Reduced Emissions from Degradation and Deforestation in Community Forests – Oddar Meanchey, Cambodia

Developed by Terra Global Capital

for

The Forestry Administration of the Royal Government of Cambodia

Project Design Document for validation under

Climate, Community & Biodiversity Standard (Version 3-0)

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Implementing partners:
Forestry Administration of Cambodia; Pact Cambodia

With support from:
Community Forestry International; Technical Working Group on Forests and the Environment, Cambodia; Children's Development Association, Cambodia; The Buddhist Monk's Association, Oddar Meanchey, Cambodia; Clinton Climate Initiative; and the Communities of Oddar Meanchey Province, Cambodia

Executive Summary

The Royal Government of Cambodia and the Forestry Administration, along with Terra Global Capital, Pact Cambodia and Community Forestry International have developed the first Cambodian Reduced Emissions from Deforestation and Degradation ("REDD") project. The project involves 13 Community Forestry Groups, comprised of 58 villages, which protect 64,318 hectares of forest land in the Northwestern province of Oddar Meanchey. The project will be one of the first to use a mosaic REDD methodology approved under the Verified Carbon Standard (VCS) and combined with the Climate Community and Biodiversity (CCB) Standard. The project is expected to sequester approximately 8.3 million metric tons of CO_2 over 30 years[1], demonstrating how developing countries can generate income from carbon markets and positively impact climate change.

Why was Oddar Meanchey selected?

The Oddar Meanchey Province provides an ideal site for the development of a REDD project. The province's forests have been under intense pressure from commercial and illegal logging, forest fire, economic land concessions and encroachment. Oddar Meanchey has lost 2% of its forests each year from 2002 – 2006, based on remote sensing analyses described further in this PDD. A growing number of communities in the province have been protecting the remaining natural forests as community forestry areas, some of the largest CF areas in the country. Project sites include large tracts of healthy closed-canopy forests, as well as degraded forests suitable for restoration.

What are the expected benefits?

This project supports sustainable forest management and livelihood development in Oddar Meanchey Province by providing financing through carbon credits generated from forest protection and regeneration. The project not only assists rural people in

[1] This is subject to change upon development and approval of the project under the Verified Carbon Standard (VCS).

gaining legal tenure rights over local forests, it creates a 30-year income stream that will directly enhance household livelihoods and natural resource management capacity. The project seeks to maintain and increase carbon stocks in these areas, enhancing the hydrology in the upland watersheds of the Tonle Sap Basin, as well as conserving biodiversity and endangered species. Carbon financing will be used to support rural communities to develop a range of livelihood activities including non-timber forest product (NTFP) enterprises, community-based ecotourism infrastructure, and natural resource development projects. The project will also work with the Forest Administration and the Commune, District and Provincial Governments to formulate long term plans for sustainable natural resource management to foster economic growth.

What is the commitment of the government of Cambodia?

The Royal Government of Cambodia has supported activities that fight climate change since the creation of the Kyoto Protocol in 1997. In May 2008, the project was officially endorsed by Samdech Akka Moha Sena Padei Techo Hun Sen, Prime Minister of the Kingdom of Cambodia through Government Decision nr. 699 ("Sar Chhor Nor 699"). The guiding principles ensure that the net carbon income are used to (1) improve forest quality, (2) provide maximum benefits to local communities which participate in project activities and, (3) assess the potential for additional REDD projects in Cambodia. The Sar Chhor Nor 699 confirms the high-level commitment of the Royal Government of Cambodia to make the project a success and use its net carbon income effectively. The success of the Oddar Meanchey project will open the door for long term financing for Cambodia's National Community Forestry Program, which, according to the Government's stated goals, could eventually encompass and protect over 2 million hectares of forest.

What do avoided deforestation projects consist of?

The initiative is based on the REDD framework which received international support at the thirteenth Conference of the Parties to the United Nations Framework Convention on Climate Change (Decision CP.13) COP 13 in Bali, Indonesia in December, 2007. Under REDD, developed countries are willing to provide payments to compensate developing nations for forests that are sustainably managed. REDD is a unique approach to climate mitigation which gives greater recognition to the importance of protecting and sustainably managing tropical forest resources in

developing countries. It is estimated that around 20% of global CO_2 emissions originate from the loss of forests associated with land use and land cover changes (Solomon et al. 2007). Currently, these payments are only available through voluntary emissions reduction markets. After 2012, a post-Kyoto agreement may see the inclusion of a REDD mechanism in the official CDM (Clean Development Mechanism) market as well.

What is the project strategy that is followed?

From the start of the project, mobilizing of communities to protect forests has demonstrated effectiveness in halting deforestation and degradation in community forestry areas. Key activities supported under the project include:

- Reinforcement of land-tenure;
- Formulation of land-use plans;
- Community-based forest protection;
- Implementation of Assisted Natural Regeneration (ANR) activities;
- Fire prevention and control;
- Introduction of fuel-efficient stoves;
- Protection of livestock;
- Agricultural intensification;
- Water resource development projects;
- NTFP development activities.

How will degraded forests be restored?

The REDD project provides regeneration contracts to all participating CF Management Committees (CMFCs), the committees that are representing the individual members of the Community Forestry Groups, to restore their degraded forests through silvicultural treatments including multiple shoot cutting, clearing around seedlings, enrichment planting, water harvesting, and other methods. Restoration contracts would be based on CFMC management plans, providing employment opportunities, materials, and funding CFMC operations. Increases in carbon stocks in regenerating forests would provide additional income from the sale of carbon credits into commune and community funds that can be used for livelihood and infrastructure development activities.

Project Location

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General Section

G1. Original Conditions in the Project Area

G1.1. The Location of the Project and Basic Physical Parameters

The project is located in Oddar Meanchey Province in the northwestern corner of Cambodia, with latitudes from 14°20′ to 13° 8′, and longitudes from 102° 54′ to 104° 43′ (see Figure G1).

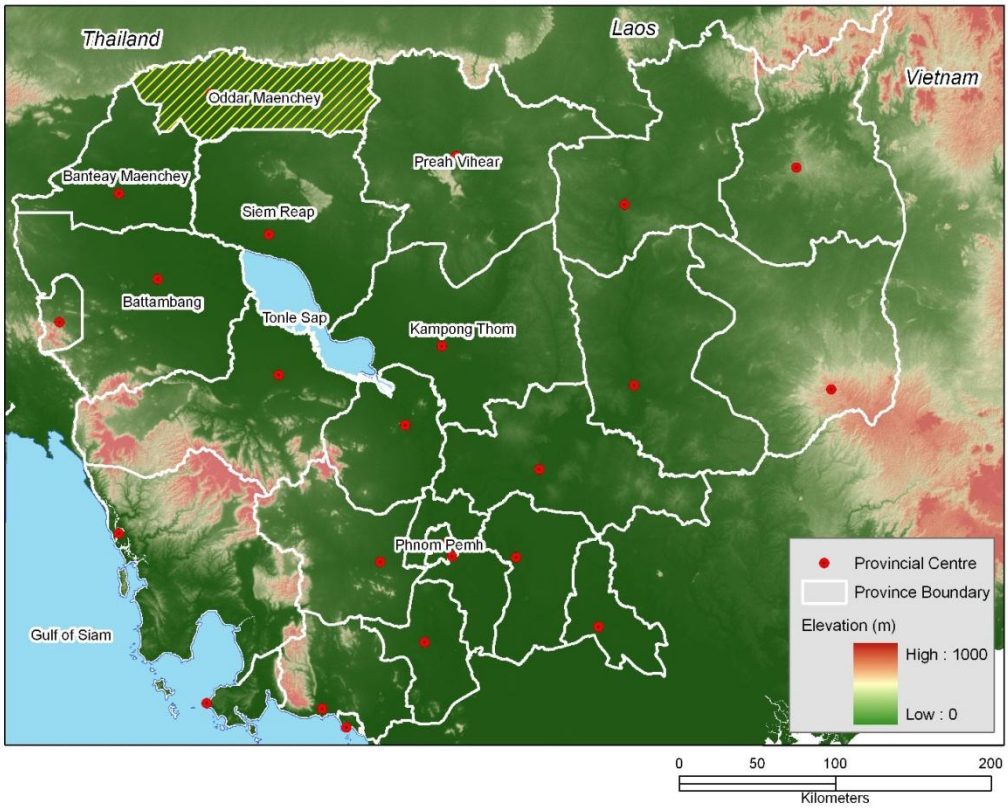


Figure G1. Regional Location of the Oddar Meanchey Province within Cambodia.

The terrain in the province is lightly undulating, with sporadic wet land depressions and small hills varying from 30 to 80 meters in elevation up to the border with Thailand to the north and west, which is characterized by a steep escarpment with higher hills of over 400 meters (USGS 2004). The soil types are about 60-70% podzols (red-yellow and plinthite), about 15% lithosols and the remainder are hydromorphics. High soil fertility is found along rivers and in the escarpment foothills making the province more attractive then neighboring flat areas (Cassidy 2007). The climate is monsoonal tropical with the rainy season extending between May and October, and the dry season from November to April (Top et al. 2004).

From 1994-2004 rainfall for Cambodia fluctuated between 1,400 mm and 1,970 mm, though Oddar Meanchey Provence is one of the drier regions (Danida 2008).

Historically, the population density in Oddar Meanchey has been low with most of the province covered in dense forest. As recently as 2002, 75% of the province was in forest cover (Figure G2). However, rapid in-migration and unsustainable forest exploitation are transforming Oddar Meanchey's landscape. Forest degradation and forest loss are accelerating as the drivers and agents of deforestation gain momentum. From 1991-1995, Thai timber companies were granted forest concessions and felled high-value commercial hardwoods in many areas around the province. As hostilities between the Khmer Rouge and government forces subsided in the 1990s, this forest frontier area became a common destination for migrants from more populated areas of Cambodia. In only one decade, between 1998 and 2008, the rural population of Oddar Meanchey Province almost tripled from 56,198 to 166,609, representing an annual growth of 9.23%, based on census information from the National Institute of Statistics of Cambodia (NIS 2008). Assuming a natural population increase of 3%, this data suggests that migrants increased the population by over 6% annually during the past decade. At this rate, the province will possess approximately 500,000 rural inhabitants by 2018.

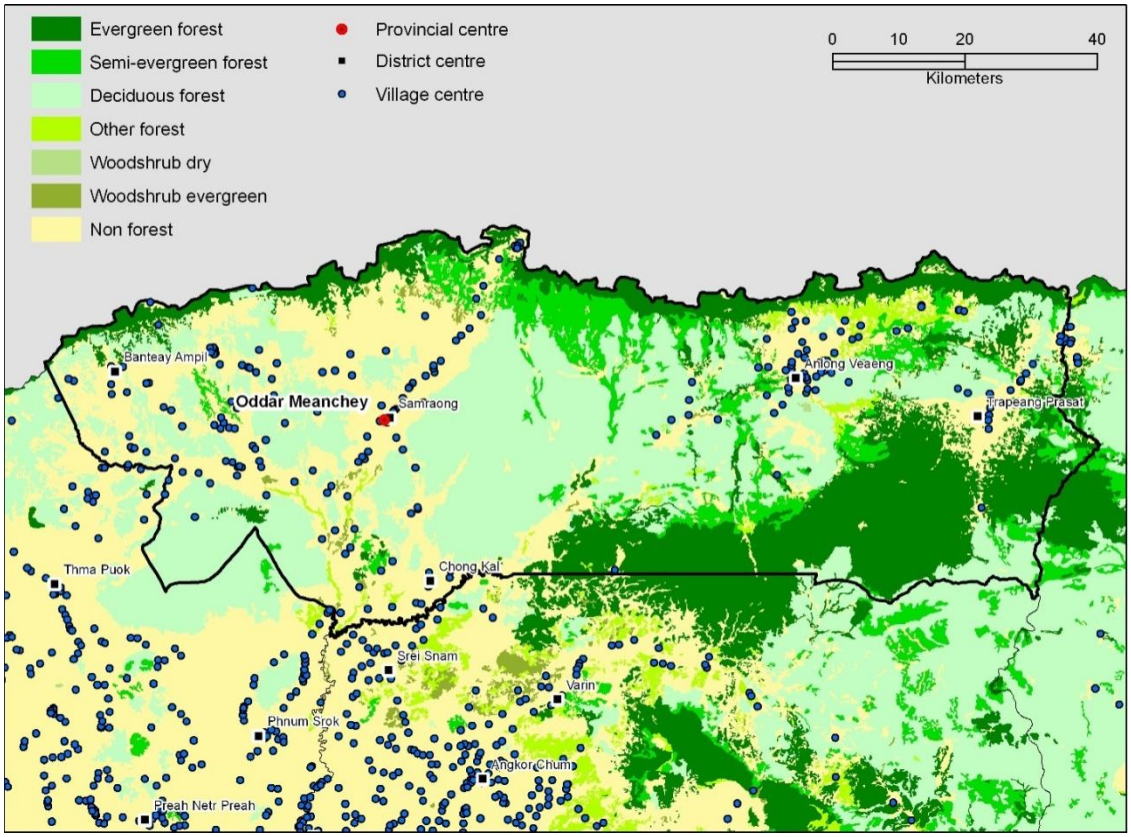


Figure G2. Oddar Meanchey Forest Cover in 2006.

In response to resource pressures, a grassroots interest in protection has emerged in a number of villages in Oddar Meanchey, often encouraged by local NGOs and Buddhist monks. Community Forestry Management Committees (CFMCs) are empowered by the Cambodian Forestry Law of 2002 and the Community Forestry Sub-Decree and supported by the Forestry Administration and NGOs. Many of these CFMC are applying for government approval and support in order to protect and manage valuable evergreen, semi-evergreen, and deciduous forests. REDD projects provide a framework to finance these community-based initiatives (Kanninen et al. 2006).

Recent analysis of remotely sensed images of Cambodia by the Forestry Administration of Cambodia and the University of Copenhagen indicates that deforestation is most rapid in the northwest. Given that there are about 335,000 ha of forest remaining in the reference region in 2008, the deforestation rates calculated in the analysis conducted for this project correspond to 2.9% loss of forest cover per year. This rate is very close to the deforestation rates calculated in the Forestry Administration study supported by GRAS A/S of the University of Copenhagen between 2002 and 2006 (see Table G1). This rate is over four

times Cambodia's national average deforestation rate of 0.6%, well exceeding Indonesia's national rate of 1.6% per year (FAO 2003). Including all forests with a canopy cover of 10%, our own remote sensing analyses showed 55,000 hectares of deforestation between 2003 and 2006. In addition to the area deforested, much of the dry deciduous forests have experienced degradation through illegal logging, partial forest clearing, and fire. During the same 4 year period, the amount of barren land in the province increased 27%, while the area of "open" forest expanded by 110% representing the deterioration of "dense" forests (see Table G1).

Table G1. Oddar Meanchey Forest Cover Change for 2002-2006.

Forest Type	% Annual Loss
Evergreen Forest	3.0%
Semi-Evergreen Forest	7.3%
Deciduous Forest	1.1%
Total Forest	**2.5%**

This data was prepared by the Forestry Administration and GRAS A/S at the University of Copenhagen

Forest loss and degradation are driven by illegal logging, fire, (ex-)soldiers and migrant settlers moving into the region and clearing forests for agriculture. In response to growing pressures on local forests, 58 villages in Oddar Meanchey have formed Community Forestry Management Committees to protect local forests with the assistance of the Forestry Administration (FA), the Children's Development Association (CDA), the Buddhist Monks of Samrong Pagoda, Community Forestry International Cambodia, and PACT Cambodia. This project seeks to reduce deforestation and use carbon finance to support the work of local communities, NGOs, and forestry officials working in this province to stabilize forest cover.

G1.2. Types and Condition of Vegetation within the Project Area

The project site is covered by lowland evergreen, semi-evergreen, and dry deciduous forests. Semi-evergreen forests contain varying percentages of evergreen and deciduous trees, with the percentage of evergreen trees varying from 30% to 70%. Semi-evergreen forests appear evergreen throughout the year, despite a frequently high proportion of deciduous trees. Deciduous forests are comprised of mixed deciduous forests and dry Dipterocarpaceae forests, both of which drop most of their leaves during the dry season. The majority of forests in the plains of the Northern provinces are dry-land ecosystems.

With around 1300 mm rainfall and more than 4 months dry, the Oddar Meanchey Province is one of the drier regions in the country.

Forests in Cambodia are typically classified according to the proportion of evergreen species. Kim Phat et al. (2002) distinguish three predominant forest types: deciduous, mixed/semi-deciduous, and evergreen. Deciduous forests contain almost exclusively deciduous tree species (>90%). Mixed forests contain both deciduous and evergreen tree species, where deciduous species represent more than 50 % of the stand. Evergreen forests are dominated by evergreen tree species. It is often difficult to distinguish between mixed and deciduous forest types in the forests of the Oddar Meanchey Province. Therefore, in the analysis of the carbon stocks, any dry-land forest system of which more than 30% of the trees are deciduous is part of a combined "mixed and deciduous" forest class.

Mixed and deciduous forests are relatively open, and have low crown covers, only exhibiting a closed canopy structure during the wet season. The single-tree stratums of these forests generally feature tree diameters of less than 40 cm and are relatively species poor, dominated by *Dipterocarps* and a few gregarious species such as *Lagerstroemia* spp. and *Xylia dolabriformis* as well as numerous scattered associated species such as *Afzelia xylocarpus*, *Pterocarpus pedatus*, *Ceiba pentandra* , and *Irvingia oliveri*. Important indigenous tree species include *Albizia lebbeck* (chres), *Fagraea fragrans* (ta trao), *Diospryros cruenata, Thwaites* (cheu kmao), *Gardenia ankorensis* (dai khala*), Dalbergia oliveri*, *Pterocarpus macrocarpus*, *Dipterocarpus tubinatus*, and *Afzelia xylocarpa* (beng), a high-value deciduous, broad-leaved tree. A number of bamboo species are also present in these forests. In the dry season, this forest type is subject to frequent fires. Although fire is a natural phenomenon in these systems, human intervention has exacerbated the incidence of fire due to the extremely dry conditions during the dry season. Due to fires, the understory is nearly always sparse and dominated by grasses. Kim Phat et al. (2002) estimated that the average growing stock varies between 52 and 60 m^3 ha^{-1} with annual growth rates from 0.08 to 0.37 m^3 ha^{-1} yr^{-1}.

Human impacts, such as degradation from fire, typically occurs with more frequency in deciduous forests compared to other forest types. In contrast to the dense crown closure found in older growth evergreen forests, dry Dipterocarpaceae forests naturally have a more open canopy leaving them more degradation from fire. Even in an undisturbed deciduous forest, crown cover may only have a 40% closure. Approximately 20% of the forest in the project area is degraded, containing less than 20% canopy closure, especially in areas with dry deciduous forest. This forest degradation has occurred over the past 15 years, and has

accelerated in the last 5 years. Annual human-caused ground fires contribute to this degradation, as they are common occurrences in the dry deciduous forest.

The **evergreen forests** in Oddar Meanchey Province are mainly dry-land evergreen forests (in contrast to highland forests or tropical rainforests). They are multi-storey forests with more than 80% trees of evergreen species, and a canopy cover of 80-90%. The average growing stock varies between 192 and 230 m^3 ha^{-1} with annual growth rates varying from 0.21 to 0.67 m^3 ha^{-1} yr^{-1} (Kim-Phat 2000). These floristically and structurally heterogeneous forests occur in humid to sub-humid areas where the rainfall exceeds 1,200 mm per year and the dry season lasts three to five months. Emergent trees such as *Ficus*, *Dipterocarpus alatus*, *Shorea vulgaris*, *Anisoptera cochichinnensis* and *Tetrameles nudiflora* may exceed 40 m high. They possess cylindrical boles up to 20 m high, which lend the forest a majestic aspect. The diverse continuous tree stratum is between 20 to 30 m high with no family clearly dominating. *Guttiferae*, *Ficus*, *Irvingia malayana*, *Sindora cochinchinnensis*, *Pterocarpus pedatus*, and *Pahudia cochinchinensis* are commonly found.

Although Cambodia has a significant area of **forest plantations** (82,425 ha in 1997 according to DFW 1998), the plantations are mostly scattered on old paddy fields or unmanaged farms near the Tonle Sap lake or the Mekong River. Because this area is relatively small compared with the area of dry-land forests in the Northern plains, the few forest plantations present were included in dry-land forests. This will not significantly affect the carbon accounting.

G1.3. Boundaries of the Project Area and the Project Zone

The project area covers 64,318 hectares and consists of 13 different discrete parcels spread across the central section of Oddar Meanchey Province (Table G2). The exact boundaries of each of the parcels are supplied electronically.

In each of these parcels, individual community forests are located. The sizes of the Community Forests Sites range from 383 hectares to 18,164 hectares, and add up to a total project area of 64,318 hectares (Table G2). Of these 64,318 hectares, 87%, or 55,946 hectares are classified as forest areas according to the FAO definition of a forest. Community forests boundaries were identified by communities, hence area identified for protection and conservation may not contain forest exclusively. Community forests contain both naturally open areas and otherwise open areas. These non-forest areas were excluded from the project area and carbon calculations. Each Community Forest can consist of multiple villages, is located within a Commune and District, and belongs to different Triages

and Communes according to the Forestry Administration's land classification system (Table G3).

Table G2. Size and Location of the Participating Community Forest Groups

ID	Community Forest Group Name	CF Size [ha]	Land Class or Forest Stratum Evergreen Forest	Mix/Dec* Forest	Non-forest	Centroid Coordinate† Lat (X)	Lon (Y)
1	Angdoung Bor	6,114	0%	97%	3%	103.22645	13.97972
2	Chhouk Meas	383	79%	19%	1%	103.78889	14.27255
3	Dung Beng	1,843	40%	53%	7%	103.33325	14.04474
4	Ou Yeay Kaov	960	91%	0%	9%	103.60698	14.39666
5	Phaav	2,025	95%	1%	4%	104.19031	14.36268
6	Prey Srorng	6,344	72%	19%	9%	103.94002	14.03732
7	Prey Srors	1,604	94%	0%	6%	103.39863	14.35069
8	Ratanak Ruka	12,872	4%	90%	5%	103.93705	14.31620
9	Rolus Thom	2,666	62%	3%	35%	103.55344	14.37799
10	Romdoul Veasna	6,016	59%	1%	40%	103.46286	14.35645
11	Samaky	1,079	92%	6%	1%	103.93705	14.31620
12	Sangkrous Preychheu	4,151	89%	6%	5%	104.06200	14.04641
13	Sorng Roka Vorn	18,261	9%	85%	6%	103.81329	14.16166
	Total	**64,318**	**36%**	**53%**	**11%**		

†Coordinates are in decimal Degrees.

*Mix/Dec = Mixed and Deciduous Forests

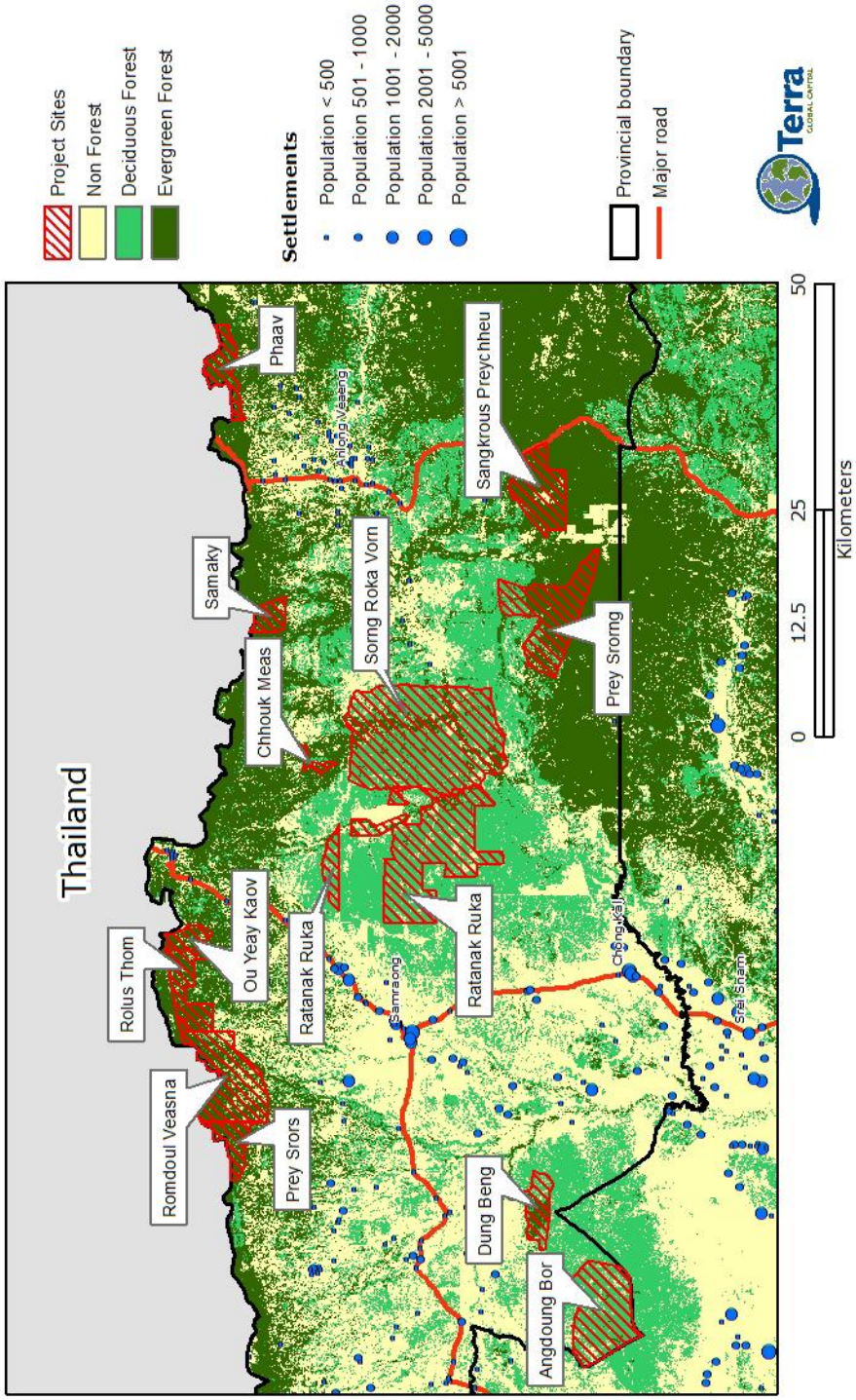


Figure G3. Map of Oddar Meanchey Province with Community Forestry Sites.

Table G3. Administrative Designations of the Participating Community Forest Groups.

Nr.	Community Forest Group Name	Forestry Administration Triage	Forestry Administration Division	Commune	District	Villages present
1	Andoung Bor	Beng-Ampil	Banteay Ampil	Kouk Khpos	Banteay Ampil	Voa Yeav Village, Samraong Taheae, Kantuy Choun, Dong Kao Tabuk
2	Chhouk Meas	Samraong	Samraong	Koun Kriel	Samraong	Chhouk Meas
3	Dung Beng	Beng-Ampil	Banteay Ampil	Kouk Khpos	Banteay Ampil	Ta Mat Thmey, Beng, Yey Teb, Por Chas
4	Ou Yeay Kaov	Samraong	Samraong	Koun Kriel	Samraong	Ou Pork
5	Phaav	Trapeang Prasat	Anlong Veng	Phaav	Trapeang Prasat	Thnol Kaeng, Chrok, Ou Beng, Ou Chik
6	Prey Srorng	Anlong Veng	Anlong Veng	Lumtong	Anlong Veng	Lumtoun Chas, Korki Kandal, Rohal, Kok Sampor, Sralau Sraong
7	Prey Srors	Beng-Ampil	Samraong	Kouk Khpuos	Banteay Ampil	Chheu Slab, Ou Torng
8	Ratanak Ruka	Samraong	Samraong	Samraong	Samraong	Chheub, Kok Chres, Ou Russei, Ou Kanseaeng, Doun Kaen, Chhuok, Pul, Bak Nim, Koun Domrie
		Samraong	Samraong	Koun Kriel	Samraong	Trapeang Veaeng, Khtum, Ta Mean, Champa Sok, Chhei Krom, Kiri Vorn, Bos
9	Rolus Thom	Koun Kriel	Samraong	Koun Kriel	Samraong	Ktoul, Traeng Thoung, Kouk Ampil
10	Romdoul Veasna	Samraong	Samraong	Bansay Rak	Samraong	Tnot, Sambur Meas, Romduol Veasna, Kak Seportivong, Cheing Phnom Meanchey
11	Samaky	Anlong Veng	Anlong Veng	Trapeang Tav	Anlong Veng	Ou Anrae, Ou Sramor, Trapeang Tav, Trapeang Tav Chas
12	Sangkrous Preychheu	Anlong Veng	Anlong Veng	Anlong Veng	Anlong Veng	Rom Chek, Dey Thmey, Ou Ta Meng
13	Sorng Roka Vorn	Samraong	Samraong and Anlong Veng	Koun Kriel	Samraong	Sras Yey Chheok, Tom Nub Thmey, Som Pour, Char Thmey, Poum Thmey, Char Chas

The reference region, which is the region from which the deforestation rate is used as the baseline deforestation rate in the project area, encompasses all of Oddar Meanchey Province, and parts of Siem Reap Province (shown in detail in Figure G4).

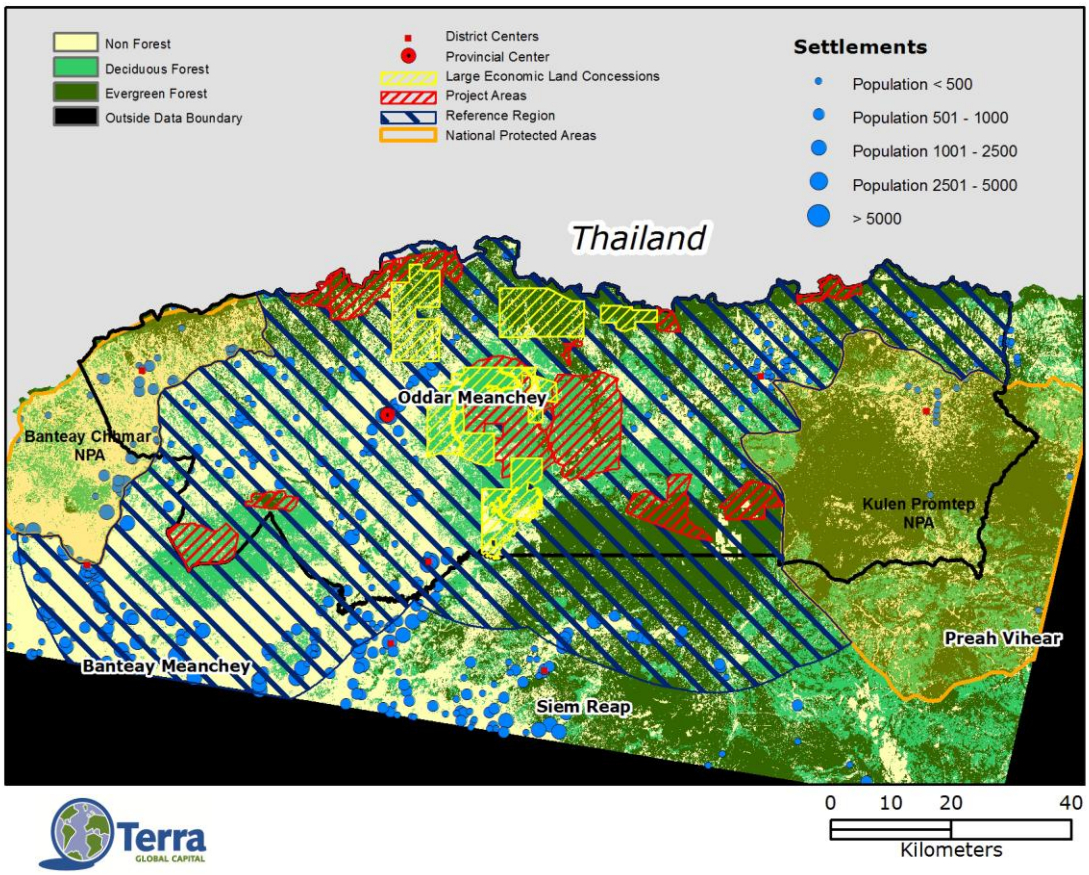


Figure G4. Overview of the Extent and Location of the Reference Region.

G1.4. Current Carbon Stocks for Each LULC Class or Forest Stratum at Project Site

We identified six classes within the project area, and several non-data classes based on the Intergovernmental Panel on Climate Change's 2006 Guidelines for National GHG Inventories for Agriculture, Forestry and Other Land Use. Non-data classes include Burn mark (BRN), Cloud shadow (CLS), Bare or lightly wooded area covered by haze, (THS) and Forest covered by haze (THF). The six IPCC LULC classes include Grassland (BAR), Cropland (BAR), Wetlands (WTS), Settlement (STL), Other land (OTL) and Forest. All identified classes are elaborated on in detail within the Project Description of the VCS PD. Through a rigorous process outlined in the VCS PD, the forest class was further divided into forest strata of

deciduous forest and (DCD) and evergreen forest (EVG). The full Standard Operation Procedures used for classification, containing detailed descriptions and criteria to identify the LULC classes is available to the verifier.

We identified several forest biomass density classes within deciduous /mixed and evergreen forest classes. Table G4 provides photographs illustrating the main forest strata. The main identification criteria of the two forest types are summarized in Table G5. Table G6 gives an overview of the carbon density and associated basic statistical measures of each of the LULC classes and forest strata. Carbon stock densities described in Table G6 were calculated based on procedures described in the VCS PD.

Table G4. Representative pictures of evergreen, and mixed/deciduous strata.

Examples of Evergreen forests (EVG)		
Examples of Deciduous and Mixed Forest (DCD)		

Table G5. Basic Criteria, Thresholds, and Characteristics for the Identified Forest LULC Classes or Forest Strata.

Name	Code	Criteria and Thresholds		Seasonality	Management
Bare or Lightly Wooded < 10% Canopy Cover	BAR	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	< 10% NR Medium Low High Gradient	Grasses and shrubs dominate. Grass senesces during the dry season (November through April).	Significant human intervention. Frequent fires (no understory and dry grass biomass).
Settlement Land	STL	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	< 10% NR Medium Low High Gradient	Settlements are often created during the dry season.	Significant human intervention. Some fruit trees may be grown
Agricultural Land	AGR	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	< 10% NR Low High Medium Distinct	Main cropping season from May to September. Fallow agriculture classified as bare soil.	Significant human intervention
Open Water	WTR	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	NR NR Medium Low Low Distinct	Remains inundated during most of the year.	
Wet Soil	WTS	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	< 10% 0 m Medium Low High Gradient	Slowly dries out during the dry season (November through April)	Occurs naturally, within forest systems and may be used for rice cultivation
Burn Mark	BRN	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	< 10% NR Medium Low High Distinct	Very apparent in mixed and dry deciduous forest, less so in evergreen forests. After burning, quick regrowth occurs.	Fires are often human-induced. Some low-intensity fires occur naturally in dry deciduous forests.
Clouds	CLD	Canopy Closure Tree Height Red DN	NR NR High	Persistent cloud cover during most of the wet season (May-November). Some clouds in the	

Name	Code	Criteria and Thresholds		Seasonality	Management
		NIR DN SWIR DN Boundaries	Medium High Gradient	dry season.	
Cloud Shadow	CLS	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	NR NR Low Low Low Distinct	Cloud shadows follow cloud cover.	
Shadow covered by thin cloud or haze	THS	Canopy Closure Tree Height Red DN NIR DN SWIR DN Boundaries	< 10% NR Medium Medium Medium Gradient	Thin clouds over shadow occur in all seasons. Haze from burning occurs during the dry season.	
Forest area covered by thin cloud or haze	THF	Canopy Closure Tree Height Red DN NIR DN\ SWIR DN Boundaries	> 10% > 2m Low High Medium Gradient	Thin clouds over shadow occur in all seasons. Haze from burning occurs during the dry season.	

Table G6. Basic Statistical Measures of the Field Measurements per Forest Type.

Carbon Stock Density	Unit	Deciduous and Mixed Forest	Evergreen Forest	Non-forest
Average	Mg C ha^{-1}	56.72	139.87	1.62
Standard deviation	Mg C ha^{-1}	23.51	70.16	2.04
Maximum	Mg C ha^{-1}	108.43	412.63	8.98
Number of observations (n)	-	55.00	61.00	36.00
Standard error of the mean	Mg C ha^{-1}	3.17	8.98	0.34
Lower Confidence Limit of the mean (LCL)	Mg C ha^{-1}	50.37	121.91	0.93
Upper Confidence Limit of the mean (UCL)	Mg C ha^{-1}	63.07	157.84	2.31

Table G7. Average and Conservative Emission Factors for Two Forest Types.

Deforestation from	Average Emission Factor [t CO_2e ha^{-1}]	HWCI [t CO_2e ha^{-1}]	Relative Uncertainty [-]	Conservative Emission Factor [t CO_2e ha^{-1}]
Evergreen	505.13	64.51	13%	505.13
Mixed	201.70	23.42	12%	201.70

G1.5. Description of the Communities Located in the Project Zone

The project zone includes 58 village communities generally ranging in size from 30 to 500 households (Table G8). Most of the families participating in the project are coming from a cultural tradition that is highly forest-dependent. The ethnicity of the communities of the project area is primarily Khmer with some Kuy indigenous people, according to the 2008 census. These communities have formed groups with governance structures called Community Forestry Management Committees and are actively protecting local forests. The CFMCs have received legal recognition from the Ministry of Agriculture, Forestry and Fisheries under the Royal Government of Cambodia's Community Forestry Sub-Decree. Most families in the project area control between two to five hectares of rain-fed agricultural land which provides subsistence food and generates some cash income. Many families only produce sufficient food for six to nine months of the year and must rely on forest foods such as wild tubers, mushrooms, and wild vegetables or purchase rice in the market during the remainder of the year. Chickens, pigs, water buffalo and cattle are also raised and can be sold for cash during emergencies. Off-farm employment pays approximately Riel 8,000 to 10,000 per day ($2 to $2.50). Additional income is generated through the sale of non-timber forest products including resin oil, rattan, honey, and other forest goods. Annual income for most households rarely exceeds $1000 to $1,500, with many households living below the poverty line. Mean monthly income for rural Cambodian families was approximately $100 in 1999 (NIS 2002). A World Bank study reported that annual per capita income in Cambodia was around $290 in 2002 (World Bank 2011).

Table G8. Population and Gender Distribution in the Participating Community Forest Groups

			Total Population			Population of CF Members		
No.	CF Group Name	Village Name	Households	Male	Female	Households	Male	Female
1	Angdoung Bor	Voa Yeav Village	218	416	884	185	243	245
		Samraong Tahae	248	499	459	225	295	237
		Kantuy Choun	208	454	211	200	210	235
		Dong Kao Tabuk	72	175	169	68	72	171
2	Chhouk Meas	Chhouk Meas	166	305	336	166	305	336
3	Dung Beng	Ta Mat Thmey	90	218	210	83	87	87
		Beng	104	430	214	96	120	125
		Yeay Teb	110	187	142	68	55	118
		Por Chas	254	431	447	230	179	246
4	Ou Yeay Kaov	Ou Pork	177	380	325	155	127	112
5	Phaav	Thnol Kaeng	157	412	373	157	39	373
		Chrok	133	602	600	133	360	242
		Ou Beng	57	151	143	57	8	143
		Ou Chik	82	164	237	82	-73	237
6	Prey Srorng	Lumtong Chas	120	300	310	90	95	141
		Korki Kandal	151	375	348	90	174	163
		Rohal	128	280	272	116	158	155
		Kok Sampor	125	340	259	93	100	89
		Sralau Sraong	138	324	334	81	223	73
7	Prey Srors	Chheu Slab	159	342	364	155	342	364
		Ou Tong	87	424	241	83	424	241
8	Ratanak Ruka	Chheub	163	477	394	141	169	166
		Kok Chres	104	262	295	73	83	85
		Ou Russei	43	91	128	42	90	125

			Total Population			Population of CF Members		
No.	CF Group Name	Village Name	Households	Male	Female	Households	Male	Female
		Ou Kansaeng	144	334	352	140	153	175
		Doun Kaen	407	791	1,015	232	310	262
		Chhuok	372	1,018	1,579	197	268	267
		Pol	281	781	721	144	198	198
		Bak Nim	246	696	444	236	339	230
		Koun Domrey	120	179	156	120	108	105
		Trapeang Veng	125	324	314	116	150	149
		Khtum	292	530	541	218	203	213
		Ta Man	125	281	292	120	423	134
		Champa Sok	106	296	101	99	84	76
		Chheu Krom	195	582	432	190	155	149
		Kiri Vorn	133	327	316	123	317	316
		Bos	216	499	498	147	103	99
9	Rolus Thom	Ktoul	103	366	95	72	50	22
		Trapeng Thoung[1]	212	446	417	114	230	312
		Kouk Ampil[1]	116	282	254	68	48	20
10	Romdoul Veasna	Tnot	525	1,138	1,240	497	890	966
		Sambur Meas	115	258	240	97	253	143
		Romdoul Veasna	111	265	234	80	222	234
		Cheung Phnom Meanchey	127	448	429	95	329	326
		Kak Seportivong	332	840	803	283	620	526
11	Samaky	Ou Anrae	293	545	697	13	28	29
		Ou Sramor	105	138	127	100	117	113
		Trapeang Tav	214	455	497	148	189	167
		Trapeang Tav Chas	74	86	124	56	78	90
12	Sangkrous Preychheu	Rom Chek	310	710	670	233	269	265

			Total Population			Population of CF Members		
No.	**CF Group Name**	**Village Name**	**Households**	**Male**	**Female**	**Households**	**Male**	**Female**
		Dey Thmey	138	359	115	130	216	234
		Ou Ta Meng	185	433	390	157	153	158
13	Sorng Roka Vorn	Sras Yey Chheok	116	245	228	116	245	228
		Tom Nub Thmey	175	381	329	175	381	329
		Som Pour	171	357	325	171	357	325
		Char Thmey	151	220	292	151	220	292
		Poum Thmey	203	800	226	203	800	226
		Char Chas	61	73	75	61	73	75
Total	**13 CF Groups**	**58 villages**	**9,893**	**23,522**	**22,263**	**7,971**	**12,464**	**11,962**

[1]These are not registered villages, but are significant population centers for the area. They are included to assure a conservative estimation of stakeholders or project beneficiaries.

G1.6. Description of the Current Land-use and Property Rights

For centuries Oddar Meanchey Province was a lightly populated, densely forested region with small patches of subsistence rain-fed agriculture and forest hunting and gathering. The province became a Khmer Rouge stronghold from the 1970s through the mid-1990s due to its isolation.

The vast majority of the land in Oddar Meanchey Province has never been titled nor have boundaries been well-demarcated. Ownership has remained unclear, though this situation is changing as stakeholders struggle to claim the provinces forests. Under the Forestry Law (2002), the vast majority of land in Cambodia is considered part of the Permanent Forest Estate (PFE) and under the management of the Forestry Administration (Cambodian Forestry Law 2002). Forest Estate Demarcation (FED), while a national priority, has only recently been undertaken. As a consequence, much of the forests of Oddar Meanchey are being contested by a variety of groups. Over the past 15 years, part of the forests have been cleared by poorly managed forest concessions, economic land concessions (ELCs), military soldiers, migrant settlers, and local communities working for land speculators. During the 12 months leading up to March 2008, nearly 8% of the provincial land area, totaling about 55,000 hectares of forest land, was leased to private sector investors as ELCs (Real Green, Angkor Sugar, Cane and Sugar Vely, Tonle Sugar Cane, Samraong Wood, Crystal, and Meng Ly Heng). ELCs are a component of the government development strategy to attract private investment for the development of underutilized state public lands. In Oddar Meanchey, ELCs are currently being mechanically cleared for sugarcane. Local interviews indicated that ELCs are often managed by a partnership of Thai and Cambodian businessmen. The ELCs have also absorbed over 12,000 hectares of natural evergreen and dry deciduous forest that had previously been protected by local communities. The project boundaries have been designed to ensure that ELC areas do not overlap with the community forests.

Aside from large ELCs leased by the national government, smaller leases of up to 1,000 hectares in size are being issued to businessmen by the Provincial Government. In addition, thousands of migrants are pouring into Oddar Meanchey Province to clear land along highways and smaller roads. While the ELCs are formally recognized by the Royal Government of Cambodia, there has been limited demarcation of the Permanent Forest Estate or cadastral surveys of private land. This has encouraged a steady flow of migrants into the province, as well as a speculative land market that has seen property prices

increase over 1000% in some parts of Oddar Meanchey Province in recent years (McMahon 2008).

G1.7. Description of Current Biodiversity and Threats to Biodiversity

Cambodia, Vietnam and Laos have over 3,300 species of trees, with forests that are predominantly comprised of Dipterocarpaceae, Leguminosae, Lythraceae, and in some places Pinaceae, Podocarpaceae, and Bambuseae (FA 2004). In Oddar Meanchey Province, there are periodic reports of tigers, leopards, jungle cats, pileated gibbons, dholes, elephants, bantengs, gaurs, and sun bears, many of which are on the IUCN endangered species list (See Annex 2 for a list of potential species). Wetlands and areas with older growth possess high biodiversity. Important indicator bird species, who are often critically endangered, include the giant ibis (*Thaumatibis gigantea)*, white-shouldered ibis (*Pseudodibis davisonsi)*, bengal florican (*Eupodotis bengalensis),* and other threatened species such as sarus crane (*Grus antigone*), greater and lesser adjutants (*Leptoptilos dubius*). Loss of forest and wetland habitat, which is occurring with increasing speed, has been recognized as the greatest threat to these species. In addition, hunting – especially by soldiers with firearms – and traps for large mammals represents a secondary threat to biodiversity. Currently, Community Forestry Sites are becoming increasingly important refuges for larger mammals seeking remnant forests. More information on Biodiversity and ecosystems is described in Section G2.

G1.8. Identification and Description of High Conservation Value Areas

G1.8.1 Globally, Regionally or Nationally Significant Concentrations of Biodiversity Values

G1.8.1.a. Protected Areas

Within the different forest types listed above there are areas of High Conservation Value (HCV), divided into areas of biological and cultural significance. Biological HCV areas include the primary forest of the project area, composed primarily of evergreen forest. Due to the presence of several IUCN listed threatened species in the project area (see previous section), the project area can be designated as a biological HCV area. Cultural HCV areas are areas that are significant to local and indigenous communities. Cultural HCV areas are either (1) areas of traditional, cultural, ecological, economic or religious significance as identified by the local communities, or (2) areas that help meet the basic needs of communities or provide critical ecosystem services. Most of the families participating in the project come from a cultural tradition that is highly forest-dependent. Rural communities are not only forest stewards; they are dependent upon the forest resources for shelter, water, fuel and food. Aside from rural Khmer households, there are also scattered indigenous Kuy villages in and around the project area. The lifestyle of these communities is increasingly threatened by internal and external forces. With the land rush of the past decade, speculators were eager to secure control over forest lands, jeopardizing cultural traditions. Because of these reasons, the project area can be designated as a cultural HCV area.

G1.8.1.b. Threatened Species

Analysis of the IUCN Red List of species for 2001 indicates that 82 animals in Cambodia are threatened:

- Critically endangered- 17 species
- Endangered- 23
- Vulnerable- 42

Another 31 flora species are also threatened (IUCN 2001).

Red listed species that may be found in the project area include tigers, fishing cats, sun bear, common otter, pileated gibbon, and douc langurs. CITES lists hundreds of bird, tree, amphibian, and mammal species in Cambodia as threatened (see Annex 2).

G1.8.1.c. Endemic Species**.**

Many species endemic to Cambodia within the project areas are threatened by forest loss. Through project implementation these areas will be protected improving populations. Endemic species to the reference region and Southeast Asia such as *Afzelia xylocarpa* (beng), will be planted for both biological enhancement and social use. Beng is a high-value deciduous, broad leaved tree which coppices well. Community members are very interested in the preservation of native bing as it is a highly desired species. Native species to South and Southeast Asia such as *Dalbergia oliveri*, *Pterocarpus macrocarpus*, and *Dipterocarpus tubinatus* will also be planted and conserved.

G1.8.1.d. Areas with Significant Species Concentrations.

Areas that support many species during any time in their lifecycle include wetlands and evergreen forests. These species will be protected through project implementation.

G1.8.2. Significant Landscape-level Areas with Natural Species Concentration Composition

Community Forestry Groups were created to protect, enhance and sustainably manage forest areas. Large Community Forestry Sites that provide continuous forest cover include Ratanak Ruka (12,872 ha) and Sorng Roka Vorn (18,261 ha). These areas will provide significant habitat to large vertebrates with expansive ranges. The biodiversity study (Elliott et al 2010) undertaken for the Oddar Meanchey project focused in particular on 5 CF sites to carry out in-depth surveys for biodiversity; Andong Bor, Sangkrous Preychheu, Prey Srorng, Sorng Rokavorn and Romdoul Veasna. A total of 174 bird species were found to reside within the CF areas of Oddar Meanchey, with a large majority (110) recorded in the largest CF, Sorng Rokavorn. All CFs surveyed in the biodiversity study were found to support at least one globally threatened bird species. Green peafowl (*Pavo muticus*) were located throughout Romdoul Veasna, Sangkrous Preychheu and Sorng Rokavorn, particularly around standing water supplies. The endangered Green Peafowl was found to be present in two of these CFs. Sorng Rokavorn, the largest CF by area, is host to populations of important mammals such as Banteng (*Bos javanicus*), large deer (*Cervus eldii)*, Dhole (*Cuon alpinus*) and, according to the biodiversity study, is most likely home to a small population of large cats (leopard or tiger, and other species from the Pantherinae family). Further, the near-threatened white-rumped falcon (*Polihierax insignis*) was found in Sorng Rokavorn, Andong Bor and Prey Srorng.

The biodiversity study also identified a small population of Northern Pig-tailed Macaque (*Macaca leonina*) and pileated gibbons (*Hylobates pileatus)* in Sangkrous Preychheu (Elliott et al 2010).

Other Community Forestry Groups that have significant tracks of high-biodiversity evergreen forest include Phaav, Sangkrous Preychheu, Prey Srors, Rolus Thom, and Romdoul Veasna. These areas provide continuous more dense forest cover rich in plant and species diversity.

G1.8.3. Threatened or Rare Ecosystems

High Conservation Value areas described as ecologically significant contain rare species or provide habitat to these species. Without project implementation these areas are threatened by agents and drivers as described above.

G1.8.4. Areas with Critical Ecosystem Services

Community forests containing tree cover provides watershed protection as well as erosion control. Oddar Meanchey province is one of the driest regions in Cambodia, receiving on average only about 1,300 mm (personal communication with local foresters) of rainfall per year. As a result, maintaining the integrity of forest areas in Oddar Meanchey is critically important to protecting watersheds. The deciduous dipterocarp, semi-evergreen and evergreen forests found in Cambodia, particularly in Sorng Rokavorn CF, represent the some of the last remaining tracts of this forest type in the Mekong region. Deciduous dipterocarp forests exhibit a high degree of fire tolerance, unlike evergreen forests. As such, the maintenance of deciduous forests is of critical importance to reduce the frequency and intensity of forest fires. Increased canopy cover in both deciduous and evergreen forests will serve to decrease ground fuels and fire hazard. Through project implementation forest cover will be conserved and increased, providing critical ecosystem services of watershed protection, erosion control and fuel load reduction.

Deciduous dipterocarp forests, which constitute the more than 50% of the vegetation in the Oddar Meanchey CFs, are of particular importance to a variety of endangered, vulnerable and near-threatened bird species. Sorng Rokavorn is of particular importance due to the presence of year-round water resources, a requirement for the habitat of Green peafowl. Semi-evergreen and evergreen forests found within the CF areas are host to seed-dispersing species such as the Oriental Pied Hornbill (*Anthracoceros albirostris)*, Green Imperial Pigeon (*Ducula aenea*) and pileated gibbon, which aid in natural forest regeneration.

At least 13 different species of woodpecker, including the vulnerable great slaty woodpecker (*Mulleripicus pulverulentus)*, make a home in Oddar Meanchey's deciduous forests. In addition, the black-headed woodpecker (*Picus erythropygius)* is biome restricted to

deciduous forests, making these areas critically important to their survival. Furthermore, a number of bird species found in Oddar Meanchey deciduous forests are migratory, and these forests provide an important winter habitat. The pale-legged leaf warbler *(Phylloscopus tenellipes),* white-throated rock-thrush (*Monticola gularis*) and Siberian blue robin (*Luscinia cyane)*, each of which are migratory species, all require wet forests with good understory, conditions found in the evergreen forests of the CFs.

In addition, five globally threatened mammal species were observed in the CFs surveyed for the biodiversity study; banteng, sun bear (*Ursus malayanus)*, sunda pangolin (*Manis javanica)*, northern-pig-tailed macaque and pileated gibbon. Banteng, an endangered species, were located in three of the four surveyed CFs, with multiple individuals located in Sorng Rokavorn and Sankgrous Preychheu. Observations and tracks were most prominent around water sources and chobs (river sources). Gaur (*Bos gaurus*), a vulnerable species, tracks were also observed near watering holes in Sangkrous Preychheu.

G1.8.5. Areas Fundamental to Meeting the Basic Needs of Local Communities

Community forestry members in Oddar Meanchey depend on forest to meet their basic needs, particularly in times of food scarcity. Villagers in each of the CFs collect a range of timber and non-timber products to supplement agricultural income or to source traditional foods and medicines that aren't available in markets. They also collect firewood from the forests nearby their homes. According to a study in Samaky CF by Enders (2011), NTFP provide an overall mean contribution of 24% to household income.

Each of the CF areas in the project were identified at the outset by communities themselves through a participatory mapping process which involved identifying important forest areas for local communities based partly on prevalence of important forest products. As such, each of the CFs represent the most critically important forest areas to communities living in and around them vis-à-vis fundamental social and economic needs.

G1.8.6. Areas Critical for Traditional Cultural Identity of Communities

The forests in Oddar Meanchey are critical for the traditional identity of the local communities, particularly for those communities who have been living in the area for generations. For communities where resin collection is prevalent (Sorng Rokavorn, Prey Srorng, Sangkrous Preychheu, Phaav, Dung Beng), villagers have been collecting tree resin (a sustainable practice) for generations. Villagers have informal tenure over their trees and pass them down to their children. Furthermore, four of the CF areas contain spirit forests.

Local people believe that these forest groves are the inhabited by spirits (neak ta) that protect the village and affect prosperity.

Spirit forest areas (see Table G9) were initially identified through telephone conversations with the CF leaders in 2011. In June/July 2012, Pact collected further information on spirit forest and other culturally important areas during PRA exercises with community members in each of the 13 project CFs.

Table G9. Location and area of spirit forests in Oddar Meanchey CFs

CF Area	Area according to June/July 2012 PRAs
Andong Bor	101 ha (includes Chumneap Ou spirit forest – 1 ha, Rong Phnom spirit forest – 100 ha)
Samaky	10.5 ha (includes Trapeang Andong spirit forest = 0.5 ha, Koun Kromum Bey - 4m^2, and Chupoey Kralanh – 5 ha, Chup Kleang Taoy spirit forest – 5 ha)
Sorng Rokavorn	25 ha (includes Prasat Trapeang Prey temple – 15 ha, Prasat Kuy temple – 10 ha)
Romdoul Veasna	33 ha (includes Ou Tuk Chaol – 4 ha, Prasat Khna – 25 ha, Domnak Preah Ang spirit forest – 4 ha)
Chhouk Meas	1 ha (includes Kaov Prasat Boran temple – 1 ha)
Ratanak Ruka	4 ha (includes an unnamed temple area – 4 ha)
Phaav	10 ha (includes Dombon Tuk Khiev spirit forest – 10 ha)
Prey Srorng	None.
Sangkrous Preychheu	20 ha (includes Dombon Chup Thom spirit forest – 20 ha)
Prey Srors	100 ha (includes Prasat Ta Krabey temple – 100 ha)
Ou Yeay Kaov	20 ha (includes Anlong Dongkaov spirit forest – 10 ha, Dae Dongtung spirit forest – 10 ha)
Rolus Thom	13 ha (includes Phnom kounkroul spirtit forest -10 ha,

	Phnom Bak temple- 3 ha)

G2. Baseline Projections

G2.1. Most Likely Land-use Scenario in Absence of Project

In absence of the project, it is likely that deforestation in the province will continue at the current rate of at least 1.5 – 2 % per year and will accelerate over the next decade due to the growing population. Additionally, it is likely that deforestation will be caused by the same deforestation drivers and agents as the ones that have been active in the province in the past. Project assessments, interviews and participatory rural appraisals indicate that at least ten drivers of deforestation and six agents of deforestation have been and continue to be active in the Oddar Meanchey Province (CFI 2008) (Table G10). Note that the identified ten active drivers of deforestation are not an exhaustive or complete representation of the deforestation threat in Cambodia or even within the Oddar Meanchey Province. These ten drivers represent the ten most prevalent drivers that have been active in the past. Threats of deforestation that have not yet been active in the past, such as deforestation due to mining, were excluded from this analysis, since no quantitative data is available on their historical dynamics. When other deforestation drivers increase in significance, or when deforestation threats become active deforestation drivers, they can be added to the list of active deforestation drivers in a baseline update.

Table G10. Drivers and Agents of Deforestation.

	Deforestation Agents					
Active Deforestation Driver	**Migrants**	**Private Companies**	**Local Communities**	**Hunters**	**Soldiers**	**Other Non-local**
1. Forest clearing for land sales	●		●			
2. Conversion to cropland	●	●	●			
3. Conversion to settlements	●		●			
4. Fuelwood gathering	●		●			
5. Forest fires induced to clear the forest understory			●			
6. Forest fires induced by hunters				●		
7. Illegal logging for commercial on-sale		●			●	●
8. Timber harvesting for domestic use	●		●		●	
9. Large economic land concessions		●				
10. Timber concessions		●				

1. Forest clearing for land sales

It is estimated that over the past decade, between 8,000 and 9,000 migrants each year moved into Oddar Meanchey Province in search of agricultural land, in part due to the province's substantial forest tracts and its rapidly increasing land values. This type of forest clearing typically involves small plots (0.5 to 2 hectares) of land along major and minor roads. Forest encroachment starts along roads and continually moves into forested areas. There is a pattern in Oddar Meanchey to grab what is seen as available public forestland and claim it until it can be resold at a higher price. The Royal Government of Cambodia and local government offices have had limited resources to control immigration effectively, and to demarcate the Permanent Forest Estate. As a consequence, it is likely that migrants will continue to clear forests in a without-project scenario.

While migrants may participate in forest clearing for future land sales, land speculation is often driven by business-people, officials, and local villagers who seek to claim and clear forest land for sale. According to reports, "power men" hire migrants or local villagers to fell and burn off forest cover for $50 to $100 per hectare. Small huts are constructed to indicate residence, although these are frequently not occupied. This pattern reflects attempts to grab available public forest land and hold it until it can be resold at a higher price. While

these actions are usually illegal, letters from local officials are used to create an appearance of legitimacy. Once one plot is opened it appears to encourage other migrants to open forests in neighboring areas. In some cases, poor migrants may sit on the plot for one to two years waiting for land values to rise. These plots are then sold to a "consolidator" or businessman who buys a number of them to form a larger plot. In 2007, the Prime Minister ordered all provincial governors to confiscate illegal encroachments of forest areas. In Oddar Meanchey, the Provincial Governor reclaimed over 20,000 hectares of occupied forestland. Since the province has no budget to protect, rehabilitate or develop these lands are either leased by MAFF as large Economic Land Concession or reclaimed by migrants.

Figure G5. Migrant Encroachment in Forest Land Neighboring Krous Prey Bordering the Samrong Rubber Concession.

2. Conversion to cropland

The rapid increase in population due to natural growth as well as migration has led to the increased clearing of forest lands for agricultural use. Typically, subsistence agriculture is practiced in these previously forested areas. Based on surveys and social appraisals, it is estimated that 2,000 to 4,000 hectares of the project area may already be cleared for agriculture at present. This could double every ten years due to increased migration and population pressure. With the rural population expanding at a rate of 15,000 per year, demand for farm land will require an additional 5,000 to 6,000 hectares annually based on 2 hectares for each household. In addition, the Provincial Governor has proposed the

development of new settlements for migrants to the Ministry of Interior. Aside from migrant pressures on forest clearing, local communities are experiencing overpopulation and also require an increasing amount of farmland as children marry and establish independent farms. In the past, village elders were responsible for identifying forest areas that are suitable for rain fed paddy fields. Young families or migrants requiring land approach the elders to request a farmland allocation. Usually a 2 to 5 hectares plot with good soil moisture is selected within the forest. For the most part, these were created before the formation of the CFMCs and it is difficult for poor farmers that own them to be evicted. Many committees are accepting these plots on the basis that the "owner" agrees not to expand the existing fields.

3. Conversion to settlements

There are 58 villages within the project area, and these villages cover a 600 hectare area in total. Based on social appraisals, it is estimated that these rural settlements will grow at a rate of 4 percent per year. The growth of settlements occurs in an unplanned and uncontrolled manner and therefore uses available space inefficiently. This has a detrimental impact on the forest resources surrounding the settlements. Communities themselves are anticipating land scarcity, and the fear of future land grabbing is leading villagers to claim several plots of forest land for future settlement development. This is occurring through the expansion of village boundaries as forests are cleared for houses, shops, and other buildings. In addition, newly created communities are also established by migrants or local families interested in creating new villages. New villages are approved by local government officials.

4. Fuelwood gathering

Communities living in the project area are almost entirely dependent upon fuelwood for their energy needs. Smoke from the burning of fire wood is often used to repel mosquitoes from livestock and living areas. Although, there was no local evidence of threat to livestock from mosquito borne diseases in the project area, insects and mosquito bites to livestock can cause discomfort and irritation resulting in potential reduction in livestock productivity. In addition, the growth of urban centers (e.g. Siem Reap, Samraong, Anlong Veng) and small industry, where charcoal is the fuel source of choice, are stimulating expansion of the charcoal industry. Without the introduction of fuel-efficient stoves and mosquito nets for livestock pens as recommended in the project, it is likely that fuelwood consumption would continue to rise, rather than stabilize.

In Cambodia 95% of the population is dependent on wood fuel for cooking (NIS 2002). The result of the household survey conducted inside the project are showed that current consumption of fuelwood is about 3.1 t dry matter (DM) per household per year (consistent with results from regional study by Top et al. 2004). Reducing the demand for fuel will lead to a direct reduction in the unsustainable harvesting of fuelwood. Different types of cook stoves are in use in the project area ranging from least efficient type such as three stone stoves to high efficient types such as Neang Kongrey Stove. Approximately 9 percent of households have already adopted most efficient stoves.

Given the cost of fuel-efficient stoves which is available at the rate of $3 – 3.75, it is highly unlikely that the households would adopt efficient stoves under baseline scenario. Over one third of the households are using traditional three stone stoves which uses 4.02 Mg DM per households. The social assessments indicated that people are willing to substitute their stoves with the most efficient stoves. The project will first target the households using the least efficient stoves and gradually replace existing stoves with efficient stoves. Such substitution is likely to reduce the fuel wood use by 15 – 65% from the current level. The project expects (conservatively) that only 70% of the households will immediately adopt improved cook stoves in their households and given the fact that some of the households, the implementation of the cook stove program is likely to reduce fuel consumption by about 44% which corresponds to reduction of consumption of 1.36 Mg DM of fuel-wood per household per year, or an annual CO_2 emission reduction of 1.75 t CO_2e per household per year. These fuelwood savings are achieved through the redesign of the Lao bucket stove, which specifically improves insulation and airflow. Some further research is still necessary to optimize the design of the stoves and outreach activities will be required to maximize adoption rates. The project will work with local NGOs to extend fuel-efficient stoves to 8,000 households in the project area. Fuel-efficient stoves would be distributed at a rate of 1,000 cook stoves per year during 2012 – 2021. These cookstoves would be maintained throughout the project crediting period.

5. Forest fires induced to clear the forest understory

Forest fires are a natural and essential part of the forest ecosystem in dry deciduous forests found within the project and surrounding areas. Naturally occurring fires are typically of a low intensity and incur minimal damage to mature trees, rarely spreading to the canopy. However, the occurrence and intensity of forest fires has increased significantly in the last 20 years, concurrent with an increase in population. Communities use fire as a management tool for instigating new vegetation growth, reducing dead wood, and clearing understory

vegetation. As fire is a common practice to clear the forest understory and stimulate the growth of grasses. Fires are often left to burn uncontrolled. Historically, community forest management did not focus on fire suppression, nor was fire seen as threat to forest cover. Approximately 90% of dry season forest fires are caused by people including hunters, children, careless smokers, and farmers burning agricultural residue.

6. Forest fires induced by hunters

Forest fires are occasionally started by hunters aiming to flush out wild game (wild pigs, turtles, monitor lizards etc.) from heavily forested areas and concentrate the game into smaller parcels, where they are easier to catch. These fires often grow beyond their intended size and spread to other forest lands leading to significant degradation of forests and deforestation. The burning of bunches of leaves and small branches is also practiced with the purpose of producing smoke to drive bees away from their hives to facilitate the collection of honey. Occasionally, this practice is the source of forest fire. Game animals are typically hunted by subsistence hunters. Increased urbanization, and demand for exotic meat may increase pressures on hunting lands and stimulate the use of hunter-induced forest fires to concentrate animal populations. The project will allow for the protection of forest lands from hunting fires by "social fencing", patrolling, and fire-prevention activities.

7. Illegal logging for commercial on-sale

Illegal logging contributes significantly to forest degradation in Cambodia and is widespread and poorly controlled. High-value "luxury wood" is sought after for the booming hotel construction market in Siem Reap, where over two million foreign tourist visit annually. Illegal timber smuggling is widespread and is often organized by private sector operators who obtain support from local military and police personnel. There are reports of officials allowing illegal logging operations to continue in order to protect their own business interests. Armed soldiers often aid in the transport of illegal timber harvests for politicians, presenting control problems for weaker Community Forestry Management Committees. In the Ratanak Ruka CFMC an estimated 100m^3 per year has been extracted by illegal loggers (Poffenberger, 2008). Illegal loggers also benefit from the lack of transparency and information on land title and land tenure rights.

Without the project, it is unlikely that local communities will have the capacity to apply for CF agreements or have the financial and material resources to enable effective patrolling and enforcement of forest laws.

8. Timber harvesting for domestic use

Timber harvesting by local stakeholders is conducted to accumulate building materials for construction of lodging and basic infrastructure in settlements. Housing in rural settlements is classified as semi-permanent (roofs and walls constructed of temporary materials like bamboo, thatch, grass, reeds, etc.) and permanent (constructed with more durable materials like wood, concrete, etc.). Permanent housing requires the felling of straight timbers to construct residences, hotels, businesses, and shops. Semi-permanent housing also requires the harvesting of timber and their temporary nature often means they are abandoned and their inhabitants move on to other areas, increasing degradation on forestlands and requiring the use of additional forest resources. These timber resources will last less than 100 years and thus do not qualify under long-lived wood product pool.

9. Large economic land concessions (ELCs)

During the 2007 to 2008 period, the Royal Government of Cambodia leased approximately 44,000 hectares of forest land in Oddar Meanchey Province to private interests, representing nearly 7% of the province's land area. These concessions are currently being cleared to make way for ethanol producing crops (jatropha, sugar cane, palm oil, etc.) (e.g., Figure G7). There is speculation that some business interests seek ELCs simply to harvest high value luxury woods, with no intention or financial capacity to invest in the development of the land. It can be expected that as long as there is demand for high-value timber and agricultural commodities such as jatropha oil, forest land will be threatened with potential ELC conversion. It must be noted that land under Community Forestry agreements will not be allowed to be leased as ELCs.

Figure G6. Cleared, Burned and Fenced Land Concession in Central Oddar Meanchey Province.

Figure G7. Meang Ly Heng Sugar Concession Neighboring REDD Project Site. (2008)

10. Timber concessions

A moratorium on timber concessions (coupes) was introduced in Cambodia effective 01 January 2002. However, in 2006, the RGC re-introduced an Annual Bidding Coup system currently operating in five provinces, including Oddar Meanchey. Small logging concessions are issued by the Forestry Administration. These coups are limited by guidelines that impose a maximum limit of 1,000 hectares. In practice the concessions are issued for much larger areas of land. For example, one coupe issued on the western side of the Samaky CF block was initially granted 3,000 hectares Annual felling coups are designed to provide timber for provincial level markets. Only Community Forestry Agreements, of which the size and location is legally agreed upon with the Forestry Administration, can prevent the loss of forest by timber concessions. Without the project, it is unlikely that effective community forestry agreements would be approved, or that the resources would be available to support local CFMCs.

Conclusion

These 10 drivers of deforestation contribute to the total observed deforestation and forest degradation rates to different extents. It is deduced from interpretation of satellite images that forest clearing for land sales and conversion to cropland or settlements account for approximately two-thirds of the observed deforestation. It was assumed that the contribution of forest clearing for land sales and conversion to cropland by non-migrant people was equal. In-county experts have determined that fuelwood gathering was equally important for deforestation as conversion to settlements (10% of the total rate). The remainder of the relative contribution was equally divided amongst forest fires, hunters, illegal logging, and timber harvesting (Table G11). Note that no formal contribution is attributed to the issuance of large economic land concessions, and timber concessions, since their rate varies drastically over time and is dependent on political factors. It would be extremely challenging to issue carbon credits based on an avoided conversion to concessions without concrete plans and with a very high risk for leakage. Therefore, in all future carbon calculations, the areas of concessions are geographically excluded. This is conservative since the project has and will reduce the number of land concessions being granted, while not acquiring carbon credits for this effort. There is a reasonable likelihood that a large proportion of the Community Forestry Sites would be leased to ELCs, cleared by land speculators, or claimed by soldiers, migrants, or local communities within the next 5 years.

An identical exercise has been completed for forest degradation. The designation of the exact relative contributions is based on expert knowledge and social appraisals. It was observed that the gathering of fuelwood is the main contributor to forest degradation. Forest clearing for land sales, forest fires and hunters were assessed to be equally important, but less than fuelwood gathering. As a consequence, fuelwood gathering was assigned a relative contribution of 30%, while forest clearing for land-sales, forest fires and hunters were each assigned 20%. The remainder of the total contribution was equally divided over illegal logging and timber harvesting (each 5%). Because conversion of forest land to cropland or settlements leaves almost no trees, only deforestation occurs and no direct forest degradation is present. It is assumed that indirect effects of this conversion on forestland adjacent to the new cropland or settlements on forest degradation were accounted for in the forest clearing for land sales and fuelwood gathering drivers.

The following table summarizes the relative contributions of each of the drivers of deforestation.

Table G11. The Relative Importance of Driver d in Deforestation to the Total Deforestation, $contribution_{DF}(d)$.

Drivers of deforestation	Importance [%]
1. Forest clearing for land sales	0.19
2. Conversion to cropland	0.39
3. Conversion to settlements	0.10
4. Fuelwood gathering	0.00
5. Forest fires induced to clear the forest understory	0.23
6. Forest fires induced by hunters	0.00
7. Illegal logging for commercial on-sale	0.10
8. Timber harvesting for local use	0.00
9. Large economic land concessions	NR
10. Timber concessions	NR

While Cambodia has passed laws to protect forests (Forestry Law 2002), support biodiversity and conservation (Law on Environmental Protection and Natural Resources Management, 1996), and enhance the livelihoods of rural peoples (Community Forestry Sub-Decree, 2003) it has also adopted policies to accelerate economic growth and encourage private sector investment (Oberndorf 2006). Though the Forestry Administration seeks to achieve a national goal of retaining 60% of the nation's land area under forests,

other government ministries and policy makers see economic development opportunities in converting the province's forest to uses that might generate revenues for the state and the private sector. To that extent, forest conservation policies are in competition with other national goals including ELC development and other government programs. The Ministry of Interior, for example, is interested in allocating forest lands for social concessions that can provide settlement and agricultural lands. Some stakeholders view migrant relocation as a means of increasing the local labor force and clearing forests for agriculture.

Without project intervention it is likely that forests throughout the province, including those targeted for inclusion in the proposed project, will lose forest cover at a rate of at least 3% per year. A number of the 13 Community Forestry Sites have already been targeted for ELC leasing, but community and Forestry Administration protests and the prospect of a REDD project has blocked the issuance of land concessions in the project areas. Without a REDD project in place, it is unlikely that the CFMCs responsible for protection will have the financial, technical, or political support required to ensure the conservation of the areas targeted for the project. The following table summarizes indicators that will be used to monitor the threat of each of the drivers of deforestation during the project's crediting period.

Table G12. Drivers of Deforestation and Risk Indicators.

Risk	Indicators
1. Forest clearing for land sales	• Areas are deforested to establish a claim on land that is later sold, or resold as land prices increase
2. Conversion to cropland	• Growing pressure on forest land for agricultural expansion
3. Conversion to settlements	• Uniformed soldiers clearing forests, establishing bases within forests • Increase in migrant forest clearing
4. Fuelwood gathering	• Rapidly growing domestic consumption; • Unsustainable exploitation in CF Areas; • Transfer of pressures to forests neighboring CF areas; • Growth of community-based commercial fuelwood collection; • Existence or growth of charcoal industry
5. Forest fires induced to clear the forest understory	• Suppressed natural regeneration of degraded forests • Carbon emissions from forest destruction
6. Forest fires induced by hunters	• Suppressed natural regeneration of degraded forests • Carbon emissions from forest destruction
7. Illegal logging	• Further forest degradation, removing larger, high value hardwoods, while undermining community control
8. Timber harvesting for local use	• Reduced quantity of phenotypically superior and large trees
9. Economic land concessions	• Reduced forest resources. This creates pressure on neighboring forests, and causes social conflict
10. Annual felling coups	• Annual felling coups on forest • Reduced forest resources. This creates pressure on neighboring forests, and causes social conflict

G2.2. Documentation that Project Benefits Would Not Happen in Absence of Project

The key barrier to implementation of the project is financial. While donor funding has thus far been the essential component enabling project development, project activities would be unable to continue without revenues from the sale of carbon credits. Without these revenues, areas protected by the project would be subject to deforestation and degradation. Funds will enable to provide training, workshops, technological assets and funding to support the ongoing monitoring of carbon stocks to ensure project activities are continued for the planned duration of the project. Additional discussion of the financial aspects of the project can be found in Section G3.11.

There are no laws in place in Cambodia that require project areas to be protected. Only through community registration of project sites under the Community Forestry Sub-decree do communities have legal recognition and empowerment to protect and sustainably manage their lands. The project has contributed significantly to community awareness of and ability to utilize the Community Forestry Sub-decree to protect their lands. The project has also facilitated the development of government capacity to support and implement carbon projects, which prior to project intervention did not exist. In addition, the project has

clarified land tenure and demarcated boundaries with signs between various community land-holdings. Both are key requirements in the development of carbon projects and distribution of carbon-related benefits.

G2.3. Calculation of Estimated Carbon Stock Changes in Absence of Project

Rates of future deforestation and forest degradation in absence of the project are assumed to be identical to the rates of historical deforestation during the 10 years before the project start in the reference region. The baseline rates of deforestation and forest degradation are discounted according to the empirically determined uncertainty of classification. An example of the LULC maps are in Figure G9 and show the progressive deforestation from 1990 – 2004 near Tapping Prasat, based on a Landsat 5 and 7 analysis of the land cover.

Table G13. Accuracy Measures for the Verification of the Broad Classification of the Images in the Historical Reference Period.

Image (YYYYMMDD)	Overall Accuracy
19940128	98%
20000325	99%
20020110	96%
20041107	94%
20061215	94%
20081220	94%

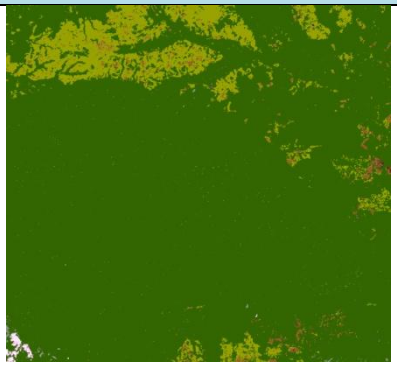
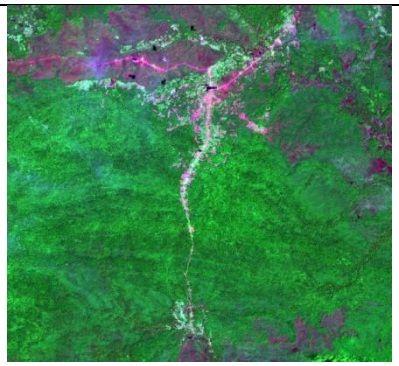
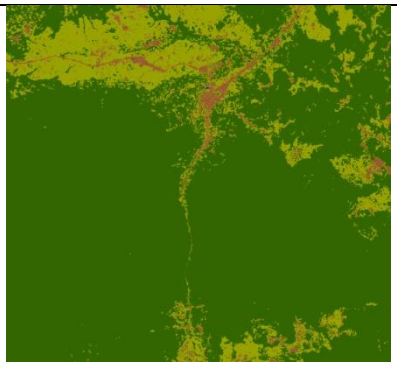
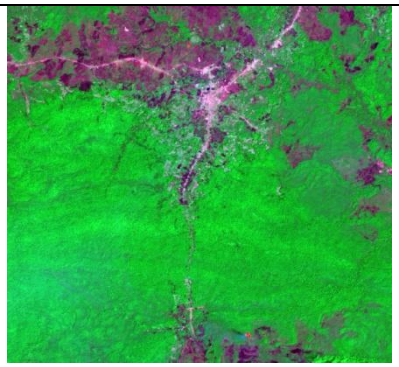
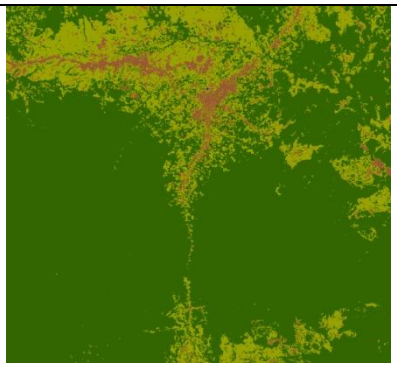
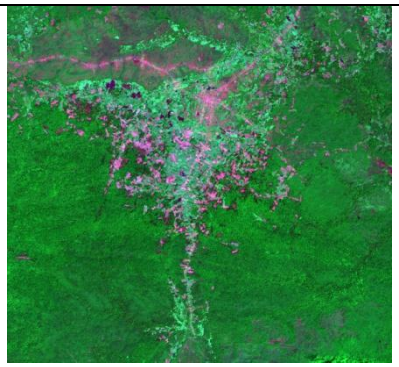
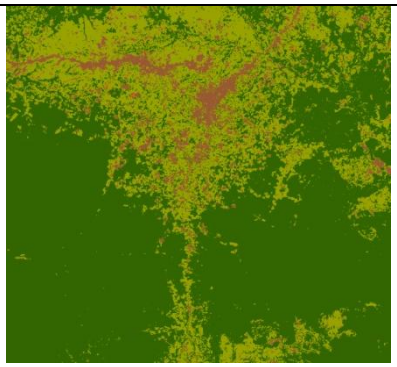
Year	Spectral Image (7-4-2 Band Combination)	Classification
1990		
2000		
2003		
2004		

Figure G8. Example of the LULC maps produced by the classification procedure near Trapping Prasat in Oddar Meanchey.

Table G14. Summary of the Average Historical Deforestation Rate in the Reference Region (621,860 ha).

From class	To class	Average Deforestation Rate in Reference region [ha yr^{-1}]
Mixed Forest	Non-Forest	1,567
Evergreen Forest	Non Forest	8,726

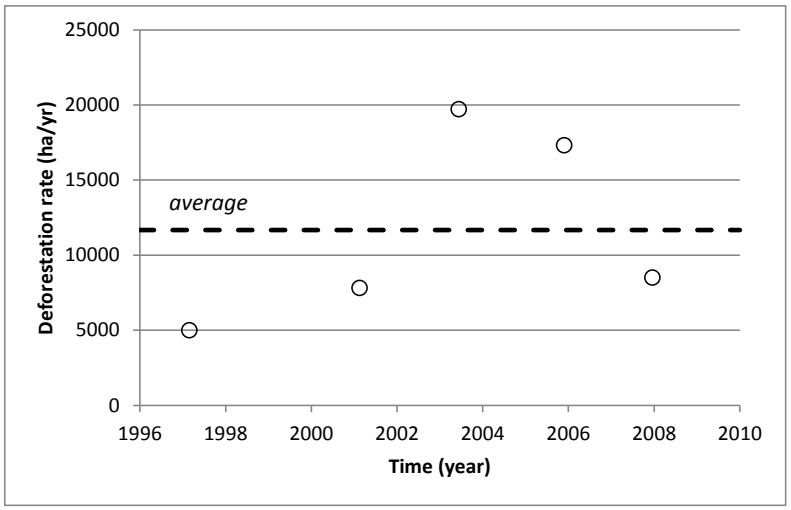


Figure G9. Historical deforestation rate in the reference region, and conservative deforestation rate projection.

Given that there are about 335,000 ha of forest remaining in the reference region in 2008, the deforestation rates calculated in the analysis conducted for this project correspond to 3.03% loss of forest cover per year. This rate is very close to the deforestation rates calculated in the Forestry Administration study supported by GRAS A/S of the University of Copenhagen between 2002 and 2006 (Table 15).

Table 15. Oddar Meanchey forest cover change for 2002-2006 (source: Forestry Administration and GRAS A/S of the University of Copenhagen).

Forest Type	% Annual Loss
Evergreen Forest	3.0%
Deciduous Forest	1.1%
Total Forest	**2.5%**

No significant linear trend in the deforestation rate was observed. Therefore, it was assumed that the deforestation rate remains constant during the crediting period.

It is well documented that deforestation rates decrease when forest areas are gradually disappearing. The "forest transition" theory (Mather and Needle, 1998) explains how areas with vast forest areas which are initially characterized by rapid deforestation rates, stabilize their forest area after some time. To incorporate a decrease in deforestation rate upon a gradual depletion of forest resources, these initial deforestation rates were multiplied with a forest scarcity factor, which gradually decreases as the proportion of remaining forest decreases. This scarcity factor was calibrated in a conservative way by using a land-use change model. A very similar pattern was reported by Meyfroidt and Lambin (2008) in neighboring Vietnam. Deforestation rates started decreasing when 50% of forest cover remained, and halted in 1991-1993 at around 25% forest cover. Due to its cultural and ecological similarity to Cambodia, the forest transition trends observed in Vietnam are a valid reference for the situation in Cambodia. For a detailed description of forest cover loss due to the scarcity factor see the VCS Methodology, and the VCS PD for detailed descriptions for calculated rates of deforestation. Note that in all carbon calculations will be discounted for based on the uncertainty around the remote sensing analyses.

Non-CO_2 emissions are fully included in the project's calculations when significant. The test of whether a non-CO_2 emission source is significant is described in the Climate section. The Climate section also contains an overview of all emissions sources from non-CO_2 emissions and fuel-related emissions from project activities.

G2.4. Description of How the 'Without Project' Scenario Would Affect Communities

Without the project it is likely that many communities will increasingly lose control over their community forests. These communities depend on these forests for a wide range of products including foods, fodder, fuelwood, timber, honey, rattan, bamboo, and resin oils (among others). A 1997 study by the World Bank indicated that nearly 78% of Cambodia's population subsisted on less than $2 per day (World Bank 2011). Most rural families face seasonal food shortages that are often met through forest resources including the consumption of "famine foods" from the woods such as edible leaves, bamboo shoots, tubers, fruits, etc. In addition, during the agricultural off-season, many families engage in non-timber forest product (NTFP) collection. In one of the project areas this includes an edible leaf called brik which can be sold in neighboring Thailand for $4 per kilo.

Loss of access to these resources will create economic hardships for local communities and undermine the achievements of the Millennium Development Goals. Encroachment of these forests by private corporations and migrants will also likely generate social conflicts in the area. Under the Without-Project Scenario it is likely that Oddar Meanchey will lose its remaining natural forests at a rate of over 2% annually. Not only will forest cover be lost and environmental services weakened (including biodiversity and hydrological functions), local communities will experience diminishing access to forest resources. This will lead to social and economic marginalization and possible displacement of thousands of rural families, and potentially create conflict between concessionaires, migrants, and local populations.

An additional component of the non-project scenario is the deterioration of hydrological services essential to the lives of rural families. Most of the project villages depend on water tanks for domestic supplies. These in turn are fed by rainfall, stream-flow, and springs that are recharged through infiltration in village forests. The clearing of forests will adversely impact water resources, including possible change to micro-climate. Also, it is expected that existing water tanks will fill with silt rapidly since there is currently no financing mechanism in place to de-silt water tanks or build new water storage facilities.

Finally, since agriculture is almost exclusively rain-fed, declining rainfall and soil moisture will likely cause declines in family farm productivity. Without revenues from carbon sales, including agricultural intensification, water resource development, or NTFP processing, activities geared to enhance community livelihood will not take place.

G2.5. Description of How the 'Without Project' Scenario Would Affect Biodiversity

In the absence of the project it is likely that forest habitat in the project area will be reduced by 20% in the next 10 years through land clearing, illegal logging and fires. In addition, forest degradation will reduce the density of the understory vegetation and disrupt the natural age distribution of trees, leading to a substantial loss of habitat. The reduction of key habitat and refugia will place pressure on already-stressed flora and fauna. Without the project, community efforts to control poaching and regulate hunting will not be implemented. Without these protections, rampant hunting and deforestation will almost certainly lead to the extinction of the last tiger population in northwest Cambodia. High market prices and growing demands for luxury hardwoods (often originating from endangered and slowly growing tree species) in Cambodia, China, Thailand and Vietnam have placed growing pressures on Cambodia's forest, with much of this valuable timber

harvested illegally. Logging bans and the decline of natural forest resources in Thailand and Vietnam have increased the pressure on Cambodia's forests. Many of the species with the highest value are already listed on the IUCN threatened species list. As these trees and forests are depleted, so too are important indigenous sources of seed, reducing the potential for regeneration (FA 2004). In addition, hunting and poaching are wide-spread, resulting in an increasing number of endangered fauna species. Moreover, biodiversity reduction will occur from the clearing of forest for commercial agriculture, which is rapidly reducing the habitat for many flora and fauna species. Finally, the clearing of forest for commercial agriculture is rapidly reducing the habitat for many flora and fauna species, and reducing biodiversity. The rampant deforestation will almost certainly lead to the extinction of the last tiger population in northwest Cambodia as no other refuge area included in this project are deforested.

The province has experienced severe erosion as forest cover has been removed. Erosion problems have accelerated over the past decade. This region experiences an extended dry season and often torrential wet season. This mosaic of open dry deciduous forest, combined with lowland evergreen or semi-evergreen, transitions to extensive wetlands and swampy areas during the annual monsoon. The lowland forests of Oddar Meanchey supply the Tonle Sap (Great Lake) with water, helping regulate the annual hydrological cycle of the greater Mekong basin. The clearing of forests from the upper watersheds of Oddar Meanchey Province accelerates erosion of soil and promotes the sedimentation of the Tonle Sap, currently estimated at 20 to 40 mm per year (Bailleux 2003). Forest conservation is a key element in any strategy to preserve Cambodia's complex hydrological systems and avoid further loss of soil through erosion.

During the extended dry season, many rural areas in Oddar Meanchey Province experience chronic water shortages. Forest loss exacerbates these drought conditions by creating a hotter microclimate and accelerating water run-off rates. Without the project, land degradation will be more extensive; there will be greater soil erosion and reduced water infiltration and aquifer recharge.

G3. Project Design and Goals

G3.1. Summary of Project's Major Climate, Community, and Biodiversity Objectives

Climate Objectives

The project is designed to mobilize 58 local communities in 13 project areas to avoid further deforestation and degradation, as well as facilitate the natural regeneration of 64,318 hectares of project area with 55,946 of forests. This will lead to an avoided emission of approximately 8.3 million t CO_2e over the 30 year project. The project will develop and demonstrate a carbon finance mechanism to reduce greenhouse gas emissions, contribute to economic and social development, and conserve biodiversity over the next 30 years. Principle project strategies include building the capacity of local villages to conserve community forests as the primary managers of REDD project forests, creating a strong coalition of stakeholders who are committed to achieving the project goals including supporting villagers to improve the quality of forests, maximizing benefits flows to local communities participating in the project, and studying and developing additional REDD projects (Sar. Chor. Nor 2008).

Operationally, the success of the project depends on strengthening community capacity to protect local forests through legal recognition and technical and financial support. The institutional, logistical, and political support of the Forestry Administration and local government will significantly enhance the effectiveness of community efforts to protect forests. Community managed assisted natural regeneration and enrichment planting activities are planned to enhance carbon sequestration in degraded forests and reduce soil erosion, while improving forest livelihoods and local employment opportunities. The emphasis on community involvement will maximize the longevity of the sequestered carbon, and minimize the risk of losing the carbon assets. In addition, by increasing biodiversity in these forests, especially the number of birds, reptiles, and amphibians, the risks of farm pests will be reduced. Through supporting and documenting the role communities play in forest carbon conservation and sustainable management, PACT seeks to provide "proof of concept" to the Royal Government of Cambodia and to the donor community that will encourage the replication of this strategy as a core national program. The long-term goals of this project are to sequester carbon, contribute to the devolution of forest management rights to poor, and demonstrate the viability of utilizing carbon offset credits to finance the national CF program.

Community Objectives

The project seeks to ensure the land tenure and security of families in project communities and to assist them by increasing employment opportunities and livelihood on a sustainable basis from their natural resources. The project will strengthen community leadership, organizational and financial capacities, improve relationships with local government, help resolve resource conflicts, and educate local communities on forest management and biodiversity. Community bookkeeping and project management skills will be developed as a major goal of the project, while project funds will be used to build capital reserves within the CFMCs. In addition, new micro-finance groups will be created to help manage non-timber forest product enterprises. Training, technical support, and funding for forest-based livelihood activities (such as the sustainable extraction of non-timber forest products) and the extension and adoption of more productive and sustainable agricultural practices will also be provided by the project.

Biodiversity Objectives

This project will contribute to the protection and conservation of Cambodia endangered flora and fauna in tropical rainforests by supporting the engagement of rural communities as resident managers. Forest regeneration will be facilitated through fire protection and weeding, with enrichment planting of endangered species to increase the quantity and quality of available habitat. Project staff will facilitate community dialogues and provide technical guidance regarding effective practices for conserving flora and fauna. Project communities will also conduct regular monitoring of biodiversity with support from the project staff. High Conservation Value areas mentioned before will not be negatively affected.

Though the project consists of 13 Community Forestry Sites, the surrounding area or the reference region will be positively affected by project implementation.

G3.2. Description of Each Project Activity

The project will undertake ten different activities to achieve reduced degradation and deforestation. Each of these activities targets one or more of the above identified deforestation drivers (Table G16). Reinforcing legal land-tenure only directly affects migrant encroachment and the concession-type deforestation drivers. It is clear from previous analysis that community respect and acceptance of legal status and laws is absolutely essential in the success of the project. Other project activities may be highly inefficient if the communities involved do not have legal rights to the land. To optimize the efficiency of

the project activities, these activities are incrementally implemented, with reinforcement of land-tenure status being the first project activity. Because of this incremental implementation, the total benefits accrued from the project of the project activities will increase gradually over time. This is explicitly taken into account into the carbon calculations. Note that although the initial project activities (in 2007 and 2008) were absolutely essential (reinforcing the land-tenure status, empowering and educating local communities, and consulting of all stakeholders), their effect on deforestation rates is assumed to be minimal.

Table G16. Summary of Project Activities and targeted Driver of Deforestation.

	Project Activities									
Driver of Deforestation	**1. Reinforcing land-tenure**	**2. Land-use plans**	**3. Forest Protection**	**4. ANR**	**5. Fuel-efficient Stoves**	**6. Livestock Protection from Mosquitoes**	**7. Agricultural Intensification**	**8. Natural Resource Management Projects**	**9. NTFP Development Activities**	**10. Fire Prevention**
1. Forest clearing for land sales	●		●							
2. Conversion to cropland		●		●			●	●	●	
3. Conversion to settlements		●								
4. Fuelwood gathering			●		●	●				
5. Forest fires set to 'clean' the land			●					●		●
6. Forest fires induced by hunters			●							●
7. Illegal logging for commercial on-sale			●							
8. Timber harvesting for local use		●	●	●						
9. Large economic land concessions	●									
10. Timber concessions	●									

ANR = Assisted Natural Regeneration, NTFP = Non-Timber Forest Products

The project will undertake a number of activities to achieve its goals. This section contains a description on how each of these activities affects each of the drivers. It is also described how the effectiveness of each of these activities changes throughout the project's lifetime due to gained experience, or differences in funding. The relative effectiveness in the graphs below refers to the effectiveness relative to what is maximally achievable given the project's conditions, but may be different from this maximum due to timing of funding or lack of

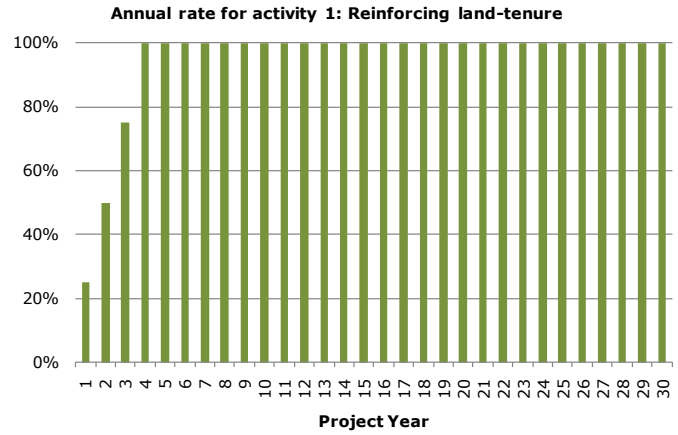
experience. In other words, the relative effectiveness will always be 100% at some point during the crediting period, regardless of the absolute effectiveness of the activity in reducing deforestation.

1. Reinforcing the land-tenure status

Land is the single most important asset for most Cambodians, as economic and social lives are inexorably tied to the use of natural resources. Transparently assuring land-tenure rights structures is of upmost importance both to the livelihoods of local populations and the prevention of unregulated and unsustainable land use. Conventional land tenure for forest areas does not always extend to tenure over housing and agricultural lands, and a lack of protection for agricultural lands can lead to families moving deeper into forest areas to clear new patches. In the project areas, local communities do not legally own the forest land on which they settle and use for agriculture, and the land-tenure status is unclear as most of the PFE in Cambodia has not been formally demarcated. By establishing legally-binding forest management agreements, under the Community Forestry Sub-Decree, project communities will have secured management rights from the Ministry of Agriculture, Forestry, and Fisheries (MAFF), the operational administrator for the national Permanent Forest Estate (PFE).

This action provides exclusive management rights and responsibilities to the CFMCs over the project area for a fifteen year period that can be renewed, greatly enhancing their ability to protect and conserve these resources. Without legal reinforcement, maintaining tenure over land against migrants or concessionaries is extremely difficult. The establishment of these agreements often requires financial resources to implement, which can be generated by sale of carbon credits from the project. These financial resources can also be used for forest monitoring and patrolling programs, as well as forest boundary demarcation to ensure that migrant populations do not encroach on forest lands belonging to local populations. Maintaining formal land-tenure rights is also important in ensuring that agriculture lands are not granted to large corporations as ELCs or as timber concessions to harvest luxury woods. One of the benefits as described by MAFF of ELCs is to generate capital to develop agricultural land and increase rural employment. The creation and reinforcement of land tenure rights can effectively accomplish this by granting land rights to local rural populations and ensuring this land is not taken through ELC or exploited by in-migration. CFMCs will also be responsible for meeting with new migrant communities and leaders, as well as the local government to clarify boundaries of the project area, resolve any existing conflicts, and emphasize the intention of the CFMCs to secure the area.

The Royal Government of Cambodia has demonstrated a commitment to this project by expediting the approval of Community Forestry Agreements for all villagers participating in this project. The potential of the proposed REDD project to generate carbon revenues for forest management has been instrumental in generating an action plan to resolve tenure conflicts in the project area through meetings, workshops, site visits, as well as higher level policy discussions. In the first quarter of 2009 a series of meetings and communications among senior FA officials and the military commanders operating in Oddar Meanchey has gained the support of senior officers to move soldiers out of all unauthorized forest bases. Further, no ELC's have been issued for that province in the past twelve months reflecting not only the global economic downturn but also a shift in national policy.

Project Action 1: Reinforcing Land-tenure	
	The land-tenure is enforced through Community Forestry Agreements. These were signed in May 2009, during the second year of the crediting period. Therefore, a rate of 50% was assumed for this year. They are automatically renewed for 15 years unless the land is not managed according to the agreement.
Maximal reduction in driver-induced deforestation	
• driver 9 (large economic land concessions)	100 %. Creating legally binding Community Forestry Agreements which establish land rights provides proof of land ownership, and will prevent 100% of the deforestation associated with the granting of ELCs. The MAFF will have a map available to them clearly showing the location of rural land ownership, and can avoid these areas when assigning large ELCs.
• driver 11 (timber concessions)	100%. Idem to above; backed by the Forestry Administration, Community Forestry Agreements restrict all harvesting of timber in the project area, and therefore no timber concessions will be granted.

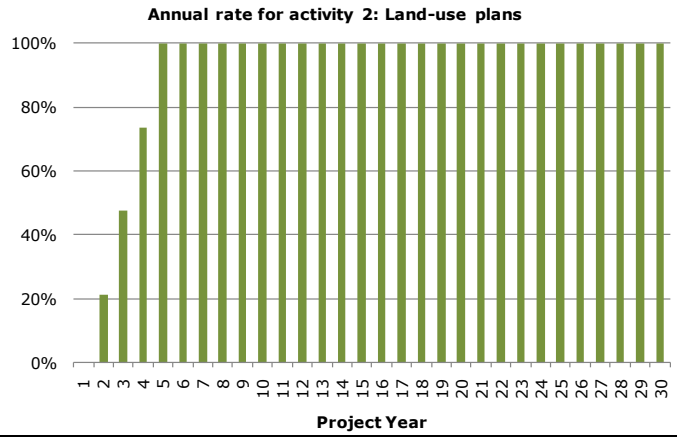
2. Sustainable forest and land-use plans

While commune council members and village leaders are consulted in land allocation activities, there are currently no land-use plans for the project areas. However, developing

forest management plans in a collaborative fashion is a key element in sustainable resource management. The project will financially and logistically support communities in developing Community Forestry Management Plans in a participatory and democratic manner. The plans contain guidelines on the amount of timber each community can harvest, based on current and future timber needs, and how much land within the project sites can be converted in the future for expansion of settlements and cropland. The forest management plans also identify areas for assisted natural regeneration and enrichment planning. Areas of high biodiversity, hydrological value and High Conservation Areas are identified for special management. The forest management plans increase the efficiency of the current land-use, and take into account the increased need for land for settlements and agriculture in the future. By planning the future conversion and avoiding the random conversion of forest patches, forest degradation along settlement and cropland edges is reduced.

The development of forest management plans requires community-wide discussion on how to best manage natural resources, emphasizing the inclusion of all stakeholders. This policy of inclusion cultivates a feeling of resource ownership, motivating sustainable land use practices. The project will guide communities in identifying appropriate areas for future settlement and agricultural expansion while clarifying and demarcating areas for permanent forest conservation. Often the need for new settlement or agricultural space leads to the degradation of forest lands. The involvement of knowledgeable local stakeholders and outside experts allows for the realization of technical and sustainable methods of expansion. During the stakeholder meetings, there will also be a discussion on how the forest should be managed with respect to the use of fire to “clean” the land. Additionally, participatory land-use planning can also provide guidance and rules in case of disputes or conflict over land or resources.

Land-use planning procedures will include the preparation of large scale maps (1:25,000) of the project area with zoning information that will be posted in community meeting locations. The resource management plan maps will be used for resource related discussions, annual work-plan development, fire management, and other spatial monitoring needs. Data from maps of each CF block will be transferred into the project GIS data base on an annual basis.

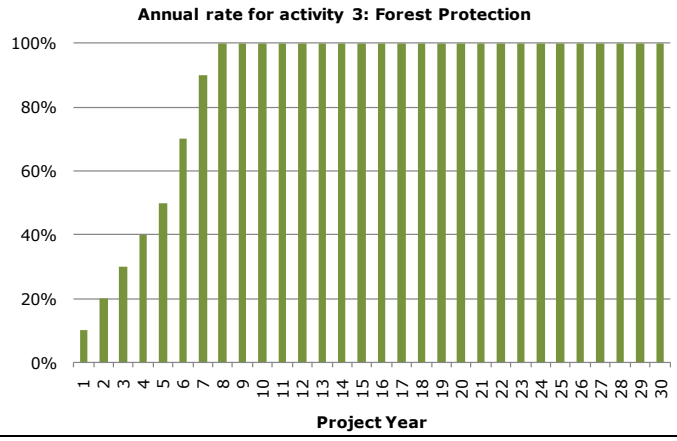
Project Action 2: Land-use Plans	
	Land-use plans are fully supported by the project proponents from the first year of the project. However, it is expected that a period of 5 years is necessary before the full effect (rate) of land use plans is reached due to the often challenging negotiations to design a broadly accepted land-use plan.
Maximal reduction in driver-induced deforestation	
• driver 2 (Conversion to cropland)	25%. Combined with an effective forest protection and patrolling effort, land-use plans can stipulate where local people are allowed to convert forests into cropland. If this conversion occurs in a pre-determined and planned order, a random destruction of forest resources is avoided, and the total deforestation rate due to conversion to cropland will decrease. Avoiding random conversion will reduce deforestation by 25%.
• driver 3 (Conversion to settlements)	50%. Idem. The effect of random conversion to settlements on existing forest resources is more destructive than for cropland. Forests around settlements degrade rapidly due to grazing and fuelwood collection. Therefore, if the conversion to cropland will occur in an ordered fashion, deforestation from this conversion can be reduced to 50%.
• driver 5 (Forest fires induced to "clear the forest understory)	25%. Management and land use plans explicitly restrict the use of intentional forest fires within the project area. In addition, during the discussions to design the management plans, the dangers of fires will be further explained. Some intentional fires will remain unavoidable. Therefore, land-use plans will reduce forest fires with 25%.
• driver 8 (Timber harvesting for local use)	25%. Idem.

3. Forest Protection

Improving forest protection is a key element in conserving carbon sinks in the project area. This strategy involves supporting local CFMC and community members as they demarcate forest boundaries, construct and maintain fire lines (which will increase forest stocks by sustaining forest regeneration), and patrol/protect forest areas. Project support provides training in forest management and planning and includes uniforms, vehicles, communication equipment, patrol huts, boundary markers and signage, and employment. These actions

increase the legitimacy of patrol groups in the eyes of outsiders and enhance status of CFMC members in their local communities. In addition, the project seeks to strengthen cooperative relationships between the local Forestry Administration staff, police, and military effort in order to create a unified group of stakeholders that can prevent further forest encroachment, illegal logging, forest fires set by humans and poaching. Similarly, forest protection activities prevent the unsustainable harvesting of fuelwood and timber for local use. The project will provide financial support to local Forestry Administration staff to develop a quick-response mobile unit to react to illegal forest activities in cooperation with local government, police, and military.

Illegal logging risks will be mitigated through a number of measures including demarcating boundaries and posting signage, blocking tractor access through trenching and other methods, regular patrolling, development of a network of patrol huts and fire roads to facilitate rapid movement, rapid response and confiscation of chainsaws and other equipment, and improve communications through the use of mobile phones. In addition, a case tracking system would be set up so that the prosecution of major offenders can be followed through. The project would support the CFMCs, local FA, NGOs, and other partners to create a cell-phone network to act as an early warning system to control illegal forest activities. Cell phone communications provides a low-cost way to strengthen coordination among the inter-organizational enforcement team. Text messages sent to all participating communities by a central server can be a rapid way to inform communities of fire or other threats. Workshops and meetings would be held to build team relationships. Support for enhanced mobility through financing of motorcycles, jeeps, and a pick-up truck will reduce response time. Previous work with communities has already increased their awareness and sensitivity to their land rights. This work led to a number of chainsaw confiscations during 2007 and 2008.

Project Action 3: Forest Protection	
	Forest protection measures are fully funded for the whole project period. It is assumed that full effect, or rate, of forest protection will be reached after 3 years, when all participating communities will have acquired experience to protect the forests most effectively.
Maximal reduction in driver-induced deforestation	
• driver 1 (Forest clearing for land sales)	100%. Migrant encroachers require a minimum amount of time, at least one week, to clear the forest to establish a settlement on encroached land. Routine weekly forest patrols and increased monitoring activity will ensure migrant encroachers are unable to settle, or are removed quickly. Forest protection activities will be able to prevent 100% of migrant encroachment.
• driver 4 (Fuelwood gathering)	25%. Without enforcing the rules in the management and land-use plans, it can be expected that some community members will still collect fuelwood in the forests. An effective patrolling system will reduce the fuelwood gathering by discouraging people to collect fuelwood. However, some fuelwood gathering will be unavoidable. Therefore, the reduction is predicted to be around 25%.
• driver 5 (Forest fires induced to clear the forest understory)	20%. Forest patrolling will increase the awareness of the communities to fire, and patrolling teams will be able to alarm the communities and the voluntary fire brigades sooner after a forest fire starts. Forest fires are far from avoidable, and therefore, this measure is projected to only reduce intentional fires with 25%.
• driver 6 (Forest fires induced by hunters)	50%. Forest patrolling will discourage hunters from trespassing in the project areas and inducing forest fires. Hunters usually operate alone and within a timeframe of one or more days. Therefore, similar to the previous driver, it is assume that forest fires induced can only be avoided for 25%.
• driver 7 (Illegal logging for commercial on-sale)	90%. Cooperation between local communities, police, and Forestry Administration staff and the distribution of equipment to aid in patrols should be able to reduce 90% of deforestation associated with illegal logging. Illegal logging operations require large amounts of equipment, and sufficient time to fell trees. Frequent patrols

	will eventually persuade illegal loggers to discontinue operating in the project area. For example, in 2007, with project support, the Samaky CFMC has been successful in reducing illegal logging from an estimated 100 m^3 per year to 20-30 m^3 per year in the first year of implementation. This has largely been accomplished through implementation of community patrols. Community based monitoring is often the most effective way to prevent illegal logging as local stakeholders are most familiar with their forest lands and can directly report illegal logging operations to authorities. It is expected that the patrolling will be able to reduce illegal logging with 90% once fully operational.
• driver 8 (Timber harvesting for local use)	50%. Timber harvesting is severely restricted in the management plan. Forest patrolling will effectively enforce this rule. Some minimal timber harvesting will still be allowed, at a rate of about 50% of pre-project conditions.

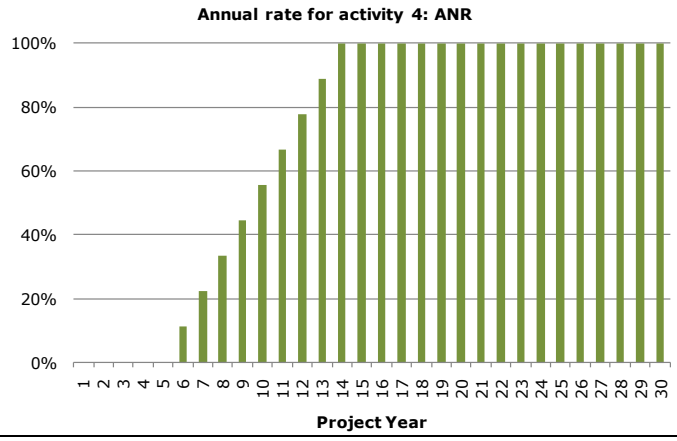
4. Assisted Natural Regeneration and Enrichment Planting

The project will also rely on forest restoration utilizing low-cost Assisted Natural Regeneration (ANR) techniques to restore forest cover and accelerate carbon sequestration rates on approximately 5,355 new hectares of degraded forest over 9 years of the project. The project proponents have the capability to manage a total of 2,000 ANR ha per year including new treatment areas and revisiting (maintaining) treated areas for years 2013 to 2030. Scattered patches of degraded forest with 10 to 20% crown cover will be improved using silvicultural techniques for ANR. The ANR activities will be focused in areas that would regenerate poorly without any intervention due to severe degradation. Community members will be employed to plant tree seedlings in forest openings and carry out silvicultural activities such as clearing degraded forests of weeds and cleaning healthy tree stumps and thin shoots to encourage growth. This activity is designed to generate approximately 20 days of employment per project households during the agricultural off-season (February through April).

Apart from the fire control, the CFMCs will plant approximately 60,000 tree seedlings each year in forest gaps between areas being treated with ANR. The planting is scheduled to begin in 2013 and continue through 2030, with a budget allocation of $30,000 per year. During the first 2 years of the project, assessment of where natural regeneration potential is lowest, and where need for enrichment planting is greatest, will be undertaken. Trees to be planted will include the unique endemic species *Afzelia xylocarpa* (beng), a high value

deciduous, broad leaved tree which coppices well. Coppicing species allow for harvesting of wood from the same stumps preventing the need to fell new sections of forest. If the demand for fuelwood increases beyond the production of deadwood in the protected forests, and coppice culture, then fuelwood generating small woodlots will be planted. Communities are eager to regenerate the high value beng species and other indigenous trees, as well as to incorporate cashews, jackfruit, mangoes and other non-invasive fruit trees in the degraded forest areas. Harvesting of these crops will replace the need to clear land for agricultural subsistence purposes, and can eventually be sold at market as cash crops.

The locations of the ANR activities were selected using a three-step process; (1) priority areas were selected based on forest present in 2000, but deforested in 2008, that were within 5 km of settlements, and are land-mine free, (2) in community map-sketching meetings, the map of potential ANR areas was presented to the local communities for them select the areas they felt they can manage and have highest potential for recovery, (3) communities then used the sketched maps and a hand-held GPS and directly mapped areas for ANR, concrete management plans are being developed.

Project Action 4: Assisted Natural Regeneration	
	Assisted natural regeneration activities consist of (1) silvicultural activities such as thinning, removal of exotic and invasive species, and coppicing, and (2) enrichment planting. Silvicultural activities are planned for years 3-20, while enrichment planting is planned for years 3-30. During the first year, a number of pilot activities are planned to find out the most effective way to optimize the regeneration. Therefore, the rate of the first year is set to 50%.
Maximal reduction in driver-induced deforestation	
• driver 2 (Conversion to cropland)	5%. Assisted natural regeneration will provide a significant source of income for many households that are dependent on subsistence farming for their food. It is expected that the employment from ANR will reduce the need to clear forestland for subsistence farming with about 5%.
• driver 8 (Timber harvesting for local use)	20%. ANR activities will reduce deforestation from local timber harvesting another 20% by providing a sustainable source of wood, reducing the burden on forestlands in the project area.

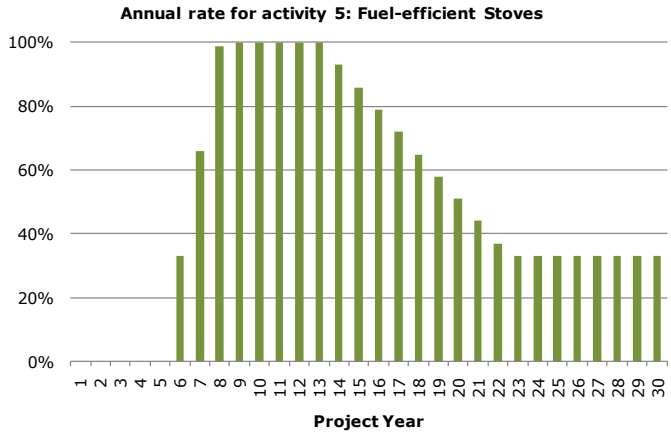
5. Fuel-efficient Stoves

The project will work with local NGOs to extend fuel-efficient stoves to all 8,000 households in the project area. Fuel-efficient stoves would be distributed at a rate of 1,000 cook stoves per year during 2009 – 2016 and continue supporting the cook stove program throughout the project crediting period. Such programs are reported to have a 70% adoption rate and reduce fuel consumption by up to 44%, and reports show that 30-40% efficiency is a reasonable objective (AFD and GERES 2009). Conservatively, a fuel consumption reduction of 20% is assumed. More than 95% of Cambodians use biomass as cooking fuel, typically fuelwood gathered from the forest in rural areas and charcoal in urban areas. While harvesting of fuelwood provides the added benefit of ground detritus clearing, which can help prevent forest fires, fuelwood is often harvested unsustainably and can lead to land degradation. Reducing the demand for fuel will lead to a direct reduction in the unsustainable harvesting of fuelwood. Different types of cook stoves are in use in the project area ranging from least efficient type such as three stone stoves to high efficient types such as Neang Kongrey Stove. The social assessments indicate that the implementation of the cook stove program can reduce fuel consumption by 44%. The stoves will cost approximately $3 - $3.75 each and will reduce fuelwood consumption by 2.5 to 2.8

metric tons per stove per year, reducing the approximate annual CO_2 emission per stove by 4 Mg (AFD and GERES 2009). These fuelwood savings are achieved through the redesign of the Lao bucket stove, specifically improved insulation and airflow. However, some further research is necessary to optimize the design of the stoves and the outreach activates required to maximize adoption rates.

Table 17. Energy efficiency gain by implementing improved cook stoves program in project area.

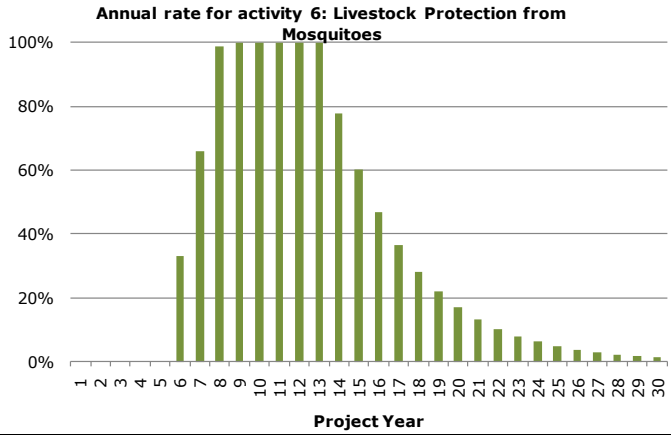
Type of stoves	Percentage of households using different type of stoves [%]	Fuel use [Mg DM yr^{-1} $Household^{-1}$]	Relative fuel use compared to three stone stove [%]	Net reduction in fuel wood with Neang Kongrey or similar stove [Mg DM yr^{-1} $Household^{-1}$]
Neang Kongrey stove	8.79	2.85	35	0
New Lao stove	26.74	2.63	55	0.52
Seam stove	1.10	3.29	75	1.31
Three stones	35.90	4.02	100	2.61
Traditional Lao Kg Chhnang stove	2.56	2.56	80	1.14
Traditional Lao stove	24.91	2.40	85	1.20

Project Action 5: Introduction of Fuel-efficient Stoves	
	The project plans to distribute 500 fuel-efficient stoves annually for year 3 until 10. It is assumed that a fuel efficient stove has a lifetime of about 3 years. Therefore, from year 5 onwards, when the project activity has the greatest effect, on average 1,500 stoves will be active. During years 3-10, 500 stoves are anticipated to become defunct while still 500 stoves are introduced by the project. After 10 years, no more stoves are distributed, and the activity rate will go down with 500 per year. However, around 10 years, it is assumed that 33% of the people that once had a fuel-efficient stove will purchase or maintain a fuel-efficient stove due to the higher efficiencies, and the fewer time required to gather fuelwood. This represents around 5% of all the households in the project area.
Maximal reduction in driver-induced deforestation	
• driver 4 (Fuelwood gathering)	7.5%. Fuelwood is primarily used in communities as cooking fuel. In total, 5,000 stoves will be distributed over 10 years. However, at the maximal rate, 1,500 out of 8,000 households will be using a fuel-efficient stove that uses 45% of the wood compared to a conventional stove. With 10,000 households expected around year 10, the introduction of fuel-efficient woodstoves is anticipated to reduce deforestation from fuelwood at a maximal rate of 0.45*1,500/9,000 = 7.5%.

6. Livestock Protection from Mosquitoes

One of the largest contributors to fuelwood consumption is the burning of wood to generate smoke for the purpose of repelling mosquitoes around cattle and water buffalo enclosures. Livestock are the most valuable possessions rural farmers have, often worth years of wages. Protection of these animals from insects and related maladies is of utmost importance, and often the lowest cost option is to generate wood-smoke to repel mosquitoes. The project would provide integrated insect repellent measures including large mosquito nets treated with insecticide, insect repellent sprays or wipe-on solutions at a

reduced price to local households to cover livestock pens. These measures will be corroborated by awareness activities in the project area to reduce mosquito infestation and promotion of natural repellents such as Eucalyptus oil. These measures will dramatically reduce the amount of fuelwood consumed by rural families, and will help to decrease the burden on forest land. These measures will be made available through revolving credit associations, as they are often too expensive for farmers to purchase outright.

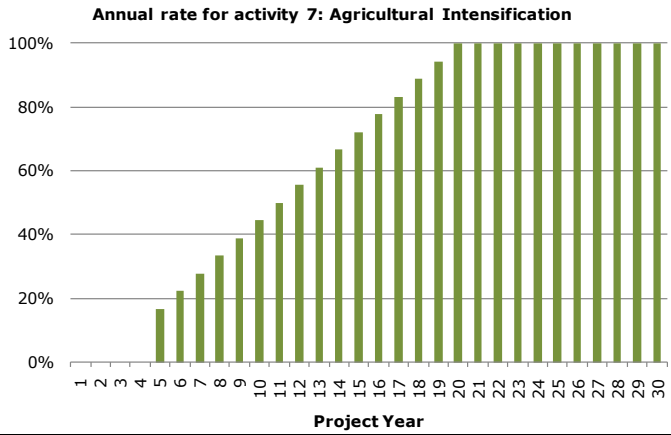
Project action 6: Introduction of Livestock Protection Measures	
	Analogously to fuel-efficient stoves, mosquito nets are introduced from years 3 until 10. About 700 mosquito nets per year will be distributed. Similarly to fuel-efficient stoves, a lifetime of 3 years is anticipated, while no mosquito nets will remain in use in the project after subsidizing by the project has terminated.
Maximal reduction in driver-induced deforestation	
• driver 4 (Fuelwood gathering)	25%. Mosquito netting can replace the use of wood smoke completely to repel mosquitoes. At a maximal rate of 2,000 households per year, deforestation from fuelwood collection for mosquito repelling will be reduced with 2,000/8,000 = 25%.

7. Agricultural Intensification

Extensive tracks of forest land are being cleared around the project area to create additional farmland. While additional agricultural land is being created, crop yields remain very low when compared with neighboring countries in Asia (e.g. Thailand and Vietnam). Interviews with communities in Oddar Meanchey indicate that rain-fed rice yields are averaging between 1 to 1.5 metric tons per hectare, while Thai and Vietnamese farmers may obtain yields 4 to 5 times this much for the same area.

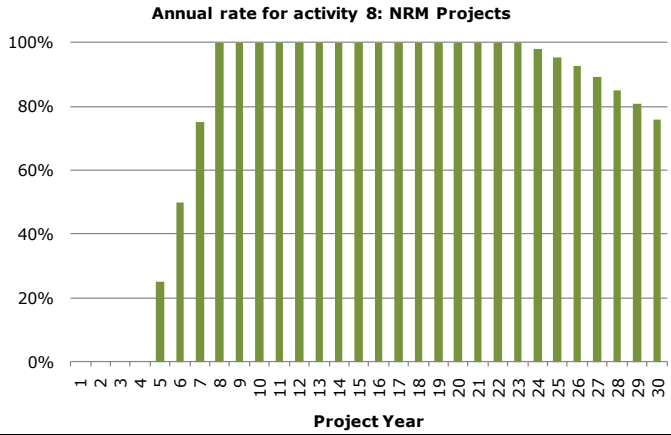
Improved farming systems, as well as better access to irrigation, financing, and markets could allow existing farmland to become two to three times as productive. In order to take pressure off further forest clearing for agriculture, the project would provide technical and financial support to local farmers to develop sustainable techniques to increase productivity. Techniques would include organic fertilizers, vermiculture, and access to improved seed

varieties (non-GMO). The project would also provide communities with the resources needed to develop better water sources for irrigation. Project support would target innovative local farmers who are willing to demonstrate the new techniques to their neighbors. Training local farmers to improve efficiency instead of moving to new land in search of better soil will significantly decrease the amount of forestland needed for agriculture, and provide teachable and demonstrable techniques that can be passed between communities.

Project Action 7: Agricultural Intensification	
	Agricultural intensification measures are planned from years 3-20. Every year, 60 new farmers will be introduced in the system. In addition, it will take time to build out marketing networks for alternative crops and commodities. Therefore, the effect of agricultural intensification will increase linearly until year 20.
Maximal reduction in driver-induced deforestation	
• driver 2 (Conversion to cropland)	30%. Intensifying the current agriculture from the subsistence level using higher-input sustainable practices can reduce the need of future households to deforest the land. It is planned to introduce high-input farming practices to 60 farmers per year during years 3-20. At year 20, around 1,000 (60 x 18) households will be affected. It is expected that yields can increase by 300% due to optimized practices, and that for every household that is participating in the program, another farmer will spontaneously adopt due to the inherent financial advantages of optimized practices. At year 20, it is expected that around 13,000 will be present in the project area. The 2,000 households using optimized practices will increase production to 130% (2,000*3 + 11,000)/13,000 of the without-project reduction. This increase in production will lead to a cropland conversion-induced deforestation rate of the same magnitude.

8. Natural Resource Management Projects

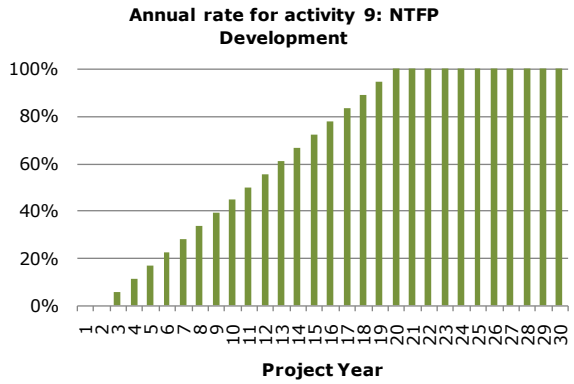
Many project communities have requested assistance to develop their domestic water resources, especially the de-silting of tanks. The project would give 10-15 small grants each year ranging in size from $1,000 to $2,000, to communities based on their water resource development proposals. Proposals will be evaluated on both the immediate and long term benefits of the proposed water resource developments, as well as the feasibility of implementation. Projects would include de-silting tanks, tube well drilling, drinking water system development, and installation of purification technologies. Additionally, the project will also consider the use of irrigation and other agricultural water distribution technologies, as both decrease the amount of water needed for agriculture and improve the productivity of farmland. In addition, water impoundments will be installed at strategic positions within the forest area to facilitate firefighting during the dry season, as well as function as additional water sources for wildlife.

Project Action 8: Natural Resource Management Projects	
	Natural resource management practices are fully planned from year 3 until the end of the project. Due to the nature of the projects, measures will be instantly effective.
Maximal reduction in driver-induced deforestation	
• driver 5 (Forest fires induced to clear the forest understory)	20%. Water resource management projects will include the establishment of water impoundments within the forest for firefighting which are expected to reduce carbon emissions from forest fires about 20%.

9. NTFP Development Activities

The project plans several livelihood enhancement activities to boost the incomes of project households. These include enhancing production, processing, and marketing of non-timber forest products including honey, rattan, and bamboo and resin oil. The sustainable management and sale of these products will help to increase rural income, shifting the

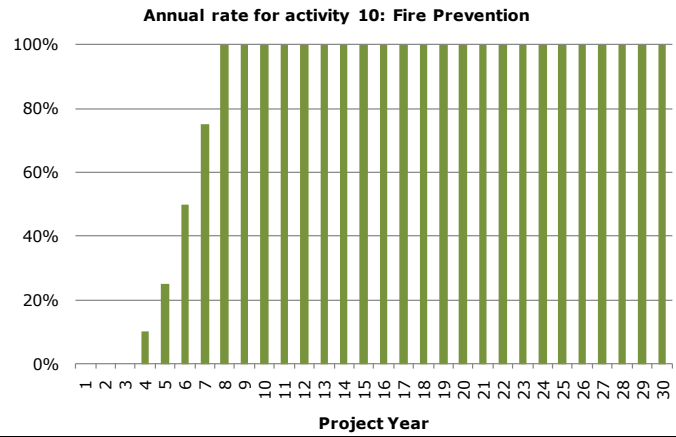
burden from the sale of agricultural and timber products, and reducing the need for cropland. The project will also assist communities in establishing micro-finance accounts that can receive small grants from carbon income, allowing capital formation to be used for revolving loans for education, health, and small enterprise development. Small grants will be awarded to farmer-innovators who wish to perform trials of new sustainable and intensive farming system techniques.

Project Action 9: NTFP Development	
	Non-timber forest product development activities are supported during years 3-20. Similar as to agricultural intensification measures, a period of 10 years is assumed before these will be fully effective because marketing networks must be developed, etc. A final adoption rate of 50% is assumed after terminating the project's support for these activities.
Maximal reduction in driver-induced deforestation	
• driver 2 (Conversion to cropland)	10%. The development of non-timber forest product enterprises supplements the income of households that are mainly dependent on subsistence agriculture for food. In the end, the REDD project will support 40 projects in total. Each project provides employment for about 15 households, or 600 households in total at year 20. Since 5,000 new households are expected from the project start until year 20, this will reduce the need for cropland expansion with about 600/5,000 = 10%.

10. Fire Prevention

The project would also facilitate the implementation of fire prevention techniques in forestlands. These techniques include the creation of fire breaks, 5 meter wide fire lines and buffer areas surrounding forests and agricultural lands, removal of dead forest debris, regulation of the use of forest fires for hunting and to "clean" the land, and education about preventing fires from cooking stoves. CFMC will facilitate the annual clearing of fire lines that can also be used for forest patrolling, and will be responsible for forming volunteer fire brigades of village youth who are trained in fire control and equipped with tools. Fires used for hunting of game, the cleaning of forestland for settlements, shifting cultivation, and to collect tree resin often grow into larger forest fires. Prevention and education about the

effects of these practices, as well as implementation of fire management measures (e.g. controlled forest fires every 5 years instead of the current practice of annual fires) will be organized during the stakeholder meetings and the discussions around the Participatory Land Use Plans. Education and prevention can markedly reduce deforestation and forest degradation from fires. However, there is a lack of information on the ideal forest management. Data from the participatory forest biomass inventories (which includes a quantification of dead wood) will be very helpful to discuss fire prevention measures and support management decisions on fire prevention and control measures.

Project Action 10: Fire Prevention	
	Fire prevention activities are planned from year 4 of the crediting period until the end of the project. A learning period of 5 years is assumed until fire prevention activities are fully effective.
Maximal reduction in driver-induced deforestation	
• driver 5 (Annual forest fires induced to "clean" the land)	25%. Fire prevention measures including the clearing of some dead-wood and the construction of fire lines will help to prevent the spread of intentional and natural forest fires. It is expected that the occurrence of fires will reduce with about 25%.
• driver 6 (Hunters inducing forest fires)	25%. idem

G3.3. Map Identifying Location of Project Areas and Leakage Areas

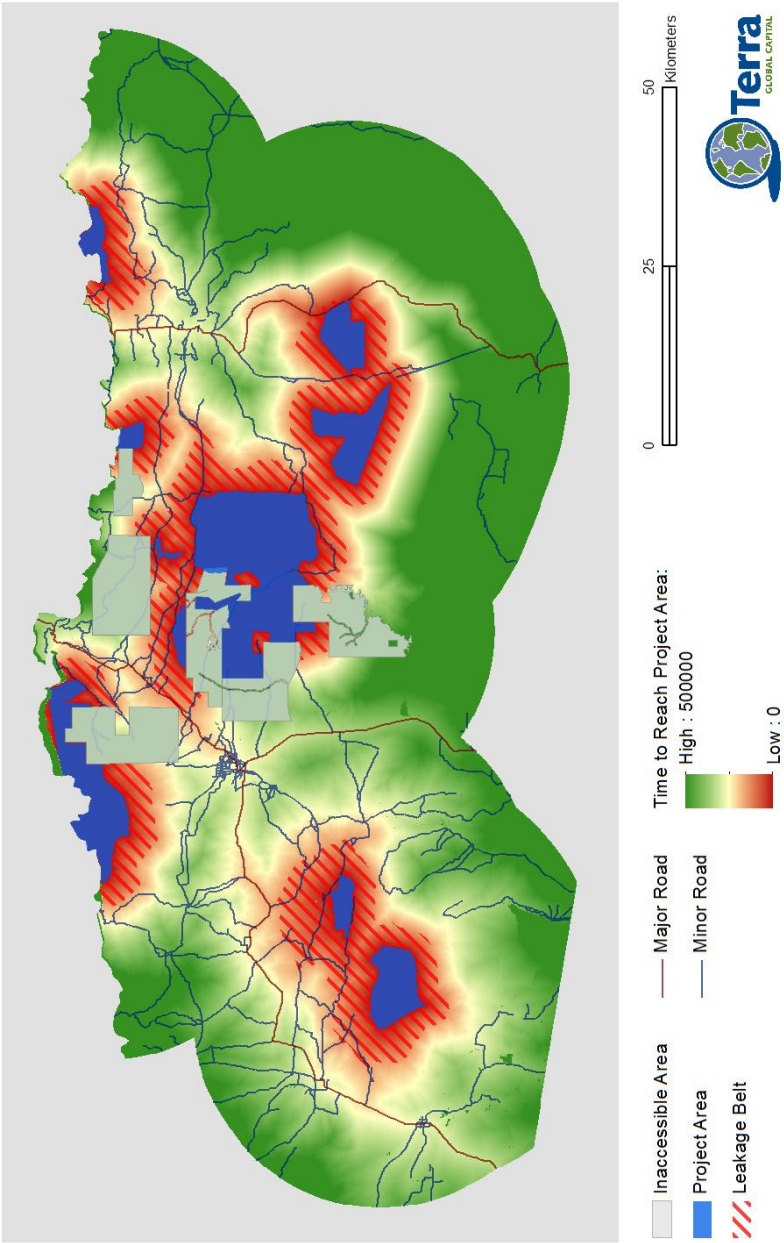


Figure G10. Location and Extent of the Leakage Area.

The leakage area was selected to be sufficiently large to encompass all forests around the project areas that could be under higher pressure during the project's lifetime. The location was selected by taking into account the "cost" that local agents of deforestation need to incur to move their activities. It is assumed that leakage will only occur when the cost to displace the deforestation activity is below a certain threshold or is less than alternative resources. To select the extent of the leakage area, this threshold was set conservatively.

Leakage from drivers of deforestation that are not constrained by geography is discounted for by using a factor approach.

G3.4. Definition of Project Lifetime and GHG Accounting Period

The project begun in 2008 after years of community work and a 12 month project preparation period that involved stakeholder consultations, PRAs, mapping, boundary demarcation, community training and negotiations with Royal Government of Cambodia, and technical partners. The project has no planned end date, as the communities will continue to renew their community forest tenure registration every 15 years, and will continue to manage their forests sustainably into the future.

In the first two years of the project, the focus was on working with communities to secure land tenure, building capacity for implementation with partners, providing limited support for community patrolling, developing a dually validation VCS methodology and collecting all the field data required to support the development of the CCB and VCS PDs. The project had limited capacity to implement the full spectrum of project activities as detailed the project workplan provided to the validator, but through securing funding will increase implementation in 2011.

The project crediting period under the VCS is 30 years, which reflects the first two periods of community tenure. Though the crediting period is 30 years, the benefits and the returns from the project will last far beyond this timeframe. Trees are a long lived species and the forest will endure beyond the 30 years provided management and protection schemes remain in place. Reforestation that takes place within the project timeline will create habitat corridors and refugia desperately needed for threatened and endangered species. If these species are protected within the project timeframe they can be expected to live on past the life of the project. Lastly social bonds, education and lessons learnt will be gained forever in the hearts and minds of the local communities.

G3.5. Identification of Natural and Human-Induced Risks and Mitigation Strategies

The project faces a number of potential risks, as outlined below, to expected climate, community and biodiversity benefits. The following are not an exhaustive list of potential project risks, but represent the most likely risks anticipated by the project team. For each identified risk, the specific benefit (i.e. climate, community or biodiversity) at risk as well as the mitigation strategies, have been identified.

1. Community lack of effectiveness to control their CFs and loss of confidence in CFMCs leads to continued deforestation and degradation

Benefits at risk: Climate, Biodiversity, Community

Unclear land tenure, or inability to enforce Tenurial rights in the project area, may lead to a lack of effectiveness of the CFs to control their forest areas and effectively prevent continued deforestation and degradation. This may pose a risk to the expected climate and biodiversity benefits of the project. A lack of CF control would likely lead to continued illegal logging and large-scale forest clearing, and carries the potential to undermine the CF community support for the CF concept in Cambodia leading to ongoing community-based deforestation and degradation pressures. If faith in the CF process and associated benefits erodes over time, the climate and biodiversity benefits that have accrued as a result of the project may be threatened. Continued deforestation and degradation would lead to continued GHG emissions and a breakdown in forest-related environmental services, and fragmented forest areas and continued poaching would threaten wildlife and biodiversity. There are also community risks associated with a loss of confidence in the CF and CFMC framework. Social cohesiveness may erode within communities as some individuals and households abandon their commitment to the CF, and conflicts may arise as community members begin unsustainable land-use practices , or as individuals from outside the CFs encroach on forest areas formally managed under as a CF. Land-use disputes in increasingly scarce forest areas may create larger social conflicts, threatening the viability of the project and leading to increased deforestation and degradation.

To prevent this, the project has tried to sustain the authority of the CFMCs over the project forests through facilitating RGC-MAFF approval of their legal status and the formalization of CF agreements as a condition for project implementation. The project will also bring together a provincial level working group with the cantonment-level Forestry Administration and Local Government officials to monitor project implementation. This will include the Special Provincial Advisor (SPA), the Deputy Cantonment Chief in Charge of Community Forestry Programs, as well as relevant District Governors. The project seeks to provide special support to local public agencies and governments to build their capacity to partner with project communities in forest protection. As one consultancy report concludes: "The main stakeholders among the public sector institutions, especially at the provincial and district level, lack the logistic means and human capacity needed to meet the challenges of sustainable natural resource management." (Van Acker 2003). The project hopes that, by addressing these weaknesses, a coalition of public institutions and community groups can develop and implement longer term natural resource management plans and strategies.

In addition, a Provincial Community Forestry Federation will be established with representatives from project areas to coordinate CFMC activities. The project also builds support and visibility within national government and the donor community by designating the Technical Working Group for Forests and Environment (TWG-F&E), a multi-donor committee established to coordinate donor activities in Cambodia, to monitor and administrator carbon revenues.

The project also provides for institutional strengthening of the CFMCs and activities to engage the project communities such as Assisted Natural Regeneration (ANR) and forest protection. Uniforms, identification cards, equipment and financial support for the CFMCs will help formalize forest protection activities and enhance the status of CFMCs members in their communities. These actions will also increase their legitimacy in the eyes of outsiders. There is a risk that increasing status and dominance of the CFMC members leads to conflicts within the community due to jealousy or feelings of being left out and not getting direct access to benefits. Regular meetings of the CFMCs and community members are scheduled to discuss management issues and project priorities. Finally, the project will monitor benefits flowing to community members every 2 years to ensure equity in access to employment and development activities. The local Forestry Administration officers, the Children's Development Association, and the Oddar Meanchey Buddhist Monk's Association will also be involved in providing training and capacity building to project CFMC members and executive officers. They will also be engaged in monitoring community performance and motivational levels on an ongoing basis throughout the life of the project. CFMCs will be knowledgeable regarding the linkage between carbon revenues and the project activities and grant programs that they fund, as well as the ability of CFMCs to protect and restore forests. As a consequence, a direct financial incentive will be maintained to encourage and motivate participating communities to succeed in forest conservation and regeneration efforts.

2. Population growth causes continued or increased agricultural expansion into forest areas in the project area

Benefits at risk: Climate, Biodiversity

It is estimated that the population density will increase from 17 people per square km in 2006 to 28 per square km in 2021 in the Oddar Meanchey Province. While this is still only 10% of the density in provinces in the Lower Mekong Basin, it represents a 60% increase in population over a 15 year period and an annual growth rate of 2.74%. This value may double or triple depending on immigration rates (SCW 2006), however as available forest

lands decrease it is anticipated that migration into the province will slow. Increasing population will necessitate an expansion of agriculture areas into existing forests in order to provide sufficient subsistence crops. Burning of forest areas to clear land for agriculture carries significant risk to surrounding forest areas and biodiversity if fires spread. Newly cleared agricultural areas lead to an advancing pattern of degradation which can quickly spread degradation and deforestation into forests. This pattern poses a serious threat to the expected climate and biodiversity benefits of the project

The project will work with the participating communities to assist them in developing long term resource management plans for their CF areas as well as other natural resources in the leakage belt under their control. This process has been effective in communities in Ratanakiri Province in stabilizing land-use patterns for the extended periods of 1989-2008 (Fox 2008). In one case, Krala Village was able to retain virtually their entire Protected Forest over a 20 year period. A review of forest management plans in Cambodia conducted by the Community-based Natural Resource Management Learning Institute (CBNRM-LI) concludes that collaboratively designed forest management plans are "particularly useful in areas with many land-use conflicts or high degradation of natural resources…and prepares the ground for the creation of Community Forestry Groups…"(Bunnara et al. 2005). The key is to involve the entire community in a land-use planning process that clearly demarcates conservation forests, as well as anticipating future agricultural land resource needs based on community priorities. This includes ensuring that forest and land resource management regulations are formulated by the community and sanctions are put in place. The project will guide communities in identifying appropriate areas for future settlement and agricultural expansion while clarifying and demarcating areas for permanent forest conservation.

The project will also actively promote and support agricultural intensification rather than further forest clearing. Most families have sufficient land in terms of their labor availability, and consequently the amount of arable land is less of a constraint than the availability of farm inputs or water from irrigation. As a result, increasing yields is likely the best way to enhance food security and farm income. A study in Mondulkiri of similar forest dependent communities found that overall rice sufficiency ranges from 2.6-6.1 months per year. Low productivity was related to poor soil, irregular rainfall, and low input techniques (Evens 2003) with rain-fed paddy yield averaging around 2 Mg ha^{-1}. Paddy yields could double, reflecting averages across the border in Thailand through the adoption of improved farming practices and better irrigation access.

The project will also provide communities with extensive information on sustainably productive farming systems and provide small grants to innovative local farmers willing to conduct cropping trials.

3. Loss of carbon stocks through fire, illegal felling, and land clearing

Benefit at risk: Climate

The baseline drivers of deforestation, in particular use of fire, illegal felling of timber and land clearing for agriculture and community expansion, all cause significant GHG emissions that threaten the climate benefit of the project. Although project activities have been designed specifically to address these drivers, it is possible that activities will not be as effective as anticipated, or that certain activities will not be adopted by the CFs.

This project proposes to reduce risk of carbon leakage from land clearing, illegal felling and fire by building strong partnerships between the Forestry Administration, CFMC, and local NGOs at the field (triage) and provincial level. The Forestry Administration's Siem Reap Cantonment will be funded to undertake special protective activities within the project areas. A project support team comprised of the implementing organization, the local FA, NGOs, and civil society organizations will support a process of building community management capacity, clarifying and formalizing community management rights and duties, providing support to communities for enhanced patrolling and organized fire control.

Fire risk will be mitigated by the CFMCs through the clearing of fire lines that can also be used for forest patrolling. Fire lines will be cleared annually before the fire season in January and February. CFMCs will be responsible for forming volunteer fire brigades of village youth who are trained in fire control and equipped with tools. Fire brigades may be linked to sports clubs or other youth associations which are supported with sports equipment as an incentive for participation. Illegal logging risks will be mitigated through a number of measures including demarcating boundaries and posting signage, blocking of tractor access through trenching and other methods, regular patrolling, development of a network of patrol huts and fire roads to facilitate rapid movement, rapid response and confiscation of chainsaws and other equipment, and improved communications with FA through two-way radios and cell phones.

Land encroachment will be addressed in three ways. First the CFMCs will take responsibility for meeting with new migrant communities and leaders, as well as local government to clarify the boundaries of the project area, resolve any existing conflicts, and emphasize the intention of the CFMCs to secure the area. Communities will be encouraged to inform

prospective migrants that the forests are protected and that there are no opportunities for new migrants to the area. This message is already being sent by word-of-mouth to more densely populated provinces and immigration appears to be slowing. Second, the CFMCs will demarcate boundaries with pillars and signage, maintain regular patrols, and call in the support of the local FA, police and military as needed. These actions will be coordinated with commune chiefs and district governors. Third, villagers who established in-holdings within the CF areas prior to the project will be asked to sign contractual agreements with the CFMC that will allow them to continue farming provided that they do not expand further into the forest area. They will also be forbidden to sell their in-holdings to any outside person.

4. Insufficient Funding or Inappropriate Use of the Revenues

Benefits at risk: Climate, Community, Biodiversity

The implementation of project activities is wholly dependent on the revenues generated by the sale of carbon credits. There is no guarantee that the VCUs sold from the project will generate sufficient income to allow project implementation. Similarly, there is potential for misuse of project revenues, which could lead to inability to implement the full suite of project activities planned by the project. Given that the project activities have been tailored to target each individual driver and agent of deforestation, the inability to implement one or more of these activities may threaten the ability of the project to reduce deforestation and degradation as planned. This would in turn create less revenue than required, threatening the ability of the project to continue to operate. In this case, all three CCB benefits would face significant threats.

Project planning and implementation costs are funded through an grant from the Cambodia Technical Working Group on Forests and Environment (TWG-F&E) and the on-going carbon income. These costs have been estimated and budgeted for the life of the project and in the initial years the ability for carbon to pay for project costs is based on estimates of potential net carbon income. Depending on the price of carbon and payment schedule for carbon payments, this cash flow may need to be augmented with additional grants in the early years of the project. Once the project is validated, any potential funding gap can be identified and additional funding sources can be secured.

Project participants will use a tool called the "Local Governance Barometer", developed by PACT, which is a participatory method for improving governance. This tool will be adapted to the project conditions. This will be one strategy to ensure transparent and accountable use of carbon revenues, as well as improved governance.

The project is developing a mechanism for the allocation of income from the sale of carbon credits, after project costs and management costs for the project are covered, that will be acceptable to participating communities, the Forestry Administration, the provincial government, the implementing organization, and the buyer. The goal of allocation will be to direct income from carbon credits to benefit participating communities, restore the health of forests and develop new REDD projects according to the directions of the Council of Ministers of the Royal Government of Cambodia (Sar. Chor. Nor 2008) after project development and management costs for the implementing agency and the FA are covered. It is proposed that the carbon revenues be managed by the TWG-F&E, with allocations made annually for project implementation costs based on the approved annual work plans. Any net revenues generated after project costs and management costs for the project are covered would be placed initially in a project grant fund administered by the TWG-F&E, and in the future into a national fund for forestry or water resource development. Net carbon revenues may be channeled into CFMCs accounts that will support livelihood activities for project communities, support water resource development activities, as well as finance the development of new REDD and A/R projects. The allocation plan will also assess how community carbon payment funds are managed in terms of technical support, institutional capacity building, reinvestment in forest restoration and economically productive forest enterprises, etc. Annual audits on project funds will be competed at the end of each year.

5. Site Preparation will Disrupt Local Ecosystems

Benefit at risk: Biodiversity

Project activities, specifically Assisted Natural Regeneration, rely on site preparation activities such as thinning, stump clearing, multiple-shoot cutting and weeding. In some situations, these activities can cause disruptions to local ecosystems.

The project will employ local communities to undertake all the manual labor required for Assisted Natural Regeneration activities. No disturbance to soils or use of heavy equipment is anticipated as part of the site preparation. Further, the project team will make every effort to ensure that site preparation activities do not negatively affect any significant biodiversity in the project area.

6. Detrimental Environmental Effects of Fertilizer and Pesticides

Benefit at risk: Biodiversity

Although it is anticipated that farmers in participating communities may use more fertilizer to encourage the growth of saplings for enrichment planting activities, as well as in their

agricultural fields to improve yields, no use of pesticides is anticipated, and thus no significant risk to biodiversity is anticipated. It is possible that the use of fertilizers amongst CFs increases beyond the planned increase envisioned by the project, particularly if education around the use of fertilizers is not sufficient to ensure adoption of optimum volumes of fertilizers for specific crops and soil conditions. Uncontrolled use of fertilizers may lead to environmental hazards, for example runoff into local water supplies which may threaten surrounding households and local fauna. The project will seek to encourage the use of organic farming techniques in the project area to reduce the use of chemical fertilizers. Ongoing monitoring of fertilizer usage and its effectiveness will be monitored by the project on a regular basis.

7. Insufficient Technical Capacity to Coordinate and Implement Project Activities Among Stakeholders

Benefits at risk: Climate, Community, Biodiversity

The project requires the cooperation of a variety of stakeholders and community groups in implementing a complex set of strategies and activities to control the drivers of deforestation, and to implement comprehensive monitoring program. While the project team is highly committed and comprised of individuals with sufficient expertise and experience to carry out these activities, it is nevertheless a challenge to bring all of the objectives to fruition. The length of the project is highly likely to result in a change in the members of the project implementation teams, requiring the training of new stakeholders and the transfer of a significant amount of information and expertise. In addition, given that there are a variety of stakeholders involved in project implementation and ongoing monitoring, there is a possibility of irresolvable conflicts between stakeholders. Local communities responsible for the implementation of project activities may lose confidence that the project is in their best interest from a livelihood improvement perspective, and no longer continue to participate in the project. Similarly, the project communities may not adopt project activities at the rate that has been anticipated, or some planned activities may end up being unsustainable or too difficult to implement in practice. These factors pose a risk to all three expected CCB project benefits.

8. Natural Disturbance Threatens Forests in Project Area

Benefits at risk: Climate, Community, Biodiversity

Although the risk of natural disturbance in Oddar Meanchey is relatively small, there is potential for significant forest disruption. Forest fire occurs annually in the project area and therefore does not allow build-up of fuel for wildfire. Naturally occurring forest fire is not

widespread and not considered a serious threat to the forests of Cambodia. Nevertheless, shifting climactic patterns may lead to a rise in the incidence of large-scale natural forest fires in the future. To mitigate both natural and man-made fires, fire prevention activities are in place. The local forestry professionals are trained for fire prevention measures. The fire control equipments and tools are in place in each of the community sites. Fire awareness programs are conducted by Forestry Administration in the project area.

Forests in the project area are comprised of a mixture of several different species. The conventional knowledge suggests that natural stands of tropical forests, characterized by high species diversity, are free of pests and diseases. The project area will also be maintained for biodiversity preservation allowing multiple tree and plant species to flourish. Such diversity in species composition acts are natural prevention of pest and disease outbreaks.

The project area is in tropical region with distinct climate i.e. dry and wet season. The area is far from coastline and the weather is stable and predictable. The natural ecosystem in the area is adapted to handle seasonal weather pattern. No devastating weather event has occurred in recent history in the project areas. Since the entire country is protected by the surrounding mountains, the project is least likely to suffer from extreme weather events such as typhoons or even severe storms.

9. Changes in Domestic Policy or Armed Conflict
Benefits at Risk: Climate, Community, Biodiversity

While each of the CFs have received formal government approval and land tenure, the possibility remains that the legal and political framework enabling this changes in Cambodia. This could theoretically lead to revocation of CF agreements that threaten the land tenure of the CFs involved in the project. Similarly, the involuntary resettlement of CF communities to other areas is a possibility. Encroachment by the military into the forests of the project area by the military for camps and resettlement of soldiers presents another potential situation where the viability of the project would be threatened. In addition, the ongoing border conflict between Thailand and Cambodia may cause ongoing military operations in Oddar Meanchey and pose a threat to the safety of the project and ability for the CF communities to implement project activities.

Given that the Forestry Administration is the project proponent, and that the project currently has support from the Prime Minister, the risks of project cancellation due to political reasons is not anticipated to be significant. The project will continue to maintain

open relationships and dialogues with relevant government stakeholders to ensure that these factors do not pose a significant threat.

G3.6. Measures to Ensure the Maintenance or Enhancement of High Conservation Values

During the assisted natural regeneration of forest resources, priority will be given to areas that are natural habitats for rare or threatened species. Enrichment planting will occur with unique endemic species including *Afzelia xylocarpa* (beng), *Dalbergia oliveri*, *Pterocarpus macrocarpus*, *Dipterocarpus tubinatus*, and others. During the biodiversity monitoring, unique habitat areas and species of exceptional importance for conservation will be identified so that project activities can focus on these areas and species.

The project seeks to ensure the maintenance of the cultural HCV areas by supporting traditional forest-dependent lifestyles through (1) clarifying the land-tenure and stewardship of the local communities over the forest they have been living in for centuries, and (2) by supporting the community's livelihoods through the various measures that are being financed from the carbon credits.

G3.7. Description of Measures that Will Be Taken to Maintain and Enhance Benefits beyond Project Lifetime

The project plans several activities to permanently enhance and support the incomes of project households. Example of such activities include supporting the sustainable harvesting, production and marketing of non-timber forest products including honey, rattan, and bamboo and resin oil. Through the micro-finance mechanisms and small grants supported by the project, small enterprises can be developed and farmers can enhance their production and yields without the on-going need for funding.

The education and training provided within the project is a direct investment in the social capacity of the communities that will be extremely valuable beyond the project lifetime.

A proportion of the funds will be used to develop other carbon projects within Cambodia. As a consequence, this project can serve as a catalyst for other forest conservation and poverty reduction projects.

G3.8. Involvement of Communities in Project Design and Provisions for Stakeholder Consultation During Project Implementation

Identification and Organization of Stakeholders and Communities Affected by the Project

The 58 participating villages were identified by a local Cambodian NGO, the Buddhist monks of the Samrong Pagoda, and the Cambodian Forestry Administration based on community interest in protecting local forests. The stakeholder communities are located around the 13 Community Forestry Sites to be included in the project. The 58 participating villages were selected due to their proximity to the forest, commitment to protect the remaining forests, and their capacity to form Community Forestry Groups and committees in compliance with the new Cambodian legal framework articulated in the national CF Sub-Decree. Virtually all forest dependent communities surrounding project forests have formed and joined CFMCs. These communities have expressed their desire to support and comply with the carbon project management plans in return for technical and financial support to build their stewardship capacity and local economy. An Oddar Meanchey Community Forestry Federation has been formed at the provincial level to create an ongoing mechanism that can support community forestry initiatives in the area in future decades. The Federation will be guided by elected representatives from all project forest blocks and will meet at least quarterly to review progress, identify ways to enhance forest conservation and productivity in sustainable ways, and address livelihood needs. Other stakeholders include the provincial and district governments, commune chiefs and councils, local NGOs and civil society groups, and the national and local Forestry Administration.

Involvement of Communities in Project Design

A series of meetings, mostly held between January and March 2008, was organized to involve the identified stakeholders in the project design process. This series of meetings coincided with field sampling and social appraisals. Additionally, a provincial stakeholder workshop was held on March 20th, 2008. The meetings had high levels of community participation in CFMC activities, and therefore helped to ensure that decision making is done transparently and through the consensus of group members. Given high levels of illiteracy in project communities and the complexities of carbon project modalities, the project development team communicated and shared project concepts with communities through a series of village meetings. The Children's Development Association (CDA) and the local Buddhist Monk's Association have met repeatedly with local village members and leaders to discuss community forestry management issues and the guidelines for participating in a carbon project. In April 2008, contracts were signed with both CDA and the Buddhist Monk's

Association to provide them with resources to hold a series of additional meetings with all project communities to discuss the procedures and modalities of the REDD project including introducing the concept, benefits and risks, as well as exploring the current situation and existing problems that communities are facing. This information has been used to formulate contractual agreements with local communities covering project participation, as well as in designing the annual work plans for technical and financial assistance. In early 2009, a Cambodian-language (Khmer) color brochure was produced describing the project, goals, benefits, risks, and project strategy. This brochure is being distributed to all project communities with follow-up discussion meetings. The Forestry Administration has held specific meetings with local provincial and district government, communities, and regional military commanders to discuss the program and explain how it will operate. At the local government level, CFI sponsored and facilitated a series of meetings with local communes, districts and provincial government representatives in order to share program design ideas and explore interest. Finally, at the national level the project concept was presented to the Technical Working Group on Forests and Environment in November 2008 when the project was initiated. The TWG-F&E includes senior government policy makers and planners and donor representatives. The project received the endorsement of the TWG-F&E, as well as the support of the Prime Minister (Sar. Chor. Nor 2008) who receives regular briefings on project developments from the FA. Key project documents including the initial concept note, Memorandum of Understanding (MOU), and field reports have been widely shared and some translated into Khmer. The project intends to post key documents on the FA website once project activities commence. The following sections contain a summary of the input of each of the stakeholder groups.

1. **Specific Inputs from Participating Communities.** Forest dependent communities are the primary stakeholders in the project area, since their livelihoods are heavily dependent on forest resources. Elected Community Forestry Management Committees (CFMCs) have been formed to organize and represent local forest-based villages. The project developers met with CFMC representatives from all 12 CFMC sites to ask their opinion and get input on the project design, key problems, and other development priorities. Local NGOs and CFI staff have been discussing forest protection activities with a number of the communities since 2004 and the communities are both aware and committed to the forest conservation project. For the most part, the problems and needs mentioned by the communities were very similar, as were their requests for support. All CFMCs have asked legal approval of their forest management agreements by the RGC. This was granted by the Royal

Government of Cambodia on November 19, 2008, with formal signing ceremonies scheduled for early April 2009.

Communities reported that forest fires remain a problem, though this mainly affects the dry deciduous forests in the lowland areas. They expressed that they would like to cut fire lines to better control the severity of forest fires, as well as mount an education campaign to discourage hunters from starting fires. A number of communities wanted to build more patrol posts. Water is also a problem for them and most of the project villages. Some wells have gone dry and the tanks are full of silt, reducing the water holding capacity in the dry season. Several villages requested support to hire local people to de-silt the tanks. Communities also requested employment opportunities to be built into the project design, especially during the off-season when there is little agricultural work available.

Communities have requested support from the Forestry Administration to address encroachment by more powerful stakeholders including the military and economic land concessionaires. The Forestry Administration has organized a series of meetings between 2008 and 20011 to inform other stakeholders of the project's goals and requested that they respect the boundaries of the CF areas.

The CFMCs also requested that the project design include funds for the construction of a large water tank to harvest rain water during the rainy season. They noted that they would like to restore their forests and would like to regenerate species like beng (*Afzelia xylocarpa*), a species that will regenerate naturally and coppices well if protected. Other desirable species include chres (*Albizia lebbeck*), koki dek (*Hopea helferi*), porpel (*Shorea cochinchinenesis*), ta trao (*Fagrea fragrans*), cheu kmao (*Diospyros cruenata*), and dai khala *(Gardenia ankorensis*). Most of these species have multiple uses and are endangered or threatened species. In addition, villagers would like to enrich plant species that are valuable, including cashew (*Anacardium occidentale*), jack fruit (*Artocarpus heterophyllus*), mango (*Mangifera indica*), and other fruit bearing species.

Some CFMC leaders reported that while initially the CFMC group members were reluctant to confront migrant encroachers, as they have become better organized they are actively confronting individuals engaged in illegal forest activities. The CFMC groups are also putting in place guidelines for the allocation of forest products. The CFMC groups have requested more of the following to strengthen protection: patrol posts, legal recognition from the FA for sites that are not yet approved, boundary

posts, fire lines, walking paths around boundary, two-way radios, motorcycle for patrols, some salary subsidies for night patrols, and uniforms. In addition, the communities would like to receive some livelihood development support including training on processing of hard resin, rattan, mushrooms, and poultry raising. The villages also expressed a need for improved access to schools. At the same time, the community requests the support of the local FA at the Triage (District level) to provide both technical training and guidance, as well as backstop community forest protection activities. Community members expressed that their biggest problems are food shortages during the dry season.

The primary stakeholder input has been the key to the design of the project support activities which will directly build their capacity to protect forests, while generating employment and income to local communities. Special projects funded under the project will reflect community priorities including water resource development, livelihood training and micro-financing, agricultural intensification, and related needs. Since annual work plans will be formulated with each CFMC, it will be possible to address community needs as the project is implemented.

2. **Specific Inputs from Buddhist Monks.** Another group of primary stakeholders are the Buddhist monks from Samrong Pagoda who established an 18,261 hectare community protected forest. The monks reported that there are a number of key needs to improve CF management:
   - CF signs around the perimeter of the CF area indicating the land-tenure;
   - Water harvesting tanks to create small reservoirs to fight forest fires;
   - Border demarcation (pillars);
   - Trenches ("canals") surrounding the CF area (5km has already been constructed;
   - Better cooperation with the Forestry Administration and local government
   - Financial support for CF patrols;
   - Encroachment by the commune chief in the southern part of the forest block.

   The monks seek financial assistance as well as support from the FA to deal with more politically powerful actors that are involved in forest crimes.

3. **Specific Inputs from Local Government.** Local Government representatives noted that they have no funding for meetings to discuss community forestry management issues at the provincial, district, or commune level. They requested funding to allow

provincial and district officials to travel to proposed and potential CF areas, as well to meetings with stakeholders to resolve forest conflicts.

4. **Specific Inputs from Civil Society Organizations.** The Children's Development Association (CDA), a local NGO, noted that they require salary and travel support for extension agents who are assisting the CFMCs. They requested support to begin active capacity building and training activities. They also seek assistance to cover the expenses of inviting FA officials to visit field sites and attend meetings of the CFMC groups in order to better resolve problems and provide guidance. CDA has played a strategic role catalyzing and supporting CFMCs emerging in the province. CDA has been included in the project design and budgets and would be responsible for institution building of the CFMCs, facilitating meetings and networks, and guiding forest management activities in conjunction with the FA.

5. **Specific Inputs from the Technical Working Group and the Forestry Administration**. In November 2007, CFI presented the Oddar Meanchey project concept to the TWG-F&E which is comprised of donor agencies working in the forestry sector in Cambodia and co-chaired by the Forestry Administration. The group unanimously approved the project concept of conducting a REDD pilot project in Oddar Meanchey. In March 2008, the Forestry Administration and DANIDA allocated funding to CFI to develop the project design and carbon certification and marketing. On May 26th, the Council of Ministers issued a legal proclamation Sor. Chor. Nor. 699 authorizing the Forestry Administration to work with CFI to sell carbon on behalf of the Community Forestry Groups (see Annex 1). The Forestry Administration is not only the seller, but a major stakeholder in the Oddar Meanchey REDD project. It also aims to develop additional REDD projects in Cambodia.

   The Forestry Administration staff at the Cantonment, Division, and Triage levels are also important stakeholders in this project with specific needs. Local FA staff comment that they have limited resources with which to provide extension and custodial support to the CFMC groups. They have requested project support to cover travel expenses to the forest areas including, transportation, gas and maintenance, and per diem for accommodation and food.

The stakeholder meetings with FA, Local Government, and civil society organizations generated a range of comments that were discussed, explored and integrated into the project strategy and work plan. Community comments, as well as those of other stakeholders provide the basis for formulating activities. This includes:

- improved forest protection through fire line construction, boundary demarcation, patrolling support including uniforms, huts, and communication equipment;
- employment for Assisted Natural Regeneration activities;
- small grants for water resource development;
- enhanced livelihoods through small enterprise training and micro-finance institution development.

Provisions for On-going Stakeholder Consultation during Project Implementation

The project will ensure regular community feedback through discussions between the CFMC and the implementing partner organizations including the local Forestry Administration, CDA, and the Buddhist Monk's Association. Project feedback will also be channeled through the Oddar Meanchey Community Forestry Federation with representatives from project communities. Carbon and biodiversity monitoring systems will also be effective mechanisms to evaluate the impact of project management and its sustainability. The supporting NGO (CDA or the Buddhist Monk's Association), will play an active role in distributing key project documents to affected community members and key stakeholders as well as publicizing community events/meetings. This documentation will be made available in Khmer where relevant.

The project design team is committed to sharing learning regarding project design and implementation in a transparent manner. Quarterly community feedback sessions together with socio-economic, biodiversity, and carbon stock monitoring conducted every 2 years will provide a steady stream of information that will be analyzed and disseminated in project reports and periodic working papers. Periodic focus group discussions will be used to document how key activities are progressing and identify problems and issues. Case studies will be written by project staff and consultants to ensure lessons are captured. In addition, annual surveys concerning household livelihood indicators and leakage attributed to project activities will be conducted to assess project impact.

Project documents and biodiversity and community monitoring data will be available on the FA, PACT, and implementing agency website. The Oddar Meanchey Community Forestry Federation will meet quarterly to review experience and best practices to identify innovations for extension. These practices will receive special attention for inclusion in the coming year's work plan.

Monthly team meetings among local FA, NGO, and community leaders will be held to discuss issues, problems, and strategies and to share information. Quarterly meetings of the

provincial working group and the Oddar Meanchey Community Forestry Federation will be used to inform local government representatives regarding project achievements and experiences.

Annual work plans and budgets will be developed each year based on feedback from the previous year's operations. The goal of this annual review by the TWG-F&E is to enhance the impact of project resources on carbon storage and sequestration, as well as livelihood and biodiversity goals. While an overall budget and strategic plan is provided in the Project Development Document (PDD) and related documents, the TWG-F&E together with project implementing organizations and community participants (CFMC) will have the flexibility to modify their annual strategies and budgets based on experiences from the previous years and emerging development priorities.

Communication Regarding Benefits Sharing

As part of project design, the project team held consultations with CF members with the purpose of gathering input from CFMC leaders, CF members and other stakeholders on the benefits sharing mechanism for the project. During these consultations it was articulated by members of Pact and the FA that benefits will accrue to communities through multiple avenues, including employment opportunities (through patrolling, monitoring and implementation of ANR activities), skills training (in NTFP development and gathering, financial management, agricultural improvements), and distribution of fuel efficient stoves and mosquito management equipment. Additional explanation was provided regarding the financial flow of the project with an aim to maximize benefits flow to the participating communities will still covering project-related costs, and that at minimum 50% of the net income from the project will go to project communities. It was clearly explained to communities that the financial benefits from the project depend on the net income generated by the project, which is in turn dependent on the selling price of carbon. Further, the idea of a grants scheme whereby funds from the sale of carbon credits will be made available to local communities was introduced, which will allow communities to apply for grant funding to develop a variety of projects aimed at improving livelihoods.

G3.9. Procedure to publicize CCB Public Comment Period

Parallel to the publishing of the English-language PD on the website of the CCB and the mechanism on the CCB website (http://www.climate-standards.org) to provide public comments, a number of activities are organized to provide local communities and stakeholders the opportunity to provide public comments. The project proponents have

translated the CCB Project Document into Khmer. This translated document has been distributed within the Forestry Administration and will be distributed to local government officials, at the district, province, and national level, and local NGOs. In addition, the CDA and the Buddhist Monk's Association will organize a series of meetings with the local CFMCs to present the Project Document. All Khmer comments will be centralized by one person within the Forestry Administration, and translated into English, and sent to TGC before the end of the public comment period. TGC will then submit the comments from local communities and other stakeholders to the CCB.

G3.10. Process for Handling Unresolved Conflicts

The Oddar Meanchey project involves a wide range of stakeholders at village, commune, district, provincial, and national levels. The success of this long-term project depends on the ability of the stakeholders to effectively and amicably resolve any problems and issues that arise during implementation. As such, the project has developed policies and procedures providing guidance to project stakeholders on how to resolve resolving complaints and grievances. These project policies have been translated into Khmer, and policy consultation workshops have been planned involving all Project Stakeholders once the project has achieved validation and received sufficient funding to cover these costs.

The Project Stakeholders are defined as any individual with a stake in the implementation and outcomes of the project. These include community forestry members, local authorities, and NGOs.

The Project Team is defined as the core project management group composed of the Forestry Administration, Children's Development Association, Community Forestry Network (CFN), Pact (1st 5 years), and the Oddar Meanchey Provincial Government. Each institution shall assign one individual as its focal point member on an annual basis. In addition, one Project Team member shall be designated as the group's Secretary responsible to keep and track records of meetings and correspondence.

Project Stakeholders may raise complaints and grievances to the Project Team or its member either verbally or in writing. If a Project Stakeholder has a complaint or grievance it should be taken up with a member of the Project Team as soon as possible after its occurrence. It is the intent of this policy that a complaint or grievance be resolved as efficiently as possible, beginning at the appropriate level. Project Stakeholders may raise complaints and grievances to the Project Team verbally or in writing. The Project Team's Secretary is obliged to (1) record every complaint and keep track of the status, and (2)

keep complaints and grievances confidential unless otherwise directed by the Project Stakeholder. If there is reason to believe that the Project Team will not provide an objective review of the concern, the matter may be taken up directly with the Secretariat of the Technical Working Group on Forestry and the Environment for further review and decision-making.

After a complaint or grievance is received, the Project Team member(s) shall discuss the problem fully with the Project Stakeholder(s) at a time that is mutually convenient. The Project Team shall conduct an investigation as appropriate and provide the Project Stakeholder(s) with a written response within 30 days of receipt. The Project Team will not retaliate against any Project Stakeholder(s) for registering a complaint or grievance through this process. All submitted complaints, written responses, and any other evidence that supports the complaint or response must be recorded and filed by the Project Team Secretary and made available to third-party auditors and the TWG F&E. The current focal points for recording and managing grievances and complaints are: 1) Long Ratanakoma (FA), 2) Chee Boreth (CDA), 3) Sa Thlay (CFN), 4) Yeang Donal (Pact), 5) the current ranking member of the Provincial Governors office. At present, no third party mediators have been included in the grievance process, although a third party mediator may be introduced at a later time if it is deemed necessary by the Project Team.

Following receipt of the Project Team's response, a Project Stakeholder who finds the response unsatisfactory should submit a signed and dated written statement to the Secretariat of the Technical Working Group with copies to the Co-Chairs of this body, containing the facts of the complaint or problem; the adjustment or relief the Project Stakeholder is seeking and the reason(s) why the Project Team’s solution was not acceptable.

The TWG F&E Secretariat will select and convene an ad-hoc Appeals Committee of three or more persons. The TWG F&E will provide this committee with staff assistance to arrange for meetings, take meeting minutes, and conduct investigations as necessary. The Committee will give full consideration to the facts presented, conduct any further investigations needed, and render a final decision in writing to the Project Stakeholder with a copy to the TWG F&E and the Project Team.

The ad-hoc Appeals Committee has full authority to make any adjustments deemed appropriate.

G3.11. Demonstration that Financial Mechanisms are Adequate for Project Implementation

Up-front project funding for the project has been provided through generous support of various organizations, including the John D. and Catherine T. MacArthur Foundation, DANIDA, Denmark (through the Multi-Donor Livelihoods Facility jointly funded by Danida, DfID and NZAid), and the William J. Clinton Foundation's Clinton Climate Initiative, USA (through a grant from the Rockefeller Foundation). Donor support and funding for the project has been critical, and these funds have ensured that all start-up costs as well as the cost of validation of methodology and Project Documents for the VCS are funded. Additional potential sources of donor funding are currently being considered. However, even with the addition of these funds, the project would not succeed without the revenues provided by the sale of carbon credits. Estimated net carbon revenues from the project, ranging from US$30 million to $60 million depending on market prices over 30 years, is expected to exceed all project-related costs, including inflation, as well as all on-going carbon monitoring costs. Detailed 30-year financial projections have been developed for the project, and will be made available to the Validator upon request.

G4. Management Capacity and Best Practices

G4.1. Identification and Roles of Project Proponents

The project proponent for the Oddar Meanchey project is The Forestry Administration (FA) of the Royal Government of Cambodia. They will be assisted by three implementing partners: PACT, Cambodia, Children's Development Association (CDA), and the associations of local communities. Three technical partners will assist on technical issues: Terra Global Capital (TGC), Clinton Climate Initiative (CCI), and the Technical Working Group Forest and Environment (TWG-F&E).

The specific roles of each of the project partners are outlined in Table G18. Each year the implementing organizations will prepare an annual project report to be approved by the TWG-F&E. Every six months meetings will be held to allow project managers to report to the TWG-F&E regarding progress, needs, and achievements. At the field level, the implementing organization will oversee the daily administration and monitoring of the REDD project activities in cooperation with the implementing partners allowing coordination with local government and technical agencies.

Table G18. Roles of Each of the Project Partners.

Organization	Role
FA	Seller of carbon on behalf of Royal Government of Cambodia. Participate in project design. Responsible for implementation of project actions, administering project funds and conducting monitoring activities. Support forest protection and enforcement, guarantee security of CF areas, capacity building for local communities, stakeholder consultation and conducting forest inventories. Daily administration of all project activities.
PACT	Assisting the FA with coordination of project actions. Participate in project design. Facilitation between various stakeholders, ensuring accountability, transparency in use of revenues, and good governance. Support with training of local communities, stakeholder consultation and integration. Designing and conducting social appraisals, and support with conducting forest inventories.
CDA	Support with implementation of project actions in the field. Support with training of local communities, stakeholder consultation and integration.
TGC	Participate in project design. Carbon calculations, development of Project Design Documents, creation of management system to gather monitoring data, technical assistance. Designing forest inventory plan. Monetization and marketing of project carbon credits as a broker.
CCI	Technical partner and funder.
Sonnenschein Nath & Rosenthal LLP	Legal advice on Emission Reduction Purchase Agreement
CFI	Project identification and design, research and monitoring
TWG-F&E	Project review and control, approval of future project actions.
Buddhist Monk's Association	Facilitate cooperation with Sorng Ruka Vonn CF
Communities of Oddar Meanchey	Protect and manage forest/CF resources. Assist in planning and implementing activities to improve livelihoods and forest quality.

G4.2. Identification of Key Skills and Experience of Management Team

The implementing organization and the implementing partners have extensive experience designing and implementing community forest management projects in rural Cambodia. The team includes a project manager who has experience on local community, legal issues, and forest management, a senior forester, specialists trained in community forestry, as well as a cadre of extension workers with expertise in small livelihood activities. The project management team is supported by the general expertise of the Forestry Administration including the Department of Forest and Community Forestry, the Department of Forest Industry and International Relations, the Department of Wildlife and Biodiversity, and the Research and Development Institute of Forest and Wildlife. In addition, the project will be supported by the local Forestry Administration staff that will provide technical and custodial support to local CFMC. Local NGOs, including Children's Development Association (CDA) and the Buddhist Monk's Association have been working with project communities for the past 5 years and are well positioned to provide organizational and technical support. Terra Global

Capital, a private organization based in San Francisco, U.S.A., and specializing in the development and marketing of community forest carbon credits has supported the development of all carbon market preparatory work and will ensure that buyer-seller negotiations are conducted in an efficient manner and that carbon measurement and submission to registries are successfully completed. CFI will complete the project design and facilitate negotiations between the implementing organization and the TWG-F&E to ensure a smooth transition as field activities are initiated. CFI also intends to continue to study project implementation experiences as a third-party monitor.

G4.3. Plan to Provide Orientation and Training to the Project's Employees

A substantial amount of training will be provided to the project's employees. Depending on the needs for the project, these will include training in forest inventories, biodiversity assessments, silvicultural management for fire risk mitigation, or silvicultural management for assisting natural regeneration. The training for these jobs will be organized by the local Forestry Administration, local NGOs, and other requested organizations, such as the organization who will conduct the biodiversity monitoring. In addition, a key component of the project is to have local community members teaching and learning from each other. Groups that have worked with the local communities in the past will select local community members to be trained. Special attention will be given to gather a wide range of people from within the communities and especially from underrepresented groups.

G4.4. Equal Opportunity of Local Community Members for Employment

We believe strongly that local employment is a key component in the project. Local community members are more knowledgeable about the local flora, fauna, conditions, geography, weather and culture than most experienced outsiders. In addition, employing local community members not only will create significant direct and indirect job opportunities over a 30 year period, but facilitates a stronger connection to the land and forest resources. The training and employment directly offered and created by the project will support the creation of a lifestyle that emphasizes sustainable forest protection and forest stock enhancement.

Jobs related to project implementation range from constructing fire lines, to conducting forest inventories, forest patrolling, and managing microfinance, and thus require a range of skill-sets. Though all community members are given an equal opportunity to apply for employment, the ultimate decision is up to the local groups mentioned above based on the

abilities of the individual. As local community members train each other, become more self-sufficient, and knowledgeable of their trade they will move into upper management. The project proponents will investigate if specific community groups are underrepresented. Project proponents will organize training sessions targeting underrepresented community groups to ensure the inclusion of such groups into employment activities. Special attention will go to gender equality and the participation of women in capacity building and employment activities .

G4.5. Compliance with Regulations Covering Worker Rights and Plan to Communicate Regulations

The primary law relating to the rights of workers or laborers in Cambodia is the Cambodia Labor Law (1997). The project will meet or exceed all applicable national labor laws and regulations covering worker rights. Compliance will be achieved by the explicit approval of the annual work plans designed by the Forestry Administration by the TWG-F&E. This will ensure that actions are consistent with the national legal framework. The implementing partners have taken steps to ensure during meetings with CF representatives that workers rights have been clearly articulated. Rights of workers have also been integrated into the Project Policies, to ensure that any project activities carried out by the CF communities are done in accordance to relevant labor regulations. Documents explaining national rules on worker's rights and the obligations of both contracting parties will be made available in local languages when relevant. These materials will be placed and posted in easily accessible areas so that CF members may access them at any time. Implementing partners will ensure during ongoing conversations and meetings with CF representatives that CF members and participating communities are fully aware of their rights.

G4.6. Assessment of Risk to Worker's Safety and Plan to Communicate and Minimize Risks

During the work in the field, the main risks for the safety of workers include: malaria, falling trees in thinning operations, forest fires, and landmines. Malaria could be a risk for workers, especially when they are working in the forest for a long consecutive period. Falling trees are less of a problem as most of the thinning operations involve very small diameter shoots. Forest fires are a regular occurrence in the project area during the dry season. However, they tend to be ground fires of lower intensity that can be easily avoided. Nonetheless, fires and firefighting activities pose a potential risk to workers. While much of the project area has been cleared of landmines over the past 15 years, in a number of forest project areas

landmines are still present. Communities will be provided with maps showing forest areas where land mines may exist and place these out of bounds from forest activities.

Safety guidelines will be formulated to address risks that endanger worker health. In order to avoid accidents, daily staff briefings both in the morning and the late afternoon, will be compulsory. CFMC work groups involved with forest fire fighting and thinning will be trained in safety techniques. The Project Implementation team will review worker risks and mitigation strategies annually to ensure risks are minimized. Often disadvantaged groups become associated with jobs of greater health risk. Special attention will be given to make sure that CFMC work groups will be from diverse backgrounds and that knowledge of any risk associated with project employment is understood by all means possible. The project will also subscribe to or create a life insurance program that would provide coverage for any project participant who is dies or is disabled as a result of project related work. Communities will map any forest areas where land mines may exist and place these out of bounds from forest activities until de-mined.

The Oddar Meanchey Community Forestry REDD+ Project Policies contain clauses and provisions which align with the Cambodian Labor Law. These policies are currently in draft form; however, they will be finalized after communities have been consulted on the policies. Part of this consultation will provide an introduction to the relevant sections of the Cambodian Labor Law. See Oddar Meanchey CF REDD Project Policies for more details.

Specific procedures have been introduced in the project to inform communities on risks and provide procedures in case of an accident. The project has a Safety policy which includes guidelines on precautions for all project participants. It also outlines the existence of a Health Fund to support medical coverage in the event of an accident during field work. The consultation on this policy will provide an opportunity to inform communities about risks and accident procedures. Specific excerpts of these precautions and methods for incident reporting follow:

Safety Area	Required Precaution
Transport	-Wear helmets or seat belts -Do not overload tractors, motorbikes, or cars -Never travel after dark -Carry a first aid kit -Carry enough money to handle unforeseen problems -Know basic vehicle maintenance and carry basic tools -Carry drinking water -Make sure there is enough fuel for the journey -Stay within speed limits -Alcohol consumption is strictly prohibited before and during field work
Communication	-Project participants shall be made aware of any risks beforehand -Always carry a charged mobile phone -Inform colleagues and key contacts beforehand of detailed field schedule -Keep a list of key contacts and telephone numbers, including emergency services -In case the detailed field schedule cannot be executed due to some unforeseen circumstance or emergency, key contacts must be immediately notified -When possible, carry a GPS unit to track location
Field work	-Wear protective and appropriate clothing (helmets, gloves) -Follow training and instruction to avoid accidents -Prepare all necessary logistics -Never enter landmine hazard area -Prevent mosquito and insect bites -Always drink only clean water
General	-Be informed on local health providers (ambulance services, hospitals)

Safety and security incidents must be recorded and sent to the Project Team Secretary. The Project Team will make a decision of what action to take to address the situation, and take action as soon as possible. All incident reports and records of follow up actions are kept on file by the Project Team.

Incidents that require completion of an incident report include but are not limited to the following:

- Attacks or assaults
- Thefts of funds, goods, or other assets

- Vehicle accidents
- Any other accident that requires intervention of a medical professional
- Arrests and interrogations
- Credible threats of harm to Project Stakeholders
- Bombings, gunfire or other significant disturbances

Incident reports should include the following information:

Who was involved in the incident: Name, gender, age, and any other pertinent data

- What: A detailed description of the incident
- When: The date and time of the incident
- Where: The location of the incident, pinpointed on a map if possible
- How: The manner in which the incident take place

Response: Any immediate action taken, including police reports as applicable. Incident reports must be signed by at least 2 witnesses. The full name, and contact information of the witnesses must be available on the incident report.

Once the project has achieved validation and received funding to implement project activities, the Project Team will organize workshops among CF leaders to outline the potential risks of project activities, and review safety policies and formulate a plan to disseminate findings to relevant CF members that will be engaged in potentially hazardous activities. Safety policies have be translated to Khmer and will be updated as required. Any CF members that do not wish to participate in specific activities may choose to participate in alternative project activities. Trainings and demonstrations of project activities will include demonstration of practices, and periodic training updates as well as ongoing monitoring of activity implementation will ensure that good-practices are followed.

G4.7. Financial Health of Implementing Organization

The project is being jointly implemented by the FA and PACT. The FA is a governmental institution and attracts donor funding. Pact is an international non-governmental organization (NGO) registered in the United States as a 501 c (3) non-profit corporation (tax identification number: 13-2702768). Its mission is to build empowered communities, effective governments and responsible private institutions that give people an opportunity for a better life. Pact does this by strengthening the capacity of organizations and

institutions to be good service providers, represent their stakeholders, network with others for learning and knowledge sharing, and advocate for social, economic and environmental justice. Interdependence, responsible stewardship, inclusion of vulnerable groups, and respect for local ownership and knowledge are core values across all of our programs.

In 2010, Pact managed over $203 million in funds from bilateral, multilateral, and private donors utilizing a highly transparent and effective organizational financial management system. Currently, Pact implements over 100 projects in 60 countries, with offices in 22 countries, using multi-dimensional approaches to enhance the capacity of individuals, organizations, networks, and communities to deliver services and increase learning in five key sectors: community-based natural resource management; improving livelihoods; civil society strengthening and democracy, governance; peace building; and HIV/AIDS. In 2010, Pact partnered with over 12,000 organizations to address these pressing development issues. These programs generally entail institutional strengthening, technical assistance and training for national and grassroots organizations, as well as management of grant funds on behalf of donors and the private sector. Pact employs over 2,512 staff members worldwide, 78 of whom are based at headquarters in Washington, DC.

Pact established an office in Cambodia in 1991 and currently maintains a staff dedicated to the Community Forestry Program which includes the work related to the Oddar Meanchey Community Forestry REDD+ Program (OM REDD+). The office has experienced staff, a long-term presence in the project area, and is currently developing REDD+ baseline scenarios for other projects in addition to OM REDD+, in Cambodia. Pact has an MOU with the Ministry of Foreign Affairs which was recently extended until December 2013 as is the protocol for all international organizations. Pact has worked with more than 150 villages throughout the country to establish community managed forests. Almost all of these Community Forest Management Committees have received pre-approval for their stewardship of community forests and a growing number of these sites have received l5-year legal tenure, including the community forests in the OM REDD+ project area.

Additionally, Pact is currently developing an NGO-wide REDD+ Strategic Initiative. This initiative has dramatically expanded Pact's interest in, and commitment to, REDD+ as a vehicle for community development, governance and sustainable forest management. Pact's REDD+ Strategic Initiative is increasingly looking to pilot creative approaches to community-oriented REDD+ in Cambodia. Pact expects to capture lessons learned and stimulate the replication of successful approaches in other community-oriented REDD+ projects.

While Pact and the FA demonstrate internal financial stability and permanence, a complete understanding of the financial resources that are budgeted for project implementation also needs to be considered. For a complete analysis of the resources allocated for project implementation, please refer to the 30 year project budget and the linked 30 year project work plan. Both of those documents, part of a Memorandum of Agreement between Pact and the FA, will demonstrate the detailed level of planning that has gone into project design and highlight that adequate resources are budgeted for effective implementation.

G5. Legal Status and Property Rights

G5.1. List of Relevant Laws and Assurance of Compliance

The proposed project activities are all within the existing legal framework of the Royal Government of Cambodia. Project work plans will be approved by the Forestry Administration's TWG-F&E on an annual basis, ensuring that actions are consistent with the national legal framework. Furthermore, as Cambodia begins to develop a national REDD program, the project proponent and implementing partners will ensure that the project is in compliance with all relevant decrees and regulations developed to govern the implementation of REDD activities. Should Cambodia's national REDD program include provisions for the oversight of spatially-explicit project activities, the project proponents and implementing partners will encourage regular review of the project by national REDD authorities to assure compliance.

The project will comply with the following national and local laws and regulations.

- Law on Environmental Protection and Natural Resources Management (1996) supports environmental resources and biodiversity.
- The Cambodian Land Policy Framework of 2002 stipulates that the participation of people who use the land on a daily basis must provide essential participation in land-use planning.
- Forestry Law, 2002 specifically protects forest areas.
- The Cambodian Community Forestry Sub-Decree of 2003 provides utilization rights of the forest to the local communities. CFMC management agreements are in place for 15 years and are automatically renewed for an additional 15 years, unless a major failure in management has occurred.

In addition, the project proponents and implementing partners will ensure the project is in compliance with all existing and future laws and regulations relating to forest, environment and REDD. A part of the ongoing internal review undertaken by the TWGF&E will include a review of all laws and regulations in the context of the Oddar Meanchey REDD project. The Oddar Meanchey Community Forestry REDD+ Project Policies, which contain the rules that govern the implementation of the project, will be iteratively updated to reflect any changes in the Cambodian legal framework. Ongoing project monitoring will ensure that the procedures outlined in the Project Policies are being effectively implemented in the field.

G5.2. Demonstration of Approval from Authorities

The Forestry Administration of the Royal Government of Cambodia has established the Community Forestry Sub-Decree and has developed the technical support in the national and local Forestry Administration. In January 2008, the Siem Reap Forestry Administration Cantonment has identified the 12 CFMC group forests as "potential CF areas" and formally submitted these zones to be classified as such by the Ministry of Agriculture, Forestry, and Fisheries (MAFF). On November 19, 2008 MAFF approved 13 project sites as potential CF project sites, covering an area of 67,853 hectares as "potential Community Forestry Sites." The FA Cantonment in Oddar Meanchey has fully approved all 13 CF agreements. These agreements are renewable after 15-years and grant the CFMC groups utilization rights to the forests for subsistence needs. All CF agreements have been officially signed as April 2010 during a public ceremonies. Under the CF Sub-Decree, CFMC management agreements are automatically renewed for an additional 15 years, unless a major failure in management has occurred. The Director General of the Forestry Administration has endorsed the project. In addition, the Office of the Prime Minister has sanctioned this project and delegated the sale of carbon to the national Forestry Administration. The project has strong policy and legal endorsement because the Royal Government of Cambodia has agreed to act as the seller of carbon under the ERPA and aggregate on behalf of the CMFC groups. The national Council of Ministers of the Kingdom of Cambodia issued a letter of project approval on 26th May 2008 (Sar. Chor. Nor. 2008) (see Annex 1).

G5.3. Guarantee that Project Will Not Result in Property Encroachment

The project will not encroach uninvited on private property, community property, or any other government property. In the Project Area, 64,318 hectares has been managed informally by 13 Community Forestry Groups comprised of members from 58 surrounding villages. The Forestry Administration of the RGC views this territory as part of the Permanent Forest Estate, but grants Customary User Rights to community groups. Thirteen CFMC groups have voluntarily submitted their application to the Ministry of Agriculture, Forestry and Fisheries (MAFF) for approval of 15 year renewable management agreements under the Forest Law and Community Forestry Sub-Decree. The project activities will take place only on lands that are part of the Permanent Forest Estate (PFE) being managed by approved CFMC groups.

G5.4. Demonstration that Project does not Require Involuntary Relocation

The project activities will not involve the resettlement of any communities or households, since project goals include stopping settlements before they happen. Resettlement is not a component of the project design nor would it be acceptable under the Cambodian Land Policy Framework of 2002 which stipulates that "the people who use land are the day-to-day mangers, their participation in land-use planning is essential." Community Forestry Agreements are recognized by the Ministry of Agriculture, Fisheries and Forestry of the Royal Government of Cambodia and ensure the rights of communities to reside and utilize designated forests (Community Forestry Sub-Degree 2003). Community rights to land are also reflected in the National Forest Policy of 2002 which recognize and "legally protect the traditional rights of local communities in use of forest resources" (Oberndorf 2006).

None of the project activities requires any relocation, voluntary or involuntary. However, due to the high pressure from migration into the Oddar Meanchey Province, the project must be ready to respond to pressure from future migrants to encroach in the area. The project team is already conducting diagnostic studies to better understand in-migration patterns and drivers in the project area. The project team will organize a regular dialogue between the project communities and migrant communities in each area to develop natural resource management plans, as well as guidelines and regulations covering land-use allocation. Project benefits will also target local migrant communities where feasible, to ensure incentives are in place to stabilize and guide land-use and land-use change in the project area and leakage belt.

The formulation of clear land use plans with large format maps posted in public places will clarify tenure status for land in the project area. This will enable the community to explain new land and forest policies to migrants visiting the area. As the tenure situation is publicly and transparently clarified, word-of-mouth communications will inform prospective migrants and slow migration rates into the area.

G5.5. Identification and Mitigation of Illegal Activities

This project is designed to combat all illegal activities within the project boundary. The most common illegal activities are illegal logging, intentional fires, and agricultural encroachment. Cooperation between local communities, police, and Forestry Administration staff and the distribution of equipment to aid in patrols should be able to reduce 90% of deforestation associated with illegal logging. Frequent patrols will eventually dissuade illegal loggers from continuing their operations in the project area.

Intentional fires are used to "clean the land" and are often started by hunters to attract game to new shoots to feed. The clearing of land by fire severely harms the forest ecosystem and often is the first step toward agriculture encroachment. The project would facilitate the implementation of fire prevention techniques in forest lands. These would include the construction of fire breaks, the creation of volunteer fire brigades of village youth, removal of down woody debris, stronger enforcement of fire starting, and regular forest patrolling.

Intensified agriculture will help mitigate agriculture encroachment in forested areas. Local farmers will be trained to improve efficiency instead of moving to new land. Additionally, the project will also consider the use of irrigation and other agricultural water distribution technologies, as both decrease the amount of water needed for agriculture and improve the productivity of farmland. For more information on how the project will stop illegal activities see Section G3.2.

G5.6. Demonstration of Land Tenure Status and Title to Carbon Rights

The project has received high-level endorsement; the prime minister has issued Government Decision ("Sar. Chor. Nor.") No. 699 through the Council of Ministers, explicitly endorsing the project. In addition, thirteen communities have signed Community Forestry Agreements with the government, the legal land owner, which ensures the explicit and uncontested legal tenure to the local communities as well as the land management rights for the communities. Official signing ceremonies for these CF Carbon Agreements have taken place, demonstrating the full consent of these thirteen CFMCs. The Royal Government of Cambodia (RGC) has agreed to act as the seller of carbon under the ERPA and aggregate on behalf of the CMFC groups. Within the RGC, the Forestry Administration is responsible for all carbon credit transactions. Because the participating communities have the long-term tenure and usage rights of the land while the government still remains the legal owner, an agreement was signed between the communities and the government, through the FA, to unambiguously clarify all rights and responsibilities regarding carbon ownership and land usage.

Climate Section

CL1. Net Positive Climate Impacts

CL1.1. Net Change in Carbon Stocks due to Project Activities

Net Change in Carbon Stocks due to a Decrease in Deforestation Rate

The carbon calculations are based on approved VCS methodology VM0006 "Methodology for Carbon Accounting in Project Activities that Reduce Emissions from Mosaic Deforestation and Degradation". A basic outline of this methodology is provided here. Every project activity is designed to reduce one or more deforestation drivers to some extent. The net change in deforestation rates under the project scenario are calculated by multiplying the relative reduction in deforestation due to project activities with the absolute deforestation rates under the baseline scenario.

$$D_{projectArea,projectScenario,DF}(t,i) = RelativeProjectImpact_{DF}(t) \cdot D_{projectArea,baselineScenario,DF}(t,i)$$

Where:

$D_{projectArea,projectScenario,DF}(t,i)$	=	Rate of deforestation within the project area for year t in stratum i under the project scenario. [ha yr^{-1}]
$RelativeProjectImpact_{DF}(t)$	=	Relative impact of all project activities on deforestation during year t (see following Equation). [-]
$D_{projectArea,baselineScenario,DF}(t,i)$	=	Baseline rate of deforestation within the project area for year t in stratum i (see Table G14 in the General section). [ha yr^{-1}]

The relative reduction in deforestation due to project activities is calculated based on the effectiveness of each project activity to reduce every driver of deforestation and the relative contribution of each driver to the total deforestation. Mathematically, the relative impact of a project on the deforestation rate is calculated as:

$$RelativeProjectImpact_{DF}(t) = \sum_{d=1}^{nrDrivers} RelativeDriverImpact_{DF}(t,d)$$

$$RelativeDriverImpact_{DF}(t,d) = \sum_{a=1}^{nrActivities} \left(rate(a,t) \cdot effectiveness(a,d) \cdot contribution_{DF}(d)\right)$$

Where:

$RelativeProjectImpact_{DF}(t)$	=	Impact of all project activities on deforestation, relative to the baseline deforestation rate during year t. [-]
$RelativeDriverImpact_{DF}(t,d)$	=	Relative impact of a driver d on deforestation for year t of the crediting period. [-]
$nrActivities$	=	Total number of project activities = 10 for the Oddar Meanchey REDD project. [-]
$nrDrivers$	=	Total number of deforestation drivers = 11 for the Oddar Meanchey REDD project [-]
$rate(a,t)$	=	Adoption rate or relative degree of activity for activity a during year t, with a value of 100% indicates that the activity cannot be more efficient in reducing deforestation. These values are discussed in Section G3.2, and summarized in Table CL2. [-]
$effectiveness(a,d)$	=	The effectiveness of project action a to reduce deforestation driver d. These values are discussed in Section G3.2, and summarized in Table CL1. [-]
$contribution_{DF}(d)$	=	The relative importance of driver d in deforestation to the total deforestation, see Table G10. [-]

The results of this calculation are summarized in Figure CL1. A 50% reduction in the deforestation rate from baseline conditions is achieved in the first five years of the project. The full impact of the REDD project is reached after 10 years, when the deforestation rate is expected to be reduced to 30% of the baseline deforestation rate.

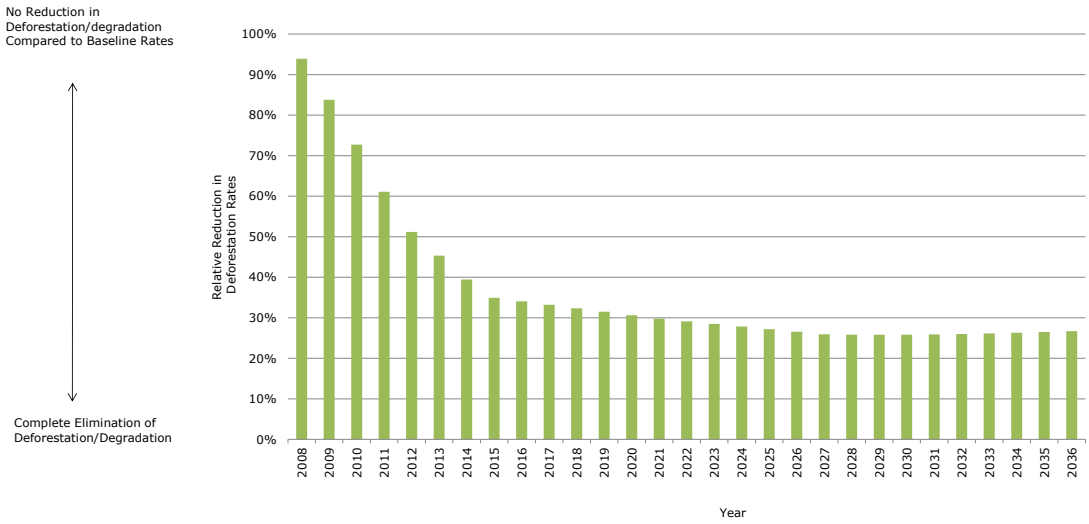


Figure CL1. Estimated decrease in deforestation rate under the project scenario due to project activities; A relative reduction of 100% implies no decrease in deforestation compared to baseline conditions while a 0% relative reduction implies elimination of deforestation compared to baseline conditions.

Table CL1. Relative Reduction in the Impact of Each Deforestation Driver due to Project Activities.

Driver of Deforestation	1. Reinforcing land-tenure	2. Land-use plans	3. Forest Protection	4. ANR	5. Fuel-efficient Stoves	6. Livestock Protection from Mosquitoes	7. Agricultural Intensification	Development Projects	9. NTFP Development	10. Fire Prevention	TOTAL REDUCTION
1. Forest clearing for land sales	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2. Conversion to cropland	5%	25%	0%	5%	0%	0%	25%	0%	5%	0%	60%
3. Conversion to settlements	5%	50%	0%	0%	0%	0%	0%	0%	0%	0%	50%
4. Fuelwood gathering	0%	0%	25%	0%	35%	25%	0%	0%	0%	0%	85%
5. Forest fires induced to clear the forest understory	0%	20%	20%	0%	0%	0%	0%	20%	0%	20%	80%
6. Hunters inducing forest fires	0%	0%	50%	0%	0%	0%	0%	0%	0%	25%	75%
7. Illegal logging for commercial on-sale	0%	0%	90%	0%	0%	0%	0%	0%	0%	0%	90%
8. Timber harvesting for local use	0%	20%	50%	20%	0%	0%	0%	0%	0%	0%	90%
9. Large economic land concessions	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
10. Timber Concessions	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Net Effect on Total Deforestation (Excl. Leakage)	16%	22%	6%	3%	0%	0%	14%	4%	3%	4%	

Table CL2. Relative Degree of Activity Effectiveness during the Crediting Period.

Calendar Year	1. Reinforcing land-tenure	2. Land-use plans	3. Forest Protection	4. ANR	5. Fuel-efficient Stoves	6. Livestock Protection from Mosquitoes	7. Agricultural Intensification	8. water resource development Projects	9. NTFP Development	10. Fire Prevention
2008	25%	0%	10%	0%	0%	0%	0%	0%	0%	0%
2009	50%	21%	20%	0%	0%	0%	0%	0%	0%	0%
2010	75%	48%	30%	0%	0%	0%	0%	0%	0%	0%
2011	100%	74%	40%	0%	0%	0%	0%	0%	6%	10%
2012	100%	100%	50%	0%	0%	0%	17%	25%	11%	25%
2013	100%	100%	70%	11%	33%	33%	22%	50%	17%	50%
2014	100%	100%	90%	22%	66%	66%	28%	75%	22%	75%
2015	100%	100%	100%	33%	99%	99%	33%	100%	28%	100%
2016	100%	100%	100%	44%	100%	100%	39%	100%	33%	100%
2017	100%	100%	100%	56%	100%	100%	44%	100%	39%	100%
2018	100%	100%	100%	67%	100%	100%	50%	100%	44%	100%
2019	100%	100%	100%	78%	100%	100%	56%	100%	50%	100%
2020	100%	100%	100%	89%	100%	100%	61%	100%	56%	100%
2021	100%	100%	100%	100%	93%	78%	67%	100%	61%	100%
2022	100%	100%	100%	100%	86%	60%	72%	100%	67%	100%
2023	100%	100%	100%	100%	79%	47%	78%	100%	72%	100%
2024	100%	100%	100%	100%	72%	36%	83%	100%	78%	100%
2025	100%	100%	100%	100%	65%	28%	89%	100%	83%	100%
2026	100%	100%	100%	100%	58%	22%	94%	100%	89%	100%
2027	100%	100%	100%	100%	51%	17%	100%	100%	94%	100%
2028	100%	100%	100%	100%	44%	13%	100%	100%	100%	100%
2029	100%	100%	100%	100%	37%	10%	100%	100%	100%	100%
2030	100%	100%	100%	100%	33%	8%	100%	100%	100%	100%
2031	100%	100%	100%	100%	33%	6%	100%	98%	100%	100%
2032	100%	100%	100%	100%	33%	5%	100%	96%	100%	100%
2033	100%	100%	100%	100%	33%	4%	100%	93%	100%	100%
2034	100%	100%	100%	100%	33%	3%	100%	89%	100%	100%
2035	100%	100%	100%	100%	33%	2%	100%	85%	100%	100%
2036	100%	100%	100%	100%	33%	2%	100%	81%	100%	100%
2037	100%	100%	100%	100%	33%	1%	100%	76%	100%	100%

Net Change in Carbon Stocks due to Assisted Natural Regeneration

Assisted natural regeneration (ANR) will be carried out on 5,355 hectares of degraded forest through a combination of silvicultural activities such as site preparation, pruning, enrichment planting, stem thinning and stand thinning. Each year between 2013 and 2021, 595 new ha will be treated while the some areas that were treated previously will be given maintenance treatments. The project proponents have the capability to manage a total of 2,000 ANR ha per year including new treatment areas and revisiting treated areas for years 2013 to 2030. After the year 2030 no ANR treatment may be necessary as the forest can regenerate on its own. The "baseline" natural growth rate without any interventions is 1.3 Mg (above- and belowground) DM ha^{-1} yr^{-1}. Assisting the natural regeneration can increase this regeneration rate to about 8.7 Mg DM ha^{-1} yr^{-1}. The majority of this increase in regeneration will take place shortly after the ANR procedure, and will slowly fall back to slightly above baseline rates. The following graph indicates the expected regeneration rates under both natural and assisted conditions:

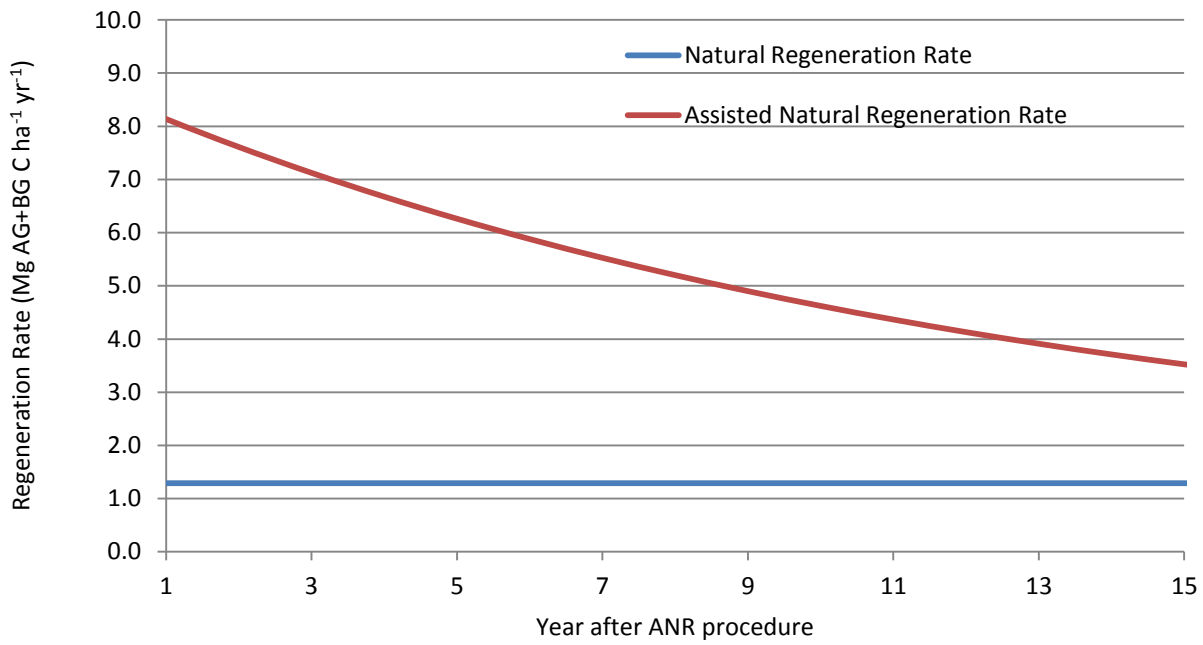


Figure CL2. Regeneration Rates under Natural and Assisted Conditions.

Due to the project crediting period of 30 years, only the increases over this period can be accounted for. Therefore, the sequestration benefits from the areas that were treated later in the project period are only partially accounted for.

Table CL3. Ex-ante estimate of carbon stock and GHG benefits from ANR activities for the crediting period

Time after project start	Year	ΔC_{ANR} [t CO_2e]	$E_{ANR,biomassLoss}$ [t CO_2e]	$\Delta C_{ANR,BSL}$ [t CO_2e]	LK_{ANR} [t CO_2e]	$GHG_{E,ANR}$ [t CO_2e]	C_{ANR} [t CO_2e]
1	2008	0	0	20,016	0	0	-20,016
2	2009	0	0	20,512	0	0	-20,512
3	2010	0	0	21,504	0	0	-21,504
4	2011	0	0	27,308	0	0	-27,308
5	2012	0	0	33,599	0	0	-33,599
6	2013	-3,834	0	38,027	0	0	-52,085
7	2014	-7,303	0	51,261	0	0	-78,038
8	2015	-10,438	0	62,541	0	0	-100,812
9	2016	-13,266	0	54,545	0	0	-103,188
10	2017	-15,815	0	51,016	0	0	-109,003
11	2018	-18,107	0	54,761	0	0	-121,151
12	2019	-20,163	0	59,112	0	0	-133,044
13	2020	-22,005	0	68,059	0	0	-148,743
14	2021	-23,649	0	75,812	0	0	-162,526
15	2022	-21,279	0	83,792	0	0	-161,816
16	2023	-19,109	0	81,498	0	0	-151,564
17	2024	-17,121	0	76,360	0	0	-139,138
18	2025	-15,301	0	74,592	0	0	-130,696
19	2026	-13,634	0	74,641	0	0	-124,634
20	2027	-12,108	0	75,433	0	0	-119,829
21	2028	-10,710	0	72,336	0	0	-111,607
22	2029	-9,430	0	68,750	0	0	-103,327
23	2030	-8,258	0	63,024	0	0	-93,304
24	2031	-7,185	0	52,180	0	0	-78,524
25	2032	-6,202	0	46,443	0	0	-69,182
26	2033	-5,301	0	31,259	0	0	-50,697
27	2034	-4,477	0	10,919	0	0	-27,334
28	2035	-3,722	0	3,847	0	0	-17,494
29	2036	-3,031	0	4,328	0	0	-15,440
30	2037	-2,398	0	0	0	0	-8,791
SUM	**0**	**-293,845**	**0**	**1,457,473**	**0**	**0**	**-2,534,905**

CL1.2. Net Change in Emissions of Non-CO_2 Gases

The decrease in N_2O and CH_4 emissions due to reduced occurrence of fire in the project area are conservatively omitted. These are unlikely to account for more than 5% of the project's emission reductions. The net changes in emissions of non-CO_2 gases are all incorporated in the next section.

CL1.3. Other GHG Emissions from Project Activities

Potential emission sources of non-CO_2 gases and fuel-related CO_2 gases are included from biomass burning, vehicle use, and increased fertilizer use. N_2O emissions from forest fires in the baseline scenario were conservatively omitted. Table CL4 contains a justification of which gases were included, and which gases were excluded.

Table CL4. Emission Sources of Non-CO_2 Gases and Fossil-fuel Related CO_2 Gases Related to Project Activities.

Source	GHG	Included?	Justification/Explanation
Biomass burning	CH_4 N_2O	no no	The clearing of fire lines may be done using biomass burning, which releases CH_4 and N_2O emissions. However, these emissions are insignificant.
Fossil fuel use	CO_2 CH_4 N_2O	no no no	Patrolling activities and transport of materials for ANR activities are found to be insignificant. Insignificant. Insignificant.
Increased use of irrigation (including rice production)	CH_4 N_2O	no no	No planned increases in rice production or flood irrigation.
Increased Fertilizer Use	N_2O	yes	Some agricultural intensification measures are included.
Increased emissions from enteric fermentation from livestock stocking	CH_4 N_2O	no no	No major animal husbandry activities are present or anticipated in the reference and project areas. Project activities will have no effect on the minimal number of animals currently present.
Manure management	CH_4 N_2O	no no	The manure management system is not changed or anticipated to change during the project scenario.

The following hypotheses were made to calculate the increase in emissions (Table CL8).

Fuel Emissions from Patrolling and Transport of Materials for ANR Activities

Standard IPCC equations were used to calculate emissions from patrolling. For forest patrolling, 10 motorbikes and 1 four-wheel drive vehicle will be purchased as early as 2011 and will be in operation throughout the project period. The total fuel consumption was calculated by multiplying the number of days per year that these vehicles will be used (5

days per week for 52 weeks = 260 days), the hours per day that these vehicles will be operated, the average speed of the vehicles, and the fuel efficiency of the vehicles:

$$E_{vehicle}(t) = FC(t) \cdot \rho_{fuel} \cdot \frac{NCV}{10^6} \cdot EF_{fuel,CO2}$$

Where,

$E_{vehicle}(t)$	=	GHG emissions from fuel use for vehicles used for implementation of REDD project activities vehicles. [t CO_2e yr^{-1}]
$FC(t)$	=	Estimated annual consumption of fuel during year t [liters yr^{-1}]. This is calculated by the number of vehicles with the days of operation per year, the hours of operation per day, the average speed during operation and the fuel efficiency. Motorbikes will consume 4066 liters yr^{-1} and mobile units 1,490 liters per year.
ρ_{fuel}	=	Standard density of fuel i. Use standard values of 0.737 kg l^{-1} for gasoline and 0.85 kg l^{-1} for diesel fuel. [kg l^{-1}]
NCV	=	Net caloric value of fuel i. Use values from IPCC GPG 2006 guidelines for Energy (Table 1.2), if no regional estimates are available. The most specific and conservative values should be used. [TJ Gg^{-1}]
$EF_{fuel,CO2}$	=	CO_2 emission factor for fuel type i. Use values from IPCC GPG 2006 guidelines for Energy (Table 3.2.1), if no regional estimates are available. The most specific and conservative values should be used. [kg CO_2 Gg^{-1}]

It was calculated that all emissions associated with vehicles will not account for more than a 5% increase of the project's overall GHG emissions reductions over each monitoring period. Therefore emissions from vehicles are considered *de minimis* and not included.

Emissions from Biomass clearing for Fire Prevention

In the first 10 years of the project, maximally around 200 km of firebreaks will be installed and maintained, at an average installation rate of 20 km of firebreaks per year. With a maximal width of a firebreak of 5 m, this corresponds to clearing 10 ha per year in mixed deciduous forest which are prone to fire. The carbon lost by removing trees or biomass and from N_2O and CH_4 emissions from fire prevention activities can be calculated by:

$$E_{fireBreaks} = \frac{44}{12} \cdot \sum_{i=1}^{nrFireClasses} area_{biomassLoss}(i) \cdot C(i) + \sum_{i=1}^{nrClasses} area_{fireBiomassLoss}(i) \cdot C(i) \left(\frac{44}{28} \cdot \frac{GWP_{N2O} \cdot ER_{N2O}}{r} + \frac{16}{12} \cdot GWP_{CH4} \cdot ER_{CH4} \right)$$

Where:

$E_{fireBreaks}$	=	Annual GHG emissions from implementation of fire-preventing actions as REDD project activities. [t CO_2e yr^{-1}]
$nrFireClasses$	=	Number of forest strata in which firebreaks were installed = 2, evergreen and mixed forests in this project. [-]
$area_{biomassLoss}(i)$	=	Total annual area of forest stratum i that was cleared = 10 ha yr^{-1} in mixed forest, 5 ha yr^{-1} in evergreen forest. [ha yr^{-1}]
$C(i)$	=	Carbon content in forest stratum i. It is conservatively assumed that all biomass is removed. See Table G8 in the general section [Mg C ha^{-1} yr^{-1}].
$area_{fireBiomassLoss}(i)$	=	Annual area of forest stratum i that was cleared by controlled burning = 7.5 ha yr^{-1} in mixed forest, 2.5 ha yr^{-1} in evergreen forest. [ha yr^{-1}]
GWP_{N2O}	=	Global Warming Potential for N_2O = 310 according to IPCC default value for the first commitment period. [-]
ER_{N2O}	=	Emission ratio for N_2O = 0.007. See Table 3A.1.15 in IPCC GPG-LULUCF 2003. [-]
r	=	Carbon-to-Nitrogen ratio of the wood, conservatively approximated as 100. [-]
GWP_{CH4}	=	Global Warming Potential for CH_4 = 21 according to IPCC default value for the first commitment period. [-]
ER_{CH4}	=	Emission ratio for CH_4 = 0.012. See Table 3A.1.15 in IPCC GPG-LULUCF (2003). [-]

It is anticipated that in total, 100 hectares will be treated for fire prevention measures. This will include the installation of firebreaks (200 km long and 5 m wide) by clearing the understory biomass in fire prone areas. Therefore, this treatment is considered "intense" (see Table CL5). For thinning, only some trees are removed. Therefore, this treatment is referred to as "medium". Fires dominantly occur in the lower dry deciduous forests. Therefore, the carbon difference of the intense treatment was estimated to be equal to the average carbon density of dry deciduous forests.

Table CL5. Parameters Used to Estimate GHG Emissions from Fire Prevention Measures

Variable	Acronym/ symbol	Value	Unit
Annually treated area (without fire)	$area_{biomassLoss}$	10	[ha yr^{-1}]
Carbon stock in treated area (without fire)	$C(treatedArea)$	30	[Mg C ha^{-1}]
Annually treated area (with fire)	$area_{fireBiomassLoss}$	0	[ha yr^{-1}]
Carbon stock in treated area (with fire)	$C(fireTreatedArea)$	30	[Mg C ha^{-1}]

In total, 11,000 t CO_2e yr^{-1} emissions from fire prevention measures are expected.

N_2O emissions from agricultural intensification

The project plans to install pilot projects to educate local communities on some agricultural practices which can increase yields, and decrease the pressure on forest land to be converted to agricultural land. This will involve an increase in the use of fertilizer, both from organic and synthetic sources. Since the amount of livestock and cattle is limited in this area, it is assumed that increases in fertilizer will mainly come from synthetic fertilization. As the pilot projects mature and the techniques become more wide-spread, local farmers will gradually adopt these techniques. Although fertilizer will not be provided for free or subsidized to the farmers, it is expected that the pilot projects will increase the purchase and use of fertilizer by local farmers. It is expected that the fertilizer application rate increases to 100 kg per ha from 55 kg per ha with average increase of 80%.

The maximal rate of adoption during the project at year 20 of the crediting period is 2,000 households. The maximal average parcel size over a period of 30 years is 3.5 ha per family. Therefore, maximally 7,000 ha will be affected. Application rates are 100 kg N of chemical fertilizer and 80 kg N for organic fertilizer and standard emission factors are used (Table CL6):

$$\Delta E_{\text{fertilization}}(t) = \frac{44}{28} \cdot GWP_{N2O} \cdot EF_{\text{N-inputs}} \cdot \Delta area_{\text{fertilized}}(t) \left(N_{\text{synthetic}} \cdot (1 - f_{GASF}) + N_{\text{organic}} \cdot (1 - f_{GASM}) \right)$$

Where:

$\Delta E_{fertilization}(t)$	=	Annual difference in GHG emissions due to increased use of N fertilizer as an agricultural intensification measure for year t of the crediting period. [t CO_2e yr^{-1}]
GWP_{N2O}	=	Global Warming Potential for N_2O (IPCC default = 310 for the first commitment period). [-]

$EF_{N\text{-}inputs}$	=	Emission factor for emissions from N input. Use the default emission factor of 1.25 % of applied N as noted in IPCC GPG 2000.
$nrfertilizerClasses$	=	Number of cropping systems in which fertilizer is used. [-]
$\Delta area_{fertilized}$	=	Difference in area of cropping system i between project scenario and baseline scenario during year t of the crediting period. [ha]
$N_{synthetic}(i)$	=	Average per hectare annual amount of synthetic fertilizer nitrogen applied within the LULC class i. [Mg N ha^{-1} yr^{-1}]
f_{GASF}	=	Fraction that volatilizes as NH_3 and NO_x for synthetic fertilizers. Use the default value of 0.1 from the 1996 IPCC Guideline. [-]
$N_{organic}$	=	Average per hectare annual amount of organic fertilizer nitrogen applied within the LULC class i. [Mg N ha^{-1} yr^{-1}]
f_{GASM}	=	Fraction that volatilizes as NH_3 and NO_x for organic fertilizers. Use the default value of 0.2 in the 1996 IPCC Guideline. [-]

Table CL6. GHG Emissions from Increased Fertilization

Variable	Acronym/ Symbol	Value	Unit
Volatilization factor for synthetic fertilizer	f_{GASF}	0.1	[-]
Volatilization factor for organic fertilizer	f_{GASM}	0.2	[-]
Emission factor for N_2O	EF	0.0125	[-]
Global Warming potential for N_2O	GWP_{N2O}	310	[-]
Baseline synthetic fertilizer rate		55	[kg ha^{-1} yr^{-1}]
Project synthetic fertilizer rate		100	[kg ha^{-1} yr^{-1}]
Synthetic fertilizer rate above the baseline		45	[kg ha^{-1} yr^{-1}]

Table CL7. Annual areas of agricultural intensification and total GHG emissions from increased fertilization.

Year	Adoption area (ha) [ha]	Increase in Organic Fertilization Rate [kg N yr^{-1}]	Increase in Synthetic Fertilization rate [kg N yr^{-1} ha^{-1}]	Sum of GHG emissions from Fertilization [t CO_2e yr^{-1}]
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	438	0	45	108
2013	875	0	45	216
2014	1,313	0	45	324
2015	1,750	0	45	432
2016	2,188	0	45	539
2017	2,625	0	45	647
2018	3,063	0	45	755
2019	3,500	0	45	863
2020	3,938	0	45	971
2021	4,375	0	45	1,079
2022	4,813	0	45	1,187
2023	5,250	0	45	1,295
2024	5,688	0	45	1,403
2025	6,125	0	45	1,511
2026	6,563	0	45	1,618
2027	7,000	0	45	1,726
2028	7,000	0	45	1,726
2029	7,000	0	45	1,726
2030	7,000	0	45	1,726
2031	7,000	0	45	1,726
2032	7,000	0	45	1,726
2033	7,000	0	45	1,726
2034	7,000	0	45	1,726
2035	7,000	0	45	1,726
2036	7,000	0	45	1,726
2037	7,000	0	45	1,726

Emissions from Biomass clearing for Assisted Natural Regeneration

No significant biomass clearing for implementing Assisted Natural Regeneration activities are undertaken in the project. ANR activities will not involve burning of fossil fuel and or burning of biomass and therefore no GHG emissions is expected from this activity.

Combined Emissions and Test of Significance

In decreasing order of magnitude, sums of GHG emissions include (see Table CL8)

- Fertilization **31,937 t CO_2e yr^{-1}**
- Biomass Firebreaks **11,000 t CO_2e yr^{-1}**

All GHG emissions that together account for less than 5% of the total benefits of the project, or 42,937 t CO_2e, are considered insignificant and can be omitted from the calculations.

Table CL8. Estimation of GHG Emissions due to Project Activities.

Year	Emissions from firebreaks [t CO_2e yr^{-1}]	Emissions from fertilizer [t CO_2e yr^{-1}]	Emissions from ANR [t CO_2e yr^{-1}]	Total Emissions [t CO_2e yr^{-1}]
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	108	0	108
2013	1100	216	0	1,316
2014	1100	324	0	1,424
2015	1100	432	0	1,532
2016	1100	539	0	1,639
2017	1100	647	0	1,747
2018	1100	755	0	1,855
2019	1100	863	0	1,963
2020	1100	971	0	2,071
2021	1100	1,079	0	2,179
2022	1100	1,187	0	2,287
2023	0	1,295	0	1,295
2024	0	1,403	0	1,403
2025	0	1,511	0	1,511
2026	0	1,618	0	1,618
2027	0	1,726	0	1,726
2028	0	1,726	0	1,726
2029	0	1,726	0	1,726

2030	0	1,726	0	1,726
2031	0	1,726	0	1,726
2032	0	1,726	0	1,726
2033	0	1,726	0	1,726
2034	0	1,726	0	1,726
2035	0	1,726	0	1,726
2036	0	1,726	0	1,726
2037	0	1,726	0	1,726
Total	**11,000**	**31,937**	**0**	**42,937**

CL1.4. Net Climate Impact of the Project

The project has a positive net climate impact; about 8,347,209 t CO_2e are generated during its 30 year duration (Table CL9). After reductions due to the buffer and risk buffer 7,296,328 t CO_2e VCU are generated.

Table CL9. Overview of ex-ante estimation of NER through the project crediting period

YEAR	1 ΔGHG from avoided deforestation [t CO_2e]	2 ΔGHG from deforestation due to leakage [t CO_2e]	3 ΔGHG from avoided degradation [t CO_2e]	4 ΔGHG from avoided degradation due to leakage [t CO_2e]	5 GHG from leakage by unconstrained geographic drivers [t CO_2e]	6 ΔGHG from assisted natural regneration [tCO2e]	7 ΔGHG from changes in long lived wood products [t CO_2e]	8 GHG from improved cookstoves [t CO_2e]	9 GHG from Emission sources [t CO_2e]	NER [t CO_2e]	Risk Buffer [%]	Buffer [t CO_2e]	VCU [t CO_2e]
2008	-19,475	3,467	0	0	1,180	-20,016	0	0	0	-34,844	19.75	6,882	27,045
2009	-61,245	7,257	0	0	6,290	-20,512	0	0	0	-68,209	19.75	13,471	52,063
2010	-105,261	11,263	0	0	15,875	-21,504	0	0	0	-99,627	19.75	19,676	74,591
2011	-153,889	16,048	0	0	30,185	-27,308	0	0	0	-134,965	19.75	26,656	99,178
2012	-189,224	19,626	0	0	37,854	-33,599	0	-1,313	0	-166,655	19.75	32,914	122,648
2013	-204,032	28,681	0	0	42,392	-52,085	0	-2,625	0	-187,670	19.75	37,065	137,087
2014	-232,823	41,761	0	0	46,931	-78,038	0	-3,938	0	-226,106	19.75	44,656	164,711
2015	-251,703	47,765	0	0	50,407	-100,812	0	-5,250	0	-259,594	19.75	51,270	189,972
2016	-254,939	45,441	0	0	51,034	-103,188	0	-6,563	0	-268,214	19.75	52,972	197,484
2017	-257,074	49,043	0	0	51,661	-109,003	0	-7,875	0	-273,250	19.75	53,967	200,949
2018	-258,127	49,859	0	0	52,291	-121,151	0	-9,188	0	-286,316	19.75	56,547	211,409
2019	-277,858	61,680	0	0	52,917	-133,044	0	-10,500	0	-306,805	19.75	60,594	225,652
2020	-283,411	48,187	0	0	53,546	-148,743	0	-10,500	0	-340,920	19.75	67,332	255,570
2021	-290,442	40,147	0	0	54,166	-162,526	0	-10,500	0	-369,155	19.75	72,908	279,694
2022	-293,504	20,373	0	0	54,623	-161,816	0	-10,500	0	-390,825	19.75	77,188	300,899
2023	-312,472	28,398	0	0	55,075	-151,564	0	-10,500	0	-391,063	19.75	77,235	299,416
2024	-311,146	39,410	0	0	55,518	-139,138	0	-10,500	0	-365,856	19.75	72,256	276,925
2025	-312,738	34,547	0	0	55,957	-130,696	0	-10,500	0	-363,430	19.75	71,778	275,852
2026	-313,625	44,595	0	0	56,378	-124,634	0	-10,500	0	-347,786	19.75	68,688	261,229
2027	-310,830	40,498	0	0	56,769	-119,829	0	-10,500	0	-343,892	19.75	67,919	258,837
2028	-298,952	57,194	0	0	56,692	-111,607	0	-10,500	0	-307,173	19.75	60,667	226,087
2029	-298,619	61,797	0	0	56,448	-103,327	0	-10,500	0	-294,201	19.75	58,105	214,817
2030	-313,238	65,351	0	0	56,045	-93,304	0	-10,500	0	-295,645	19.75	58,390	215,353
2031	-321,114	71,238	0	0	55,313	-78,524	0	-10,500	0	-283,587	19.75	56,008	204,659
2032	-336,720	54,075	0	0	54,139	-69,182	0	-10,500	0	-308,188	19.75	60,867	228,022
2033	-343,838	24,154	0	0	52,285	-50,697	0	-10,500	0	-328,596	19.75	64,898	250,675
2034	-332,743	4,458	0	0	49,472	-27,334	0	-10,500	0	-316,648	19.75	62,538	245,532
2035	-317,642	0	0	0	45,494	-17,494	0	-10,500	0	-300,142	19.75	59,278	233,952
2036	-299,897	0	0	0	40,328	-15,440	0	-10,500	0	-285,509	19.75	56,388	223,230
2037	-257,878	0	0	0	34,273	-8,791	0	-10,500	0	-242,896	19.75	47,972	190,229
Total	**-7,814,461**	**1,016,310**	**0**	**0**	**1,381,539**	**-2,534,905**	**0**	**-236,250**	**0**	**-8,187,767**	**0**	**1,617,084**	**6,143,767**

CL1.5. Specification How Double Counting is Avoided

The carbon credits generated from the project will be registered under the Voluntary Carbon Standard and sold under that mechanism. Credits from the project will not be registered or sold under any current regulatory scheme, as these schemes currently only allow for Afforestation or Reforestation credits to be sold. If and when the credits become eligible under a regulatory scheme, the proper procedures will be taken to ensure that credits are not sold twice. In addition, the Forestry Administration (as the Seller and aggregator of credits) maintains agreements with each CFMC group to ensure that credits are only sold by the FA so that duplicate sales of the same credits cannot occur.

CL2. Offsite Climate Impacts ("Leakage")

CL2.1. Determination of Leakage Type and Extent

Determination of Leakage Type

Leakage has been cited as being a major obstacle for the development of avoided deforestation projects (e.g., Schlamadinger et al., 2005; Miles and Kapos, 2008). If the project is successfully able to reduce deforestation in the project areas, solely to be transferred to areas outside the project boundaries, this would not achieve the desired environmental benefits of the project. However, the mere potential for leakage does not necessarily negate the environmental integrity of an avoided deforestation project. Only in cases where potential leakage cannot be identified and quantified does leakage pose an insurmountable barrier. In addition, the leakage risk can be mitigated by incorporating leakage prevention activities into the project activities. Activities adopted to minimize leakage, and make communities less dependent on deforestation include agricultural intensification, the introduction of fuel-efficient woodstove, and assisted natural regeneration. This project recognizes three different leakage types: (1) activity-shifting leakage within the leakage belt, immediately adjacent to the project sites (2) activity-shifting leakage outside of the leakage belt, and (3) market leakage.

- **Activity-shifting leakage versus market leakage**. Activity-shifting leakage refers to the increased deforestation outside of the project area due to the project-related displacement of agents of deforestation from the project area. Market-effect leakage occurs when prices and market forces are affected by project activities, influencing the economic attractiveness of deforestation. This may occur, for example, by reducing the rate of illegal logging for commercial on-scale. The reduction in illegal logging can increase the price of illegally logged wood in the area, which will make illegal logging in other areas more attractive. A more in-depth review of leakage can be found in Aukland et al., 2003. The conservative quantification of market leakage is based on coefficients set by the VCS AFOLU guidance.
- **Activity-shifting leakage within the leakage belt vs. activity-shifting leakage outside of the leakage belt**. Some drivers are acting at a local level and are geographically constrained and will shift pressure from the project area to right outside of the project area, in an area that is referred to as the leakage belt (see Figure G12). However, other drivers are geographically unconstrained and might shift pressures to areas far away outside of the project area. Examples of geographical constrained drivers

are fuelwood collection or collection of timber for local use. The range of action local agents of deforestation is constrained by the time it takes to move from a dwelling to the place of deforestation. Examples of geographical unconstrained drivers are migrant encroachment. Only activity shifting leakage within the leakage belt can be monitored. Activity-shifting leakage outside of the project area cannot be monitored as it can happen in completely different areas. As a consequence, loss of carbon credits from activity shifting leakage within the leakage belt can be estimated ex-ante but monitored and integrated ex-post for the calculation of the actual carbon credits. Activity shifting leakage outside of the leakage belt can only be conservatively estimated ex-ante using a factor approach and used in ex-post calculations. The assumptions made while assigning these factors must be monitored during the crediting period. Factors will be updated upon a validation of the baseline.

A typology of the leakage caused by every identified driver of deforestation is included in Table CL10.

Determination of Leakage Extent

The relative impact of leakage is quantified by *ex-ante* leakage cancellation factors, which express the driver-specific relative amount of leakage for the amount of deforestation that is avoided. For example, a leakage cancellation factor of 20% translates into a loss of 20 tons of credits through leakage from a project activity with a greenhouse gas benefit of 100 tons within the project area. In other words, the net greenhouse gas benefit would be 80 tons in this example. The methodology to quantify losses in carbon credits from leakage is included in one of the next section. This quantity describes the proportion of the (expected) gross emission reductions inside the project area that are lost again due to leakage outside of the project area. Only changes that are directly attributed to project activities should be included in the cancellation rate. For example, if preventing illegal encroachment within the project area by patrolling saves 500 ha of forest per year, but directly leads to an increased deforestation outside of the project area of 300 ha, the cancellation rate of illegal encroachment prevention is 60%.

Below is a justification of the selected leakage cancellation rate for every identified driver, divided into geographically constrained and geographically unconstrained drivers.

Leakage from Geographically Constrained Drivers

Leakage from geographically constrained drivers is expected to take place adjacent to the project area. Seven of the 10 drivers identified in the project areas are geographically constrained drivers.

1. **Conversion to cropland.** Project participants will have approved binding forestry agreements that prevent the expansion of croplands within the project areas. The availability of arable land is typically less of a constraint than the availability of farm inputs or water. Improvements in agricultural efficiency will improve crop yields from existing agricultural land, preventing the need for further deforestation to create new land to grow crops.
2. **Conversion to settlements**. Project participants will be bound by approved forestry agreements that prevent the clearing of the community forests for the creation of new settlements. The project will support participatory land planning to increase the efficiency in land use. In addition, improvements in infrastructure including water distribution and purification in existing settlements will reduce the need for settlement expansion.
3. **Fuelwood gathering**. Adoption of more efficient cookstoves and alternative measures to protect livestock from mosquitoes will significantly reduce the amount of fuelwood use, and shouldn't result in significant leakage. There will not be, however, be a 100% adoption rate for these new technologies, so we conservatively estimate a 15% leakage cancellation rate.
4. **Forest fires induced to clear the forest understory**. The adoption of alternative land management techniques will replace the need to use forest fires to clean the understory. These alternative techniques will be implemented on existing forest and agriculture lands and will not lead to leakage greater than 10% in the surround areas.
5. **Hunters inducing forest fires.** Hunters denied access to the project areas by forest patrols will shift the location of their hunting grounds to alternate locations. The use of forest fires to concentrate and drive animals from forest cover will shift to the leakage belt, resulting in a 90% leakage cancellation rate.
6. **Illegal logging for commercial sale.** Illegal loggers denied access to the project areas by forest patrols will also shift the location of their logging operations to alternate locations outside of the project area. Illegal logging operations in these new locations will likely continue at the same pace, resulting in a 90% leakage cancellation rate.

7. **Timber harvesting for local use.** The need for timber on a local level will not decrease as a result of project implementation. Local communities will shift the location of their timber harvesting to the leakage belt surrounding the project areas to harvest wood. We anticipate timber harvesting for local use to continue at a steady pace, resulting in a 100% leakage cancellation rate.

Leakage from Geographically Unconstrained Drivers

Leakage from geographically unconstrained drivers can occur in areas beyond and far away from project area vicinity. Forest clearing for land sale is the only geographically unconstrained driver that is relevant in the project. Other drivers that are geographically unconstrained are large economic land concessions and timber concessions. These were excluded from the reference area and not included in the carbon accounting. The latter is conservative since a leakage cancellation rate of 100% is assumed; no project activities will affect the hectares of forest being cleared by large economic land concessions or timber concessions.

1. **Forest clearing for land sales.** Migrants unable to settle and encroach within the project area are likely to shift to the land immediately surrounding the project. The majority of these migrants will stay within the leakage belt, and we estimate conservatively that migrant encroachment and resulting deforestation within the leakage area will cancel approximately 50% of avoided deforestation within the project area.

2. **Large economic land concessions**. Economic Land Concessions granted by the MAFF and provincial governments will not be allowed within the project areas. However, large ELCs will continue to be granted outside the project area, effectively cancelling through leakage 100% of the avoided deforestation within the project area. Since ELCs were excluded from the reference region, no further adjustment has to be done to the carbon accounting.

3. **Timber concessions**. Timber concessions are not allowed in the project area, but will continue to be granted in the surrounding areas and leakage belt. We anticipate timber concessions to be granted with the same frequency regardless of project implementation, and estimate a 100% leakage cancellation rate as a result. Since Timber concessions were excluded from the reference region, no further adjustment has to be done to the carbon accounting.

Table CL10 summarizes the leakage extent for each driver, divided into leakage types.

Table CL10. Anticipated Leakage Cancellation Rates for each Deforestation Driver.

Driver of Deforestation	Leakage cancellation rate (%) Geographically constrained	Geographically unconstrained
1. Forest clearing for land sales	0%	50%
2. Conversion to cropland	0%	0%
3. Conversion to settlements	0%	0%
4. Fuelwood gathering	15%	0%
5. Forest fires induced to clear the forest understory	10%	0%
6. Hunters inducing forest fires	90%	0%
7. Illegal logging for commercial on-sale	90%	0%
8. Timber harvesting for local use	100%	0%
9. Large economic land concessions	0%	0%
10. Timber Concessions	0%	0%

CL2.2. Documentation and Quantification of How Leakage will be Mitigated

The protection of the forest can lead to the displacement of fuelwood collection, conversion of forest land to agriculture or settlements, etc. Leakage is mitigated by implementing specific project activities that either improve livelihoods or reduce the need for land or fuelwood.

- Project activities provide new livelihoods and will therefore reduce the need for local communities to deforest land for subsistence agriculture. Such project activities include participatory measurement and monitoring, forest patrolling, construction of fire-lines and other fire-prevention measures, assisted natural regeneration and enrichment planting.
- Project activities will increase the efficiency of already-deforested land for producing crops or providing settlement area by organizing stakeholder-driven Participatory Land Use Plans, and agricultural intensification.
- Project activities will decrease the use of wood from the forest by increasing the efficiency of woodstoves and introducing mosquito nets to reduce the use of wood for smoke to repel mosquitoes. The adoption rate of the fuel-efficient woodstoves and the mosquito nets will be monitored throughout the project's lifetime.

CL2.3. Subtracting Project related Leakage from Carbon Benefits

Similar to the calculations above, the exact methodology for quantifying leakage is based on the VCS methodology VM0006. The procedure to quantify losses from activity-shifting or market leakage is summarized below. Briefly, the effect of leakage can be quantified by multiplying the expected leakage cancellation rates with the rates by which the influence of each driver is reduced and the net decreases in deforestation due to project actions. This can be done separately for activity-shifting leakage within the leakage belt and activity-shifting leakage outside of the leakage belt. Areas undergoing commercial harvesting activities were not excluded from the project area and therefore the project is not susceptible to market leakage. The following formula was used in determining the leakage from geographically constrained drivers i.e. increased GHG emissions occurring within the leakage belt:

$$\Delta D_{LK,DF}(t,i) = RelativeLeakageImpact_{DF}(t) \cdot D_{projectArea,baselineScenario,DF}(t,i)$$

Where:

$\Delta D_{LK,DF}(t,i)$	=	Leakage-induced increase in deforestation rate within forest stratum i for year t of the crediting period. [ha yr^{-1}]
$RelativeLeakageImpact_{DF}(t)$	=	Total relative impact of leakage on the decrease in GHG emissions due to project activities for deforestation for year t of the crediting period. [-]
$D_{projectArea,baselineScenario,DF}(t,i)$	=	Baseline rate of deforestation within forest stratum i and the project area for year t of the crediting period. [ha yr^{-1}]

The relative impact of leakage is quantified by *ex-ante* leakage cancellation factors, which express the driver-specific relative amount of leakage for the amount of deforestation that is avoided. This quantity describes the proportion of the (expected) gross emission reductions inside the project area that are lost again due to leakage outside of the project area. Only changes that are directly attributed to project activities should be included in the cancellation rate. For example, if preventing illegal encroachment within the project area by patrolling saves 500 ha of forest per year, but directly leads to an increased deforestation outside of the project area of 300 ha, the cancellation rate of illegal encroachment prevention is 60%. Once the leakage cancellation rates $leakage(d)$ are fixed for every driver d, the $RelativeLeakageImpact$ can be calculated as following:

$$RelativeLeakageImpact_{DF}(t) = \sum_{d=1}^{nrDrivers} leakage(d) \cdot RelativeDriverImpact_{DF}(t,d)$$

where:

$RelativeLeakageImpact_{DF}(t)$	=	Total relative impact of leakage on the decrease in GHG emissions due to project activities. [-]
$leakage(d)$	=	Leakage cancellation rate for avoiding deforestation of fuelwood collection. [-]
$RelativeDriverImpact_{DF}(t,d)$	=	Relative impact of a driver d on deforestation for year t of the crediting period. [-]

Forest clearing for land sale is the only geographically unconstrained driver that is relevant in the project. Approximately 50% of the emission reduction achieved from this driver in project area is expected to increase the GHG emissions outside of the leakage belt.

Approximately 22% of the climate benefits from the REDD project within the project area is annulled by increased emissions outside of the project area due to activity-shifting (Figure CL3). Most of the leakage is due to activity shifting leakage outside of the leakage belt, followed by activity shifting leakage inside of the leakage belt, and market leakage. For more information on the leakage belt location and calculations see the VCS PD.

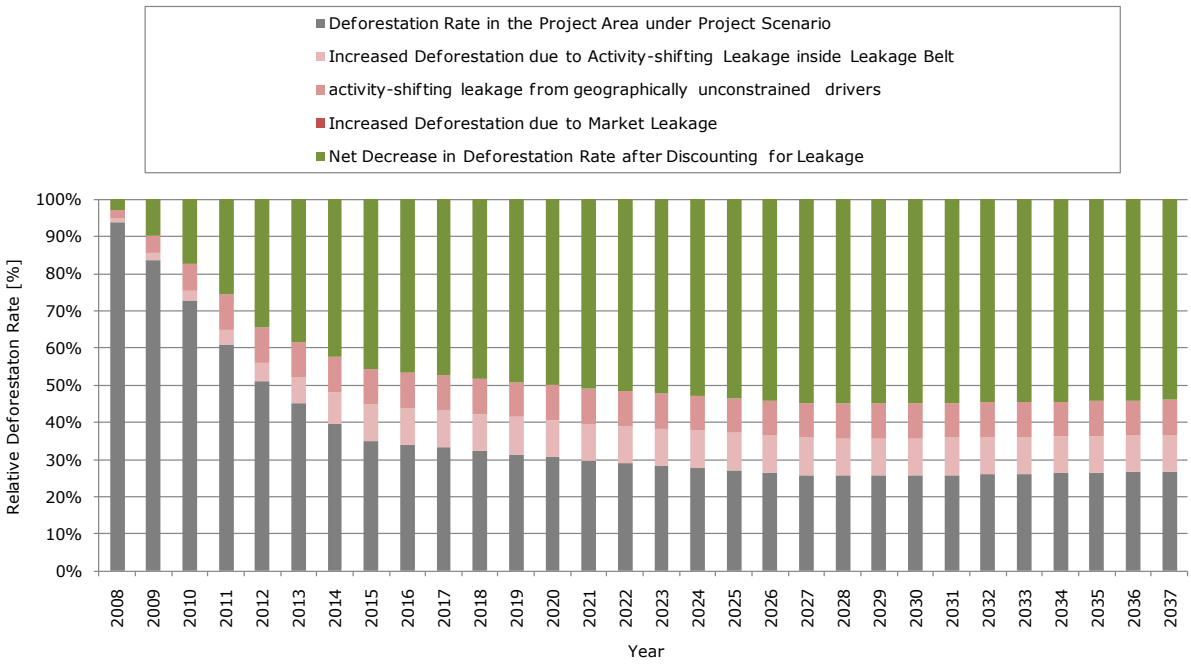


Figure CL3. Impact of the Project on Deforestation Rates Inside and Outside of the Project Area (Leakage).

CL2.4. Inclusion of Non-CO_2 Gases in Calculations

Non-CO_2 gases are fully included in the project's calculations when significant. The test of whether a non-CO_2 gas is significant is described in section CL1.3. Table CL8 contains an overview of all emissions sources from non-CO_2 gases and fuel-related emissions from project activities.

CL3. Climate Impact Monitoring

CL3.1. Plan for Selecting and Monitoring Carbon Pools

The following table contains a justification for which carbon pools were selected. Non-CO_2 GHG were not included in monitoring because they are expected to be less than 5% of the total CO_2 equivalent benefits generated by the project.

Table CL11. Carbon Pools Selected in this Project.

Carbon Pool	Selected	Justification/ Explanation of Choice
Aboveground tree biomass	yes	Major carbon pool affected by project activities
Aboveground non-tree biomass	no	Can be conservatively omitted because no conversion occurs to a land use with high non-tree biomass occurs
Belowground biomass	yes	Major carbon pool affected by project activities
Dead wood	yes	Included because project activities may lead to a decrease in the dead wood pool when biomass is removed for fire prevention and reducing the fuel-load or sustainable fuelwood collection
Litter	no	Expected to decrease under baseline conditions, is therefore conservatively omitted
Soil organic carbon	no	Expected to decrease under baseline conditions, is therefore conservatively omitted
Wood products	no	No commercial timber operations take place under the project scenario. A decrease in long-lived wood products from reducing illegal timber logging is insignificant.

In the spring of 2008, 80 permanent forest inventory plots were established within the forests of the project area. Throughout 2009, an additional 70 permanent forest inventory plots were established in combination with 40 non-permanent plots outside of the forest area, in settlements, shrub-land, degraded woodland, and cropland. Forest inventory plots will be re-measured throughout the crediting period. The location of plots was selected using a stratified random sampling design. The size and layout of the plots were selected to be compatible with the Cambodian forest inventory system. Plots were 50 m x 50 m, and all trees above 10 cm DBH within each plot were measured. The location and exact procedure to measure each of the selected biomass pools is described in detail in a Standard Operations Procedure. This manual is available to the verifiers in a non-public attachment.

CL3.2. Development of a Full Monitoring Plan

The carbon developer firm will develop a full monitoring plan within six months of the project start date. This monitoring plan will a part of the project monitoring plan that is being developed for the VCS. A single monitoring plan that is consistent with both the CCB standards and the VCS methodology will be finalized upon validation of the VCS PD. The monitoring plan will be adjusted to be compatible with a potential future National Carbon Accounting System. The monitoring plan will be completed within 6 months after the submission of this PD. The results of monitoring will be made publically available and communicated to local communities.

Community Section

CM1. Net Positive Community Impacts

CM1.1. Methodologies to Estimate Impacts on Communities

Net Positive Community Impact Methods

The project initiated an ongoing series of community dialogues in January 2008 providing new communication channels for project communities to voice their aspirations and problems. The project development team worked with the local NGO (Children's Development Association) to conduct a series of village Participatory Rural Appraisals (PRAs) and community sketch maps to assess proposed project areas. The discussions focused on local drivers of deforestation, management problems, social conflicts, as well as priorities for development and perceived livelihood opportunities. Participants in the discussions included: elected CF management committee members, Buddhist monks, local farmers, commune representatives, and both men and women household heads. Both members of the Khmer ethnic majority and members of a small minority of ethnic Kuy people have been included in discussions. The results from the interviews are described in Section G3.8 on Stakeholder Input.

Positive Community Impacts

The Royal Government of Cambodia has identified three major project goals that will benefit forest dependent communities:

- improve the quality of the forests;
- maximize benefit flows to local communities participating in the project;
- develop new REDD project sites that will benefit other forest-dependent communities.

The project will directly benefit communities by:

- engaging with local communities in the design and development of the project at the earliest possible stage;
- providing training and support to local village organizations to build forest management capacity;
- securing the Royal Government of Cambodia's recognition of community forest management rights;

- generating carbon revenues that the community will use for forest restoration employment, improving farming systems, establishing micro-finance organizations, and capitalizing small livelihood enterprises;
- maintaining the access and use rights of local communities to continue harvesting NTFPs for customary use from the project area forests.

The project has budgeted to train 260 patrollers to patrol all 13 community sites. Based on project budget projections direct support for community forest protection and restoration will employ an estimated 65 people full-time from local communities, and support local police officers and Forest Administration, while small grants for water resource development projects, NTFP development and agricultural intensification will employ an estimated 30 people.

A participatory approach, including quantitative (household surveys) and qualitative (participatory rural appraisals and focus groups), will be used to measure the impacts that the project has on communities. This approach will identify communities that are directly and indirectly affected by the project by clearly identifying each villages, households and CF groups within the project area and leakage belt. The project will differentiate communities into three strata: 1) households participating with the project CFs, 2) households that are not participating with the project CFs, but that are located within the villages that are participating, and 3) households located outside of participating CF villages. These interviews have formed the basis for the creation of the project's community impact monitoring plan, which is intended to measure the community impact of the project on the participating CFs. Table CM1 outlines the specific community impact variables that will be monitored by the project, which is part of the broader project monitoring plan aimed at monitoring the climate, community and biodiversity project impacts. Based on the baseline community and livelihood data, this monitoring plan will allow for a detailed qualitative and quantitative assessment of community impacts from the project over the baseline scenario.

This sampling strategy provides the basis for targeting households that are likely to experience direct (strata one and two) and indirect impacts (strata two and three). Community impacts will be identified within and across these three strata over time by replicating the household surveys every on an annual basis, or at least once every with VCS verification period (expected to be 2 years). Complementing the household surveys will be participatory rural appraisals and focus groups which will provide exploratory, in-depth insights into community impacts in each CF. Participatory monitoring activities such as

community meetings, forums and workshops provides the opportunity for further identification of site-specific community impacts by local actors.

Improve the Quality of the Forest.

A substantial portion of project carbon revenues will be utilized to improve the quality of the forests, largely through supporting community protection and restoration efforts. Conserving and improving forests will enhance environmental services including water availability, microclimate stability, NTFP productivity and other benefits of importance to local communities. Leaders and members of the CFMC groups will receive training in forest management, as well as in resource planning, forest restoration, microfinance, and small enterprises. During the first two project years, the local Forestry Administration officers and implementing organizations will work with the Community Forest Management Committees (CFMCs) in the project areas to strengthen forest protection capacity including forest patrols, fire control systems, and addressing resource conflict issues. The Forestry Administration and the CFMCs will formalize a Memorandum of Understanding to implement the REDD project. Project CFMCs and their members will be legally, technically, and financially supported to play a primary role in stopping the major drivers of deforestation and degradation currently operating in the project area and leakage belt. This is the most important action required to achieve the REDD project goals. Community action to secure forest boundaries by social fencing and by intensifying protection is the key strategy to control illegal logging, migrant encroachment, and fires. The first project budget allocates financial support for labor and equipment to establish forest boundary demarcation, patrol hut construction, purchase of patrol equipment, and fire prevention measures.

In years 3 through 30, aside from support for forest protection, this REDD project will secure carbon credits through forest management activities allowable under REDD. Forest management will focus on assisted natural regeneration and enrichment planting of degraded forest land. The project target will target 5,355 hectares of degraded forests for regeneration from 2013 to 2021. Funds for the ANR activities will be directed to project communities primarily for labor and materials. The project planners estimate that this will provide approximately 20 person days of employment each year per household during the agricultural off-season. These activities are designed to protect High Conservation Value (HVC) areas mentioned in Section G.1.8. High Conservation Value areas will not be negatively affected; in fact they are expected to flourish with project implementation.

Maximize Benefits to Local Communities

The project will provide small grants to CFMCs to undertake:

- NTFP development activities;
- NRM and social development activities (i.e. water supply, health, education);
- agricultural intensification activities.

Beginning in October 2009, discussions to define the mechanism to deliver benefits to the local level are taking place among project partners and local communities, with the aim to identify the most appropriate mechanism for Cambodia. According to discussions, it is likely that a small grants mechanism will be available for community organizations based on local level planning and participation of CF members in the application process. The project implementation team and partners will continue to provide training in bookkeeping and assist project participants to strengthen community institutions and accounts. Small grants are likely to include capital investment in NTFP enterprises including honey production, rattan and bamboo culture and processing as well as NRM and social development projects including tank de-silting, well drilling, the development of drinking water systems, schools and health clinics, according to community priorities. To reduce leakage and increase food security in the project area, support will also be provided to innovative local farmers who agree to conduct farming system trials. The project will facilitate access to technical extension services regarding promising methods for intensifying farming systems in a sustainable manner through the use of improved water, fertilizer, seed, and cultivation techniques. This will be linked to a program to improve water resources, with a focus on small grants to fund community de-siltation of water tanks and agricultural trials. The agricultural intensification services are designed to assist communities to raise the productivity of existing farmland, reducing the need for further forest clearance. All methane and nitrous oxide emissions from agricultural intensification activities are accounted for in the calculation of the project's greenhouse gas benefits.

Compare the With-project Scenario and the Baseline Scenario of Social and Economic Well-being

In Section G2.1, the economic and tenure situation of the project communities and the drivers of deforestation are described in the Without-project Scenario. It is clear that without a project, several outcomes are likely, including:

- increasing conflict with migrants, military, and concessionaires;

- loss of control over forest lands;
- deforestation of local forests critical for livelihood and environmental services;
- growing poverty and social marginalization;
- loss of biodiversity.

The project will work to build an alliance between project communities and the RGC's Forestry Administration, as well as with other local stakeholders, providing legal recognition of community rights to manage and utilize local forests. Aside from enhancing tenure security, the project will bring in significant direct and indirect employment opportunities and investment funds for resource and community initiatives over a 30 year period, providing a stable financing mechanism for long term social and economic development.

Stakeholder Dialogue

The project implementation team has engaged a range of stakeholders in discussions to guide the design of the project including Forestry Administration policy makers and field staff, commune, district, and provincial government officials, civil society organizations including local NGOs and the Buddhist Monk's Association, as well as the forest dependent communities that represent the primary stakeholders. The Forestry Administration has played a critical role in supporting consultation at all levels, combating illegal activity on the ground, negotiating with the military to relocate soldiers, and processing legal tenure agreements for all the sites. Consultation has been held with the military commanders operating in the province, as well as local police.

An initial exploratory field visit was conducted by Community Forestry International in January 2008. In February 2008, a PRA exercise was held with four communities including semi-structure interviews and group discussions resulting in an initial social assessment (CFI 2008). A more in-depth research project was conducted on Sorng Rokavorn CF involving extensive dialogue with the organizing monks and community members (Elkin 2008). These community dialogues were followed-up by a Provincial Workshop held on 20 March 2008 which was attended by national and provincial government officials, as well as civil society and community representatives (CFI 2008b). A follow-up workshop with provincial stakeholders was held on Cambodia's Arbor Day, followed by four district level workshops for local officials. Each workshop has increased the knowledge and understanding of local government officials and representatives from public agencies regarding the goals and strategies that will be adopted under the project. It has also

provided the project design team with inputs regarding local government priorities and modes of operation.

Figure 1. CFMC Members in Bat Nim Village Discuss Drivers of Deforestation Operating in Ratanak Ruka CF.

At the village level, between March and August 2008, community dialogues were conducted in eight communes located in three districts involving at least 10 to 15 households representing most of the 58 project villages and hamlets. Between July 2010 and June 2011, 13 meetings were held between the project implementing partners and representatives of the Community Forest Federation and other community members. Some of these dialogues were facilitated by the project development team, while others were led by a local NGO, the Children's Development Association, and the local Buddhist Monk's Association. Both groups have strong ties with local communities and have been supporting local community resource management initiatives over the past 5 years. Community dialogues have helped focus project design on unique forest management issues and opportunities found across the 13 Community Forestry Sites.

Over the course of the project, annual stakeholder dialogues with a focus on project communities will be held to generate feedback and information necessary for project adaptation and documentation. The stakeholder dialogue will be held towards the end of each calendar year over a two week period allowing for decentralized, village level meetings

culminating in a provincial workshop. The findings from the meetings will be posted online for public review.

CM1.2. Demonstration that no HCV Areas are Negatively Affected

This REDD project will secure carbon credits through forest management activities implemented by the local communities. Activities of the communities will focus on the protection, restoration, and regeneration of High Conservation Value (HCV) areas as well as the restoration of 5,355 hectares of degraded forestland. The baseline biodiversity assessment involving community members in surveying and ongoing biodiversity monitoring, will help to define the HCV Areas facilitate plans for their protection. A biodiversity field study was completed by Birdlife International in January 2011, which also contributes significantly to the identification of HVC areas in the project area. These HVC areas described in Section G.1.8.4-6 are expected to flourish with project implementation. There is no expectation of any negative effects on HCV areas within the project.

CM2. Offsite Stakeholder Impacts

CM2.1. Identification of Negative Offsite Stakeholder Community Impacts

The social appraisal indicates that the distance of community impact beyond the project area is limited, averaging around one kilometer. This is due to the fact that the land and forest beyond the project area has in many cases been claimed by "market driven" forces through the granting of ELCs, or has been cleared and settled by migrants moving into the region from other provinces. In the past 10 years, Oddar Meanchey Province has transitioned rapidly from an "open frontier" environment to a "claimed domain" context. This is largely driven by many migrants seeking land for agriculture and resale, as well the dynamics of land speculation driven by the growth in foreign direct investment. The drivers of deforestation that may be affected by project activities beyond the project site include:

- forest clearing for agriculture expansion by migrants entering the area;
- forest clearing for settlement expansion;
- fuelwood collection;
- timber felling for house construction are more likely to be intensified in the offsite areas.

A minimal number of deforestation drivers are expected to shift from the inside of the project area to areas outside of the project area. The impact for communities outside of the project is expected to be minimal. Often drivers of deforestation are carried out by local community members. By providing alternative forest-based incomes to local communities deforestation activities should discontinue and not just shift to another location.

CM2.2. Offsite Impact Mitigation Strategies

The project implementation team will assist project communities in establishing a dialogue with migrants to the area to inform them of the CF areas and management rules that govern them. Awareness-raising for both project and surrounding communities will be addressed through traditional theatre performances (e.g., shadow puppetry), billboards, boundary demarcation, and meetings, with encouragement for surrounding migrant communities to emulate sustainable forest management practices under future REDD expansion. The project will also facilitate a natural resource management planning process with project communities that would involve local migrant families. This process would

result in the formulation of land-use plans in accordance with the Commune Land-Use Planning Sub-decree (2008) The impact of the project outside the project area is already being witnessed in the form of new community forestry site development. Currently, there are four new CF sites under development, demonstrating the potential for the project to increase interest in forest protection, CF registration, and REDD. The project will also improve forest governance in general in the province through better communication among stakeholders and improved resourcing of enforcement measures throughout the province. Regular provincial radio broadcasts will continue to provide updates on the project as it progresses. The increased value placed on the protection of forests will lead to shifts in behavior and pressure on migrants and hunters in other areas to move away from illegal and unsustainable practices which will become less socially accepted. Though it is beyond the control of this project, it is hoped that in the future, expansion of REDD initiatives in the province (national or sub-national) will seek to provide alternative more sustainable livelihoods for migrants and hunters living outside the project area.

However, it is also anticipated that the livelihoods of certain members of the population of Oddar Meanchey may be negatively affected by the project. Specifically, hunters and migrants, who in many cases are subsisting from illegal land-use activities, may be forced to seek alternative livelihoods, or move outside of the project area. The project intends to monitor this activity-shifting leakage in a leakage belt surrounding the project to account for the negative environmental impacts of these activities. To the extent possible, hunters, migrants and other agents of deforestation that are shifting their illegal land-use practices outside of the project area will be engaged by the project team to encourage alternative land-use practices and livelihoods. Employment opportunities will be presented to avoid excluding these agents of deforestation from the project and FA officials and the other project implementation partners will work to educate these agents about the benefits of the project.

CM2.3. Demonstration that Well-being of Other Stakeholder Groups has not been Negatively Impacted

The project is designed to minimize any negative offsite impact. By building and empowering community institutions to manage and conserve local forests, creating employment and livelihood opportunities, and assisting in the formation of capital in community micro-finance institutions, this project will have a little negative offsite impact.

The project will include neighboring communities outside the project area in its socio-economic monitoring activities. This should allow feedback from non-project communities in the area concerning the negative and positive ways in which the project impacts them. The implementing organization team would also respond to queries and problems related to the project that may arise in neighboring non-project communities.

CM3. Community Impact Monitoring

Although a community monitoring plan has not yet been developed, a Monitoring Framework developed by Pact in 2011 (Pact 2011) does address social and community impact monitoring. Community impact will be monitored using a mixed-methods approach featuring both quantitative and qualitative research methods. In keeping with the participatory Monitoring, Evaluation, Reporting and Learning (MERL) approach taken by Pact, the monitoring methodology is participatory in that project participants including proponents (FA, Pact and TGC) local partners (CDA, CFN and CFMCs) and authorities (local FA, Commune Councils) will provided input into the design, planning, implementation and use of the monitoring system.

The methodology will feature a periodic social assessment consisting of a household survey and a participatory rural appraisal and series of focus groups which will be implemented bi-annually to coincide with verification. Social variables to be monitored include household size, forest-related incomes, agriculture and crop harvesting, employment, security of land tenure, access to forest resources, and use of forest products and NTFPs.

Whereas the household survey is semi-structured and will canvass a stratified randomized sample of community members in the project area (participants and non-participants alike) based on socio-economic and geographic variables, the participatory rural appraisals and focus groups provide a targeted, purposive sample of CFMC members and project participants. Using an open-ended, participatory approach, the participatory rural appraisals and the focus groups also provide the opportunity for an in-depth exploration of issues relevant to community members.

The periodic social assessment will be augmented by ongoing project activity monitoring of participation in project activities by community members, which will encompass associated direct impacts on employment, tenure and livelihoods.

CM3.1. Selecting Community Variables to be Monitored

The project communities will be involved in an annual participatory monitoring exercise to assess the extent to which project activities are achieving the community and project goals. The following aspects will be monitored:

- social indicators;
- economic indicators;

- institutional indicators;
- biodiversity indicators;
- carbon stocks and forest condition.

All methods will rely on community input regarding project impacts. Parameters to be measured will include:

- community member knowledge, attitudes, and behaviors related to the project, especially levels of participation;
- changes to forest related income and employment;
- institutional capacity to manage natural resources and finances;
- improvements in forest habitat and sighting frequency for indicator species;
- changes in carbon stock levels and forest conditions.

Data will be collected through community focus group discussions, in-depth interviews, and sample surveys. This annual participatory assessment will be supplemented by field trip reports and the minutes of meetings facilitated by the local NGO support group. Longer term measurement of the impact of the project on local communities will be gathered through periodic sample surveys conducted with project families. Longer term measurement of the impact of the project on local communities will be gathered through periodic sample surveys conducted with project families. These surveys will cover a range of issues including income, land tenure, and employment, education, social capital, and resource availability and will be used to quantitatively measure socio-economic changes in the project communities.

A copy of the draft community monitoring plan which contains a detailed description of the variables to be surveyed will be made available to the verifier. This monitoring plan will be finalized within 6 months after validation.

Table CM1. Community Impact Monitoring Variables (taken from Pact, 2011)

Category	Indicator / output	Unit / measure	Frequency	Notes	Reporting	Responsibility
Land tenure	Record dates and reports of all meetings with stakeholders regarding land-tenure status strengthening	Narrative	Annually	Require records of implemented activities	VCS	Pact

	Original agreements strengthening land-tenure status	Narrative	Annually	Require records of implemented activities	VCS	Pact
	Dates when land tenure status strengthening agreements were signed	Time / Date	Annually	Require records of implemented activities	VCS	Pact
	Dates and reports of all meetings with stakeholders regarding forest and land use plans	Narrative	Annually	Require records of implemented activities	VCS	Pact
	Meeting minutes	Narrative	Annually	Require records of implemented activities	Pact	Pact
	Project updates provided to ministries	Narrative	Annually	Require records of implemented activities	Pact	Pact
Agricultural intensification	Location of agricultural intensification practices	Lat/lon coordinates	Annually	Location of demonstration and pilot sites	VCS	Pact

	Crop species and varieties used	Narrative	Annually	-	VCS	Pact
	Dates of planting, cultivation, harvesting for agricultural intensification	Narrative	Annually	-	VCS	Pact
	Costs of inputs (seed, fertilizer etc.)	USD / Riel	Annually	-	VCS	Pact
	Agricultural outreach activities	Narrative	Annually after the validation of the project	Provide dates and detailed reports of agricultural extension activities and meetings	VCS	Pact
Community development	Number of community members employed in project	n=employed	Annually	-	Pact / CCB	Pact
	Changes in community members KASA as a result of financial management	Narrative	Quarterly	Coaching report	Pact / CCB	Pact
	Village cooperative structure	Narrative	As observed	-	Pact / CCB	Pact
	Community Development Workshop Reports	Narrative	As observed	Community priorities identified	Pact / CCB	Pact
	Community Development Plans	Narrative	As observed	Community priorities identified	Pact / CCB	Pact

	Landmine Clearance Survey	Coordinates Narrative	Year 1	ANR areas, biomass inventory plots, and patrol tracks will be surveyed for landmine risk. Areas of risk will be either cleared or avoided.	Pact / CCB	Pact
	Small grants delivered	Narrative	As observed	NTFP, NRM & agricultural intensification	Pact / CCB	Pact
Awareness and understanding	CF Meeting minutes	Narrative	Quarterly	-	Pact / CCB	Pact
	Provincial review meeting minutes	Narrative	Annual	Findings are documented and utilized	Pact / CCB	Pact
	CFN registration and meeting minutes	Narrative	As observed	-	Pact / CCB	Pact
	CFN training materials	Narrative	As observed	-	Pact / CCB	Pact
Benefit sharing	CFN financial records and reporting	Narrative	Annually	-	Pact / CCB	Pact / CFN
Sustainable land management planning	Agricultural inholdings & settlement mapping finalized	GPS Boundaries	As observed	Each site will have a map showing inholdings with GPS boundaries demarcated	Pact / CCB	Pact
	Communities sign agreements with FA for no further expansion of in-holdings	Narrative	As observed	-	Pact / CCB	Pact

NRM / Water Resource planning	Locations of irrigation ponds	Coordinates Photo's	AO	Year 5 – 8	Pact / CCB	Pact
Community impact	Community impact monitoring indicators identified	Narrative	Year 1	Participatory process undertaken to identify community impact indicators	Pact / CCB	Pact
	Community participation in the project	# participants	Annually	Across demographic variables of gender, age, ethnicity etc.	CCB	Pact
	Community monitoring plan	Narrative	Year 1	Community impact monitoring indicators & timeline	CCB	Pact
	Gender assessment	Narrative	Year 1	-	CCB	Pact
Community impact	Community member knowledge, attitudes and behaviors related to the project	Narrative	Every 2 years	-	CCB	Pact
	Changes in social capital	Narrative	Every 2 years	Forest governance indicators will be developed which will include social capital measures	CCB	Pact
Capacity building	CF members biodiversity knowledge and skills	# participants	As observed	-	CCB	CFMCs / Consultant

CM3.2. Assessing Effectiveness of High Conservation Value Monitoring

Special attention will be given to High Conservation Value (HCV) areas specific to meeting community needs, such as areas with high concentrations of resin trees, rattan, or other important non-timber forest products, along with traditional spirit forests and areas where rare or threatened wildlife have been sighted. These areas will be monitored similar to the aspects of community variables as listed above. Data on HCV areas will be collected through community focus group discussions, in-depth interviews, and field surveys within the HCV area. The effectiveness will be assessed by HCV areas not being negatively affected by project implementation over time. The effectiveness will further be monitored by reviewing interviews of community members over time. If the project is successful these interviews should show positive attitudes towards care of the HVC areas.

CM3.3. Community Impact Monitoring Timeline

A full community impact monitoring plan will be developed within six months of the project start date through collaboration between the implementing partners PACT and the FA. Participatory trainings on REDD project monitoring will be conducted with all the project communities in order to consult on required indicators and prepare local capacity for monitoring. The results of monitoring will be made publically available and posted on the project website. An SMS system of communication using Frontline® software or a similarly equipped suite of software and tools will be installed as soon as it is available in Khmer language, making it possible for communities to report immediately on activities and their UTM coordinates. A central database will compile information to be uploaded to the project website. Communication to local communities and stakeholders will be consistent to that described in Section G3.8 and will be made available in local language (Khmer) when relevant.

Biodiversity Section

B1. Net Positive Biodiversity Impacts

The major positive biodiversity impact of the project is ensuring the conservation of key habitat for threatened flora and fauna. With 64,318 hectares included in the project, the project area represents 10% of the land area of Oddar Meanchey Province, and approximately 15% of its remaining evergreen forest. The project seeks to conserve and regenerate dry deciduous and evergreen forest ecosystems through improved protection from illegal logging, fire, and through assisted natural regeneration activities. This strategy would restore unique habitat for amphibians, reptiles, mammals, and birds, while restoring high value and endangered tree species (see Annex 2 for a list of potential species). The project will also create greater awareness among local communities regarding the value of biodiversity, as well as build monitoring, patrolling, and habitat restoration skills, which will result in better controls over hunting, poaching, and damage to critical habitat. Mobilizing the CFMCs to engage in biodiversity conservation will also result in the community establishing rules and sanctions prohibiting hunting and regulating NTFP collection to sustainable levels. Without the project biodiversity is expected to have a net negative impact.

B1.1. Methodologies Used to Estimate Changes in Biodiversity

The proposed participatory biodiversity monitoring methodology draws on the systems articulated by Finn Danielsen et al. (2000). This simple system was selected because it not only provides a cost-effective, field-based monitoring system, but it also creates a sense of ownership among resident people over the biological resources and their conservation. The main elements of the biodiversity monitoring system include:

- standardized recording of routine observations;
- fixed point photography;
- line transect surveys;
- focus group discussions.

These methods have been field tested in Cambodia by Conservation International, Fauna and Flora International, FRONTIER, and other organizations that will be able to provide technical support. These groups have confirmed the importance of involving local villagers in biodiversity assessment and monitoring in order to incorporate existing knowledge in the survey and build commitment to the monitoring program. Several key indicator species will

be selected and monitored to track the impact of project activities in comparison to the baseline. At least one of these indicator species will be a species which has a market value and is commonly traded, thus indicating the human-wildlife dynamic as it evolves.

In the without-project scenario forest cover is expected to continually decrease causing a loss of biodiversity, quantity of species present, and quality of forest ecosystems. Under the with-project scenario forest cover will increase and forest ecosystems will be enhanced. Native species to the project area are expected to flourish with the project. Overall the project will have a net positive benefit to biodiversity in the project area. As Community Forestry areas will act as a refuge for many species, biodiversity is expected to increase in the reference region with project implementation as well.

B1.2. Demonstration that High Conservation Value (HVC) Areas will not be Negatively Affected

Since the goal of the project is to enhance and protect forest resources, areas that are of High Conservation Value will not be negatively affected. These areas of special environmental, biological, and rare ecosystem significance are expected to flourish throughout and beyond the life of the project. Areas that provide habitat for IUCN listed species are strongly affected. The participatory biodiversity inventory and monitoring to be conducted within 6 months of project approval, and will provide identification of any protected species in accordance with the Forestry Law and Prakas 120 Wildlife Protection List, 25 January 2007. The latter is consistent with the IUCN RED List. Some of the species mentioned in G1.8.1 have already been identified in the project area, as confirmed by the baseline biodiversity report was completed by Birdlife International in December 2010 (Elliott et al. 2011). The agreements between the FA and CFMC groups include a provision on the protection of wildlife and biodiversity in the project area (Annex 2). Without the project these areas of special value are expected to decrease with the loss of forest cover.

B1.3. Identification of Tree Species to be Planted by the Project

No invasive species will be used and the use of exotic species will be limited. Community members have expressed interest in fruit and nut barring trees not native to the project area. Though these species will be incorporated into the project, there use will be limited and indigenous fruit-baring species will be promoted whenever possible. Since Assisted Natural Regeneration is the primary method for forest restoration, native species known by local communities for their multi-purpose values will predominate. Special attention will be

placed on *Afzelia xylocarpa* (beng), a high value deciduous, broad leaved tree which coppices well. The recently logged forests in the project area still possess substantial beng root stock that can be regenerated through thinning, stump cleaning, and protection from fire. Enrichment planting will be done in gaps with indigenous species including *Dalbergia oliveri*, *Pterocarpus macrocarpus*, *Dipterocarpus tubinatus* and others. Communities are eager to regenerate beng and other indigenous trees in degraded forests. Some fruit tree species, such as cashew, jackfruit, and mangos, while not native to Cambodia are common throughout the country and may be planted on homesteads to assist in alternative income generation In a 'without project' scenario, native species are expected to decrease with the loss of forest cover. In Oddar Meanchey, native forests cannot naturally regenerate faster than the rate of deforestation. As a consequence, without the project, forest cover is expected to decrease.

Table B1. List of Additional Native Trees that may be Used to Increase Biodiversity and Species Richness.

Species to be Planted		Additional Species that maybe Used
Scientific Name	Khmer Name	Scientific Name
Afzelia xylocarpa	beng	*Hopea odorata*
Albizia lebbeck	chres	*Aquilaria crassna*
Hopea helferi	koki dek	*Dalbergia cochinchinensis*
Shorea cochinchinensis	porpel	*Pterocarpus macrocarpus*
Fagrea fragrans	ta trao	*Dysoxylum loureiri*
Diospyros crumenata	cheu kmao	*Lasianthus kamputensis*
Gardenia ankorensis	dai khala	*Diospyros bejaudii*
Dipterocarpus tubinatus		*Dasymaschalon lamentaceum*
Pterocarpus macrocarpus		*Pinus merkusii*
Dalbergia oliveri		*Garcinia hanburyi*
		Cinnamomum cambodianum
		Sterculia lychnophora
		Cananga latifolia

Additional species that maybe used are listed in the Cambodia Tree Seed Project developed by the Forestry Administration and DANIDA. More information can be found at http://www.treeseedfa.org/. The Cambodia Tree Seed Project has identified specific seed gene-ecological zones within Cambodia which will be followed when planting tree species. The project proponents have worked closely with the Forestry Administration to identify the specific species listed in Table 1B which are native to the project area and important to local communities.

B1.4. Adverse Effects of Non-Native Species in the Project Area

The introduction of a small quantity of exotic fruit trees are not expected to negative impact indigenous species in the project area and reference region. These fruit trees will reduce the consumption of native fruits and other native foods aiding in native vegetation propagation and distribution. Cashew, jackfruit, and mango trees will provide subsistence crops to local communities, reducing dependence on agricultural production. The suggested non-native species are commonly planted in Cambodia and are likely already introduced to the project area. These species are not known to be naturally invasive nor do they carry any disease unknown to the reference region. Without the project local communities will continue to utilize forest foods at an increasing rate that may exhaust the supply for native regeneration. If alternatives are not provided, agriculture will continue to increase in order to feed the growing population at the expense of forest cover.

B1.5. Guarantee that No Genetically Modified Organisms (GMO) will be used in the Project

The Project Design Team guarantees that no genetically modified organisms are included in this project design and that no genetically modified trees shall be planted under the project. In addition, agricultural interventions under the project will also avoid purchase of genetically modified organisms, and this requirement will also be specified in any sub-contracts with technical support or extension agencies.

The Project Design Team recognizes that genetically modified organisms are becoming more common for a source of seed, fast growing trees, and livestock feed all over the world, and Oddar Meanchey Provence is no exception. Though we can guarantee that the project will not use any genetically modified organisms we cannot regulate the flow of community resources such as feedstock, and foods such as rice or other grain use in and out of the project areas.

B2. Offsite Biodiversity Impacts

B2.1. Identification of Potential Negative Offsite Project Impacts

Since the project will also support CFMCs in restricting hunting and fire in the project areas, the project may displace some pressure from hunting or NTFP gathering pressures outside of the project area. These impacts will be monitored within the leakage belt surrounding the project area. Hunters, in particular, are likely to shifting illegal hunting activities to areas outside of the jurisdiction of the project, which has potential to negatively affect biodiversity in these areas. Illegal hunting activities and illegal logging does have potential to be displaced from the project area to the Kulem Promtep Wildlife Sanctuary which borders Sangkrous Preyccheu CF. Migrants seeking to establish households in the project area may also seek to clear forest areas outside of the project area, which may also have a negative effect on biodiversity in these areas.

B2.2. Mitigation Strategies for Negative Offsite Biodiversity Impacts

Strategies will be developed with project communities to compensate for any loss in income or harvested forest products due to project-related restrictions. Many of the community members that are currently relying on illegal activities to survive will be integrated in the project and provided alternative livelihoods. Furthermore, training on sustainable harvesting methods for NTFPs will be included as part of a capacity building and livelihood program both within the project areas and in the leakage belt to mitigate the negative impacts of displaced NTFP collection. Increased patrolling and outreach by FA officials will also serve to educate communities outside of the project area about the project, and will in time hopefully motivate additional CFs to take establish similar REDD projects.

Members of the community who are involved in hunting and/or charcoal production will be encouraged to find alternative sources of livelihoods instead of moving to other areas to continue these unsustainable practices. Ongoing biodiversity monitoring and periodic assessments and education work will aim to change behavior with regards to hunting through awareness raising. Buddhist monks have already made significant impacts in reducing hunting in one CF (Sorng Rokavorn) by educating villagers about the connection between Buddhist philosophy and the prohibition of killing other beings. Regular provincial radio broadcasts by the Chief Monk in the province (also CF Chief in Sorng Rokavorn CF) will continue to raise awareness on this issue. The project will seek to employ former hunters as

biodiversity monitors and to help to educate other hunters about the benefits of the project. This strategy has been used successfully along the Tonle Sap lake where former nest egg collectors are now paid to guard nests during the water bird breeding season.

For charcoal producers, a broader enforcement model will be employed. Mobile enforcement units will be available to crack down on illegal charcoal production not only within the CF areas, but also in other areas throughout the province. Combined with stronger governance and increased patrolling from the FA is expected to reduce charcoal production.

B2.3. Unmitigated Negative Off-site Biodiversity Impacts

No major unmitigated impacts on biodiversity are anticipated due to the project emphasis on community-based habitat restoration and the support program for biodiversity conservation. The benefits greatly outweigh any negative biodiversity impact.

B3. Biodiversity Impact Monitoring

B3.1. Biodiversity Monitoring Plan

The biodiversity monitoring plan will be developed to utilize the skill base and knowledge of the CF communities, which will be responsible for the implementation of biodiversity monitoring for the project with some oversight from the implementing partners. As such, the monitoring system will be developed such that, at the outset, a subset of all biodiversity in the project area will be measured, and a monitoring program covering the totality of biodiversity in the project area will be introduced once communities become more comfortable with monitoring.

The monitoring program will endeavor to focus on HCV areas and threatened species, at least at the outset, as monitoring all biodiversity in the project area would be prohibitive due to a lack of training and tools. Oversight from local trained experts will be necessary as a result, to ensure that monitoring data is collected according to the monitoring procedures and to carry out QA/QC. Over the course of the project, it is expected that, perhaps on an annual basis, a team of scientific experts will be employed to oversee the implementation of the monitoring plan to verify data collection procedures are working properly and to undertake techniques such as mark-recapture with a systematic camera trapping survey.

Due to their size relative to the other project CFs, biodiversity is likely to be found primarily in six CFs; Sorng Rokavorn, Sangkrous Preychheu, Prey Srorng, Romdoul Veasna, Rolus Thom and Andong Bor. These CFs are also host to permanent water sources. As such, the biodiversity monitoring plan will likely focus on these CFs. In addition, the monitoring program would ideally be able to cover the four CFs bordering the Thai border, as these areas are home to a continuous chain of Evergreen forest which is likely to prove to be an important habitat for a number of species.

Three main indicators will be incorporated into the biodiversity monitoring plan:

- Sate Indicators: State indicators refer to the condition of a site, with respect to its important species' populations. State indicators might be population counts of the species themselves. They might also include measurements of the extent and quality of the habitat required by these species.
- Pressure Indicators: Pressure indicators identify and track the major threats to important species' populations at the site. Examples include rates of habitat loss or hunting.

- Response Indicators: Response indicators identify and track conservation actions: for example, implementation of conservation activities or support to a protected area from other agencies or local communities.

In order to ramp up the biodiversity monitoring program for the project, field training workshops, regular transect walks by local communities in important areas, opportunistic continual data collection by community members, GPS tracking of patrol routes and trails, documentation of hunting activities, and centralized data collection and storage will be implemented. Furthermore, Specific assignments will be given to data collectors, equipment will be distributed and a centralized system for data storage will be developed.

Table B1. Biodiversity Monitoring Variables

Category	Indicator / output	Unit / measure	Frequency	Notes	Reporting	Responsibility
HCV	HCV areas identified	Coordinates	Baseline	-	CCB	Consultant
	Site biodiversity monitoring plans developed	Narrative	Every 5 years	-	CCB	Consultant
Pressure[3] indicators	Total area of class or stratum during time period	ha	Every 2 years	Data collected for LULC change (see remote sensing)	CCB	CFMCs / Consultant
	Area of transition from LULC class or forest stratum 1 to 2	ha	Every 2 years	Data collected for LULC change (see remote sensing)	CCB	CFMCs / Consultant
	Total area of LULC class or forest stratum	ha	Every 2 years	Data collected for LULC change (see remote sensing)	CCB	CFMCs / Consultant
	Changes in number of people living within CF areas	# houses and occupants within CF boundaries	Annually	Collected during social assessment & from census data – also collected in HH Survey	VCS / CCB	CFMCs / Consultant
	Invasive species assessment	Narrative	-	-	CCB	CFMCs / Consultant
Capacity building	CF members biodiversity	# participants	AO	-	CCB	CFMCs / Consultant

[3] Pressure indicators identify and track the major threats to important species' populations at the site. Examples include rates of habitat loss or hunting.

	knowledge and skills					
Patrol mapping	Mapping of all extant patrol routes and pathways	Coordinates	AO	-	CCB	CFMCs / Consultant
	Mapping of extant water sources, forest usage (e.g resin trees, harvesting of NTFPs), and evidence of illegal activities (e.g. logging, snares, hunting)	Coordinates	AO	-	CCB	CFMCs / Consultant
	Natural disturbances and events	Narrative	AO	Also monitored as part of project documentation requirements	CCB	CFMCs / Consultant
	Impact on habitat / species	Narrative	AO	-	CCB	CFMCs / Consultant
	Illegal activities in biodiversity monitoring sites (4 CFs)	Narrative	AO	Date, time, location – GIS etc. Impact on habitat / species	CCB	CFMCs / Consultant
State[4] indicators	Presence and relative abundance of key indicator species	Count (estimate) of selected species	Monthly	Green peafowl surveys Pileated Gibbon mapping etc.	CCB	CFMCs / Consultant
	Dawn Bird Survey	# of birds recorded	Monthly	See above	CCB	CFMCs / Consultant
	Active search for nests of important species	# of nests	Monthly	Following 2nd workshop, one search day every month during the nesting season for appropriate species	CCB	CFMCs / Consultant
	Documentation of past hunting	Narrative	-	-	CCB	CFMCs / Consultant
	Camera trapping	Photos	Monthly	Moved to new sites on a monthly basis	CCB	CFMCs / Consultant

[4] State indicators refer to the condition of a site, with respect to its important species' population. State indicators might be population counts of the species themselves. They might also include measurements of the extent and quality of the habitat required by these species.

	Changes in abundance of key NTFPs in the CFs	# or density (m^3/l) of key NTFPs	Monthly	Transects, general observations or survey plots	CCB	CFMCs / Consultant
	Night survey	# mammals	Monthly	At least once a month a mammal survey to be conducted in the three hour period prior to dawn	CCB	CFMCs / Consultant
	DNA mark-recapture program	#of DNA samples	AO	Collection and storage of faecal samples on an on-going basis during CF visits	CCB	CFMCs / Consultant

B3.2. Assessment of the Monitoring Plan Effectiveness

The project intends to rely on community participation for monitoring biodiversity and High Conservation Value (HCV) areas in the project area, with support and technical consultation from a locally-based agency. Students and recent graduates from the Royal University of Phnom Penh and Centre for Biodiversity Conservation (CBC)'s MSc course in Biodiversity Conservation shall be invited to assist the fieldwork. Community members will be tasked with monitoring a number of biodiversity indicators to track the effectiveness of habitat conservation measures. These include the following:

- changes in number of sightings of designated species or resource use;
- changes in size of vegetation type blocks;
- changes in frequency of detection of designated fauna species along established transects;
- changes in perceived harvest volume per effort.

The indicators are designed to focus on trends in biodiversity and habitat quality. Special attention will be given to High Conservation Value areas, based on community and team discussion of the monitoring results, each year the CFMCs and project implementers will identify any additional actions that need to be taken and integrated into the coming annual work plan.

B3.3. Commitment to Biodiversity Monitoring Plan Timeline

A full biodiversity monitoring plan will be developed by the implementing partner, Pact in collaboration with the Forestry Administration, within six months of the project start date. The results of monitoring will be made publically available and provided to the TWG F & E. Communication to local communities and stakeholders will be consistent to that described in Section G3.8 and will be made available in local or regional languages when relevant.

Gold Level Section

GL1. Climate Change Adaption Benefits

GL1.1. Likely Regional Climate Change Variability

In mainland Southeast Asia, occurrences of extreme climatic conditions including typhoons, heavy rainfall during extended periods, flooding, as well as extended droughts, are increasing in frequency (Houghton et al 2000). Agriculture consumes 98% of the water used in Cambodia (WRI 2003) and climate changed is expected to have a devastating effect on food security (ADB 2009). North and Eastern Cambodia have very little irrigation development (Johnston et al 2009) and reduced rainfall is expected to gravely reduce rainfed rice – the major food staple Cambodia. Rainfed rice production is prone to both risks from floods and droughts. It is estimated that over 400,000 ha of rice were destroyed in Cambodia in the floods of 2000 (MAF 2009).

Extended dry periods are also exacerbating forest fires, resulting in fires burning larger areas with more intensity compared to the past (NASA/University of Maryland 2002). This pattern of increasing climatic variability will likely affect the project area by decreasing forest cover and exacerbating deforestation.

In the absence of the project forest cover will be decreased, increasing ground fuels, and subsequently fire frequency and intensity. Forest fires will likely burn into any existing forests further decreasing biodiversity. As fires initiate forest clearing for agriculture, climate change will likely exacerbate land use change to agriculture, with poor results due to intensified drought, and worsened weather patterns.

Cambodia has small, but rapidly growing GHG emissions and Land use change, forestry and agriculture contributes 80% of their total emissions (Morton 2008, ADB 2009). Emissions from land-use, land use change and forestry are expected to continue to rise steeply due to continued conversion of forests to cropland, expansion of irrigated rice areas, growing livestock herds and increasing use of nitrogen fertilizers (Smith et al 2007).

GL1.2. Identification of Risks to the Project and Risk Mitigation Strategies

Though the project is expected to conserve biodiversity, the effects of climate changes on species are not completely known. Research suggests that creating diverse forest conditions is a good way to have forests adapt to climate change when the outcome is not known (Miller et al 2007). We anticipate that preserving and increasing forest cover will aid as a buffer for species to slowly adapt to climate change. Species are expected to move north and upslope as temperatures increase (Davis 1989). Wildlife is expected to migrate faster

than plant species (Smith et al 1989) which may leave wildlife without suitable habitats. Throughout project implementation special attention will be given to species migration. As native tree species are planted project implementers will work to increase corridors, as well as increasing forest cover northward and upslope. Species will be planted that are not known to be sensitive to changing temperatures.

A study by the Swedish International Development Cooperation Agency (Johnston et al 2009) suggests that REDD in itself is a mitigation strategy for "win-win" solutions needed changes in agriculture systems in Southeast Asia. The report, titled "Scoping Study on Natural Resources and Climate Change in Southeast Asia with a Focus on Agriculture", suggests specific actions to mitigate GHG emissions from agriculture in the region, many of which are planned project activities. Activities planned in the project are expected to sequester more carbon then in the without project scenario, as well as buffer against a changing climate such as extreme weather events. Project actions that increase canopy cover such as forest protection, land-use plans, reinforcing land tenure, and ANR will help act as a buffer for slow release of water and reduce erosion (ABD 2009). Natural resource management projects, such as the ones implemented as project actions, will help manage water resources from extreme weather events such as prolonged drought and extreme rainfall hence aid in food security in Southeast Asia's changing climate (Preston 2006). Though this project will not account for carbon sequestered from improved cropland management, other studies in Asia show that additional carbon is sequestered through improved agriculture techniques such as no-till and organic-matter input (Li et al 2003).

GL1.3. Demonstration that Climate Change Impacts Community Well-being and Biodiversity

Many farmers within the project areas depend on rain-fed crops, and extended droughts present the biggest problems to these communities. Farmers are already affected by drought and continuing climate change will exacerbate these conditions.

Forest fire frequency and intensity is expected to increase with droughts, and will also greatly affect communities. Increased fire will destroy forest, and associated products from foodstuffs to timber. Since many community members depend on forests for livelihoods for some or part of the year, climate change will cause an increasing loss of livelihoods. Increased fire intensity may destroy homes and settlements as many communities are in close proximity to forests.

Without the project, the anticipated deforestation of the area coupled with the heavy seasonal rains of a changing climate will result in widespread splash and sheet erosion that decreases soil fertility and accelerates the sedimentation of Tonle Sap Lake, one of the world's unique fresh water fisheries (containing over 400 species).

GL1.4. Demonstration that Project Activities Assist Communities and Biodiversity to Adapt to Climate Change

The project team is developing strategies to respond to more severe weather conditions that may emerge in the project area as a result of climate change. The project will focus on retaining maximal forest cover to minimize micro-climatic change and ensure slowed water run-off and optimal ground water recharge as ways to mitigate drought. The project will also develop programs to provide clean drinking water by supplying water filters and other technology. The project will provide small grants to participating communities for use in de-silting water storage tanks and ponds – a way to ensure crop protection during climate change educed droughts. The potential devastating impact of forest fires will be minimized by installing fire lines and educating local people (and hunters) on the importance of preventing forest fires. The project will also support the development and sustainable use of water resources through tank de-silting and improved groundwater access through grants for tube well installation, one of the most necessary needs for the local community. Assisted Natural Regeneration of degraded forest patches will ensure that forest restoration is based on native species that can adapt to local soil, water, and climatic conditions. Contracts with communities will be developed to guide the restoration of approximately 595 hectares of degraded forests each year from 2013 to 2021 through Assisted Natural Regeneration (ANR) techniques. Depending on the state of degradation and the ANR techniques used, the ANR treated area may be revisited and treated multiple times to ensure healthy tree growth. The project will also result in the enrichment planting of 1,200,000 (60,000 each year for 20 years) indigenous trees in forest gaps and highly degraded forest areas, which will help reduce erosion and slow water run-off. The Community Forestry Management Committees will also be trained and supported to implement better fire fighting techniques including the establishment and management of fire lines, the organization of village fire brigades, and the establishment of stronger fire prevention regulations. In addition, as required by the VCS, 20-35% of the carbon credits generated will be retained in a buffer account and cannot be sold so that they can cover the potential loss of credits due to (among other things) natural catastrophes induced by climate change. These and other

methods of adapting and responding to climate change will be implemented throughout the life of the project.

GL2. Exceptional Community Benefits

The project will train Community Forestry Groups in managing forest protection, ANR operations, enrichment planting, and project management. This will include project planning, budgeting, bookkeeping, reporting, and technical techniques. Once trained, Community Forestry Groups will be asked to work with the project implementer to develop annual work plans and directly manage project operations in their area. As a consequence, communities will not only be participating in the project, but will be responsible for much of the actual management.

The project seeks to build the community capacity not only to staff, but to manage project activities. Community members have been involved in project preparation work since the beginning of 2008. Any contracts made with the Community Forestry Groups will naturally involve the hiring of project community members. Technical support will be provided largely by local NGOs, monks, and Forestry Administration staff who are residents within the province.

GL2.1. Demonstration that the Project Zone is a Low Human Developed Country

As of 2010, Cambodia holds a .494 HDI (Human Development Index) score, ranking 124 out of 169 countries surveyed and qualifying as a Least Developed Country.

Of the 58 communities included in the project area, many households live below the poverty line. Annual income for most households rarely exceeds $1000 to $1500 making Oddar Meanchey, typical for rural provinces within Cambodia. The project communities are heavily dependent on forest resources for their livelihood, and consequently the emphasis on improved forest management achieve both community and project objectives. Capacity building plans for the project include forest management and planning, protection, silviculture, and nursery management. CFI has developed CF training modules based on the eight step process approved by the FA under the Community Forestry Sub-Decree. CFI extension workers and training teams have already guided hundreds of village participants and local NGO staff through these short courses.

The project implementing organization will also plan to extend the capacity building program to encompass a number of other topics related to the project including bookkeeping and financial management, agricultural techniques, NTFP processing and marketing strategies, and water resource development. The Project Implementers will be responsible for working with partners and communities to develop a range of training modules in these fields as well, which will be provided to community members and leaders

through short term training programs. In addition, technical support and financing will be available to ensure community trainees are able to utilize their new skills.

GL2.2. Demonstration that the Poorest Communities will Benefit from the Project

Low income households in Oddar Meanchey Province rely solely on forest products as their only significant source of income. Forest protection and forest improvement will help these communities by protecting and enhancing their livelihoods. With project implementation alternative sources of income will be provided and many households that have the lowest income will benefit the greatest.

Specific "poor" households have been identified within the project area, and a database of each of these households has been created. This database, created through the Identification of Poor Households (ID POOR) program started in Cambodia in 2006, is intended to provide regularly updated data on poor households in Cambodia to enable services and assistance to be targeted to the poorest and most vulnerable to lift these groups out of poverty. An analysis of the most recently available (2010) ID Poor data shows that approximately 30% of households in the project area can be classified as poor. ID Poor information is available for each of the CFs involved in the project, identifying the specific households, names of individuals in each household, and their respective poverty category. By maintaining this database over time, the project will ensure that these specific poorer households are receiving benefits and are not being left behind. These data are important to ensuring that the project and community leaders effectively target poorer households for participation and benefit-sharing. Having identified each "poor" household, the project will ensure through its monitoring plan that at least 50% of poorer households are specifically targeted to receive project benefits, especially important considering that many of the poorer households are forced to take part in illegal land-use activities to subsist. The precise strategy for deciding how benefits will be delivered to the poorest members of the community, and ensuring that at least 50% of poorer households involved in the project benefit will be determined in consultation with community leaders once the project becomes operational. Some of the options being considered are to 1) prioritize the poorest as members of the patrol team and ANR work team, 2) hold meetings and trainings at times convenient for the poorest, 3) prioritize poorest as recipients of improved cookstoves and mosquito nets for cattle 4) include criteria on benefits to poor in the community development grants scheme 5) ensure that the poorest join NTFP enterprise groups. In fact, NTFP collectors tend to be the poorest members of the village who have less agricultural land and depend more heavily on NTFP as a food safety net. Ongoing project

monitoring will ensure the project benefits are accruing effectively to poorer households, and that these benefits are having a meaningful effect on the socio-economic wellbeing of this population. Indicators will be developed in the monitoring plan to track these improvements in well-being among poor households, and project activities can be tailored based on this information to ensure maximum effectiveness.

The goal of this effort is to ensure that at least 50% of the poorer communities are substantially benefiting from the project, and that ultimately these households can be raised out of the poor category through the direct intervention of the project.

The Project Design Team has relied substantially on the knowledge of the Venerable Bun Saluth and the Buddhist Monk's Association, as well as the leaders and staff of the Children's Development Association both who work with some of the poorest communities. This has given the Project Design Team a better understanding of local culture and adapting project strategies to blend well with indigenous values and beliefs. Those whose livelihood depends on the forest will have the best local knowledge of common forest practices, local ecology and traditional customs. The project will support such traditions by protecting sacred groves and areas with high cultural values, and integrating them with biodiversity conservation strategies. The locations of these areas will depend on local knowledge and create employment for the poorest communities who depend on forest resources. Local cultural traditions include the protection of burial forests, spring forests, and spirit forests which will be integrated into the conservation and management plan for the area. Important rituals and beliefs, as well as indigenous knowledge will help mold the project and link activities wherever possible. Because such importance has been given to poorest community input, these community members' livelihoods are expected to benefit greatly.

GL2.3. Demonstration that Poor and More Vulnerable Households will not be Negatively Affected

The project has identified poorer households through PRA exercises and through analysis of the national ID Poor database. The large majority of project activities and/or benefits that may present a barrier to poorer and more vulnerable households will be implemented only after validation of the project. As such, potential barriers can only be anticipated at this time. Once funds/revenues are available for the full implementation of project activities, the project team shall work to ensure that at least 50% of households within the lowest category of well-being (e.g., poorest quartile) of the community are encouraged and enabled to participate in project activities.

In 2012, Maya Sepheri, PhD and Inge Boudewijn, MA, both of the University of Copenhagen, conducted assessments on the social dimensions of the project with a focus on equity in benefit sharing and inclusion. With some logistical support from the Project Team, the researchers operated independently in the field and upon conclusion of their research made presentations to the Project Team with recommendations for ensuring inclusion and equity among community project participants. The Project Team will adopt many of these recommendations, which include: 1) frequent visiting of off-the-main-road CF households, 2) representation of vulnerable and poor households on Project management committees, 3) dissemination, awareness raising and recourse mechanisms, 4) management and leveling of expectations, especially with regards to potential cash payments, 5) institution of pro poor mechanisms taking into account constraints related to gender, age, ability, time 6) ensuring wide inclusion of CF members in project activities, 7) continued updating and improvement of household surveys to capture changing conditions in livelihoods, 8) encouraging independent research and assessment of the projects benefits, 9) introduction of qualitative and flexible methods of data collection and assessment.

The project team is aware that there may be a number of barriers that may prevent poorer and vulnerable households from benefiting from the project, and that the project in fact has potential to negatively affect these households. Specific barriers that have been identified include, but are not limited to:

- Low literacy levels affecting the ability to perform some paper-based or SMS-based reporting and monitoring, or to understand written project documents
- Disability; physically or mentally unable to perform some tasks
- Single headed household (esp. woman), so less time available to participate in CF meetings and activities due to household burdens
- Itinerant laborers, since they have unstable lifestyles and are difficult to contact and invite to meetings or activities
- Children of poor families, who are unable to go to school and therefore miss project topics integrated to the school curriculum

In order to overcome these barriers, and yet to be identified barriers that may arise during the course of the project, the implementing partners will engage (as a part of the monitoring program) in ongoing consultation with poor and vulnerable households. This monitoring, combined with household surveys aimed at assessing the impact of the project activities, will allow the implementing partners to tailor direct project benefits to households that otherwise face barriers in receiving these benefits. For example, illiterate households will be provided training in ANR, agricultural intensification or patrolling, providing employment without the requirement for literacy. The project team has also submitted donor proposals to secure additional funding for literacy training since assessments have

revealed that illiteracy is a key barrier to participation of the poorest in training activities. Disabled individuals, who may not be able engage in active project activities, will nevertheless benefit from the broad improvements envisioned by the project, such as water-quality improvement projects, agricultural intensification and livestock protection.

Ongoing community monitoring will include dialogues with vulnerable households, initially identified by the ID Poor database that will updated through the life of the project, to determine if project benefits are being distributed fairly across socio-economic classes. Every effort has been made to identify negative impacts on vulnerable households and identify ways to mitigate them. However, in some cases, negative impacts may arise that have not been anticipated by the project, and for which mitigation activities may have no effect. These impacts will be measured and monitored through ongoing community monitoring activities. In cases of unavoidable negative impacts on vulnerable households and individuals, specific workshops will be held amongst CF leaders to identify activities and programs that may solve these issues. Broader workshops including any CF members wishing to attend will also be held to detail these impacts and solicit solutions that are equitable for all CF members. Wherever possible, the advice and desires of vulnerable households and individuals will be prioritized and used as a basis for ongoing decision making. A private commenting process may also be implemented, wherein more vulnerable households may present any negative views or experiences to CF leaders and focal points to avoid potential conflicts with other CF members.

Additionally, ongoing consultations between the implementing partners and CFMC leaders will provide valuable insights into the effect that the project is having on the livelihoods of CF members in the project, including poor households as well as women. For example, if a household was formerly subsisting from the implementation of illegal land-use activities such as illegal logging or hunting, the implementing partners will be able to assess whether the project activities have been appropriately designed to provide alternative livelihoods. Continued education and outreach from FA officials will help to reinforce alternative land-use practices and provide education to households which may need to transition to a new livelihood. Women will also be targeted for training in bookkeeping. Women are already playing an important leadership role in a number of the CFMCs. The project will support and encourage women's leadership in CFMC governance including management and planning activities. The project will also attempt to create linkages between women leaders in other stake-holding institutions such as the FA and local government. The project will identify women leaders in CFMCs and in villages who can help organize capacity building activities where women's involvement or expertise is high, such as certain NTFP collection,

processing, and marketing or in household financial management. Training modules and programs specifically designed for women may include bookkeeping, marketing, and handicraft production. The organization of Self Help Groups and literacy programs for women will also be explored. Gender awareness will be raised among the communities as a whole in order to create increased appreciation and opportunities for women's participation.

Furthermore, the project will work with CFMC leaders to identify members who are in need of fulltime or part-time employment and provide specific training for project involvement. Special attention will be given to ensuring that the capacity building opportunities are shared fairly among the community and that disadvantaged households, especially the poorest community members, receive special attention. A significant barrier to low-income groups has been a lack of access to and education about alternative incomes. They also lack specific necessities to link them to larger markets, and the capital needed to start alternative incomes. This project will both educate local communities in the many income topics listed above as well as aid in the basic knowledge of literacy and bookkeeping. By capacity building within communities and by connecting communities both with each other, local NGOs and government officials households will be able to network resources and access larger markets. Village youth from low income families will be engaged as fire watchers, forest monitors, and nursery managers, and in other related roles.

GL2.4. Demonstration that Disadvantaged Groups will not be Negatively Affected

Often disadvantaged groups become associated with jobs of greater health risk. Workers may be at risk from landmines, forest fires, and falling trees associated with thinning operations. While these risks are difficult to control entirely, the Project Policies includes a Safety Policy which is aimed at minimizing these risks. Training will be provided to all CF members involved in potentially risky activities to ensure that these risks are minimized. Policies will be updated iteratively as additional feedback is received during project implementation. Special attention will be given to make sure that CFMC work groups and management committees will be from diverse backgrounds and that knowledge of any risk associated with project employment is understood by all means possible. Given that the CFMCs have been drawn from diverse socioeconomic backgrounds, the project has been designed to be inclusive of disadvantaged groups from the outset. Continued inclusion of these groups will ensure that negative effects of these groups will be mitigated.

GL2.5. Community Monitoring of Disadvantaged Groups

A periodic social assessment will be conducted every 2 years. The social assessment will consist of a household survey administered to 300 households in the project area and a series of participatory rural appraisals and focus groups conducted at 13 CF sites. These household surveys and participatory rural appraisals will be inclusive in that they will focus on both more-advantaged as well as vulnerable and disadvantaged groups in order to ensure that the broadest social spectrum of CF members are being monitored and their inputs recorded. Poorer and vulnerable households have been initially identified using the ID Poor database, and an database of these households will be maintained and updated, informed by ongoing social monitoring activity. CF management committees will include representative samples of poorer and vulnerable households in from each CF to ensure that the views of these groups are included. This will also ensure that project benefits are not only accruing to elites or more advantaged members of each CF. Annual gender assessments to determine how benefits are accruing to women will also be carried out. A results-based framework outlining the required steps to improve and monitor the participation and benefits of women has been devised and carried out by the project. The findings from this initial assessment will be used to devise key indicators to monitor gender-specific impacts, and these indicators and a gender-specific monitoring plan will be incorporated into the montoring framework within 6-months of validation. Social monitoring will also be conducted by hosting scholars from external research institutions and through the implementation of a participatory monitoring system which actively involves community members in project monitoring. The specific community-oriented variables that will be monitored has been included in Table CM1.

The HHS includes questions on the following social variables:

- Household size
- Forest related income
- Agriculture and crop harvesting
- Employment
- Security of land tenure
- Access to forest resources
- Use of forest products
- NTFP usage

Complementing the HHS, the PRA addresses the following social variables:

- Agriculture and crop harvesting
- Use of forest products
- NTFP usage

During the participatory rural appraisal process, focus groups will also be conducted with community members to identify project impacts. Using a qualitative as well as quantitative approach, focus groups will be exploratory and focused on documenting the impacts of the project on community members from their perspective. The results of the participatory rural appraisal and focus groups will be analyzed together with the household survey to identify social impacts as a result of the project. Poor and vulnerable groups will be identified by disaggregating respondents according to geographical location. Meanwhile, variables such as employment status and NTFP usage (an indicator of forest dependence and socio-economic vulnerability) will be monitored over time through longitudinal analysis of household survey and participatory rural appraisal results.

Furthermore, as part of the participatory Monitoring, Evaluation, Reporting and Learning (MERL) system developed by Pact, social monitoring will also be conducted by:

- Closely tracking participation by community members in project activities (i.e. identifying the proportion of women in implementation)
- Providing community members with the opportunity to provide input and feedback into project implementation; i.e. through participatory forums where community members will into identify positive and negative project impacts. This will occur formally (in annual forums and quarterly CFN meetings) and informally (through ongoing contact with CF monitors and local NGOs (CDA) and institutions (CFN) who have a responsibility to advocate for community interests. The development and changes in capacity of social institutions and participation will also be closely monitored through ongoing monitoring and periodic evaluation (conducted every 3 years).

Exceptional Biodiversity Benefits

GL2.6. Demonstration of High Biodiversity Conservation Priority through the Vulnerability Criterion

Through project implementation many endangered and vulnerable species will potentially be protected and populations enhanced. The project will directly help IUCN endangered indigenous tropical hardwoods *Afzelia xylocarpa*, *Hopea helferi*, *Diospyros crumenata* by planting the species within the project area. The project will also directly affect IUCN endangered, threatened and vulnerable wildlife that use the project area or the services they provide. These species include: tiger (*Panthera tigris*) leopard (*Panthera pardus)*, pileated gibbon (*Hylobates pileatus)* dhole (*Cuon alpines)*, elephant (*Elephas maximus*), banteng (*Bos javanicus),* gaur (*Bos gaurus*), Asian wild buffalo (Bubalus arnee), sun bear (*Helarctos malayanus*) giant ibis (*Thaumatibis gigantea*), white-shouldered ibis (*Pseudibis davisoni*), sarus crane (*Grus antigone*), greater and lesser adjutants (*Leptoptilos dubius, Leptoptilos javanicus*), bengal florican (*Eupodotis bengalensis)*. For a more detailed list of possible endangered and threatened species in the Project Area see Annex 2.

For a detailed overview of the biodiversity present within the Oddar Meanchey project areas, please see the Biodiversity Assessment of the REDD Community Forest Project in Oddar Meanchey Cambodia available online at http://www.pactworld.org/galleries/resource-center/Oddar%20Meanchey%20Biodiversity%20Assessment%202011.pdf. The biodiversity report was prepared by Birdlife International in December 2010, and includes detailed results of field surveys conducted across Oddar Meanchey Provence. Birdlife's survey recorded a total of 174 bird species within the project sites visited, as well as 26 mammals. All of the Community Forestry areas visited hosted breeding populations of at least one globally threatened bird species and at least one globally threatened mammal.

Annexes

Annex 1: Letter for the Council of Ministers Approving the Project

ព្រះរាជាណាចក្រកម្ពុជា

ទីស្តីការគណៈរដ្ឋមន្ត្រី ជាតិ សាសនា ព្រះមហាក្សត្រ

លេខ: ...

រាជធានីភ្នំពេញ, ថ្ងៃទី ... ខែ ... ឆ្នាំ ២០០៨

ឯកឧត្តម នាយករដ្ឋមន្ត្រី រដ្ឋមន្ត្រីទទួលបន្ទុកទីស្តីការគណៈរដ្ឋមន្ត្រី
ជំរាបមក

- ឯកឧត្តម ទេសរដ្ឋមន្ត្រី រដ្ឋមន្ត្រីក្រសួងបរិស្ថាន
- ឯកឧត្តម រដ្ឋមន្ត្រីក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ
- ឯកឧត្តម ទី សុគន្ធ ទីប្រឹក្សាផ្ទាល់សម្តេចអគ្គមហាសេនាបតីតេជោ ហ៊ុន សែន នាយករដ្ឋមន្ត្រី នៃព្រះរាជាណាចក្រកម្ពុជា និងជាប្រធានរដ្ឋបាល ព្រៃឈើ

កម្មវត្ថុ : ករណីសំណើសុំការគាំទ្រដ៏ខ្ពង់ខ្ពស់ពីសម្តេចអគ្គមហាសេនាបតីតេជោ **ហ៊ុន សែន** នាយករដ្ឋមន្ត្រី នៃព្រះរាជាណាចក្រកម្ពុជា សំរាប់គំរោងឥណទានកាបោនព្រៃឈើនៅព្រះរាជាណាចក្រកម្ពុជា ។

យោង : -លិខិតចុះថ្ងៃទី២៨ ខែមេសា ឆ្នាំ ២០០៨ របស់លោកបណ្ឌិត Mark Poffenberger នាយកប្រតិបត្តិនៃអង្គការសហគមន៍ ព្រៃឈើអន្តរជាតិ (CFI)

-លិខិតចុះថ្ងៃទី ០៥ ខែឧសភា ឆ្នាំ២០០៨ របស់ឯកឧត្តម ទី សុគន្ធ ទីប្រឹក្សាផ្ទាល់សម្តេចអគ្គមហាសេនាបតីតេជោ **ហ៊ុន សែន** នាយករដ្ឋមន្ត្រី នៃព្រះរាជាណាចក្រកម្ពុជា ។

-ចំណាររបស់សម្តេចអគ្គមហាសេនាបតីតេជោ **ហ៊ុន សែន** នាយករដ្ឋមន្ត្រីនៃព្រះរាជាណាចក្រកម្ពុជា ចុះថ្ងៃទី ០៨ ខែឧសភា ឆ្នាំ ២០០៨ ។

សេចក្តីដូចមានចែងក្នុងកម្មវត្ថុ និងយោងខាងលើ ទីស្តីការគណៈរដ្ឋមន្ត្រីមានកិត្តិយស សូមជំរាបជូនឯកឧត្តមមេត្តាជ្រាបថា : ចំពោះករណីនេះរាជរដ្ឋាភិបាល បានសម្រេចយល់ព្រមតាមសំណើដូចខាងក្រោម :

១-ចាត់តាំងរដ្ឋបាលព្រៃឈើ ជាភ្នាក់ងារលក់កាបោនព្រៃឈើកម្ពុជា ជាមួយអង្គការសហគមន៍ព្រៃឈើអន្តរជាតិ CFI ។

២-រាជរដ្ឋាភិបាលកម្ពុជា ដែលជាអ្នកលក់កាបោនព្រៃឈើទទួលខុសត្រូវជួយ ធ្វើឱ្យសម្រេចបានលក្ខខណ្ឌក្នុងកិច្ចសន្យា " លក់កាបោន" ជាមួយអ្នកទិញ ។

៣-មានអនុស្សារណៈយោគយល់(MOU) រវាងអង្គការសហគមន៍ព្រៃឈើអន្តរជាតិនិងរាជរដ្ឋាភិបាលកម្ពុជា

PSSD 5/16/2008

ទីស្តីការគណៈរដ្ឋមន្ត្រី លេខ ៤១ មហាវិថីសហព័ន្ធរុស្សី ទូរស័ព្ទ : ០២៣ ៨៨០ ៦២៤ ទូរសារ : ០១១ ៥៦០ ១៥៤ / ០១២ ៨៨១ ៥៦៦

ដែលតំណាងដោយរដ្ឋបាលព្រៃឈើដែលនឹងអាចអនុញ្ញាតឱ្យអង្គការ សហគមន៍ ព្រៃឈើអន្តរជាតិ CFI កំណត់ស្វែងរកអ្នកទិញ និងសិក្សាពីលក្ខខណ្ឌ និងតម្លៃ កាបោន ដែលនឹងត្រូវពិនិត្យ និងអនុម័តពីរាជរដ្ឋាភិបាលកម្ពុជា ។ រាជរដ្ឋាភិបាលកម្ពុជាសំរេចនៅក្នុង អនុស្សារណៈយោគយល់ MOU ថា ចំណូលដែលបានពីការលក់សារជាតិ កាបោននៃគំរោងឥណទានកាបោនសំរាប់ សហគមន៍ព្រៃឈើ និងត្រូវប្រើប្រាស់ដើម្បី :

ក-កែលំអរគុណភាពព្រៃឈើ

ខ-ផ្តល់ផលប្រយោជន៍ជាអតិបរិមាដល់សហគមន៍មូលដ្ឋានដែលបានចូលរួមក្នុងសកម្មភាពគំរោង

គ-សិក្សាកំណត់សក្តានុពលនៃ ទីតាំងគំរោងឥណទានកាបោនព្រៃឈើ REDD ថ្មី

៤-ចំណូលពីគំរោងកាបោនព្រៃឈើ REDD នឹងចូលតាមរយៈក្រុមការងារបច្ចេកទេស កំណែទំរង់ព្រៃឈើ ក្នុងរយៈពេល៥ ឆ្នាំដំបូងរបស់គំរោង ។

៥-ប្រគល់ភារកិច្ចឱ្យ រដ្ឋបាលព្រៃឈើធ្វើជាតំណាង រាជរដ្ឋាភិបាលកម្ពុជា ក្នុងការងាររៀបចំចាត់ចែងលក់កាបោនព្រៃឈើកម្ពុជា ដោយត្រូវមានការពិគ្រោះយោបល់ ក្នុងក្រុមការងារបច្ចេកទេសកំណែទំរង់ព្រៃឈើ តាមការចាំបាច់ ។

អាស្រ័យដូចបានជំរាបជូនខាងលើ សូមឯកឧត្តម មេត្តាជ្រាប និងចាត់ចែងអនុវត្តតាមការគួរ ។

សូមឯកឧត្តម ទទួលនូវសេចក្តីគោរពរាប់អានដ៏ស្មោះពីខ្ញុំ ។

ថ.រដ្ឋមន្ត្រីទទួលបន្ទុកទីស្តីការគណៈរដ្ឋមន្ត្រី

រដ្ឋលេខាធំការ

ប្រាក់-សុខុន

ចម្លងជូន :

- ខុទ្ធកាល័យសម្តេចនាយករដ្ឋមន្ត្រី
- ក្រុមប្រឹក្សាអភិវឌ្ឍន៍កម្ពុជា
- រដ្ឋបាលព្រៃឈើ
- អង្គការសហគមន៍ព្រៃឈើអន្តរជាតិ CFI
- ក្រុមការងារបច្ចេកទេសកែទំរង់ព្រៃឈើ(TWGFE)
- ឯកសារ-កាលប្បវត្តិ

Mix

PSSD 5/16/2008

UNOFFICIAL TRANSLATION BY CFI

Kingdom of Cambodia

Nation Religion King

Phnom Penh 26 May, 2008

Deputy Prime Minister, Minister in Charge of Council of Ministers

To:

Excellency Minister of Cabinet Minister of Environment

Excellency Minister of Agriculture Forestry and Fisheries

Excellency Ty Sokhun, Advisor to Prime Minister Hun Sen, Head of Forestry Administration

Objective: Related to the request for support from PM Hun Sen for the Carbon Credit Forestry Project in the Kingdom of Cambodia

Reference:

- Official letter of 28 April, 2008 of Dr. Mark Poffenberger, Director of Community Forestry International.
- Official letter of 5 May, 2008 of HE Ty Sokhun, Advisor to PM Hun Sen
- Official letter of PM Hun Sen of 8 May, 2008

With reference to the above, the Council of Ministers is pleased to kindly inform: regarding this case, the Government has decided to agree to the request as below:

1. Designate the Forestry Administration as the Seller of carbon with CFI.
2. The RGC will be responsible for the selling of forest carbon and upholding the agreement "Selling Carbon" with the Buyer.
3. The MOU between CFI and RGC represented by FA will allow CFI to identify the Buyer and study on the conditions and price of carbon which must be reviewed and approved by RGC. RGC decides in the MOU that the carbon credit revenue shall be used for:
    - Improve the forest quality
    - Give maximum benefit to local communities which participate the project activities
    - Study on the potential area for new REDD projects
4. Income from the REDD carbon forestry project will be deposited with the Technical Working Group on Forestry and Environment within the first 5 years of the project.
5. Designate the FA as the representative of RGC in the preparation of carbon sales for Cambodia which must be discussed in the Technical Working Group and revised as necessary.

As described above, kindly understand and implement as appropriate.

With all respects,
Council of Ministers
Prak Sokhun, Secretary of Council of Ministers

Copies:

- Kotakalai PM Office
- Council of Ministers
- Forestry Administration
- CFI
- TWGFE
- Administration

Annex 2: List of Endangered and Threatened Biodiversity

Species likely found in the Project Area and Reference Region. Species listed below are Red Listed under the Convention for the International Trade in Endangered Species (CITES) or are listed under Appendices I, II, III in the International Union for Conservation of Nature (IUCN).

Species Category	Family	Species	IUCN	CITES
Amphibian	RANIDAE	*Limnonectes toumanoffi*	VU	
Amphibian	RANIDAE	*Paa fasciculispina*	VU	
Amphibian	RHACOPHORIDAE	*Rhacophorus annamensis*	VU	
Bird	ACCIPITRIDAE	*Accipiter gularis*	LC	II
Bird	ACCIPITRIDAE	*Accipiter trivirgatus*	LC	II
Bird	ACCIPITRIDAE	*Accipiter virgatus*	LC	II
Bird	ACCIPITRIDAE	*Accipiter badius*		II
Bird	ACCIPITRIDAE	*Accipiter soloensis*		II
Bird	ACCIPITRIDAE	*Aegypius monachus*	NT	II
Bird	ACCIPITRIDAE	*Aquila clanga*	VU	II
Bird	ACCIPITRIDAE	*Aquila heliaca*	VU	
Bird	ACCIPITRIDAE	*Aviceda jerdoni*		II
Bird	ACCIPITRIDAE	*Aviceda leuphotes*		II
Bird	ACCIPITRIDAE	*Butastur indicus*	LC	II
Bird	ACCIPITRIDAE	*Butastur liventer*		II
Bird	ACCIPITRIDAE	*Buteo buteo*		II
Bird	ACCIPITRIDAE	*Circaetus gallicus*		II
Bird	ACCIPITRIDAE	*Circus cyaneus*	LC	II
Bird	ACCIPITRIDAE	*Circus melanoleucos*	LC	II
Bird	ACCIPITRIDAE	*Circus spilonotus*		II
Bird	ACCIPITRIDAE	*Elanus caeruleus*		II
Bird	ACCIPITRIDAE	*Gyps bengalensis*	CR	II
Bird	ACCIPITRIDAE	*Gyps tenuirostris*	CR	II
Bird	ACCIPITRIDAE	*Haliaeetus leucogaster*		II
Bird	ACCIPITRIDAE	*Haliaeetus leucoryphus*		II
Bird	ACCIPITRIDAE	*Haliastur indus*		II
Bird	ACCIPITRIDAE	*Hieraaetus kienerii*	LC	II
Bird	ACCIPITRIDAE	*Ichthyophaga humilis*		II
Bird	ACCIPITRIDAE	*Ichthyophaga ichthyaetus*		II
Bird	ACCIPITRIDAE	*Ictinaetus malayensis*	LC	II
Bird	ACCIPITRIDAE	*Milvus migrans*	LC	II
Bird	ACCIPITRIDAE	*Pernis ptilorhyncus*	LC	II
Bird	ACCIPITRIDAE	*Sarcogyps calvus*	CR	II
Bird	ACCIPITRIDAE	*Spilornis cheela*	LC	II
Bird	ACCIPITRIDAE	*Spizaetus nipalensis*	LC	II
Bird	ACCIPITRIDAE	*Spizaetus cirrhatus*		II
Bird	ANATIDAE	*Cairina scutulata*	EN	I
Bird	ANATIDAE	*Sarkidiornis melanotos*		II
Bird	ARDEIDAE	*Ardea alba*		III
Bird	ARDEIDAE	*Bubulcus ibis*		III
Bird	ARDEIDAE	*Egretta garzetta*		III
Bird	BUCEROTIDAE	*Aceros undulatus*	LC	II
Bird	BUCEROTIDAE	*Anorrhinus tickelli*		II

Species Category	Family	Species	IUCN	CITES
Bird	BUCEROTIDAE	*Anthracoceros albirostris*	LC	II
Bird	BUCEROTIDAE	*Buceros bicornis*	NT	I
Bird	CICONIIDAE	*Leptoptilos dubius*	EN	
Bird	CICONIIDAE	*Leptoptilos javanicus*	VU	
Bird	CICONIIDAE	*Mycteria cinerea*	VU	I
Bird	COLUMBIDAE	*Caloenas nicobarica*	NT	I
Bird	FALCONIDAE	*Falco peregrinus*	LC	I
Bird	FALCONIDAE	*Falco severus*	LC	II
Bird	FALCONIDAE	*Falco tinnunculus*	LC	II
Bird	FALCONIDAE	*Microhierax caerulescens*	LC	II
Bird	FALCONIDAE	*Polihierax insignis*	NT	II
Bird	FREGATIDAE	*Fregata andrewsi*	CR	
Bird	GRUIDAE	*Grus antigone*	VU	II
Bird	HELIORNITHIDAE	*Heliopais personatus*	VU	
Bird	LARIDAE	*Rynchops albicollis*	VU	
Bird	MUSCICAPIDAE	*Leiothrix argentauris*		II
Bird	ORIOLIDAE	*Oriolus mellianus*	VU	
Bird	OTIDIDAE	*Houbaropsis bengalensis*		I
Bird	PANDIONIDAE	*Pandion haliaetus*		II
Bird	PHASIANIDAE	*Arborophila cambodiana*	VU	
Bird	PHASIANIDAE	*Arborophila davidi*	EN	
Bird	PHASIANIDAE	*Lophura diardi*	NT	
Bird	PHASIANIDAE	*Pavo muticus*	VU	II
Bird	PHASIANIDAE	*Polyplectron bicalcaratum*	LC	II
Bird	PHOENICOPTERIDAE	*Phoenicopterus ruber*		II
Bird	PICIDAE	*Dryocopus javensis*	LC	I
Bird	PSITTACIDAE	*Loriculus vernalis*	LC	II
Bird	PSITTACIDAE	*Psittacula alexandri*	LC	II
Bird	PSITTACIDAE	*Psittacula eupatria*	LC	II
Bird	PSITTACIDAE	*Psittacula finschii*		II
Bird	PSITTACIDAE	*Psittacula roseata*		II
Bird	SCOLOPACIDAE	*Tringa guttifer*	EN	I
Bird	STRIGIDAE	*Athene brama*		II
Bird	STRIGIDAE	*Bubo nipalensis*	LC	II
Bird	STRIGIDAE	*Glaucidium brodiei*	LC	II
Bird	STRIGIDAE	*Glaucidium cuculoides*	LC	II
Bird	STRIGIDAE	*Ketupa ketupu*	LC	II
Bird	STRIGIDAE	*Ketupa zeylonensis*	LC	II
Bird	STRIGIDAE	*Ninox scutulata*	LC	II
Bird	STRIGIDAE	*Otus bakkamoena*		II
Bird	STRIGIDAE	*Otus sunia*		II
Bird	STRIGIDAE	*Strix leptogrammica*	LC	II
Bird	STRIGIDAE	*Strix seloputo*	LC	II
Bird	STURNIDAE	*Gracula religiosa*	LC	II
Bird	SYLVIIDAE	*Acrocephalus tangorum*	VU	
Bird	THRESKIORNITHIDAE	*Pseudibis davisoni*	CR	
Bird	THRESKIORNITHIDAE	*Thaumatibis gigantea*	CR	
Bird	TYTONIDAE	*Phodilus badius*	LC	II
Plant	CYATHEACEAE	*Cyathea borneensis*		II
Plant	CYATHEACEAE	*Cyathea latebrosa*		II
Plant	CYCADACEAE	*Cycas micholitzii*		II

Species Category	Family	Species	IUCN	CITES
Plant	CYCADACEAE	*Cycas pectinata*		II
Plant	CYCADACEAE	*Cycas rumphii*		II
Plant	DIOSCOREACEAE	*Dioscorea deltoidea*		II
Plant	NEPENTHACEAE	*Nepenthes anamensis*	DD	II
Plant	NEPENTHACEAE	*Nepenthes mirabilis*	LC	II
Plant	ORCHIDACEAE	*Bulbophyllum rufinum*		II
Plant	ORCHIDACEAE	*Cleisostoma discolor*		II
Plant	ORCHIDACEAE	*Cymbidium cyperifolium*		II
Plant	ORCHIDACEAE	*Cymbidium dayanum*		II
Plant	ORCHIDACEAE	*Cymbidium ensifolium*		II
Plant	ORCHIDACEAE	*Cymbidium finlaysonianum*		II
Plant	ORCHIDACEAE	*Cymbidium giganteum*		II
Plant	ORCHIDACEAE	*Cymbidium lancifolium*		II
Plant	ORCHIDACEAE	*Cymbidium poilanei*		II
Plant	ORCHIDACEAE	*Cymbidium siamense*		II
Plant	ORCHIDACEAE	*Dendrobium acinaciforme*		II
Plant	ORCHIDACEAE	*Dendrobium aduncum*		II
Plant	ORCHIDACEAE	*Dendrobium aggregatum*		II
Plant	ORCHIDACEAE	*Dendrobium aloifolium*		II
Plant	ORCHIDACEAE	*Dendrobium bellatulum*		II
Plant	ORCHIDACEAE	*Dendrobium crystallinum*		II
Plant	ORCHIDACEAE	*Dendrobium draconis*		II
Plant	ORCHIDACEAE	*Dendrobium loddigesii*		II
Plant	ORCHIDACEAE	*Dendrobium nathanielis*		II
Plant	ORCHIDACEAE	*Dendrobium parishii*		II
Plant	ORCHIDACEAE	*Dendrobium pulchellum*		II
Plant	ORCHIDACEAE	*Liparis distans*		II
Plant	ORCHIDACEAE	*Luisia teretifolia*		II
Plant	ORCHIDACEAE	*Paphiopedilum appletonianum*		I
Plant	ORCHIDACEAE	*Paphiopedilum callosum*		I
Plant	ORCHIDACEAE	*Paphiopedilum concolor*		I
Plant	ORCHIDACEAE	*Papilionanthe masperoae*		II
Plant	ORCHIDACEAE	*Phalaenopsis amabilis*		II
Plant	ORCHIDACEAE	*Phalaenopsis cornucervi*		II
Plant	ORCHIDACEAE	*Phalaenopsis mannii*		II
Plant	ORCHIDACEAE	*Phalaenopsis parishii*		II
Plant	ORCHIDACEAE	*Schoenorchis gemmata*		II
Plant	ORCHIDACEAE	*Spathoglottis plicata*		II
Plant	ORCHIDACEAE	*Sunipia racemosa*		II
Plant	ORCHIDACEAE	*Tropidia curculigoides*		II
Plant	ORCHIDACEAE	*Vanda amesiana*		II
Plant	ORCHIDACEAE	*Vanda pseudo-coerulescens*		II
Plant	THYMELAEACEAE	*Aquilaria crassna*		II
Mammal	BOVIDAE	*Bos frontalis*	VU	
Mammal	BOVIDAE	*Bos javanicus*	EN	
Mammal	BOVIDAE	*Bos sauveli*	CR	I
Mammal	BOVIDAE	*Bos gaurus*		I
Mammal	BOVIDAE	*Bubalus arnee*		III
Mammal	BOVIDAE	*Capricornis sumatraensis*	VU	
Mammal	BOVIDAE	*Capricornis milneedwardsii*		I
Mammal	CANIDAE	*Canis aureus*		III

Species Category	Family	Species	IUCN	CITES
Mammal	CANIDAE	*Cuon alpinus*	EN	II
Mammal	CERCOPITHECIDAE	*Macaca arctoides*	VU	II
Mammal	CERCOPITHECIDAE	*Macaca fascicularis*	NT	II
Mammal	CERCOPITHECIDAE	*Macaca leonina*		II
Mammal	CERCOPITHECIDAE	*Pygathrix nemaeus*	EN	
Mammal	CERCOPITHECIDAE	*Pygathrix nigripes*		I
Mammal	CERCOPITHECIDAE	*Trachypithecus germaini*		II
Mammal	CERCOPITHECIDAE	*Trachypithecus phayrei*		II
Mammal	CERVIDAE	*Axis porcinus*		I
Mammal	CERVIDAE	*Muntiacus vuquangensis*	DD	I
Mammal	CERVIDAE	*Rucervus eldii*		I
Mammal	DELPHINIDAE	*Delphinus capensis*		II
Mammal	DELPHINIDAE	*Globicephala macrorhynchus*		II
Mammal	DELPHINIDAE	*Orcaella brevirostris*	DD	I
Mammal	DELPHINIDAE	*Pseudorca crassidens*		II
Mammal	DELPHINIDAE	*Sousa chinensis*	DD	I
Mammal	DELPHINIDAE	*Stenella attenuata*		II
Mammal	DELPHINIDAE	*Stenella longirostris*		II
Mammal	DELPHINIDAE	*Tursiops aduncus*		II
Mammal	DUGONGIDAE	*Dugong dugon*		I
Mammal	ELEPHANTIDAE	*Elephas maximus*		I
Mammal	FELIDAE	*Catopuma temminckii*	VU	I
Mammal	FELIDAE	*Felis chaus*	LC	II
Mammal	FELIDAE	*Neofelis nebulosa*	VU	I
Mammal	FELIDAE	*Panthera pardus*	LC	I
Mammal	FELIDAE	*Panthera tigris*	EN	I
Mammal	FELIDAE	*Pardofelis marmorata*	VU	I
Mammal	FELIDAE	*Prionailurus bengalensis*	LC	II
Mammal	FELIDAE	*Prionailurus viverrinus*	VU	II
Mammal	HERPESTIDAE	*Herpestes javanicus*		III
Mammal	HYLOBATIDAE	*Hylobates pileatus*	VU	I
Mammal	HYLOBATIDAE	*Nomascus gabriellae*	VU	I
Mammal	LORISIDAE	*Nycticebus bengalensis*		I
Mammal	LORISIDAE	*Nycticebus pygmaeus*		I
Mammal	MANIDAE	*Manis javanica*		II
Mammal	MANIDAE	*Manis pentadactyla*		II
Mammal	MUSTELIDAE	*Aonyx cinerea*		II
Mammal	MUSTELIDAE	*Lutra lutra*	NT	I
Mammal	MUSTELIDAE	*Lutra sumatrana*	DD	II
Mammal	MUSTELIDAE	*Lutrogale perspicillata*	VU	II
Mammal	PHOCOENIDAE	*Neophocaena phocaenoides*		I
Mammal	PTEROPODIDAE	*Pteropus hypomelanus*		II
Mammal	PTEROPODIDAE	*Pteropus lylei*		II
Mammal	RHINOCEROTIDAE	*Dicerorhinus sumatrensis*	CR	I
Mammal	RHINOCEROTIDAE	*Rhinoceros sondaicus*	CR	I
Mammal	SCIURIDAE	*Hylopetes alboniger*	EN	
Mammal	SCIURIDAE	*Ratufa bicolor*		II
Mammal	TUPAIIDAE	*Dendrogale murina*		II
Mammal	TUPAIIDAE	*Tupaia belangeri*		II
Mammal	URSIDAE	*Helarctos malayanus*	DD	I
Mammal	URSIDAE	*Ursus thibetanus*	VU	I

Species Category	Family	Species	IUCN	CITES
Mammal	VIVERRIDAE	*Arctictis binturong*		III
Mammal	VIVERRIDAE	*Paguma larvata*		III
Mammal	VIVERRIDAE	*Paradoxurus hermaphroditus*		III
Mammal	VIVERRIDAE	*Prionodon pardicolor*		I
Mammal	VIVERRIDAE	*Viverra zibetha*		III
Reptile	CHELONIIDAE	*Chelonia mydas*		I
Reptile	CHELONIIDAE	*Eretmochelys imbricata*		I
Reptile	COLUBRIDAE	*Ptyas mucosus*		II
Reptile	CROCODYLIDAE	*Crocodylus porosus*		I
Reptile	CROCODYLIDAE	*Crocodylus siamensis*		I
Reptile	ELAPIDAE	*Naja atra*		II
Reptile	ELAPIDAE	*Naja kaouthia*		II
Reptile	ELAPIDAE	*Naja siamensis*		II
Reptile	ELAPIDAE	*Ophiophagus hannah*		II
Reptile	GEOEMYDIDAE	*Batagur baska*		I
Reptile	GEOEMYDIDAE	*Cuora amboinensis*		II
Reptile	GEOEMYDIDAE	*Cuora galbinifrons*		II
Reptile	GEOEMYDIDAE	*Heosemys annandalii*		II
Reptile	GEOEMYDIDAE	*Heosemys grandis*		II
Reptile	GEOEMYDIDAE	*Malayemys macrocephala*		II
Reptile	GEOEMYDIDAE	*Malayemys subtrijuga*		II
Reptile	GEOEMYDIDAE	*Siebenrockiella crassicollis*		II
Reptile	PYTHONIDAE	*Python molurus*		II
Reptile	PYTHONIDAE	*Python reticulatus*		II
Reptile	TESTUDINIDAE	*Indotestudo elongata*		II
Reptile	TESTUDINIDAE	*Manouria impressa*		II
Reptile	TRIONYCHIDAE	*Amyda cartilaginea*		II
Reptile	TRIONYCHIDAE	*Pelochelys cantorii*		II
Reptile	VARANIDAE	*Varanus nebulosus*		I
Reptile	VARANIDAE	*Varanus salvator*		II
Insect	PAPILIONIDAE	*Troides aeacus*		II
Insect	PAPILIONIDAE	*Troides helena*		II
Fish	CYPRINIDAE	*Probarbus jullieni*		I
Fish	OSTEOGLOSSIDAE	*Scleropages formosus*		I
Fish	PANGASIIDAE	*Pangasianodon gigas*		I

IUCN: DD = Data Deficient, LC = Least Concern, NT = Not Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered.
CITES: I = Species that are the most endangered, II = Species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled, III = Species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation

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Annex 4: List of Acronyms

A/R	Afforestation and Reforestation
ANR	Assisted Natural Regeneration
CBNRM-LI	Community-based Natural Resource Management Institute
CDA	Children's Development Association
CDM	Clean Development Mechanism
CF	Community Forestry
CFI	Community Forestry International
CFMC	Community Forest Management Committees
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
DANIDA	Danish International Development Agency
FA	Forest Administration
GRAS	Geographic Resource Analysis and Science
IUCN	International Union of the Conservation of Nature
MAFF	Ministry for Agriculture, Forestry, and Fisheries
MOU	Memorandum of Understanding
NRM	Natural Resource Management
NTFP	Non-Timber Forest Products
PDD	Project Design Document
PLUP	Participatory Land-Use Planning
PRA	Participatory Rural Appraisal
REDD	Reduced Emissions from Deforestation
RGC	Royal Government of Cambodia
SPA	Special Provincial Advisor
TGC	Terra Global Capital
TWG F&E	Technical Working Group for Forests and Environment