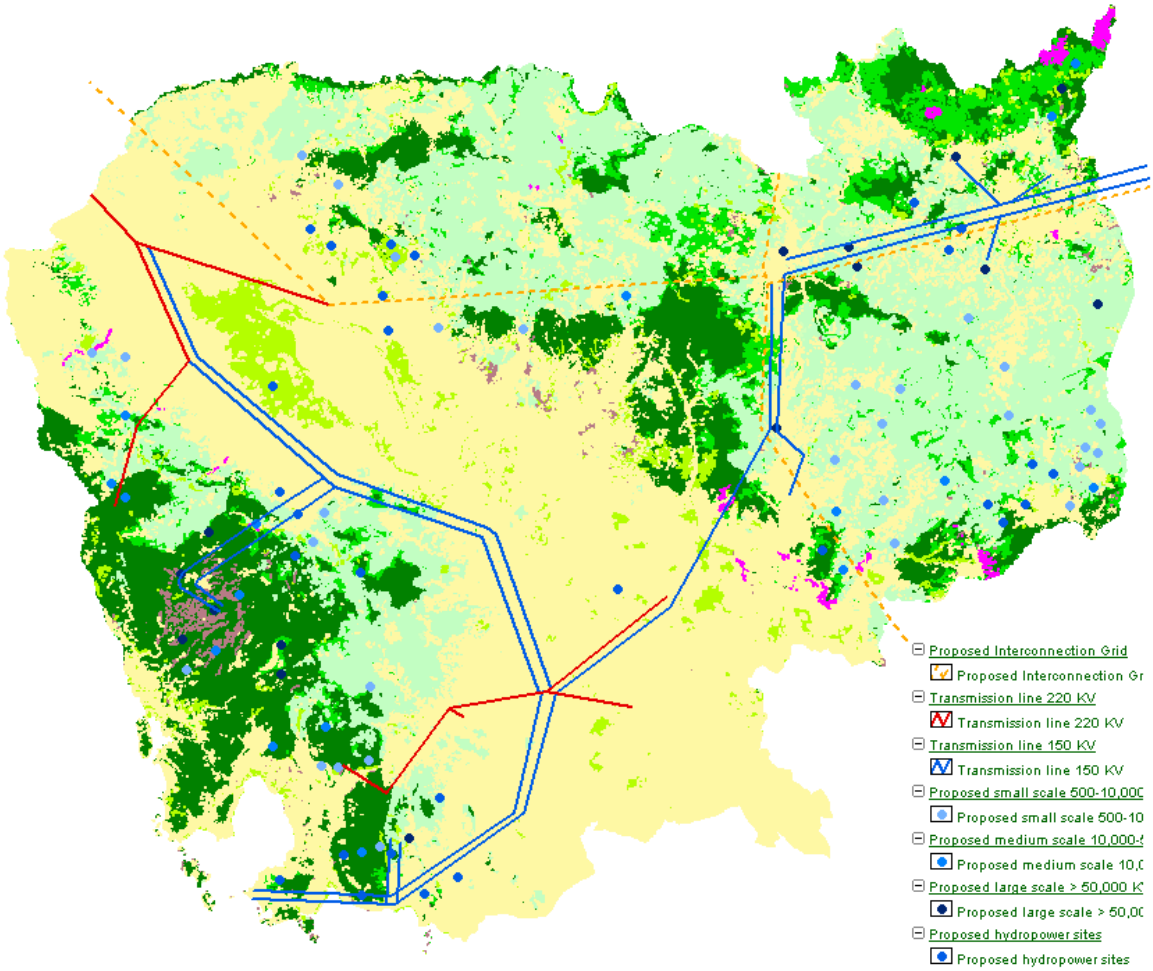


Figure 5.3. Electricity and hydropower developments and forest cover in 2006, DANIDA 2006

Mining, plantation establishment, dam construction and road improvements pose a particular threat to forests in Mondulkiri Province. The effects of mining on forests in Mondulkiri are both direct, through disturbance of land, and indirect, through access improvement resulting from road construction and population increase due to establishment of camps for construction workers (Pollard et al 2009).

The 2002 Forestry Law allows mining within the Permanent Forest Estate, however, any proposed mining operation, in addition to following other relevant laws, must be the subject of a "prior study-evaluation" by the Ministry of Agriculture, Forestry and Fisheries (MAFF; Grimsditch 2010). Following this, there must be authorization from the RGC for mining operations to proceed. The holder of the mining license must also:

1. Avoid causing or aggravating soil erosion or damage to vegetation or to the hydrologic system; and

2. Restore the site to its original state after project completion and within the time frame set by the permit.

Despite these regulations, a major problem is lack of due process in land, road and infrastructure development which often questions the primary designation of the area. Consultation may not take place and plans often go unpublished or cover existing land use types, e.g. mining exploration, dam development and land concessions allocation within conservation areas, wildlife sanctuaries and production and protection forests (Pollard 2009).

5.2. DEMAND FOR LAND

In recent years conversion to cash crop plantations and agriculture appear to have much stronger impact on the remaining forest cover than logging and timber exploitation (Stibig et al 2007). Several processes are at work, including the RGC system for allocating land for economic purposes, land speculation brought about by the global boom in land markets, increase in food prices and demand for biofuels prior to the 2008/09 economic slowdown. Rising rural populations and internal migration also play an important role. The overall situation in relation to forestry is exacerbated by weak law enforcement at the local level and accompanying corruption.

5.2.1. Agricultural expansion

Agricultural production in Cambodia is concentrated in the north-western districts bordering Thailand; in the central plain around Tonle Sap lake and its river systems, and Mekong and Basac rivers towards the Mekong delta; and in the northern and north-eastern provinces. Paddy rice is the dominant crop and accounts for nearly 80% of agricultural land. Field crops (maize, soybean, mungbean, peanut, sesame), slash and burn agriculture and rubber are also important. In upland areas, production of soybean, cassava, and sesame have increased most rapidly in recent decades followed by maize, mungbean and peanut. By contrast, production of sugarcane, vegetables, jute and tobacco has fallen (TWGAW 2010).

According to figures submitted to FAO by RGC, the area of agricultural land[1] in Cambodia increased between 1997 and 2007 at 1.8% per annum from 4 580 to 5 455 thousand hectares (26 to 31% of land area; FAOSTAT 2010). Forest cover was reported to be falling at 1.8% per annum over the same period.[2] "Other land",[3] constituting 12.1% of the total land area increased at 7% per annum. Trends in the area of agricultural and other land, if continued, suggest that the area of forest land will decrease further (see also Figure 2.1 and accompanying text).

Comparison of Cambodia's GDP and population density figures with those from surrounding economies also suggest that the tendency will be for a reduction in forest cover in the coming years (Figure 5.4, Table 5.2). By 2020, population in Cambodia is projected to be 19% greater than in 2010 and rural population is set to expand at a rate of around 158 000 per year (UN Population Statistics 2006). Assuming five members per family and a need of 2 hectares of agricultural land per household, the demand for new farm land is around 63 000 hectares per year, equating to 0.36% of the country's land area. This is considerably lower than rates of agricultural expansion reported in recent years (1.8% per annum, see above) but at the same time constitutes a basic level of need for subsistence unless agricultural intensification or trade can satiate additional consumption. According to the Forestry Administration, "Being a highly agriculture-dependent country with accelerating population growth, Cambodia will need more forestland to be cleared" (FA, 2009).

[1] According to internationally agreed definitions, land area is divided into three classes: forest, agriculture and other land.

[2] Annual deforestation at a rate of 1.3% between 2000 and 2010 was reported by RGC in 2010. Figures for agricultural and other land are not yet available for the same period.

[3] Land not classified as agricultural land or forest area. It includes built-up and related land, barren land, other wooded land, etc.

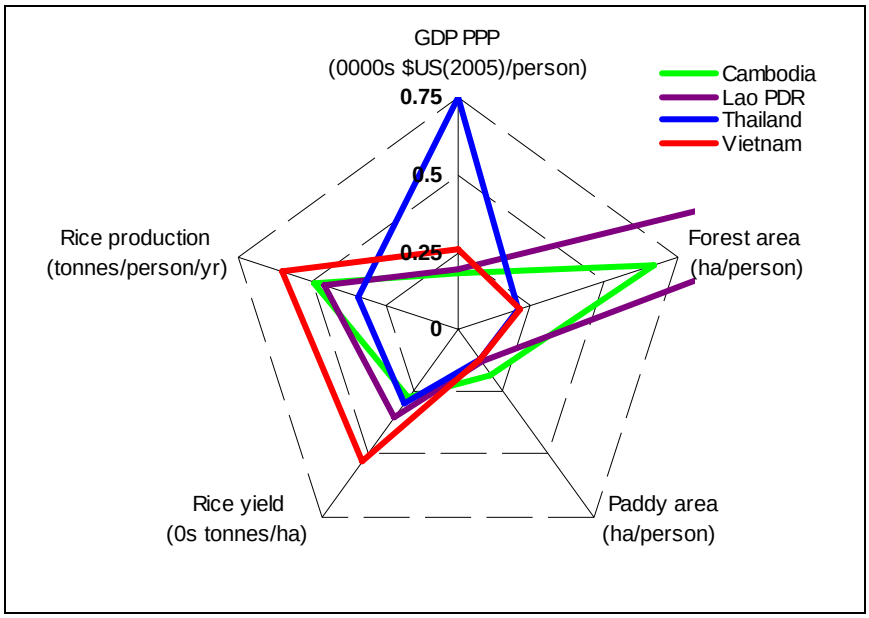


Figure 5.4. Income, forest area and paddy rice production in Cambodia, Lao PDR, Thailand and Viet Nam in 2008.

N.B. Forest area figures are for 2010. Forest area per person for Lao PDR (2.55 ha/person) not shown due to distortion of graph.

Source: UN Population Statistics (2006), FAOSTAT; FAO (2010); World Development Indicators, FAOSTAT.

Table 5.2. Income, forest area and paddy rice production in Cambodia, Thailand and Viet Nam in 2008.

	GDP PPP ($US(2005)/capita)	Forest area* (ha/capita)	Rice production (tonnes/capita/yr)	Paddy area (ha/capita)	Rice yield (tonnes/ha)
Cambodia	1802	0.66	0.49	0.18	2.75
Lao PDR	1962	2.55	0.45	0.13	3.47
Thailand	7469	0.21	0.34	0.12	2.97
Vietnam	2574	0.21	0.60	0.12	5.22

Source: UN Population Statistics (2006), FAOSTAT; FAO (2010); World Development Indicators, FAOSTAT.

N.B. Units are different to those used in Figure 5.4.

*Forest area figures are for 2010

Rice yields in Cambodia are the lowest in the region while per capita levels of rice production are relatively high (Figure 5.4). While other indices suggest that forest cover in Cambodia will fall, these figures suggest that considerable gains in agricultural output and agricultural GDP could result from agricultural intensification efforts without loss of forest. Currently, rice is mainly rain fed in Cambodia and dry season rice crops with full and/or supplementary irrigation occupy only 11% of the total area cultivated for rice production (TWGAW 2010).

The area of irrigated rice production is, however, increasing rapidly in Cambodia and between 2000 and 2005 growth of 67% was recorded (TWGAW 2010). In connection, Figure 5.5 shows that between 2004 and 2008 rates of increase in rice yield in Cambodia at 3.3% per annum were more than four times those recorded in Viet Nam, which had the second fastest rate of increase.

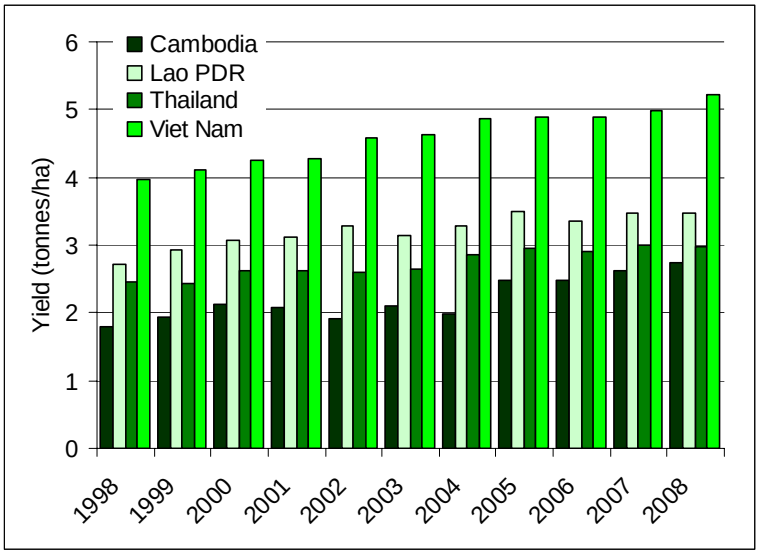


Figure 5.5. Paddy rice yield in Cambodia, Lao PDR, Thailand and Viet Nam, 1998-2008

Source: FAO FAOSTAT database

National level aggregate data is supported by data provided by Poffenburger (2009) which indicate that rain fed rice yields in Oddar Meanchey average only 1-1.5 tonnes per hectare. In Thailand and Vietnam, where irrigation is much more widely used, farmers obtain 2 to 5 times this amount. Irrigation does not account for all variation in rice yield, however, and there are also marked differences between soil types. In Kompong Thom the highest producing of eight surveyed villages yielded an average of 2.3 tonnes per household (Sam-ong) and 1.6 tonnes (Choam Svay). Both these villages farm in red soil areas. Rang Khnai, another village in Kompong Thom, has less productive "sandy" soils and yields only 0.7 tonnes per household (McKenney, Chea, Tola, and Evans 2004).

Other than paddy fields, there are also many upland areas that are under shifting cultivation throughout the remote highland regions of north-eastern Cambodia. When not being farmed, these areas are covered by regrowth forest or grassland as part of the shifting cultivation cycle (Rotha 2008).

Aside from potentials to increase rice yields with little expansion of agricultural lands, low institutional and management capacity to support farmers and the agricultural sector have been found as core problems in perpetuating low growth in productivity, stagnation in the rural economy and persistent poverty (TWGAW 2010). Poverty rates are highest in plateau and mountain areas (Table 5.3). All of the provinces listed in this category in Table 5.3 except Pailin have significant areas of forest (see Figure 2.7). Lower poverty rates are found in the plains and on the coast where forest area is much lower, with the exception of Koh Kong province where forest area is high and poverty rates are below the national average (Table 5.3).

Table 5.3. Distribution of poverty rate by province

Region	Provinces/Cities	Poverty rate (%)
Phnom Penh	Phnom Penh	4.60
Plains	Kampong Cham, Kandal, Prey Veng, Svay Rieng, Takeo.	32.07
Tonle Sap	Banteay Meanchey, Battambang, Kampong Thom, Siem Reap, Kampong Chhnang, Pursat	42.80
Coast	Kampot, Sihanoukville, Kep, Koh Kong	26.84
Plateau/Mountain	Kampong Speu, Kratie, Mondulkiri, Preah Vihear, Rattanakiri, Stung Treng, Oddar Meanchey and Pailin	52.05
Cambodia		**34.68**

Source: TWGAW 2010

At the field level, low agricultural production in many areas is causing expansion of agriculture. In villages in Kulen Promtep Wildlife Sanctuary for example, despite fertile soils, rice yields are low compared with the national average and farmers are driven to expand agricultural lands. This results primarily from maintained use of traditional farming methods. Additionally, the vast majority of farmers lose rice almost every year to unidentified diseases and pests such as rat, wild pigs and crab (Dara 2008).

To improve food security, increases in smallholder food production are necessary. This is especially the case in areas where producers are not well linked with markets. Possible measures include improving access to land through social land concessions, land titling and landmine clearance. There is also considerable scope for improving storage, marketing and other on-farm post-harvest practices that do not entail forest clearance (TWGAW 2010).

Notwithstanding trends and opportunities related to subsistence-based production, land markets are becoming increasingly linked to international markets and subsistence/domestic needs are no longer a reliable indicator of demand. All across the region, sedentary, market orientated farming systems are replacing traditional forms of subsistence agriculture (Fox et al., 2008). In Cambodia, policies to liberalize trade and markets, together with high prices for agricultural products have provided incentives for farmers to switch to cash cropping as a primary source of income. In the case of Oddar Meanchey, Thai investors play and important role and negotiate with senior Cambodian officials for long term investments (Poffenburger 2009). Sugarcane, Jatropa, and rubber are the favoured crops. These developments are likely to bring increasing pressure to bear on forestland in Cambodia, particularly where forests remain in areas of high soil productivity e.g. the far west of the country and in Mondulkiri and Ratanakiri (Figure 5.6).

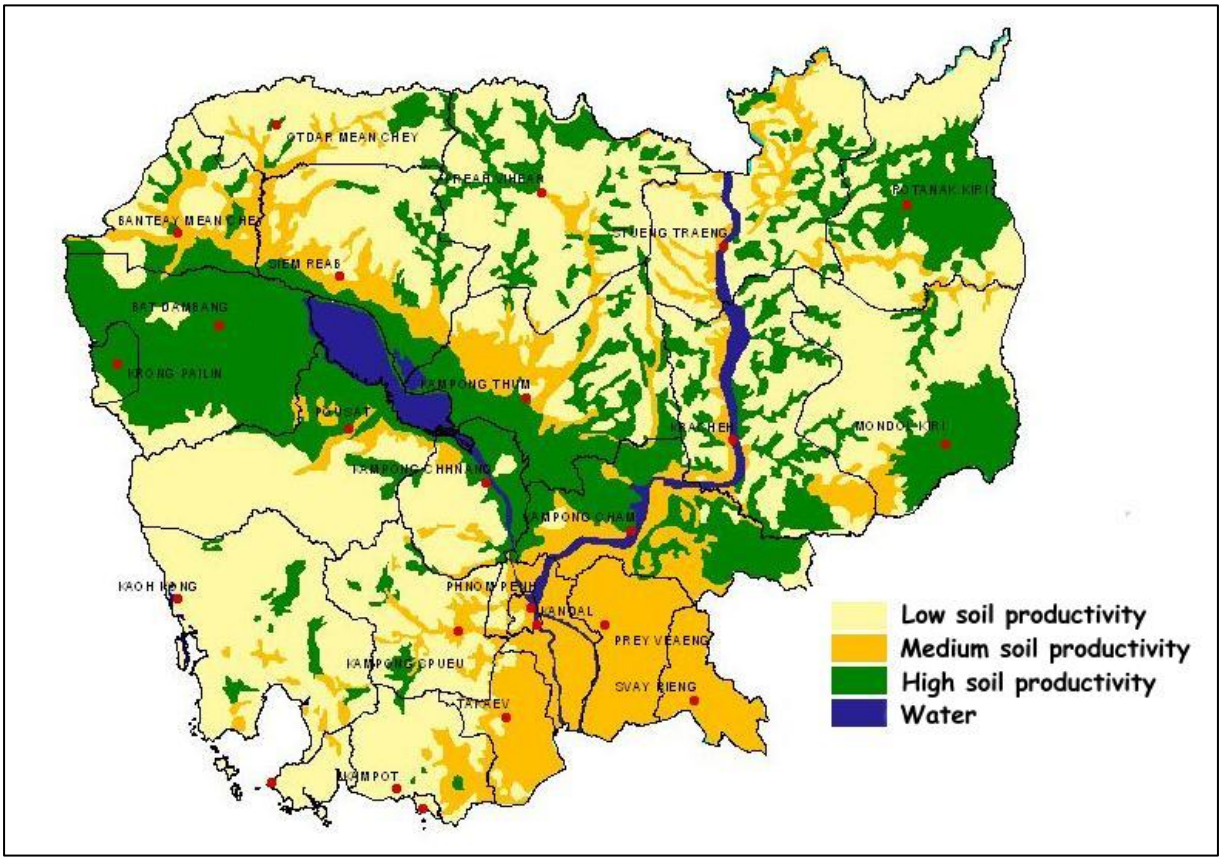


Figure 5.6. Map 2.5: Soil Productivity of Cambodia

Source: FA (2003)

5.2.2. Land concessions

In Cambodia, land privatisation for cultivation and granting of economic land concessions – mostly for wood, biofuel and food production – has been closely related to deforestation and environmental degradation and also to human rights abuses (GTZ 2009; UN 2007; EFCT 2005). Economic Land Concession (ELC) are defined as a mechanism to grant private state land to a concessionaires for agricultural or industrial-agricultural[1] exploitation. According to the Land Law, Economic Land Concessions (ELCs) are granted for a period of 99 years can only in areas of State private land. Since "any property that has a natural origin" is defined as public property of the State, forests should be classified as public state land and ELCs should not be allocated within the permanent forest estate. In reality, ELCs are a major driver of deforestation in Cambodia.

Over 1 million hectares (6% of Cambodia's land area) have been granted as economic land concessions, not counting concessions granted at the province level (GTZ 2009). Concessions have often been granted in forested areas and former forest concessions contrary to the forestry law and forestry regulations. Although forest is generally cleared, only 10% of concessions are reportedly in active production.

Aside from ELCs, the Sub-Decree for Social Land Concessions (RGC, 2003c) regulates allocation of state private land to poor communities and households. Social land concessions have also been linked to deforestation, however. According to Poffenburger (2009), the Ministry of Interior has an interest in allocating social concessions in forest lands for settlement and agriculture. Encouragement of migration is also seen as a way of clearing forest for agriculture.

Data on land and mining concessions is not publicly disclosed in a systematic way, particularly in relation to planned developments although current concessions are listed on a MAFF website. Involved companies also sometimes release data on individual concessions and in 2006 the Ministry of Industry, Mines and Energy released a large dataset. The Forestry Administration also receives copies of some concession agreements and at times seeks technical inputs from partner organisations (Pollard and Evans 2008).

Publicly available information shows that between 1992 and 2006 the Government had granted 97 ELCs each of greater than 1000 ha. As of June 2010, 85 concessions covering 956 690 hectares located in 16 provinces remained, following some cancellations.[2] This amounts to over a 5% of the total land area of Cambodia. There are also 47 companies each with less than 1 000 hectares that have been granted concessions by provincial authorities in 9 provinces:

- 18 companies in Kratie;
- 2 companies in Preah Vihear;
- 10 companies in Kompong Thom;
- 1 company in Pursat;
- 4 companies in Kompong Speu;
- 3 companies in Kompong Cham;
- 6 companies in Rattanakiri;
- 1 company in Stung Treng;
- 2 companies in Oddar Meanchey.

[1] Raising animals, aquaculture, construction of plants or facilities for the processing of agricultural raw materials, cultivation of food or industrial crops including tree plantations

[2] http://www.elc.maff.gov.kh/overview.html accessed 16 June 2010.

Over the past 15 years, 45% of the land in Cambodia is alleged to have been purchased by private interests (Global Witness 2009). In particular there is extensive exploratory mining activity in at least six out of Cambodia's 23 protected areas.

Figure 5.7 shows ELCs in Cambodia in relation to carbon density in biomass and community forest areas. Large areas of high carbon density forest fall within the concession areas, including tracts in the southwest region and in the Prey Long forest area in Kampong Thom and bordering provinces.

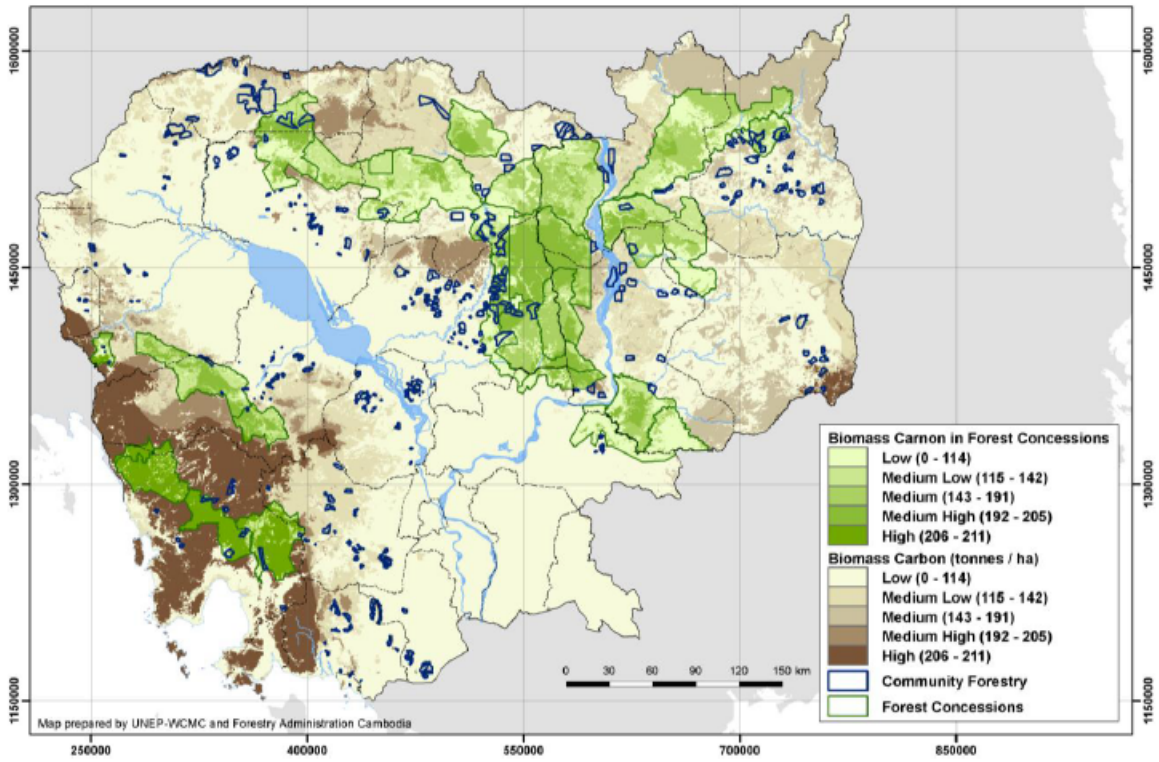


Figure 5.7. Economic Land Concessions, community forests and biomass carbon density in Cambodia.

Source: Leng et al. (2010)

5.2.3. Land speculation

With increased global interest in land following steep rises in food and agricultural commodity prices prior to the 2008/09 economic downturn, land speculation became a driver of deforestation in Cambodia. In association with the common understanding that utilisation of land legitimises a claim, large areas of land were cleared but often not utilised (GTZ 2010; Adler, Porter and Woolcock, 2008).

Land speculation is driven by businessmen, officials or villagers who claim forest land to sell on at profit (Poffenberger 2009). Migrants or local villagers are generally hired to clear the land and smaller plots are often consolidated by buyers who then sell on once again to developers. Although illegal, local officials may provide supporting letters for speculation activities, imparting the appearance of legality.

In 2007, the Prime Minister ordered provincial governors to confiscate illegally encroached forest areas and in Oddar Meanchey, the Provincial Governor reclaimed over 20,000 hectares of occupied forest land. With no budget for protection, rehabilitation or development, however, land is generally either leased as ELCs or reclaimed by migrants (Poffenberger 2009).

5.2.4. In-migration

In many forested areas in Cambodia, in-migration is having major impacts on demand for land and resources and is driving deforestation and degradation. In some provinces in-migration is encouraged with secure land offered as an incentive. Migrants generally clear farmland for themselves but may also open forestland to sell-on. In recent years, migration has primarily involved demobbed military and others from land-poor provinces including Svay Rieng and Takeo (Poffenburger 2009; Pollard and Evans 2008).

In Ratanakiri, population increase including births, deaths and migration has reached 4-5 percent per annum. In combination with market expansion, pressure is increasing on land and forests and fuelling a large illegal land market. Cashew nuts and also rubber have been favoured crops (Fox et al., 2008). The conversion of forest has been supported by increased accessibility and a rapid increase in local demand for cash to meet education and health costs, improve housing, buy consumer durables and meet rising community and family expectations.

In the Kulen Promtep Wildlife Sanctuary which spans Siem Reap and Preah Vihear Provinces in the northern plains, villages are expanding as populations grow and migrants move into "unclaimed areas". Annual population growth rates across three villages in the sanctuary stood at an average of 9.2 percent between 2002 and 2007 (Dara, 2008).

In Mondulkiri, agricultural expansion and land sales are accelerating and village forest areas are being encroached upon for new farmland. Rising land prices have been a key driver of forest clearance and rates of expansion have been significantly higher where rapid in-migration has taken place (Pollard et al 2009). Although the existing relatively low population densities are sufficient to place significant pressure on local natural resources, the main threat is in-migration and associated acceleration in forest clearance (Evans and Delatre 2005). The reported rate of population growth in Seima Protection Forest (SPF) at around 5.8% per year between 2003 and 2008 is high compared to the national rate of 1.7% (Pollard and Evans 2008; UN Population Statistics 2006). Much of the growth is due to in-migration and as access improves, cash cropping is spreading. Kampong Cham, Takeo, Svay Rieng and Kratie provinces have often been reported as sources of migrants to the area. Cham families reported that they moved to Mondulkiri because they had no land in Kampong Cham and relatives in Mondulkiri had informed them of land availability. It was also reported that some provincial authorities encourage migration into Mondulkiri (Pollard and Evans 2008). This is also true for Oddar Meanchey (Poffenburger 2009).

No only have migrant populations placed greater pressure on land and resources but they have also shown less interest in sustainability and maintaining forest resources for livelihoods benefits. In general migrants have been found to be more motivated by financial gain or rapid acquisition of farmland. Because migrants occupy land illegally, land tenure and land-use planning are made more difficult and the rapid arrival of migrants can also destabilise existing land-use plans. Additionally, migrants may be well-connected to traders other potential in-migrants in other provinces, which can have compound effects on land and resource pressures (Pollard and Evans 2008).

According to Poffenberger (2009), migration rates have been falling since 2008, possibly due to the global economic slowdown and resulting reduction in demand. However, it is also suggested that the slowdown has resulted from the belief that no more land is available. In Oddar Meancheay, for example the land situation has become more settled and ELCs, encroachments, established (or proposed) CF areas and areas of forest claimed by villages have stabilised land use change.

5.2.5. Local level corruption

In several provinces, commune chiefs, district or provincial government officials have reportedly been involved in forest encroachment including into Community Forest areas. Although the problem is widespread, incidents have been reported in Oddar Meancheay and in Kompong Thom and also in

Ratanakiri province, where large numbers of forest dependent indigenous peoples live (Poffenberger 2009; Global Witness, 2006; Fox et al., 2008).

Although community lands belonging to indigenous peoples cannot legally be sold, the lack of registration and documents make it possible for officials to facilitate illegal sales while local people often lack the confidence to challenge those involved despite having the law on their side. Sale agreements have, however, often been overturned by higher-level judicial authorities demonstrating that access to the law may be of greater importance that enforcement.

5.3. DEMAND FOR WOOD

Although demand for wood does not necessarily cause deforestation or, in some cases, forest degradation, building of logging roads, timber extraction and intensive fuelwood collection often result in a chain of events that begins with forest degradation and may end in deforestation. Reliable information on forest degradation is not generally available although illegal and unauthorized harvesting of wood and non-wood forest products, subsistence harvesting/foraging, community encroachment, fire, insects/diseases, extreme weather events, have all had significant impact on the forests of Cambodia.

To reduce emissions from forestry a thorough understanding of the causal factors for forest degradation will be required. This section presents details of causal agents but quantitative data on the degree of degradation is only sparsely available and additional efforts will be required to develop a historical trend.

5.3.1. Forest products production and trade

Data submitted by RGC to FAO indicate that production, consumption and export of industrial roundwood, have fallen significantly since 2000 (Figure 5.8). Although sawnwood and wood-based panels followed this trend, exports of sawnwood showed some resurgence after 2000 (Figure 5.9 and Figure 5.10). The fact that sawnwood exports are in excess of production suggest that domestic production is not being recorded. In 2007 production of industrial roundwood, sawnwood and panels were 113 000 m^3, 3 800 m^3 and 7 400 m^3 respectively. Import figures for the same products were very low at just 1 473, 48 and 1 103 m^3.

Although figures submitted by RGC indicate production of just over 1 million cubic metres of industrial roundwood in 1997, Castren (1999) reported harvest levels well over 4 million m^3. Around 3 million m^3 were estimated to have been exported. Total household non-market wood consumption was estimated at 8 million m^3, 75% woodfuel and 25% for construction (2 million m^3). These figures suggest that officially collected data do not fully represent the scale of wood consumption in the country.

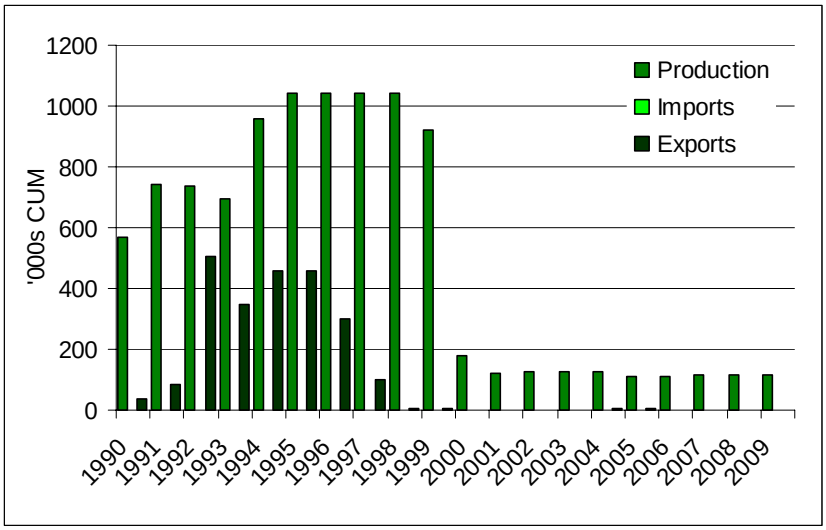


Figure 5.8. Industrial roundwood production and trade in Cambodia, 1990-2009
Source: FAOSTAT

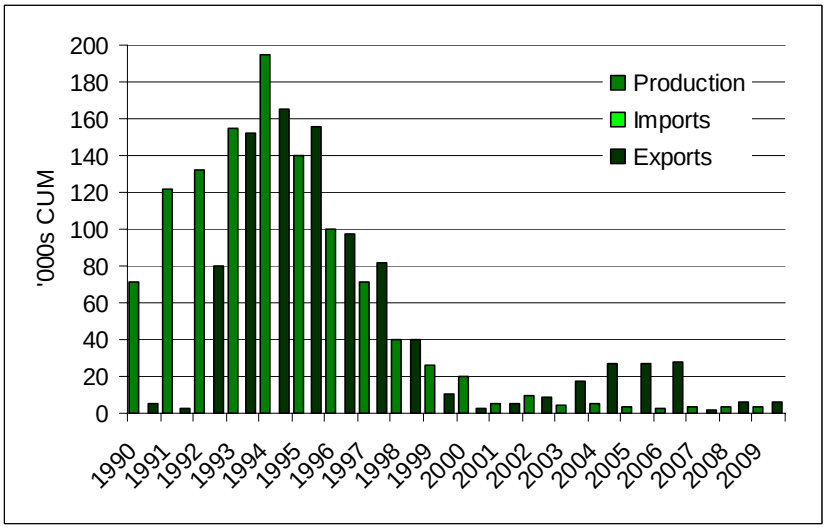


Figure 5.9. Sawnwood production and trade in Cambodia, 1997-2007
Source: FAOSTAT

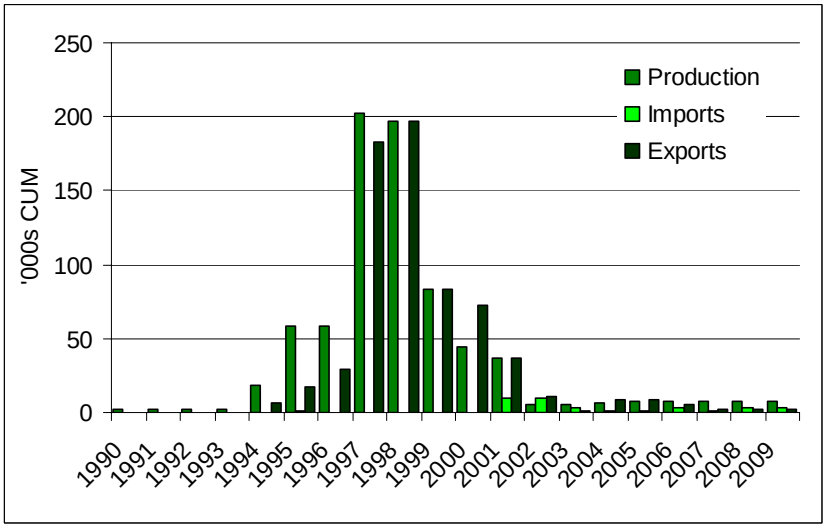


Figure 5.10. Wood-based panel production and trade in Cambodia, 1997-2007
Source: FAOSTAT

While the preceding graphs show the reduction in production and trade of major forest products since the late nineties, Figure 5.11 shows that the value of forest products exports has also fallen. At the same time, there has been a steady increase in the value of wood products imports. According to reporting partners' data, the value of wood products imports has been at much higher levels and peaked at around $US120 in 2008, with 98% of the total accounted for by pulp and paper. Imports of wood based panels and sawnwood in the same year amounted to several thousand cubic metres (UNCOMTRADE database accessed August 2010). Only marginal increases in imports have been reported over the past decade while there has been a steady increase in imports of pulp and paper.

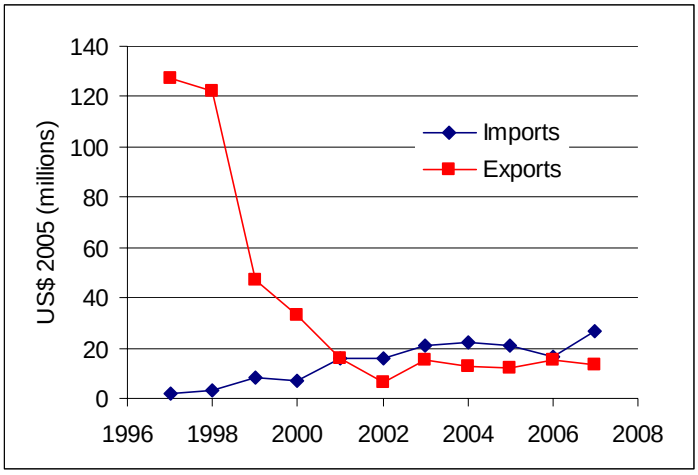


Figure 5.11. Forest products trade value (2005 USD)

Source: FAOSTAT

A general decline in wood products exports is reflected in data reported by partner countries (Figure 5.12). Resurgence in sawnwood exports after 2000 is evident in Figure 5.9 despite a 2006 Sub-decree on "Timber and Non-timber Forest Products Allowed for Export and Import", which stipulates that logs or rough sawn timber are prohibited from export (Forestry Administration 2009). Date for 2009, however, show that the sawnwood trade and wood products trade in general have fallen to a very low level although probably more as result of the global economic slowdown and reduced demand.

Between 2004 and 2009, Viet Nam was the main importer of wood products from Cambodia with a share of 52% by volume, followed by China with 27% and Thailand with 16%. Between 2000 and 2004, these proportions stood at 18%, 48% and 7% respectively, indicating a shift towards Viet Nam and Thailand and away from China.

Blackett (2009) indicates high level of illegal plywood and sawn-timber exports to both Vietnam and China. In addition, an annual flow of 50,000 cubic meters of illegally logged timber to support the furniture industry in Vietnam has been estimated (Prom Tola, 2010 [information reported at FLEG meeting in Lao PDR, November 12, 2009]).

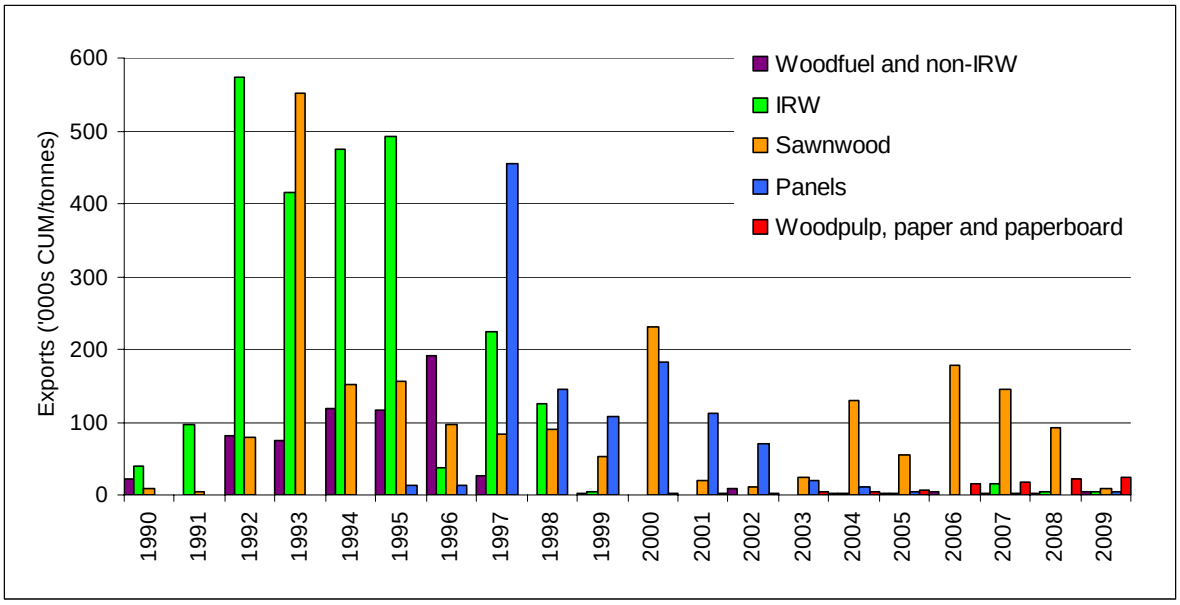


Figure 5.12. Cambodia's wood products exports as reported by partners, 1990 -2009

Source: UN COMTRADE accessed July 2010

N.B. Units for woodpulp, paper and paperboard are tonnes while cubic metres are used for other products.

5.3.2. Domestic timber demand

Several partial sources of information are available to help assess timber demand in Cambodia although accurate statistics are not available due to the prohibitions on logging and informal nature of much of the trade. With respect to primary extraction, Tola (2010) provides figures for timber production from annual coupes shown in Table 5.4. It is also likely that a considerable amount of wood is extracted during clearance of ELCs, hydropower developments, etc., although figures are not available, and licenses are widely available to households to supply domestic needs.

Table 5.4. Annual coupe timber production

Year	Production (m^3)
2006	1 338
2007	20 228
2008	41 599

Vanna and Suntra (2008) estimated total national timber supply in 13 provinces and cities covering areas of high, medium and low forest cover[1] in 2008 at 158 177 m^3 sawnwood equivalent. The following sources were included:

(1) local coupe bidding - 28 909 m^3;

(2) forest plantation (state and private industry) - 1 482 m^3;

(3) economic land concession - 11 635 m^3;

(4) confiscated timber - 1 249 m^3;

(5) traditional use sources - 114 402 m^3;

(6) import - 500 m^3.

Rubber plantations were also reported to have supplied 6 300 m^3 of sawnwood in 2008.

[1] Battambang, Siem Reap, Kampong Thom, Kampong Cham, Kratie, Ratanak Kiri, Prey Veng, Svay Rieng, Takeo, Kampot, Kampong Speu, Kandal, and Phnom Penh.

With respect to demand, several sources were identified. Estimates of volumes consumed by source were as follows:

- House construction - 261 130 m^3
- Hotel decoration - 13 264 m^3
- Guesthouse decoration - 8 415 m^3

Including different sources, total national timber demand was estimated at 282 808m^3.

The volume of sawn timber produced, sold in timber shops and processed by wood products manufacturers was estimated at 102 255 m^3 as follows:

- Processed by sawmills - 17 938 m^3
- Sold in timber retail shops - 62 160 m^3
- Processed by wood products manufacturers - 22 157 m^3

Volume estimates for sawnwood sold in shops and processed by wood products manufacturers are several times higher than the volume of sawnwood processed by sawmills. This suggests either that the volume of sawnwood was significantly underestimated or that import from other provinces is taking place. Total Cambodian sawnwood exports of 92 245 m^3 in 2008 also suggest that the volume of sawnwood processed is unrepresentative of the national situation (UN COMTRADE).

The overall supply-demand balance also suggests hidden sources of supply. Adding together estimates for demand from the different identified sources (total timber demands for house, hotel and guesthouse construction and volume sold in timber retail shops and processed by wood products manufacturers[1]) puts total demand at 367 126 m^3. As estimated production is only 158 177m^3, at least 208 949 m^3 must be sourced elsewhere, either unmeasured sources within the focal provinces, from elsewhere in Cambodia, or via importation.

Based on surveys in 11 provinces and complementary data and with a primary focus on wooden house construction, CGFP/GTZ (2005) estimated domestic timber demand for Cambodia in 2004 at 161 993 m^3 sawn timber - considerably lower than that the estimate given by Vanna and Suntra (2008). The report noted that demand is very much dependent on the economic situation of consumers and recommended that to reduce consumption, preservation of wooden houses by painting should be encouraged.

By comparison, figures submitted to FAO by RGC for 2007 production of industrial roundwood, sawnwood and panels amounted to 113 000 m^3, 3 800 m^3 and 7 400 m^3 respectively. These figures appear low, in relation to the calculations of consumption summarised above and suggest that only officially sanctioned production is being recorded. In contrast, and although before the logging moratorium, Castren (1999) estimated for 1997 that around 1 million m^3 roundwood was provided to domestic markets while non-market wood consumption for construction was estimated at 2 million m^3.

From another angle, average per capita consumption of industrial roundwood for Southeast Asian countries for 2007 equalled to 0.127 m^3 per capita (FAOSTAT; UN Population Division 2006). With Cambodia's population in 2010 standing at 15.2 million, annual consumption of 1.94 million m^3 would be expected using this average figure. This would suggest that sawnwood consumption for Cambodia would be close to 1 million m^3 per year. Given that, at the regional level, a proportion of consumed roundwood is exported as finished products, and that roundwood consumption is generally underreported due to illegal logging, this figure probably represents an underestimate of real consumption in Cambodia.

[1] Assuming that wood for construction is not sourced from timber retail shops

A possible explanation is that some sources are not being detected or measured. For example, Blackett (2009) reported that both luxury and other grades of timber have been sold in local markets including in Kampong Cham and Siem Reap provinces and in Phnom Penh. Cutting and trade of luxury timber is prohibited but a well-coordinated chain of actors paying informal fees facilitate the illegal production and trade (Tola, 2010). The low official volume of sawnwood exports reported above and the low official figures for timber extraction suggest that this is probably how much of the Cambodia's domestic and export timber is supplied.

Overall, it would seem from these figures and taking into account the logging moratorium that a best guess for total sawnwood demand in Cambodia would be somewhere between 0.5 and 1 million m^3 per year or possibly more although this would depend on the market situation.

Vanna and Suntra (2008) estimated that with 9 144 hectares plantations established in 2007 and 3 700 in 2008 and assuming a 10 year rotation and average harvest volume of 57.4 m^3/hectares, total volume production in 2017 and 2018 will reach 527 060m^3 and 213 268m^3 respectively. A total of 19 ELCs also claim to be developing pulpwood plantations (537 895 hectares in total) although companies often prefer to plant rubber, teak or cassava if soil conditions are good (Baskoro et al 2008)

With respect to production from natural forests, FA and MAFF planned to provide annual coupes to produce 261 277 cubic meters of wood for the domestic market in 2009 while Government estimates were that domestic demand would be 282 800 cubic metres (MAFF, 2009 cited in Tola 2010). According to McKenny and Tola (2002), however, most of Cambodia's forests are no longer commercially attractive. As of 1997, only 6 percent (~630,000 hectares) were commercially attractive "dense evergreen" forests, while 30 percent (~3,200,000 hectares) were identified as "disturbed evergreen". Taking into account the high rates of deforestation and degradation since 1997, the situation is likely to have deteriorated. As such, it is not clear how much longer natural forests can be relied upon for timber production although given that annual logging coupes and other timber production is continuing McKenny and Tola's claim may have been overstated.

This analysis suggests that some commitment will be needed to supply timber, either from domestic or external sources and that greater efforts will need to be made to manage timber demand such that forest degradation does not result.

5.3.3. Logging

In the 1990s and early 2000s, industrial roundwood production in Cambodia, which itself has very limited wood products manufacturing capacity, increasingly began to supply the region's wood product manufacturing centres in Viet Nam and China (Katsigris *et al*. 2004; EIA/Telapak 2008). Low levels of roundwood production reported by RGC to FAO (see above) suggest that production from illegal logging, which continues at unknown levels despite suspension of concession licenses, is not reflected. Distribution of benefits from forest management has also been limited in the past. For example, in 1996 the government should have reportedly received over US$100 million in logging revenues but only received US$10.7 million (Dauvergne 2001).

Additionally, uncontrolled logging in Cambodia has resulted in extensive forest degradation. With respect to quality of logging, implementation of the Cambodian code of harvesting practice, although mandatory, is very limited and corresponding standards of logging and roading are low. Generally there is very little supervision of harvesting due to low capacity within forest companies and forest authorities (Wilkinson 2009; FAO 2006).

Illegal logging has many forms, and has been widespread in Cambodia's forests. When the Forest Concession system began, the most common illegal activity was the failure of companies to pay royalties for harvested timber (Miller 2004). Other illegal practices mostly revolved around

overharvesting and lack of application of standard principles to sustain productivity. Harvesting of prohibited species and outside of concessions was also widespread.

Since the moratorium on commercial logging was imposed in 2001, large scale loggers have been replaced by small scale operators. The moratorium has been an effective means of reducing illegal logging but has also prevented legal logging and continued demand has meant that pressure has now been transferred to post- and non- concession areas. These areas were previously considered of limited commercial value and best suited for protection to allow commercial species to regenerate (Rotha 2008). Networks of logging roads and extraction trails still remain, however, and small operators are able to take advantage of these means of access including in the protected areas that were once forest concessions (Miller and Shields 2004).

Several timber species in Cambodian forests sell for high prices and timber smuggling can thus be very profitable. In Mondulkiri for example, logging, which affected large areas of forest under the concession system in the 1990s, currently focuses on high value species such as *Afzelia* and *Dalbergia*. Logging is mostly conducted by small groups, often with involvement of the armed forces or people crossing from Vietnam and such is the pressure on these species that they may soon become commercially extinct (Pollard et al 2009).

Another important factor in continued logging in Cambodia's forests is the many military bases located close to or in state forests, far from populated areas. Before the logging moratorium, many soldiers were employed as forest guards by the concessionaires. Once the moratorium was approved, and concession related employment was lost, many began logging illegally and leasing forest areas. In addition, large forest areas are often cleared around military camps to provide construction timber and land for food production (Miller 2004).

In recent years military reinforcement has taken place along the Cambodia-Thai border, especially in Preah Vihear province. Military encroachment into Community Forestry areas has been reported in Oddar Meanchey province, and encroachment of protected areas and protected forests is also taking place in Preah Vihear. In some cases, soldiers are involved in illegal logging, forest clearing for agriculture and land sales, while impacts also result from establishment of approved camps (Poffenberger 2009). As military activities are not made public, however, the scale of activities remains largely unknown. FA rarely have the authority to challenge the military, especially at the local level, and high level intervention is needed to control activities. Furthermore, if there are border threats in the future, it is likely that the military will take precedence.

Local communities have also reportedly been involved in illegal logging activities, but their extent and impact is difficult to assess. For example, under the 2002 Forestry Law, extraction of timber from state forests is allowed for local use but not sale although but in some cases it has been reported that excess timber is extracted and marketed. Newly established communities also commonly clear forest for permanent agriculture (Miller, 2004).

5.3.4. Woodfuel consumption

Woodfuel provides the primary energy source for most rural and some urban households in Cambodia and is also a major source of energy for some industries including garment manufacturing and brick baking (Baskoro et al 2008). Additionally, wood is sometimes burned to create smoke and inhibit mosquito attacks on livestock.

Although woodfuel (fuelwood and charcoal) consumption is not usually associated with deforestation, high levels of commercial demand and the lack of alternative energy sources is causing some concern in Cambodia (Arnold et al 2003; Top *et al* 2004[1]; Top *et al* 2006). Stibig (2007)

[1] In Kampong Thom Province, Top et al (2004) found no evidence that woodfuel consumption is causing deforestation and that local people rarely collect trees larger than 30 cm for fuel.

reported that fuelwood collection constituted a non-negligible cause of forest loss and degradation in the vicinity of population areas in Cambodia. Heightening demand for woodfuel in Cambodia is thus seen as a potential cause of forest degradation and deforestation. It should also be appreciated, however, that woodfuel produced from sustainable sources provides energy at a much lower rate of carbon emissions than fossil fuel energy sources. As such any switching away from woodfuel may increase emissions where woodfuel use is sustainable or is not related to deforestation or forest degradation.

On the basis of forest resource availability, population, income and level of urbanisation, levels of woodfuel consumption for 2000, 2010 and 2020 are estimated at 10.9 million, 8.8 million and 7.1 million respectively (FAO 2010). The reduction in consumption results from the commonly seen switch to superior fuels that takes place as income increased, people more to urban areas and wood sources within reach of large areas of habitation decrease. The figures quoted are, however, derived from models that are not accurately specified to provide estimates of industrial and commercial consumption, which have become increasingly significant in Cambodia in recent years (Top et al 2006).

Sources of woodfuel are manifold but a few are of particular importance in Cambodia. Following extraction of commercial timber species, land is often cleared for fuelwood and charcoal production and to make way for agriculture and other land development, particularly in ELCs. The amount of woodfuel derived from forest conversion is likely to be considerable although supporting data is not available. With respect to commercial woodfuel supply, a significant proportion of consumption is currently comes from wood residues derived from the clearance of senescing rubber plantations. The brick making and garment manufacturing industries are particularly important users (Baskoro et al 2008). Although the total area of rubber plantations in the country is increasing, depletion of existing stocks of senescing plantations may result in scarcity of rubberwood in the near future and consumers may turn to natural forest. Isolated incidents of wood from natural forest being loaded into the same trucks which carry rubber wood have been recorded (Baskoro et al 2008).

Annual demand for rubberwood woodfuel from brick and garment factories, which consume 780 000 m^3 and 145 000 m^3 per annum respectively, has been estimated equivalent to 4 650 hectares of rubber wood plantation per year. Surveys of commercial users of woodfuel indicate that many would cease activities when supply from rubber wood resources comes to an end, while around a third said they would switch to non-wood energy sources such as coal, rice husk and garment waste (Baskoro et al 2008). Although equivocal in relation to future impacts on deforestation and forest degradation, the situation suggests a need to maintain a sustainable supply of woodfuel, make efforts to reduce demand by increasing efficiency of energy conversion or switching to other fuels alternative fuels (Top et al 2006; DCC 2010).

At the domestic scale, a study in Kampong Thom province suggests that increased consumption could lead to forest degradation (Top et al 2006). At the current rate of consumption, supply and demand of woodfuel within the 1 km zone at the provincial village-scale is balanced. With demand growth, however, forests close to the village are likely to be degraded and collectors will need to go further afield to find supplies. As such, growing reliance on forests for woodfuel may prove unsustainable in more densely populated areas (Top et al 2006).

5.4. FOREST FIRES

The health and vitality of forests in Southeast Asia is threatened by several factors including fires, pests and diseases and degradation through forest fragmentation, excessive extraction and poor harvesting techniques. Across Southeast Asia, fire is used by farmers as a low cost way of clearing land and by cattle farmers to stimulate vegetation regrowth. Low intensity fires are also used to reduce forest fuel loads and can prevent devastating fires. Uncontrolled and unmanaged fires, however, lead to large-scale forest damage. In combination with the effects of uncontrolled logging

and subsequent forest drying, fire has become a major cause of forest loss in the region and poses a serious threat to remaining forest resources and to ecosystem stability.

As in other parts of Southeast Asia, fire has always been an important component of the environment in seasonal forest communities and savannas in Cambodia. It is the usual practice for farmers to burn the land after clearing a forest plot to cut down weeds and remaining vegetation and fertilise the soil. Farmers may also burn agricultural and crop residues after harvest and fires also result from hunters flushing out animals, children playing and careless smokers, etc. Increased road development in previously isolated areas and rising levels of human activity – including use of fire as a management tool and accidental fires – are, however, likely to increase vulnerability to forest fire in Cambodia in the coming years. Rowell and Moore (2000), among others, have suggested that the changing weather patterns and increased levels of anthropogenic fire ignition may result in increasing cycles of forest devastation as burned areas become progressively drier and recovery intervals contract.

The extensive lowlands of Cambodia originally supported a mosaic of semi-evergreen forest, deciduous dipterocarp forest and woodlands which covered much of western and northern Cambodia, the northern and eastern slopes of the Cardamom and Elephant Mountains, and lowlands east of the Mekong River. Logging, shifting cultivation, fire and other disturbances have heavily degraded large parts of this area into open savanna and savanna woodland (Wharton 1966; Rundel 1999). Legris and Blasco (1972) suggest that most of Cambodia would have been covered in semi-evergreen forests before the impact of human populations and that fire and swidden cultivation resulted in gradual degradation from evergreen to semi-evergreen to deciduous woodland to dry savanna.

The major impacts of fires in Cambodia include (Ashwell 2010):

- Removing fire sensitive evergreen species thereby converting large areas of evergreen, and especially semi-evergreen, forests into deciduous forest (this process is advanced in Cambodia and most semi-evergreen forest areas have been converted to deciduous forests).
- Degradation of soils and development of a hardpan that reduces soil fertility.
- Reduction of above and below ground biomass and carbon.

To exacerbate matters, forest managers or local inhabitants usually do not hold responsibility for fire control and land tenure arrangements may promote short term strategies and excessive use of fire as a management tool. Weak governance and ineffectual legal and regulatory systems may also hinder law enforcement with respect to fire (Rowell and Moore 2000).

Although traditional learning indicates that forest in Cambodia have been degraded as a result of the use of fire over a period of hundreds if not thousands of years,[1] this theory has recently been challenged by Maxwell (2004). From a survey of charcoal in lake sediments Maxwell (2004) suggests, that relative to past millennia, fire activity in recent years has been at a low level and that frequent fire may have acted to maintain tree cover in open forest formations by preventing less frequent but more intense and more devastating fires. Although this theory may apply at a large scale, local observations reported by Maxwell (2004) suggested that dense forest/swidden burning is becoming excessively frequent in some larger forest areas and causing forest degradation.

Currently, Cambodian fire-related legislation generally aims to prevent forest fire[2] although the Forestry Law allows fires for 'forest maintenance' (MacInnes 2008). With the advent of REDD and

[1] Wharton (1966); Rundel (1999); Legris and Blasco (1972)

[2] E.g. Articles 36, 37 and 97 of the Forestry Law (2002); Articles 6, 45, 55 and 57 of the Draft Protected Area Law; Articles 20 and 21 of the Environment Law (2001 revision); and the Provincial Regulations for Mondulkiri Protected Forest (2006).

differing views over the role of fire in maintaining forest carbon, additional investigation is likely to be needed to align policy appropriately.

5.5. OVERVIEW OF DRIVERS OF CHANGE

Although spatially specific quantitative information on the impact of individual drivers of change on deforestation and forest degradation is not available through the assessment of secondary sources of information undertaken here, the preceding sections point to the overwhelming influence of several interlinked factors. Among these are expanding roads and infrastructure, migration into forest areas, allocation of land for commercial agriculture in forest areas, land speculation, demand for wood and timber and expanding populations. The effects of these drivers on deforestation and degradation is exacerbated by lack of tenure clarity, poor law enforcement, low levels of human development, poverty, lack of transparency, lack of conflict resolution mechanisms, use of inefficient wood energy technologies and lack of alternative fuels and lack of alternative sources of wood supply.

Several of the primary drivers are intimately associated with normal socio-economic development and this will need to be taken into account in designing REDD strategies. As such, a focus on improving efficiency of land and resource use is likely to be appropriate. As Cambodia currently provides a relatively challenging environment for public policy implementation and governance indicators signal no widespread improvement, significant efforts will need to be made to establish an enabling environment for REDD.

6. Efforts to reduce deforestation and forest degradation

A range of efforts have been made to reduce deforestation and degradation in Cambodia both at national and project levels. The Royal Government of Cambodia (RGC) has formulated policies and programs to address the causes of forest destruction and forest degradation, which focus on (Savet and Sokhun 2003):

a. the development of forest management plan, consistent with international standards;

b. local community participation in forest management;

c. the eradication of illegal logging activities; and

d. the development of land use and management procedures for utilizing cancelled forest concession lands.

The Fisheries Law contains provision with respect to conservation of inundated forests and the 2008 Protected Areas Law mandates development of the National Protected Area Strategic Management Plan which will include management plans for individual protected areas and climate change related activities. The Plan is currently being drafted.

The effectiveness, efficiency and equity of current FA, MoE and FiA programmes in achieving their initial objectives and in the extent to which these are appropriate for REDD are reviewed below. Forest law enforcement, governance and trade related efforts are also included. The progress of other more specific efforts such as forest management certification, implementation of codes of harvesting practice, information dissemination, etc. are not considered individually due to data and time limitations.

6.1. PROTECTED FORESTS

The Forestry Law (2002) designates the Ministry of Environment as the party responsible for the management of Protected Areas and Forestry Administration (FA) for the management of Protection Forests.

6.1.1. Protected areas

The national protected area system comprises 23 protected areas created through a Royal Decree in 1993 and managed by the Ministry of Environment (MOE; ICEM 2003b see Section 3.1). In 2010 the extent of protected areas in Cambodia was recorded at 3.092 million hectares (FAO 2010). The proportion of the total land area in Cambodia under protection (25%) is larger than both the regional (16%) and global (12%) averages. Despite designation having taken place much earlier, there was, however, no functional management structure to implement the mandate until early 2000s (Rotha 2009). Less than 45% of the forest area, which equates to 27% of the total area, has been reported to be free from recurrent disturbance. The current range of protected areas in the country are assigned differing status depending on the management objectives as shown in Table 6.1.

Most protected areas are relatively isolated and located in areas of regions of medium to high poverty and relatively low but rapidly increasing population density (ICEM 2003b). The significant exceptions are the protected areas on the western border of the country in provinces with high population densities largely due to recent in-migration, and the protected areas within Siem Reap Province, including parts of the Tonle Sap Multiple Use Area.

Table 6.1. Protected areas and their management objectives

IUCN Description	Total area (ha)	Management objectives
National parks	742 000	Natural and scenic areas of significance for their scientific, educational and recreational values
Wildlife sanctuaries	2 030 000	Natural areas where nationally significant species of flora and fauna and communities or physical features require specific intervention for their protection.
Protected landscapes	97 000	Nationally significant natural and semi-natural landscapes which must be maintained to provide opportunities for recreation and tourism.
Multiple Use Areas	404 000	The areas which provide for the sustainable use of water resources, timber, wildlife, fish, pasture and recreation with the conservation of nature primarily oriented to support these economic activities.

Source: Miller and Shields (2004)

Challenges for forestry and protected areas include controlling destructive and unsustainable logging activities and managing firewood and/or charcoal collection (ICEM 2003b). Other threats include encroachment, poaching, shifting cultivation, infrastructure development and mining. Limited capacity and relaxed enforcement at the community level means that most protected areas are effectively multiple-use areas and all protected areas in Cambodia have been subject to varying intensities of logging. Many were surrounded by forest concessions, which functioned to mask harvesting and transport of wood from within the protected area boundaries. Small scale logging activities is a special problem for protected areas close to international borders where the military and other armed groups are often involved. Areas within national parks have also been allocated as ELCs e.g. Green Rich was granted an 18 300 Hectares concession in June 2003, almost wholly located inside Botum Sakor National Park in a disturbed and mosaic evergreen forest and mangrove forest EFCT (2005). A large area of Roniem Daun Protected Area in Batambang province was also excised in [insert year] following extensive agricultural development in the area (Ref needed).

The very humid, low elevation forests are affected more by roads than villager's access, while the humid low elevation forest and sub-humid deciduous forests are threatened by both road and villager access (Miller and Shields, 2004). The main cause of habitat degradation is illegal logging and approximately half of the protected areas are in evergreen or semi-evergreen forests, which have the greatest density of commercial timber species. The rate of forest loss for evergreen and semi-evergreen forest across protected areas is historically less than one third of that in current and former timber concessions (Miller and Shields, 2004). The rate of forest loss in FA managed evergreen and semi-evergreen Protection Forests is, by contrast, comparable with that in current and former concession areas as a result of the network of remaining logging roads. Since the logging moratorium, it is possible that pressure may have increased more in protected areas than in post-concession areas due to higher resource availability and the fact that the FA have confiscation powers in the latter.

Threats to protected areas are generally associated with external commercial interests supplying distant markets and, as such, protected areas adjacent to development zones are especially threatened (Corbett 2008). Increased access, and particularly road development, is a major driver behind land encroachment. Increasing national and regional demand for timber and inadequate law enforcement combined with a lack of alternative sources of income for local people contribute to pressures affecting protected areas. With respect to wood supply, protected areas in Cambodia encompass nearly one-quarter of all forests; more than in any other Southeast Asian country (McKenney, Chea, Tola, and Evans 2004). The large area designated as protected and existing

resource constraints are thought to be important factors contributing to the lack of effective enforcement in Cambodia's parks. In relation, it has been suggested that a process of rationalisation would be appropriate, whereby greater focus would be placed on protecting high value forests while some deforested, low value areas would be removed from the system (McKenney, Chea, Tola, and Evans 2004). ICEM (2003b) also call for inclusion of areas of significant biodiversity in the national protected areas system where these have been identified outside the current system.

At present, protected areas lack management plans, objectives and zonation and many have not been demarcated although all of these goals are mandated by the 2008 Protected Areas Law. There is also a general lack of financial and human resources at all levels and communication and infrastructure need to be improved. Cambodia's expenditure for protected areas around the beginning of the decade was very low when compared to other countries in the region and MOE's budget barely covers staff salaries and basic administration (ICEM 2003b). Increasing cooperation between protected area managers, local communities and other partners and improved communication between protected area staff and national authorities have provided some cause for optimism although underlying drivers of change also need to be addressed (Lacerda *et al*. 2005). Despite many small-scale logging infringements within protected areas, however, and notwithstanding a number of serious exceptions, destruction within protected areas has been less than that in surrounding landscapes (ICEM 2003).

According to the 2007 gap analysis, major forest types and species of international conservation significance are well represented in the protected area system although several habitats, dry evergreen forests among them could be better covered (Anon 2005).

Some perceived provision for community and sustainable-use zones under the 2008 Protected Areas Law as a weakening of the role of protected areas in protecting biodiversity (EFCT 2005). Unlike the core and conservation zones, the new zones can be used for development purposes and fears are that economic development will become excessive. The lack of demarcation is also a weakness although the MOE master plan on protected areas includes related provision (RGC 2010). Finalisation of the National Protected Area Strategic Management Plan, and regulations subsidiary to the Protected Areas Law, including Community Protected Area Prakas, should help strengthen protected area management and their contribution to REDD.

Without additional attention to resource management, law enforcement and governance capacity, impacts may worsen with increasing investment in roads, dams and electrification schemes in the vicinity of protected areas. Additionally, encroachment by local communities and commercial interests is, at the same time, reducing the size of protected areas. In association, movement of people from rural to urban areas, and from areas of high density to those where natural resources are less intensively used is a major threat. At the same time, more areas are being made safe from mines and the government's resettlement and military demobilisation program combined with other demographic trends is increasing pressure on natural resources in and around protected areas (ICEM 2003b).

International NGOs have been working with local communities in restoring degraded forestland following agreement with provincial authorities on access and use rights and it is widely acknowledged that community involvement in forest management will need to be a key part of future forest practice (Rotha 2009). Survey work has, however, shown that protected area effectiveness declines with the extent to which people have access (WWF 2004). Thus a balance will have to be struck between different demands and in relation, enforcement will need to play a role in protected area management. In relation, Bruner et al. (2001) found a strong correlation between the density of park guards and effectiveness of conservation. With respect to costs, a figure of US$1-2 per hectare per year has been estimated for upkeep costs of protected areas in Cambodia (Tom Clements, Pers. Comm.). This suggests that with 3.092 million hectares of protected areas costs will be between US$3.1 and US$6.2 million (FAO 2010). Costs of establishing community protected areas

will also have to be taken into account but have been estimated to be considerably lower than those for setting up community forests (Ken Serey Rotha, Pers. Comm).

Currently, there are ninety community protected areas, each having been allocated around 10 hectares of forest land for domestic use (Ken Serey Rotha pers comm.). However, the prakas relating to Community Protected Areas to be developed under the 2008 Protected Areas Law have yet to be issued and insufficient information is available to appraise the effectiveness of community protected areas in reducing deforestation and degradation.

6.1.2. Protection forests

Protection Forest are administered by FA and do not have an IUCN category assigned. They cover and area of 1.346 m hectares and are maintained primarily for protection of the forest ecosystem and natural resources therein. Protection Forests include forests of different type:

- Special forest ecosystems;
- Research forest;
- Forest for regulating water sources;
- Watershed protection;
- Recreation forest;
- Botanical gardens;
- Religious forest.

In practice, "protection forest" is a status for post concession areas awaiting rehabilitation as production forest (Forest Law 2002).

Currently the whole Seima area is classified as Production Forest but a proposal has been made for the Core Area to become a Core Protection Forest, while the remainder of the Seima Biodiversity Conservation Area will be defined as Buffer Protection Forest. An extensive community program is essential in the area as a significant part of the workload for the law enforcement teams are crimes committed by local residents. The deforestation rate in the Seima Biodiversity Conservation area has, however, been recorded to be lower than in the surrounding buffer zone or the adjacent Snuol Wildlife Sanctuary due to the continuing conservation initiative. Most of the deforestation in the SBCA was in areas with main road access and existing villages (Evans, Bauran and Delattre, 2009).

The rate of forest loss in FA managed evergreen and semi-evergreen Protection Forests was reported by Miller and Shields (2004) to be higher than that for evergreen and semi-evergreen forest across Protected Areas and comparable with that in current and former concession areas as a result of the network of remaining logging roads. The situation may have changed since this assessment was made but large scale assessments are not available.

6.2. COMMUNITY FORESTS

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. The main rationale for encouraging community forestry (CF) is that people in close proximity to the forest are familiar with and in a good position to manage forest and, in receiving continued benefits, also have an incentive to conserve forest resources (McKenney, Chea, Tola, and Evans 2004).

Recently, community forestry has received considerable attention in Cambodia as a potential alternative to forest concession management. The movement towards CF in Cambodia was led by

the FAO-supported Tonle Sap project which supported many important CF issues including increased community benefit, commercial harvesting rights. Developments over the last two to three years indicate increased interest of the Forestry Administration and plans are to hand over around 2 million hectares of forestland to communities by 2030. However, it is still difficult to establish CFs in suspended forest concessions and there is great uncertainty as to if and how negotiations with concession companies should take place (Rotha 2008).

Presently, there are more than 420 community forestry sites covering around 400 000 hectares, although only 94 sites covering 113 544 hectares are legal recognized and have signed an agreement (Database of the Forestry Administration, February 2010). For instance, there are 37 potential CF areas approved in Siem Reap province although only 18 have CF Agreements signed, and none have approved CF Management Plans in accordance with the CF Guidelines (Rotha 2008). The frequent lack of a legal mandate means that many communities face major constraints in exercising control over forests in their immediate vicinity. Additionally, because forest concessions – and now economic land concessions – were allocated on land that includes villages, responsibility for forest management was removed from local communities and as a result, forests now tend to be treated as open access resources (Rotha, 2008).

Decentralization of natural resource management has been timid in Cambodia especially in forestry. Although by law, indigenous peoples land rights are recognized, many are not registered as communities such that they are recognized by the Ministry of Interior. So far there may be only two groups that have been registered and most villagers have no idea of the law (Rotha 2008). Additionally, local councils are sidelined and Government as well as donors appear to put greater emphasis on transferring natural resource management rights and responsibilities directly to communities, rather than to local councils. In many places, however, councils have taken the initiative, and this process seems irreversible (Rotha, 2008).

Evidence on the performance of community forestry initiatives to reduce deforestation and forest degradation remains inconclusive (Blomley et al 2010). Community forestry, when legally registered and approved, reportedly "appears to increase local tenure right and reduces the risk that forests will be appropriated by external interests and converted to alternative uses." While positive effects in some sites have been observed, many sites are still seeking formal recognition and registration.

Community forestry currently provides only limited economic benefits due to the degraded condition of allocated forests and restrictions placed on commercial harvesting. Coordination between government and organisations supporting forestry has been mixed and approval processes for community forestry are lengthy (Blomley et al 2010). Many questions remain, particularly from those who do not think communities can manage forests, or who point to the failure of CF to demonstrate clear benefits or contributions to poverty reduction (Rotha 2008). As such, implementation of community forestry remains challenging and its contribution to poverty reduction remains unclear (Blomley *et al* 2010; Enters *et al*. 2009a). Additionally, investments associated with establishing community forestry sites are high – an estimated $54,900 per site although costs vary significantly (CFO/FA cited in Blomley). Many recommendations made to improve the performance of community forestry also require additional funding and as such, attention may have to be given to reducing expenditure if large scale implementation is envisaged.

Hansen and Top (2006) estimated that the direct values from sustainable management of natural forests provide little economic incentive for forest management in degraded, mostly deciduous forests often allocated for community forestry. In more valuable forest types (semi-evergreen and evergreen), there may be greater possibility if local people can be involved in the management and sale of timber. Requirements for CF to be self sustaining include a secure source of funding and reassessment of the 5 year moratorium on timber harvesting in community forest areas, which threatens profitability, especially in the degraded forest often allocated to community forestry

(Hansen and Top 2006). McKenney, Chea, Tola, and Evans (2004) similarly argue that to be environmentally and financially sustainable, community forestry must provide economic benefits to local people.

In relation, community forestry was initially begun in degraded forests in densely populated areas and focus on forest rehabilitation to support subsistence and minor NTFP trade (Rotha 2008). In general, however, communities are not sufficiently motivated to establish CF to improve management of resources in decline and only a handful of CF projects are located in HVF areas (McKenney, Chea, Tola, and Evans 2004). Although community forestry serves to solidify rights to forest, help communities defend resources against outsiders and help NGOs to conserve forests, local people want more benefits rather than forest rehabilitation for subsistence (McKenney, Chea, Tola, and Evans 2004). 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 (McKenney, Chea, Tola, and Evans 2004).

Although the main needs and challenges for CF include training/education of villagers about forest management according to the CF subdecree, and training, commune level planning and regulatory reform according to NGOs, villagers in high value forest areas need high-level patronage more than these other factors (McKenney, Chea, Tola, and Evans 2004). Villagers in high value forest areas are also more interested in opportunities to market and trade forest products than allowed under the CF subdecree, which emphasises “customary use” and restricts commercial activity during the first five years.

For community forestry to succeed in high value forest areas will require fundamental changes in the forestry sector toward a poverty reduction and rural development focus (McKenney, Chea, Tola, and Evans 2004). 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.

In areas where resources are degraded, the opportunity costs of REDD will be much higher and much greater external support is likely to be needed for to gain the interest of local people and for forests to be managed sustainably. Hansen and Top (2006) found that rubber was the most profitable alternative to natural forest management while plantation establishment for pulp production was found to be unprofitable at growth rates usually found in Cambodia. In the longer term, management of natural forests for production may become obsolete and people are likely to move from forest areas as opportunities.

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. To identify high value forest 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 (McKenney, Chea, Tola, and Evans 2004).

Efforts are needed to speed up the process of approving and formalising CF sites and to allocate more valuable forest areas while reconsidering allocation of ELCs in forest areas (Blomley *et al* 2010). Links to the government also need to be well maintained and there is need to involve commune councils in local forest management, which has often not been the case. Additionally, more support for enforcement of bylaws and greater use of sanctions is necessary to support forest recovery. Furthermore, the current CF term of 15 years may mean that rights are lost as soon as forest resources are regenerated to a productive level. As such, this ruling could constitute a fatal flaw in the long-term development of community forestry.

Box 6.1. View from the village: rapid change and the need for CF support in Bey

In Bey, the logging of the 1990s transformed local livelihoods. NTFPs were no longer abundant, and villagers instead became dependent on labouring in the timber industry. Overall, the years since peace came to Bey in 1994 have been a period of economic boom. Villagers regretted the disappearance of the beautiful tall hardwood trees and the abundance of food and wildlife, but none of them would turn the clock back.

However, villagers in Bey are generally extremely uncertain about their prospects. Opportunities for logging have declined and attention has turned to exploiting the forest for agricultural land. Since 2004 the population of the village has more than doubled as a result of migration from Kampong Cham. At the same time, outside companies have established links with various local actors to try and establish claims to agricultural land.

A community forestry project was launched in the village in 2003 but the NGO has never been more than an occasional visitor to the village. A proposed community forest site 6 kilometres distant from the village was marked in April 2006. The NGOs supporting and financing community forestry and the Forestry Administration asked the local concession company to approve the community forest site but were declined. During May 2008 the commune chief was reportedly selling off parcels of land in the community forest site for up to 500 USD each and at the end of the year secured a decision from the commune council to end the project.

An international NGO had supported the community forestry project since 2005 as part of a programme supporting 133 villages in 7 provinces but had no technical staff in-country. As of early 2009 the project remained awaiting approval by the Forestry Administration. Within the overall project there are many villages with similar to Bey in terms of non-NTFP livelihood and poor quality community forests located remote from the village. Some villages do, however, have livelihoods that are more NTFP-oriented and have functioning community forestry activities.

Source: Adapted from Biddulph (2010)

6.3. COMMUNITY FISHERIES

There are currently over 469 community fisheries in Cambodia although the rate of establishment has slowed since the over the sub-decree on Community Fisheries was adopted in 2005 (Table 6.2). Of the 469 community fisheries established in 2009, 173 have been legally registered and approved by MAFF and 60 are in the process of securing legal registration (Blomley 2010). Many of the community fisheries are located in the Tonle Sap area where much of the 1.2 million hectares of inundated forest in Cambodia is situated.

Table 6.2. Number of Community Fisheries established in Cambodia, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total	165	246	316	359	423	447	447	467	469

Source: Planning, Finance and International Cooperation Department, FiA (2010)

Blomley (2010) reports that CFi appears to have a positive impact on introducing sustainable management practices including the conservation and protection of flooded forests and mangrove areas. More precise information on the effectiveness of community fisheries on the management of inundated forests is not available although it has been suggested that fishing lots have been more effective in protecting flooded forest than community fisheries which may be effectively open access areas (Anon pers comm.).

6.4. FOREST LAW ENFORCEMENT, GOVERNANCE AND TRADE RELATED EFFORTS

Strengthening implementation of forestry policy and improving forest law enforcement and governance have been priority issues in Cambodia since 1998 (Savet and Sokhun 2003). The Forest Crime Monitoring and Reporting Project was a pioneering initiative which addressed forest law enforcement and governance issues in a way that few countries have been prepared to. Steps taken to control illegal logging after 1998 were, however, unsuccessful and a logging moratorium was announced in 2001. This resulted in closure of mills, a reduction in illegal logging and also shifts in the focus of illegal logging from commercial to small-scale operators, from few players to many and from export to domestic markets (Rotha 2009). Concessionaires were given an opportunity to continue operations, contingent on developing viable forest management plans but none were able to comply.

Notwithstanding the continued importance of illegal logging, such forest crimes are generally small scale when perpetrated for domestic consumption and local livelihoods while forestland encroachment and land grabbing are considered by Sovann and Saret (2010) to be the major issues confronting FLEG implementation.

Over the years, various efforts have been made to improve forest governance including implementation of new legislation, improved participation, and increased transparency and responsiveness (Sovann and Saret 2010). The following legislation has been aimed at FLEG (Sovann and Saret 2010):

- Imposition of a logging moratorium on concessionaires from 1 January 2002 until their new forest concession management plans (FMPs) and environmental and social impact assessments (ESIAs) were in place.
- Establishment of national committees and subcommittees at provincial levels in 2004 to assist the FA in combating forest land encroachment and land grabbing.
- Order No. 01 dated 9 June 2004 to combat forest land encroachment and land grabbing.
- Sub-decree on Permanent Forest Estates Registration & Demarcation dated 1 April 2005 to demarcate and register permanent forest estate (PFE).
- Order No. 01 dated 10 May 2006 on preventing all types of forest land clearance for real estate.
- Order No. 02 dated 20 September 2006 on management and control of chainsaw utilization.
- Circulation No. 02 dated 26 February 2007 on illegal encroachment of state lands.
- Promulgation of the Rectangular Strategy Phase II in 2008 to supporting state reform forestry reform.

Between 1999 and 2009, the FA recorded 8 440 cases and impounded 37 191 m^3 of logs and squared timber and 17 374m^3 of sawn timber. A total of 2 081 cases went to court between 1999 and 2008. Additionally, in 2010, the head of the Forestry Administration was removed over alleged failure to control illegal logging.[1] In relation to land grabbing and land encroachment approximately 270 000 hectares of forest land were returned as state property between 1999 and 2008 (Sovann and Saret 2010).

In spite of these successes, a number of obstacles confronting forestry, including corruption and clientelism have remained untouched by the technological fixes that have been promoted by donors

[1] Hun Sen fires forestry director. The Phnom Penh Post, April 7, 2010

(Rotha 2009). At the field level, lack of recourse has been recorded as an obstacle in preventing proliferation of illegal activities during past years. Household surveys in Kompong Thom and Preah Vihear indicated that local authorities usually know about illegal logging and/or large-scale forest burning and little point was therefore seen in reporting it to them. Indeed, in some instances (especially with wildlife trade and logging), local authorities may be directly involved in illegal activities (McKenney, Chea, Tola, and Evans 2004).

It is difficult to determine the scale of breaches of forest related laws in Cambodia but some reports suggest even after the logging moratorium illegal activities remained at significant levels. In addition to the switch of illegal logging from large scale commercial exporters to small scale domestic producers, Global Witness (2007) reported that several hundred thousand cubic metres of roundwood were being produced annually, distributed between a number of major processing facilities around the country.

Comparison of bilateral trade figures and calculation of raw material balances to assess the scale of illegal logging are hindered by poor data but can provide further guidance on the scale of informal activities. Comparison of RGC wood products export data with data on wood products imports from Cambodia reported by trading partners reveals significant anomalies. In particular, sawnwood imports from Cambodia reported by trading partners have been higher than exports reported by the Cambodian government. The discrepancy has been in the region of 87 000 – 150 000 m^3 per year prior to the 2008/09 economic downturn (Figure 6.1).

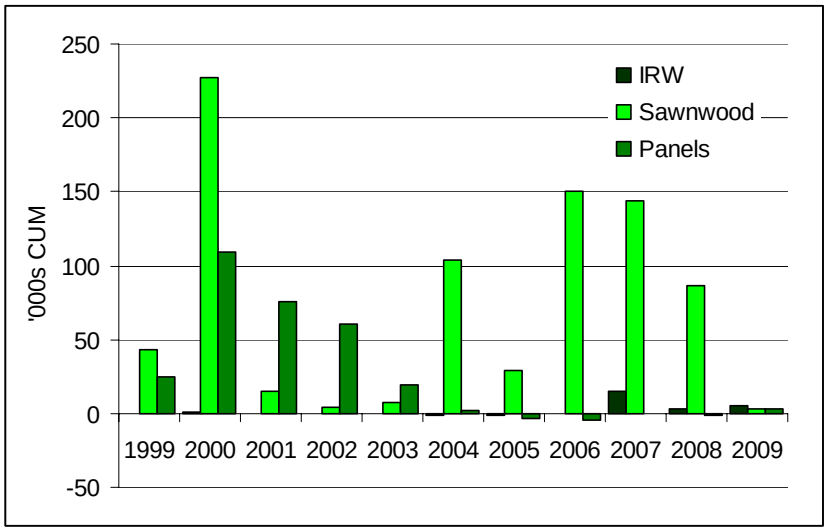


Figure 6.1. Discrepancies between wood products exports reported by RGC and by trading partners.

Source: UN COMTRADE, FAOSTAT.

If sawnwood volumes are converted back into roundwood volumes using a factor of 1.8, the total amount of roundwood necessary to produce the sawnwood imported by trading partners is 321 000 in 2006 falling to 166 000 in 2008. Industrial roundwood production figures submitted by RGC to FAO ranged between 113 000 m^3 in 2006 and 118 000 m^3 in 2008 (Figure 5.8; Table 6.3). This suggests that roundwood production in relation to sawnwood exports was 207 000 m^3 in excess of official figures in 2006 and 48 000 m^3 in excess in 2008. In 2009, with collapse of markets, the discrepancies fell close to zero and meaningful analysis is not possible. Roundwood, roundwood used to make products other than sawnwood for export, and domestically consumed forest products are not included in this assessment and a full picture of wood product flow is therefore not possible.

Table 6.3 Wood products production and trade data comparison (cubic metres)

Industrial roundwood	2006	2007	2008	2009
a. Production	113000	118000	118000	118000
b. Imports	1465	1473	1473	1473
c. Exports	360	434	373	373
d. Exports reported by partners	421	15883	3921	5427
e. Discrepancy (d-c)	61	15449	3548	5054
Sawnwood				
a. Production	2200	3800	3800	3800
b. Imports	132	48	289	289
c. Exports	27666	1342	5728	5728
d. Exports reported by partners	178229	145373	92245	8927
e. Discrepancy (d-c)	150563	144031	86517	3199
Wood-based panels				
a. Production	7400	7400	7400	7400
b. Imports	3586	1103	3663	3663
c. Exports	5441	2128	1689	1689
d. Exports reported by partners	641	2086	498	4725
e. Discrepancy (d-c)	-4800	-42	-1191	3036

Source: UN COMTRADE, FAOSTAT.

Although this analysis demonstrates that a significant quantity of wood production and trade is not reflected in nationally compiled statistics, it is not necessarily a reflection of illegal logging. However, poor statistical records do allow illegal activities to proliferate and improvements would be necessary if forest carbon accounting is to provide a realistic assessment of stocks and flows.

6.5. OVERVIEW OF EFFORTS TO REDUCE DEFORESTATION AND DEGRADATION

Without quantitative analysis of the impact of various initiatives on deforestation and forest degradation it is difficult to make a final assessment of their relative value. The review above does indicate, however, that infringements of laws and poor implementation are key factors in reducing the effectiveness of measures intentioned to reduce deforestation and forest degradation. The key question is, therefore, to what extent these efforts will be effective in tackling deforestation and degradation in combination with other centrally-based efforts to improve governance and enforcement in rural sectors. Cost is also likely to be a significant factor as are the co-benefits provided by different approaches and programmes.

7. REDD strategy focal areas

In addressing drivers of deforestation and forest degradation and deciding upon appropriate REDD strategies, many factors need to be considered in addition to the current drivers of deforestation and degradation, including:

- Which stakeholders and institutions will participate in REDD and how?
- What kinds of activities will be eligible for funding under REDD?
- To what degree should the focus be on national as opposed to forestland management activities and what mix is likely to provide the greatest potential in reducing deforestation and degradation (e.g. to what extent should funding be used to strengthen institutions as opposed to providing benefits to those make efforts towards or who stand to lose as a result of REDD implementation)?
- To what extent should REDD focus on deforestation as opposed to forest degradation?
- For field level activities, which locations are most suitable for REDD activities? - considering, *inter alia*:
    - Carbon density and potential carbon density;
    - Threat of deforestation and degradation (proximity to areas of high population density, major roads, areas outside civilian control, etc.)
    - Jurisdiction and appropriateness of policy and institutional framework within the jurisdiction;
    - Land capability and opportunity cost;
    - Prevailing resource management issues;
    - Social and environmental co-benefits;
    - Other government plans and projects;
- In the context of relevant experience which mitigation measures are the most effective, efficient and equitable?
- To what extent will strategies be susceptible to leakage either to other geographical areas or across product classes?
- To what extent will REDD receive support from UNFCCC and will financial support be forthcoming?

Cost in relation to emissions reductions and co-benefits will have to play a central role in deciding upon constituent REDD strategies. Depending on the potential availability of carbon financing, decisions will need to be made over the inclusion of strategies offering differing returns. In this context, the key question will be the extent to which support can profitably be provided to reduce emissions from deforestation and forest degradation in forest areas that have e.g. lower potential carbon density, unclear jurisdiction, higher land capability, lower biodiversity levels, etc.

The existence of a national target to maintain forest cover at 60% complicates the picture, however, as an economic analysis on the basis of cost per unit emissions reduction can provide only part of the story. In relation, the key question is to what extent the 60% target can be relied upon as a means to reduce deforestation and degradation notwithstanding REDD related efforts. In this sense, it is relevant that the target is based on historical forest cover rather than on a direct assessment of land capability and requirements for land to meet other objectives vying for

ascendancy at the national level. Cambodia is also a relatively flat country and recent developments along with trends in other countries in the region suggest that maintaining forest cover at 60% may involve difficult trade offs. As such two scenarios are presented against which REDD strategies may be considered:

Scenario 1. Effective implementation of forest policy to maintain 60% forest cover.

Under this scenario the opportunity costs of forestland will play a limited role in determining allocation for REDD activities as something approaching a permanent forest estate (including forests in protected areas and inundated areas) is assumed to have been agreed upon at the national level. Regulatory control will be the mainstay in reducing emissions and even though opportunity costs of REDD may make it uneconomical in comparison with cash crops, etc. in some areas, the political decision will prevail.

Scenario 2. Forest cover depend at least partially on REDD strategy implementation.

Under this scenario, it is assumed that the extent to which emissions are reduced will depend to a much greater extent on REDD funding. Given recent trends in forest cover (Figure 2.1), and the expansion of agricultural and other land areas, focus on certain areas of forest where large reductions in emissions can be achieved at low cost may be considered more reasonable. As such, reducing forest degradation and deforestation in areas with high actual or potential carbon density, poor soils, lower poverty levels, etc. may be more cost effective. For example, work by CCAP suggests that if coastal forests in Koh Kong province were allowed to recover to 70% of their 1980 carbon density level, an extra 80t/ha CO2e would be sequestered (Reference to be included).

In terms of forest cover, the two scenarios and related strategies may be considered in terms of forest area as more quantitative (Scenario 1) and more qualitative (Scenario 2). It is likely that actual strategies will implicitly or explicitly assume a scenario that falls somewhere between these two extremes depending on the trade off between emissions reduction potential, available revenues for emissions reductions, opportunity costs of land, political will to enforce measures to reach the stated forest cover target, etc.

Depending on jurisdiction, some areas may be more easily retained as forest than others and it may be that a scenario in which enforcement costs can be considered as a better guide to overall costs than opportunity costs.[1] For example, it could be assumed that protected forests (forests in protected areas and protected forests) would be less susceptible to deforestation and degradation. In relation, it has been estimated that the costs of upkeep of protected areas is in the region of US$1-2 per hectare per year such that the total costs of the protected area system would be in the region of US$3.1 – US$6.2 million per year.

Transaction and implementation costs will become more important where smaller areas of forest are involved and many trained staff are needed to implement and enforce efforts to reduce emissions from deforestation and degradation. Blomley et al (2010) estimated that the cost of establishing a community forestry project at US$54 900. Permanent Forest Estate covered 7.8 million hectares in 2006, i.e. 44% of the national land area and assuming that 44% of the total number of 14 073 villages in Cambodia are in forest areas and each community forestry site includes 1.7 villages,[2] the cost of implementing community forestry will be US$ 199 969 051 ($199 m; NIS 2008).

The costs of establishing community forests are, however, widely variable. Around a third of the overall cost is associated with Community Forestry Management Planning and field inventory and

[1] For a discussion of the applicability of opportunity costs to REDD see Gregersen, El Lakany, Karsenty and White (2010)

[2] The Capacity Building for Sustainable Forest and Land Management Project includes 262 Community forests covering 451 villages (1.7 villages per CF site).

the cost of a CF for carbon management will depend on what level of inventory is needed. If, for example, data from adjacent forests is available, only indicative data may be necessary and this could significantly reduce costs (Tom Evans pers comm.). A highly motivated community may also be able to complete the CF process to gain approval and legal tenure for under $10 000 (Amanda Bradley pers comm.). This figure does not, however, include Community Forestry Management Planning and field inventory according to the CF Guidelines.

Taking a narrower approach and considering only Cambodia's top 11 forested provinces are considered, which hold about 90 percent of the nation's evergreen and semi-evergreen forest, only around 2,000 villages need to be considered. (McKenney, Chea, Tola, and Evans 2004). As such, national costs associated with implementing community forestry in these villages would come to around $64 588 235 ($65 m) if the same parameters as above are used.

If CF were pursued in lower value forests with support provided for subsistence and NTFP trade activities rather than commercial production of timber, it has been suggested that limited benefits could put environmental and financial sustainability at risk (McKenney, Chea, Tola, and Evans 2004). However, as Box 7.1 makes clear, involvement of communities in forest management is likely to be of great importance in Cambodia for additional reasons.

Box 7.1. The most likely scenario for Cambodian forestry

With current trends in forest management and the reality of a young democratic country, forestry laws and regulations are likely to be strongly implemented but without active participation of local communities. Forest cover could reach the target of 60% or higher, but timber production will not be guaranteed.

It is assumed that there will be problems in forest policy implementation due to mistrust among stakeholders and that although forest management could be effective in the short-term, forestlands could be easily converted to other land use types (agriculture, economic concessions, etc.). Furthermore, illegal logging and other illegal activities could occur due to lack of government staff and financial support for enforcement, and local level forest encroachment could also occur.

Regarding decentralization, issues include the central government's power retention and top-down tradition, but the ability and capacity of local people or lower levels of government agencies to manage natural resource. Lower government agencies have often been passive and dependent on "being told to do" rather than "trying to do". Local communities are encouraged to use their rights in managing natural resources but lack voice and usually lose out to elites in defending their natural resource management rights. To achieve the target of 60% forest cover, encouraging local community participation at higher levels is essential.

Source: Adapted from FA (2009)

In addition to opportunity, and transaction and implementation costs, consideration will also be needed to be given to maintaining wood supply. Widespread forest protection such that timber supply is significantly reduced will increase pressure on forest resources and raise incentives for illegal activities. At the project level it may be possible to divert deforestation and degradation but this becomes less possible at the national level if alternative supplies of wood are not available. As such, sustainable management of production forests, timber plantation establishment, and active forest rehabilitation should also be considered as a means to maintain wood production while also conserving and enhancing forest carbon. For example, the Forestry Administration estimates that reforestation schemes are possible on an area up to 5 million hectares of state public land (NFP, 2009).

In developing national REDD strategies the current plans and programmes and their state of implementation should be given a primary position. The next sections provide some possible avenues for consideration at the central level and also take note of the considerable relevance of

current area based activities in addressing deforestation and degradation. Box 7.2 provides, for consideration, a list of measures aimed at influencing those who control or manage forests, many of which are appropriate in the Cambodian context.

Box 7.2. Influencing those who own or control forests

There basically are three sets of policy instruments that governments have available to influence those who own or control forests: (i) laws and regulations that define rights and ownership and put limits on what one can and cannot do with forests. (ii) fiscal mechanisms, (iii) public management and investment. Some of the main options that need to be considered within each category include:

Laws and regulations:

- clarifying and legalizing existing traditional and undefined tenure and land use rights; redefining land use laws and policies, including zoning regulations, to create increased incentives not to deforest;
- improving the enforcement of forest laws and expanding the control of illegal forest activity and corruption;
- passing governance reform legislation that deals with transparency, inclusiveness and accountability;
- Rationalizing forest industry contracts for harvest on public lands and encouraging low impact logging where feasible;
- Getting rid of perverse laws and policies in other sectors that encourage deforestation; and developing laws to control the relationships between the forest sector and sectors that are linked to deforestation (e.g., agriculture, energy and mining, transportation, etc.).

Fiscal mechanisms – taxes and payments:

- stopping the subsidization of forest clearing and forest degradation via agricultural subsidies and tax incentives, public road building that opens up lands, etc., encourage restructuring of some industries and encourage the agriculture sector to improve productivity on existing lands;
- expanding micro credit programs and other incentives for villagers and communities to establish businesses that provide alternatives to forest destruction; encouraging , e.g., through tax incentives and certification of forest operations;
- using fiscal mechanisms to encourage industries to source their inputs from companies that do not use unsustainable practices involving deforestation in producing those inputs;

Public management and investment:

- investing in the institutional infrastructure needed to clarify and make property rights secure, and managing the process openly and fairly as the process is implemented.
- Investing in the design and distribution of fuel efficient stoves and charcoal production systems;
- investing in education, extension, research and technology development that favors intensification of agricultural production and longer productive use of given areas of land already deforested, e.g., in the case slash and burn or shifting cultivation agriculture.
- investing in forest rehabilitation and restoration, and reforestation and afforestation where appropriate;
- investing in development of approaches and procedures to ensure fair and transparent sharing of benefits from REDD; e.g. clarifying and assigning property rights, development of participatory governance processes, involving local forest communities in decision making, etc;
- Investing in climate adaptation measures that can lead to avoiding a speeding up of carbon losses from forests, e.g., reducing fire danger, expanded insect or disease early warning systems and controls, etc.

Source: Adapted from Gregersen, El Lakany, Karsenty and White (2010)

7.1. NATIONAL LEVEL

To address many of the drivers of change attention needs to be given to governance and enforcement of existing legislation and implementation of current policy. Many areas are involved including: overlapping/unclear jurisdictions, lack of clear and stable tenure, allocation of land for commercial agriculture in forest areas; agricultural expansion, migration into forest areas, expansion of roads and infrastructure in the vicinity of valuable forest resources, illegal logging, insufficient facility for conflict resolution, lack of transparency, corruption, poverty, low agricultural productivity, inter-ministerial disputes, low awareness of rights and responsibilities, etc.

To address particular drivers, the following strategies are suggested:

Overlapping/unclear jurisdictions:

- *Support harmonisation of legislation and policy across sectors and levels of government to avoid overlap and uncertainty.*

Weak land tenure in rural areas:

- *Equitably allocate land rights according to the Land Law and establish a clear and transparent conflict resolution mechanism;*
- *Improve land use coordination.*

Land concessions in forest areas:

- *Review procedures for allocating Land Concession in relation to impacts on deforestation and degradation (see Box 7.3);*
- *Make land development plans publicly available.*

Agricultural expansion:

- *Promote agricultural intensification;*
- *Redirect agricultural development to degraded areas with low carbon and co-benefit values;*
- *Remove policies that promote agricultural extensification;*
- *Address low institutional and management capacity to support farmers and the agricultural sector.*[1]

Migration into forest areas:

- *Support development in areas from which migration into forest areas occurs;*
- *Disseminate information that no land is available within designated forest areas;*
- *Examine legal status of settlements in forest areas and provide incentives for movement out of sensitive areas (see Pollard and Evans, 2008);*
- *Provide alternative employment and subsistence for migrants and military groups.*

Weak law enforcement:

- *Train judges and prosecutors in forest and forest-related laws their roles and duties as stated in the Code of Criminal Procedure, 2007.*

Infrastructure development adjacent to forest areas:

[1] Technical Working Group on Agriculture and Water (TWGAW) 2010. Program design document annexes for strategy for agriculture and water 2010-2013. Task management support group, Phnom Penh, Cambodia.

- *Support transparency, consultation and environmental and social impact assessment in relation to development in forest areas*
- *Focus on reducing environmental impacts adjacent to development zones.*

Lack of alternatives to woodfuel:

- *Where sustainable supplies of woodfuel cannot be sourced or established, introduce alternative low carbon energy sources.*

Box 7.3. Land concession development

Although Cambodia's land laws provide a comprehensive framework for governing land use and land tenure, there are problems associated with timely implementation and enforcement due to the complex social and economic environment. There is a need to define and clarify the authority of various state institutions, strengthen law enforcement and land dispute resolution mechanisms, secure financial resources and build human capacity, regulate competing private sector interests, coordinate closely with development partners, and collect and disseminate accurate information for monitoring land policy process, implementation, and impact on social and economic development of the country (TWGAW 2010).

At a minimum, all economic concessions should be developed within the bounds of Cambodian Law, including the 2001 Land Law, the 1996 Law on Environmental Protection and Natural Resource Management, and relevant sub-decrees as they are passed. This includes (EFCT 2005):

- Economic concessions should only be granted on land legally registered as private property of the state.
- Economic concessions should not affect private ownership or collective ownership of local communities.
- Economic concessions should not be established in land potentially eligible for communal land titling until the appropriate laws are developed and land title surveying conducted.
- Community lands should be reserved to account for long-term population growth in a proposed economic land concession area.
- Submission and approval by the appropriate ministries of an environmental impact assessment should occur before any economic concession commences activity. The EIA should, furthermore, be made available to civil society and in particular the affected communities, to allow meaningful participation in the approval process.
- Concession contract should be signed and registered with the Ministry of Land before the commencement of agricultural operations.
- Economic concessions areas should not exceed 10 000 hectares in size.
- Economic concessions should not be established in protected areas.
- Benefits to local communities should be guaranteed by concessionaires.

7.2. FORESTLAND MANAGEMENT ACTIVITIES

Table 7.1 show the range of forest management jurisdictions/units in Cambodia together with preliminary estimates of the carbon contained and the owner and managing and regulating agents. For each jurisdiction different plans and strategies apply. Within the permanent forest estate the National Forest Programme is the guiding document. In protected areas, the National Protected Areas Strategic Management Plan fill an equivalent position, while in inundated forests, the Strategic Planning Framework on Fisheries is the appropriate document.

Table 7.1. Forest management units in Cambodia.

	Forest Classification	% Forest Carbon [1]	Land/Forest Owner	Managing Agent	Regulatory Agent
Permanent Forest Estate	Private Forests	? <1%	Individuals (can sell, transfer, etc.)	Individuals	FA
	Indigenous Land Title	? <1%	Registered Indigenous community (cannot sell, transfer, etc.)	Registered Indigenous community	FA
	Protection Forests (PFR)	15%	State (State Public Land)	FA (often with support of an NGO)	FA
	Community Forests (Production Forest, PFR)	3%	State (State Public Land)	Forestry Community	FA
	Forestry Concessions (Production Forest, PFR)	37%	State (State Public Land)	Forestry Concession	FA
	Other Production Forest (Production Forest, PFR)	(included in forestry concessions)	State (State Public Land)	Unclear	FA
	Conversion Forests (PFR)	14%	State (State Private Land)	Economic Land Concession holder	FA/ELC holder
Protected Areas	Protected Areas not under concession	25% (all PAs)	State (State Public Land)	MoE (often with support of an NGO)	MoE
	Protected Areas under concession		State (State Public Land)	Concession holder	MoE
Flooded forests & Mangroves	Community Fisheries	1%	State (State Public Land)	Fishery Community	FiA
	Fishing Lot	4%	State (State Public Land)		

1 – Leng et al (2010)

The guiding documents of each regulatory agent variously address issues that are of relevance to REDD implementation although as they were not drafted with the explicit aim of reducing emissions from deforestation and degradation, some gaps inevitably exist. The following sections look at the key strategies in each of the guiding documents and the extent to which they address the drivers of change identified in this assessment.

7.2.1. Permanent Forest Estate

The National Forest Programme is aimed at guiding activities within the Permanent Estate. Six core programmes guide development in social, economic and environmental aspects of forest management as shown in Box 7.4.

Box 7.4. National Forest Programme Operational Framework

The Operational Framework of the National Forest Programme (2010-2030) consists of six core programmes with constituent sub-programmes as follows:

1. Forest Demarcation, Classification and Registration

1.1. Forest Demarcation, forest classification and Registration
1.2. National Function-based Forest Classification

2. Forest Resource Management and Conservation

2.1. Forest Management Plan
2.2. Development and Management of Production Forests
2.3. Monitoring, Assessment and Reporting for SFM
2.4. Biodiversity and Wildlife Conservation
2.5. Conservation and Development of Genetic Resources and Seed Sources
2.6. Tree planting and Development of Forest Plantations
2.7. Development of Forest Product and Market Promotion
2.8. Wood Technology Development and Forest Product Processing
2.9. Forest Certification.

3. Forest Law Enforcement and Governance

3.1. Legal and Administrative Reform
3.2. Law Enforcement and Forest Crime Monitoring and Reporting
3.3. Rapid Response on Forest Crime Information
3.4. Conflict Management System
3.5. Monitoring, Reporting and Learning System

4. Community Forestry Programme

4.1. Community Forest Identification and Formalisation
4.2. Community, Institutional and Livelihoods Development
4.3. Community Forestry Development Support.

5. Capacity and Research Development

5.1. Institutional and Human Resource Development
5.2. Extension and Public Awareness
5.3. Research Capacity Building Development.

6. Sustainable Forest Financing

6.1. Government Financing
6.2. Income from Forest Sector
6.3. Income from the Private Sector and Community Forestry
6.4. Financing via Donors
6.5. Innovative Financing from Payments of Environmental services and Carbon Credit

Associated costs for the first five years, including operational, capital costs and technical assistance, are calculated at US$45.1 million. Capacity development, demarcation and community forestry will be the main areas of investment.

Source: MAFF 2010

Of the drivers of change listed in Table 5.1, those that addressed by the National Forest Programme include:

- High impact and illegal logging.
- Low institutional capacity;

- Weak forest sector governance;
- Lack of demarcation of forest areas;
- Lack of sustainable of alternative supply of wood;
- Lack of incentives promoting sustainable management of forests;
- Low awareness of land and forest management rights and responsibilities:
- Low efficiency of wood utilisation.
- Inadequate information on forest products and resources:
- Consideration of risks associated with current time limits on CF tenure and benefit entitlements;
- Allocating unclassified forests for REDD activities;

Possible additional strategies to address drivers not covered under the NFP include:

- Fire management and research into the effects of fire and fire frequency on forest carbon density.

Of particular importance given the analysis presented in this paper will be forest law enforcement and governance to ensure implementation of existing legislation and policy. For this to happen, clarification of jurisdictions will be needed although it is possible that much could be achieved from greater high-level support for change:

> *With the PM's call for illegal logging to stop, [*deforestation and forest degradation*] have slowed down, so if this level of commitment can be maintained, there's a potential for some real govt based enforcement to take place* (Anon2010 – questionnaire responses).

In relation to forest law infringements related to migration and agricultural expansion, Evans and Dellatre (2005) have drawn attention to the need for regular patrolling and use of local intelligence to detect population movements. Raising awareness among local decision makers that in-migration will reduce the share available to existing residents and providing incentives to encourage voluntary out-movements may also be needed.

Rotha (2009) lists key factors determining the future success of forest law enforcement and governance efforts to include the degree of responsibility allocated to the Forest Crime Monitoring Unit and the capacity provided to implement direct action. Alternative livelihoods for military groups and greater regulation of harvesting and environmental management are likely to reduce illegal logging although road network expansion is at the same time liable to expand opportunities.

Recommendations to improve FLEG in Cambodia made by Sovann and Saret (2010) include:

- Capacity building for FA forest law enforcement officers;
- Training of judges and prosecutors in forest and forest-related laws their roles and duties as stated in the Code of Criminal Procedure, 2007;
- Promoting participation of relevant stakeholders in developing effective forest crime prevention and suppression systems;
- Strengthen land conflict resolution mechanisms;
- Improving transparency by making data, information and statistics related to forest crimes publicly accessible;
- Establishment of a forest crime response mechanism at central and local levels to review, verify and address reports of illegal forest activities and forest land encroachment.

In relation to land grabbing, Evans and Dellatre (2005) have suggested that strong government enforcement presence is essential to resist large scale appropriation of forest land.

Given the need to supply domestic wood demand, both to avoid leakage to surrounding countries and to reduce product switching to materials with larger carbon footprints, efforts to maintain sustainable production of forest products will be necessary. A nationwide survey of wood consumption, a review of the current annual coupe system and clarification of the future of unclassified forest areas to help design effective REDD strategies would be appropriate.

Improvements in the efficiency of wood and wood energy use could also yield benefits in reducing emissions. Installing capacities for residue utilization for biofuels could maximizes useful biomass utilization and reduced emissions (DCC 2010b).

Fire management is another area of interest, especially given the differing views over its effect on forest carbon density in Cambodia. Steps to better manage fire could include education programmes, community fires management, establishment of firebreaks and law enforcement.

7.2.2. Protected areas

Many of the drivers of change listed in Table 5.1 are also relevant in relation to protected areas and should be addressed by future REDD strategies. As the National Protected Area Strategic Management Plan is yet to be completed, however, it is not clear the extent to which plans and programmes will address the drivers. As such, it is assumed that the following activities will take place during REDD readiness preparations:

- Development of the NPASMP and Protected Areas Financing Plan (including REDD+);
- Development of PA zoning regulations and Community Protected Areas;
- Consideration of potential for reforestation within Protected Areas;
- Investigation of Conservation Concession models;
- Investigation of linkages between REDD+ and Cambodia's CBD commitments.

Further consideration of integration of protected areas managed by the Ministry of Environment will take place during implementation of the REDD roadmap.

7.2.3. Fisheries areas

The Strategic Planning Framework for Fisheries: 2010 – 2019 includes the following targets in relation to management of inundated forests (RGC 2010b):

- The mapping, demarcation and protection of flooded forest (from a 2009 baseline of 2,157Ha inland and 307Ha coastal demarcated):
  - 2012: At least 2.5% of the area of inland flooded forest (40 000ha) and at least 5% of the area of coastal flooded forest (5 000 ha) protected through physical demarcation
  - 2015: At least 10% of the area of inland flooded forest and at least 25% of the area of coastal flooded forest protected through physical demarcation
  - 2019: At least 35% of the area of inland flooded forest and at least 75% of the area of coastal flooded forest protected through physical demarcation
- The area of critical fisheries habitats [mangroves are relevant in this case] under sustainable management (from a 2009 baseline of 200Ha mangrove):
  - 2010: At least 300ha of flooded forest and mangrove are replanted

2015: At least 700ha of flooded forest and mangrove are replanted

2019: At least 1000ha of flooded forest and mangrove are replanted

Consideration of integration of flooded forests and mangrove areas managed by Fisheries Administration under the Strategic Planning Framework on Fisheries into REDD+ will take place during implementation of the REDD roadmap.

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Appendix I. World Bank governance indicators for Cambodia and other Mekong countries, 1998-2008

Indicator	Governance Score (-2.5 to +2.5) 1998	2008	Percentile Rank (0-100) 2008	Change in rank 1998-2008
Control of corruption				
Cambodia	**-1.0**	**-1.1**	**8.6**	**-3.1**
Lao PDR	-0.7	-1.2	5.7	-22.5
Myanmar	-1.4	-1.7	0.9	-3.5
Thailand	0.0	-0.4	42.9	-14.9
Viet Nam	-0.7	-0.8	25.1	-3.5
Rule of Law				
Cambodia	**-1.0**	**-1.1**	**13.3**	**-1.0**
Lao PDR	-0.9	-0.9	20.0	4.8
Myanmar	-1.3	-1.5	4.7	-2.4
Thailand	0.4	0.0	54.0	-11.7
Viet Nam	-0.5	-0.4	41.6	3.0
Regulatory quality				
Cambodia	**-0.2**	**-0.5**	**34.2**	**-7.8**
Lao PDR	-1.0	-1.2	9.6	-5.0
Myanmar	-1.5	-2.2	0.9	-6.4
Thailand	0.2	0.3	59.9	4.3
Viet Nam	-0.6	-0.5	32.3	7.9
Government effectiveness				
Cambodia	**-0.8**	**-0.8**	**19.4**	**-1.5**
Lao PDR	-0.6	-0.8	17.5	-7.1
Myanmar	-1.2	-1.7	1.8	-5.3
Thailand	0.1	0.1	58.7	-1.0
Viet Nam	-0.6	-0.3	45.4	16.5
Political stability				
Cambodia	**-1.2**	**-0.3**	**34.4**	**21.4**
Lao PDR	-0.3	0.0	43.5	11.8
Myanmar	-1.3	-1.6	9.0	-3.0
Thailand	0.4	-1.2	12.9	-46.7
Viet Nam	0.3	0.3	56.4	-2.3
Voice and accountability				
Cambodia	**-0.9**	**-0.9**	**22.5**	**0.9**
Lao PDR	-1.0	-1.7	6.2	-11.1
Myanmar	-1.9	-2.2	0.0	-1.4
Thailand	0.4	-0.6	32.2	-28.9
Viet Nam	-1.4	-1.6	6.7	-3.9

Appendix II. Questionnaire response summary

In this section, the questionnaire that was distributed to forestry stakeholders in Cambodia by FAO in relation to this report is reproduced with a summary of responses included in italics under each question:

As a part of UN supported REDD readiness preparations in Cambodia, an assessment of land use change, forest policy and governance is being undertaken by FAO. The purpose of the assessment is to guide selection of strategies aimed at reducing emissions from deforestation and forest degradation. As part of the assessment, this questionnaire asks for information about recent deforestation and forest degradation, its related causes and associated policy and governance issues. The questionnaire is aimed at expert informants familiar with the field and institutional situation in relation to forests and forestry in Cambodia. The questionnaire has five sections. Please provide information in relation to all questions if possible.

The information collected will be treated confidentially and only summarised results will be published.

Please return completed information to Jeremy.Broadhead@fao.org

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A. Background information [please circle answer as appropriate]

1. Are you a Cambodian national? (YES/NO)

5 Cambodians 12 non-Cambodians

2. Do you work in forestry? (YES/NO)

All except one working in forestry (broadly defined)

3. Are you most familiar with site-based REDD or forest conservation/forest management projects, research or national policy? (PROJECTS / RESEARCH /POLICY)

Almost all were most familiar with projects although some with policy also.

Please describe in one or two sentences the project/research/policy areas you are most familiar with and list key related reports or documents.

Oddar Meanchey (x2), Kompong Thom, Community forestry (x4), forest conservation, forest conservation and livelihood support, Mondulkiri and REDD in Seima, NFP and CF Prakas, REDD pilot project.

B. Deforestation and forest degradation information

4. Which location/s are you familiar with (if not the entire country)?

Variously: Oddar Meanchey and Kompong Thom, all of Cambodia, northeast Cambodia (Kompong Thom, Kratie, Strueng Treng provinces) and west Cambodia (Kompong Speu, Kampong Chhang, Pursat, and Oddar Meanchey provinces), Kampot and Kampong Speu provinces, Southern Cardamoms, several provinces (Ratanakiri, Kratie, K. Thom, Pursat, Kampot, Takeo, Kep), 4 Provinces in NE Cambodia (Kratie, Stungtreng, Ratanakiri & Mondukiri), Mondulkiri, Mondulkiri and Ratanakiri, (Kg-Cham, Battam Bang, Odor Mean Chey, Preh Vihea, Stung Treng, Mondoul Kiry, Kg-Spue, Kg-Thom and Pursat provinces), (Stung Treng, Kratie, Kampong Thom and Preah Vihear - particularly the common boundary area of Prey Lang), (Eastern Plains, Northern Plains, Tonle Sap).

5. What change/s in land use have taken place? (please list the major changes in land-use or provide a reference if appropriate)

In Oddar Meanchey, forests are being converted to agriculture, including sugar cane (biofuels), rubber, cassava, jatropa.

In general, forestland is being converted for development of rubber, agriculture, and for new settlements.

In NE and W Cambodia, clearance of forest for large scale agriculture investment in form of economic land concessions, rubber plantations, acacia plantation and mining exploration and settlement for new villages.

In Southern Cardamoms, continually facing problems with ELCs, which are often hard to find clear information about, which end up in the PAs. Military encroachments in the PAs - along the border with Thai and encampments near rd 48. So bits and pieces get peeled away. Anarchic clearing of forest around future hydro dams and associated ingress of roads and people. Also 60-65% of Botum Sakor National park has been allocated to concessions - leaving about 35-40% as core zone to be conserved.

In general, conversion to (industrial) agriculture – rubber, eucalyptus, acacia, teak, sugar cane, oil palm, maize, cassava are the main industrial crops, although various fruit trees and more traditional agriculture is also taking place in deforested areas. Illegal logging – degradation and removal of luxury grade species and others with specific uses. Other developments – roads, dams, mining, barracks, etc. Not even National Parks and other Protected areas are inviolate.

In NE Cambodia, conversion of forest to economic land concession, degradation for farm land, mining.

In Mondulkiri, since around 2003 there has been much in-migration from other parts of Cambodia concentrated in Sre Khtum Commune, Koh Nyek, and Prichrada, which has led to large amount of natural forest clearance to plant crops such as cassava and rubber. Since 2008 there has been an increase in the development of economic land concessions, leading to conversion of natural forest to rubber or tree crops.

In NE Cambodia, increasing population pressure from Government in-migration policies, large scale concessions (forestry followed by plantations, mining and tourism) and new roads and infrastructure have led to forest clearance. Establishment of protection forests changes the land/natural resource use patterns of local communities.

In many provinces forests have been cleared for rubber, cassava, and fruit trees plantation and to sell land to private entities even though the land may not actually be used.

Annual logging coupes have been allocated in Mean Rith Commune Sandan District, Kampong Thom, which is within the Prey Lang core area and 7 000 ha has been logged. People in the area believe that the logging coupe is linked to a new road being cut along the Meng Ly Heng logging road that runs north from Sandan to Preah Vihear. Unofficial reports have also been made that Prey Lang has been declared a special economic zone, and that tens of thousands of hectares forest lands have been granted as ELCs.

Eastern and Northern Plains - opened up by logging roads and increasingly peaceful in late 1990s; re-occupation of villages displaced by KR (esp MDK); progressive expansion of clearance around indigenous and Khmer villages; major and ongoing road improvements; clearance by migrants; transition to cash crops; military logging in 1980s/90s, heavy concession logging in 90s, rising pressure of wildcat illegal logging in 2000s; arrival of large scale deforesting agri concessions from c.2008 onwards; major military activity including land concessions for families (mainly PVH but beginning now in MDK).

Upper margins of Tonle Sap (flooded forests and grasslands) cleared, in 82-83 for deepwater rice farmland, then regrowth after fields abandoned, another major episode c. 2004-present for irrigated dry season rice; but irrigation schemes reportedly being demolished so possibly another phase of

regrowth about to start. Many areas increasingly being degraded for charcoal, firewood, poles, not much building timber available though. Severe fires reported in recent years, not clear how permanent damage is. Projected trends in flood regime damaging - likely to reduce flood period at upper margins (more fire, easier access and more clearance?) and increase it at lower margin (drowning of trees?).

6. Over what period did changes take place?

In Oddar Meanchey changes have taken place over last 10-15 years.

In Cambodia as a while forest cover change has taken place gradually but extensively since 1980s, and then at an intermediate rate during early 1990s, then at a high rate in late 1990s and late 2000s.

Conversion of forested areas to rubber plantation and mining exploration has been more rapid in the last 5 years.

In Southern Cardamoms changes have been taking place in the last 10 years or so.

Forest conversion in Cambodia has accelerated over the past decade.

In Northeast Cambodia, forest cover changes have been taking place in the past 5 years.

Cambodian Government began to cooperate in a large-scale development project across the Northeast of Cambodia, the highlands of Vietnam and southern Laos after the Prime Minister's visit to Mondulkiri in 2003. Development includes encouragement of in-migration, allocation of land for plantations and mining exploration and promotion of tourism and transportation/ infrastructure development.

Changes in many provinces have taken place since 1993 with the government opening up and joining ASEAN, WTO etc.

7. What was the approximate size of the area you are referring to?

54 000 ha converted to agriculture in Oddar Meanchey

Although aggregated figures are not available, it is estimated that this is happening in a large scale and at alarming rate given the fact that this condition is happening in all most all provinces in Cambodia.

Vast areas have been converted in Cambodia – forest cover change maps show that the NW was the most affected. However, many remaining areas are under threat even if they have not yet been converted.

Could not estimated, It could be more than 70% of forest covered areas (affected by deforestation and degradation).

In Mondulkiri, at least 5 ELCs with licences of up to 10,000Ha are active with many more planned. Frontier clearance is perhaps 10 – 20,000 Ha in total.

7 000 ha in Prey Lang

Northern and Eastern Plains - each about 15,000 km^2, Tonle Sap about 6000 km^2 flooded forest.

C. Causes of deforestation and forest degradation

Please consider immediate/direct causes and background or indirect causes as well as factors both within and outside the forest sector and major land use trends and forest policy and governance issues (e.g., issues of land tenure and resource rights, effectiveness of law enforcement systems; and coordination of existing policy processes, especially relating to land use decisions).

8. What were the direct causes of the change/s?

In Oddar Meanchey: Lack of law enforcement, poor governance, poverty, fires, lack of clear tenure.

In general, agriculture and human settlement, agro/industrial development, un-sustainable harvest of forest and non forest products.

In NE and W Cambodia, illegal logging and land grabbing due to poor/ineffective law enforcement systems and corruption.

In Kompot and Kompong Speu, agriculture development, un-sustainable harvesting of forest and non forest products.

In Southern Cardamoms, ELCs are the biggest drivers of conversion of land to large scale agriculture. Military encroachment and clearing and land speculation (which has eased) are also important. Communities play a role, especially in forest degradation, through slash and burn agriculture. Once land is allocated they tend to sell it and then encroach upon new areas.

In several provinces: Chainsaws, bulldozers, axes and fire. Concessionaires, army, illegal encroachers and developers. Police and soldiers violently supporting the above.

In NE Cambodia, industrial plantation development, timber demand, demand for land for agri-business.

In Mondulkiri, households and companies clearing natural forest to plant crops.

In NE Cambodia, illegal logging of luxury timber, forest clearance by settlers moving into area and clearance of forest by companies for either plantations development, or other large scale concessions.

In several provinces, ELC for rubber, cassava, coconut oil, and other trees plantation with poor social and economic analysis and environmental analysis; illegal encroachment on CF areas, land speculation.

In Prey Lang, drivers include high returns from low investments and use of force or the appearance that the military or police or other politically powerful people are involved.

In Northern and Eastern plains and Tonle Sap, logging - military, logging concessionaires (1990s), small-scale illegals (esp Luxury timber, increasing); cross-border incursions (Lao and Vietnamese); charcoal makers, some demand for local housing timber. Deforestation: small-holder farmers (1-5 ha), larger businessmen (5-500 ha), agricultural concession companies (100s/1000s of ha), large-scale anthropogenic fires (threat in Tonle Sap only, not confirmed if causing defor proper).

9. What were the indirect causes of the change/s?

In Oddar Meanchey, road building due to border tensions with Thailand, increase in global demand for biofuels, food crisis of 2008, corruption.

In Cambodia in general, land speculation

In the northeast and west of Cambodia: lack of clearly defined property rights and unsustainable use of forest resources; lack of rural livelihood options/strategy for rural forest dependent communities; land speculation and collusion between private companies and powerful groups, lack of prior consent and well informed decision making process with effected stakeholders.

In the Southern Cardamoms: Access - with bridges and the paving of NR 48 to Koh Kong; laws are there but enforcement is weak and prosecutions are difficult; money and politics are behind it; the lack of coordination between ministries is devastating, without coordination between FA, MIME and MOE, it's difficult to enforce law and a cohesive forest management plan; desire for money and power. With the PM's call for illegal logging to stop, things have slowed down, so if this level of commitment can be maintained, there's a potential for some real govt based enforcement to take place.

In several provinces: Market forces, political doctrine, weak democracy, lack of respect for human rights, social and economic policies, greed/poverty, corruption, poor planning, failure to do to research and act on evidence, poor law enforcement, lack of resources, lack of alternatives – energy, land, livelihood opportunities.

In NE Cambodia: poor law enforcement, lack of political will, no clear management strategy.

In Mondulkiri National government policy to promote the development of ELCs, with encouragement from Mondulkiri provincial government. Family level clearances result from lack of land in native provinces/prospect of opportunities in Mondulkiri (eg Takeo and Kp Cham); rumours that local government officials are actively encouraging people to move to their area, or at least condoning migration.

In NE Cambodia: lack of tenure security; lack clarity on state versus public lands; large scale concessions (for plantations, hydropower dams and mining) allocated within protected areas; inadequate rule of law and corruption; elite capture of natural resources; forest management policies which don't adequately recognise local peoples' rights to manage forest resources, which reduces incentives for them to monitor and enforce local forest protection.

In several provinces: population growth; economic growth and Industrialization with poor law enforcement; poor local governance; high poverty rate; high rate of people migration from Prey Veng, Svay Reang, Takeo, Kampot, Kg-Speu to search jobs and to farm; nepotism, corruption; weak rule of law.

In several provinces: Inaccessibility of information; local authorities are ignorant of applicable laws; non enforcement of economic impact studies/assessments and no consultation with affected communities; ordinary people have no trust of government agencies; communities are not organised; no institutional buy-in to alternatives to commercial extraction which are yet to be developed and popularised.

In Northern and Eastern plains and Tonle Sap : many underlying economic drivers (rising global, regional and national demand for agricultural products and timber; population growth, rising wealth, post-conflict construction boom, land speculation bubbles). Examples of facilitating factors include weak governance (e.g. low and inconsistent application of laws), poorly funded civil service, non-transparent systems for issuing land concessions, rapidly improving road access, limited support for strengthened community tenure, lack of international willingness to pay for forest and biodiversity as global public goods.

D. Policies and legislation

10. Have there been any specific policies or pieces of legislation within or outside the forestry sector that have contributed significantly to reducing deforestation or forest degradation in recent years?

Variously: CF Sub-Decree & Guidelines; Govt. Decision 699 on Oddar Meanchey REDD Community Forestry project; Forestry Law; Prime Minister Orders Number One (1999) and Number Two (2000) REDD policy (2008); Community Forestry Sub-Decree; Sub-decree on community forestry and subsequent guideline (Prakas); The National Forest Programme; Forest management and education; National Forestry Program; NRM and environmental institution linkage; sub decree establishing the Southern Cardamoms protected forest; Community Forestry Sub-Decree; Crack downs on illegal logging may reduce or shift the problem temporarily; No;

No, most have in fact made the situation worse, or at least the way in which they have been applied has not reduced forest degradation. National Forest Policy is an example of a policy which could have been used to strengthen Community Forestry frameworks, rights and structures. But in fact it has weakened the rights of forest communities and appears to promote centralisation of monitoring and enforcement, removing the involvement and control of communities.

Mere statements in the law and sub-decrees are insufficient. Main problem is enforcement. And the challenge here is the building of transparent and accountable institutions. But these cannot evolve without the participation of its own citizens and civil society who must feel confident and unintimidated.

The Forestry Law and Land Law are both well written and have enormous potential impact but are still relatively weakly enforced. Same is true of many of the subsidiary legislations, for example on CF, concessions management, forest estate demarcation etc. The Royal Decree establishing the PAs was timely.

11. How have these policies or pieces of legislation contributed to reducing deforestation or forest degradation?

Variously: They have increased motivation to establish and protect community forestry areas; CF areas increased; PM Orders warned forestland encroachers to step back for few years but activities have recommenced again and again; The CF sub-decree and guidelines help community garner technical support from Forestry Cantonments and technical and financial support from donors and NGOs, to apply for legalised community forestry. By law, local communities have the right to manage and use the forest in a sustainable manner for at least 15 years based on forest management plan.; The sub decree establishing the Southern Cardamoms protected forest helps immensely by rendering certain activities illegal and providing the authority to enforce the law. Communities that have legal rights to forests conserve it for multiple benefits which contributes to REDD

Despite implementation of the National Forest Programme; Forestry administration law and forestry network; Land Resolution Management Committee at National and Provincial Level and Rectangular Strategy; cases of land conflict have increased and the contribution to reducing deforestation and forest degradation is questionable.

Lack of enforcement and of transparent and accountable institutions means that policies and legislation have been ineffective.

By outlawing many of the actions that cause deforestation or degradation; limiting the mechanisms by which public forest land can legally be converted to private farmland.

E. Reducing deforestation and forest degradation

12. What initiatives have been successful in reducing deforestation and forest degradation in the past? (initiatives at all levels should be considered)

Variously: community patrols; crackdowns by FA leading to prosecution of offenders; community forestry facilitation; education and awareness; fire control; REDD introduction along with Community Forestry development; community based sustainable forest management; building capacity of community forestry management committee and members to conduct patrols against illegal logging and forest encroachment; promote community awareness and understanding of natural resource rights; promoting NTFPs and access to markets; strengthening capacity and responsiveness of the local authorities, particularly the forestry cantonments and their units to effectively execute their roles and responsibilities in a timely manner; community forestry.

Building political support has been successful. Outcomes are sometimes hard to see but results are positive. Funding helps to leverage political support and legal status is also very helpful. Working with communities is somewhat successful, but very resource intensive and there are concerns about the sustainability of livelihood projects once technical and financial support period is finished.

Participatory land use planning, involving local people in forest management.

Enforcing the Forest Law.

Strengthening community involvement, responsibilities and financial incentives to protect local forests; allocating CF areas for community for conservation and protection; helping people to find

other livelihood options; improve market access; reducing the area of commercial fishing lots (cut of 51% in 2001); diversification of production activities in the flood plain; development of rice production; transforming cropping system from floating rice to recession (dry) season rice; improving water catchment system and irrigation system for farmers; promotion of intercropping and integrated farming; rapid development of agro-industrial plantation and increase in incomes from crop cultivation; ensuring that agro-industrial growth benefits farmers.

Few initiatives fully successful. Declaration of parks and basic government protection has probably delayed clearance/degradation in some cases. Some better-funded NGO/government collaborations at site level have had significant partial successes, with funding as one major limiting factor. Some community-based approaches also reported successful - CF and PLUP in certain settings, where community attitudes conducive.

13. What are the biggest challenges to reducing deforestation and forest degradation in the coming years?

Variously: lack of resources to support protection efforts; increasing power of military; corruption; land use planning and land use registration; improper allocation of Economic Land Concession on forestlands; population increase along with unclear land use planning; political will for economic development rather then sustainable forest management/use; illegal logging, land grabbing and forestry encroachment; strengthening the capability of Forestry Administration and rules of laws to effectively implement the Forestry Law; land use planning and land use registration.

The need/drive for development and industry and the increase in population. Perhaps even the outside economic climate, which makes those in power feel more insecure about their financial situations, which then pushes them for more business opportunities.

Variously: Continuing priority given to large commercial concessions rather than to smallholders or local communities and Indigenous People; inadequate rights for local people to apprehend wrongdoers and inadequate responses from authorities; weak judicial system, corruption, etc.; risk that local communities and Indigenous People will have rights curtailed and will undermine state led initiatives; willingness of government to enforce laws; continued promotion of land concessions for economic development; lack of respect for existing laws, especially the land law, and forest law; poor governance structures from the local to the national levels; inadequate mechanisms in place to ensure that local communities can have adequate say over the way in which forests are managed, or have adequate recompense for doing so.

From past experiences, during national election campaigns violators usually take this opportunity to clear the forest.

Lack of collaboration between line ministries, donors and the private sector.

Economic land concessions and other types of concessions; lack of mechanisms/institutions that have the resources to resolve land disputes/conflicts; lack of enforcement of the law on illegal logging; high dependence on wood fuel in Cambodia; weak bureaucracy.

Rising levels of threat and accessibility, lack of government investment in protective measures, lack of working sustainable management forestry models or PES schemes to show economic value of forest.

14. What are the biggest challenges to instituting a national-level REDD framework in Cambodia?

Variously: competing interests of different government agencies; lack of funds for start-up; -need for high technical capacity; lack of human and financial resources and political will; lack of capacity and resources as well as coordination among involved stakeholders; clear vision from the policy maker; getting other ministries (ie MIME, Finance) to support the huge revenue flow; ensuring that REDD+ allows for the multiple use of forests rather than compartmentalisation; transparent and

equitable benefit sharing mechanisms that benefits incentivise actions that contribute to REDD; leakage issues; lack of clarity over which institution is responsible for REDD; lack of political will; competing economic interests

Governance failures and institutionalised incentives for high level corruption and elite capture of natural resources; donors not being willing to coordinate their initiatives to address this issue at a high enough level (nationally and internationally).

There will be a big conflict of interest between land allocation for REDD and ELC.

Collaboration and coordination among line Ministries and the private sector.

Poor human resources and experiences on REDD, which can lead to poor implementation. Hard to get participation because this project needs time before getting benefit but people need income immediately.

People and local authorities have to understand REDD so that they can meaningfully participate in developing a national framework that is appropriate to Cambodia and fully cognizant of its culture-context. Crucial in the process is ownership of responsibility and accountability levels within that national framework, as well as the types/classes of investments to strengthen joint buy-in between community-centred forest management committees and Commune Councils/local authorities.

Declining faith in concept at all levels due to difficulty of establishing project-level revenue streams as demonstrations; complex methods and uncertain willingness to pay from developed countries; how to approach demand reduction at national level (e.g. management of leakage by landless migrant deforesters, timber demand for construction etc). ; non-transparent governance structures that may struggle to target REDD payments to necessary performance-based threat reduction measures - weakens effectiveness and undermines buyer confidence.

15. What are the biggest opportunities by which emissions from deforestation and forest degradation could be reduced in Cambodia?

Variously: REDD which shifts investment priorities towards forest protection; expansion of community forestry; REDD initiative; Community Forestry; Forest Demarcation; Community Forestry improvement align with REDD; the greatest opportunity is for CF development to overthrow increasing economic land concession granting; cheaper alternatives to wood fuel.

Promoting forest cover by: (i) ensuring effective and timely implementation of the national forestry programme that has just been approved, particularly, meeting the set target for promoting community forestry; (ii) Rapid approval and legalization of community forestry applications pending for long time at the Ministry of Agriculture, Forestry and Fisheries; (iii) Continue on-going crack down of widespread illegal logging, forestry clearance and land grabbing more systematically and consistently through out Cambodia and bring those involved and responsible to the court.

Forest Conservation through REDD; develop forest area, through planting local tree species and also fast growing trees; forest management system improvement [CF, PA, Forest boundary demarcation,..]

REDD can provide the financial incentive to allow sustainable development to happen. I think it's a fantastic opportunity to allow conservation, but of course, it has to be done carefully but quickly enough so that the forests aren't destroyed...

Promoting widespread Community Forestry with strengthened rights; promoting Indigenous Peoples rights over ancestral domains.

Adequately and comprehensively include communities in forest management and protection; find a counter-incentive which will act as a balance against incentives which currently allow the government to allocate large scale concessions inside protected / forested areas.

Working pilots that build confidence, show concrete revenues (multiple modalities need to be put in place e.g. conservation areas, community forestry, indigenous communal title areas, systematic cancellation of concessions); Early successes in national process - again, concrete results with policy actions that build confidence for next steps. Apart from support for site pilots, this could include incremental demand reduction approaches (maybe starting with tractable issues like fuelwood/charcoal or making legal wood sourcing a selling point of the national tourism sector?). These could partly be funded as leakage control activities of site-based projects?