Project Design Document

Reduced Emissions from Deforestation and Forest Degradation in Oddar Meanchey Province, Cambodia: A Community Forestry Initiative for Carbon and Biodiversity Conservation and Poverty Reduction

Submitted to the Climate, Community & Biodiversity Standard

Project Developed by

Forestry Administration of the Royal Government of Cambodia; Community Forestry International; PACT Cambodia, Technical Working Group on Forests and the Environment, Cambodia; Terra Global Capital, San Francisco, CA, USA; Children's Development Association, Cambodia; Clinton Climate Initiative, The Buddhist Monk's Association, Oddar Meanchey, Cambodia; and the Communities of Oddar Meanchey Province, Cambodia

October, 2009

Executive Summary

The Royal Government of Cambodia and the Forestry Administration, along with Community Forestry International and Terra Global Capital have developed the first Cambodian "avoided deforestation" project. The project involves 13 Community Forestry Groups, comprised of 58 villages, which protect 67,853 hectares of forest land in the Northwestern province of Oddar Meanchey. The project will be one of the first to use a new methodology for submission under the Voluntary Carbon Standard (VCS) combined with the Climate Community and Biodiversity (CCB) Standards. The project is expected to sequester 7.1 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 developing 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 3% 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 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-

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

timber forest product (NTMP) enterprises, community-based ecotourism infrastructure, and water resource development. The project would 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 a new framework called REDD (Reduced Emissions from Deforestation and forest Degradation) 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 new 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 (IPCC, 2007[2]).

[2] Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z.

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:

- **Social fencing**, Community Forestry Group strengthening, formulation and adoption of management resolution;
- **Networking** with FA triage and with neighboring villages;
- **Strengthening tenurial authority** by mapping and boundary demarcation;
- **Fuel-wood savings** through the introduction of improved cook stoves;
- **Fire control**- fire line construction, fuel load reduction, fire brigade creation;
- **Illegal logging control**- creation of volunteer patrols, forest watchers;
- **Stronger coordination** with Commune, District and Provincial Representatives;
- Creation of **financial incentives** to ensure successful protection;
- Development of annual carbon stock **monitoring** systems;
- **Agricultural intensification.**

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

Country:	Cambodia
Province:	Oddar Meanchey

Implementing Organization

Forestry Administration of the Royal Government of Cambodia

Name of Contact Person:	Mr. Long Ratanakoma
Title:	Deputy Chief, Community Forestry Office
Address:	Forestry Administration # 40, Preah Norodom Blvd., Phsa Kandal 2, Daun Penh, Phnom Penh Cambodia
Telephone:	+855-12-854-314
Fax:	+855-12-212-201
Email:	koma-long@gmail.com
Website:	http://www.forestry.gov.kh/

Implementing Partners

PACT

Name of Contact Person:	Ms. Amanda Bradley
Title:	Program Director of the Community Forestry Partnership
Address:	Pact Cambodia Phnom Penh Center, Building A, 3rd floor, Rm. 311 Phnom Penh Cambodia
Telephone:	+855-23-217-855 x160
Fax:	+855-23-217-856
Email:	abradley@pactcambodia.org
Website:	http://www.pactcambodia.org

Children's Development Association, Cambodia

Name of Contact Person:	Mr. Chee Boreth
Title:	CDA Director
Address:	Children's Development Associate Samraong Oddar Meanchey Cambodia
Telephone:	+855-17-233-050 (Khmer only)
Email:	cdacambodia@yahoo.com

The Buddhist Monk's Association, Oddar Meanchey, Cambodia

Name of Contact Person:	Venerable Bun Saluth
Titel:	Director
Address:	The Buddhist Monk's Association Samraong Oddar Meanchey Cambodia
Email:	N/A

The Communities of Oddar Meanchey Province, Cambodia

Name of Contact Person:	Mr. Sa Thlay
Title:	Chief of CF Federation
Telephone:	+855-11-425-598 (Khmer only)
Email:	N/A

Project Identification and Design

Community Forestry International, USA

Name of Contact Person:	Dr. Mark Poffenberger
Title:	Executive Director
Address:	1356 Mokelumne Anitoch, CA 94531 United States of America
Telephone:	+1-530-573-0361
Cell:	+1-530-721-1440
Email:	mpoffen@aol.com
Website:	http://www.communityforestryinternational.org

Carbon Development and Offset Marketing

Terra Global Capital, USA

Name of Contact Person:	Ms. Leslie L. Durschinger
Title:	Founder, Managing Director
Address:	One Ferry Building, Suite 255 San Francisco CA 94111 United States of America
Telephone:	+1-415-215-5941
Email:	leslie.durschinger@terraglobalcapital.com
Website:	http://www.terraglobalcapital.com

Technical Partners

William J. Clinton Foundation - Clinton Climate Initiative, USA

Name of Contact Person:	Dr. Andrew Wardell
Title:	Regional Director for Indonesia, Papua New Guinea and Cambodia
Address:	Jl. Pekalongan 7 Menteng Jakarta Pusat 10310 Indonesia
Telephone:	+62 (0) 81-386-723-865
Email:	awardell@clintonfoundation.org
Website:	http://www.clintonfoundation.org/what-we-do/clinton-climate-initiative/

Technical Working Group on Forests and the Environment, Cambodia

Name of Contact Person:	Mr. Sok Srun
Title:	TWG F&E Coordinator Forestry Administration
Telephone:	+855-12-940-936
Email:	twg.fe@citylink.com.kh

Legal Advisor on the Emission Reductions Purchase Agreement

Sonnenschein Nath & Rosenthal LLP

Name of Contact Person:	Mr. Jeffrey C. Fort
Title:	Partner
Address:	233 South Wacker Drive, Suite 7800 Chicago IL 60606-6404 USA
Telephone:	+1-312-876-2380
Email:	jfort@sonnenschein.com
Website:	http://www.sonnenschein.com/

Funding Supporters

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Name of Contact Person:	Chris Hotlz
Title:	Program Officer
Address:	140 S. Dearborn Street Chicago IL 60603-5285 USA
Telephone:	+1-312-726-8000
Email:	choltz@macfound.org
Website:	http://www.macfound.org/

DANIDA, Denmark
(Multi-Donor Livelihoods Facility jointly funded by Danida, DfID and NZAid)

Name of Contact Person:	Jacob Jajeps
Title:	Counselor – Development
Address:	Royal Danish Embassy #8, Street 352 Phnom Penh Cambodia
Telephone:	+1-855-233-987-629
Email:	jajeps@um.dk
Website:	http://www.phnompenh.um.dk

William J. Clinton Foundation - Clinton Climate Initiative, USA
(through a grant from the Rockefeller Foundation)

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Title:	Regional Director for Indonesia, Papua New Guinea and Cambodia
Address:	Jl. Pekalongan 7 Menteng Jakarta Pusat 10310 Indonesia
Telephone:	+62 (0) 81-386-723-865
Email:	awardell@clintonfoundation.org
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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).

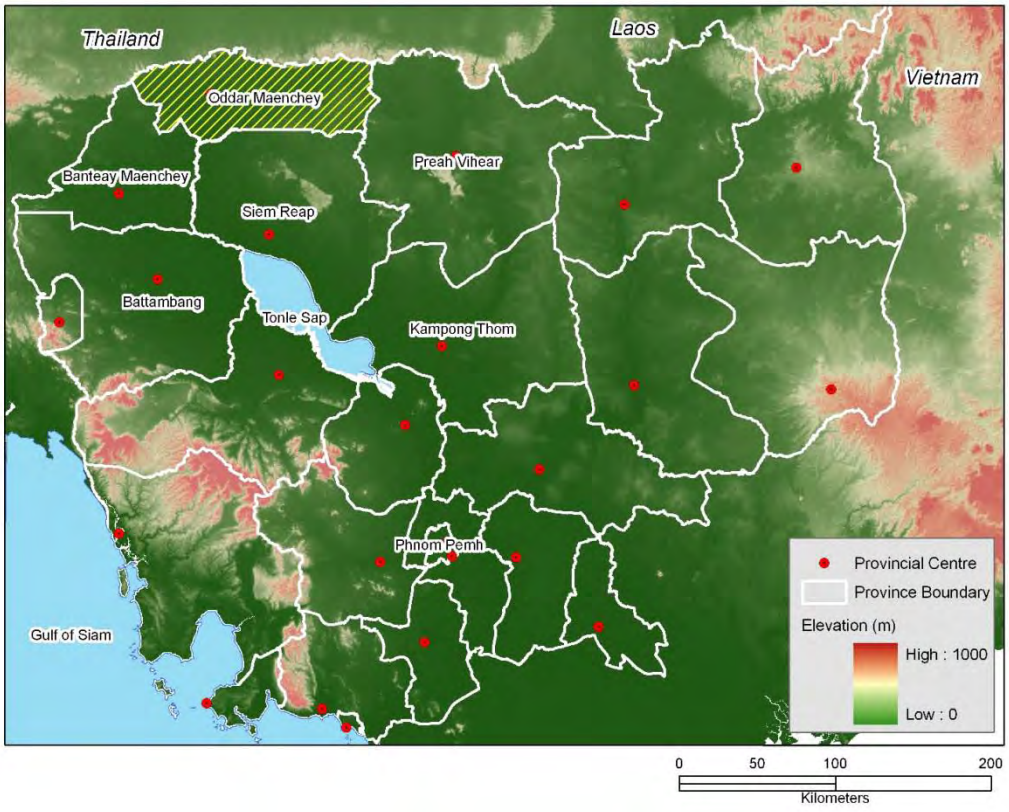

Figure G1. Regional Location of the Oddar Meanchey Province within Cambodia.

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. The climate is monsoonal tropical with the rainy season extending between May and

October, and the dry season from November to April[1]. Rainfall averages approximately 1,300-1,500 mm per year.

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. 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.

[1]Top, N. *et al.* 2004. *Spatial Analysis of woodfuel supply and demand in Kampong Thom Province, Cambodia*. Forest Ecology and Management, 194: 370-371.

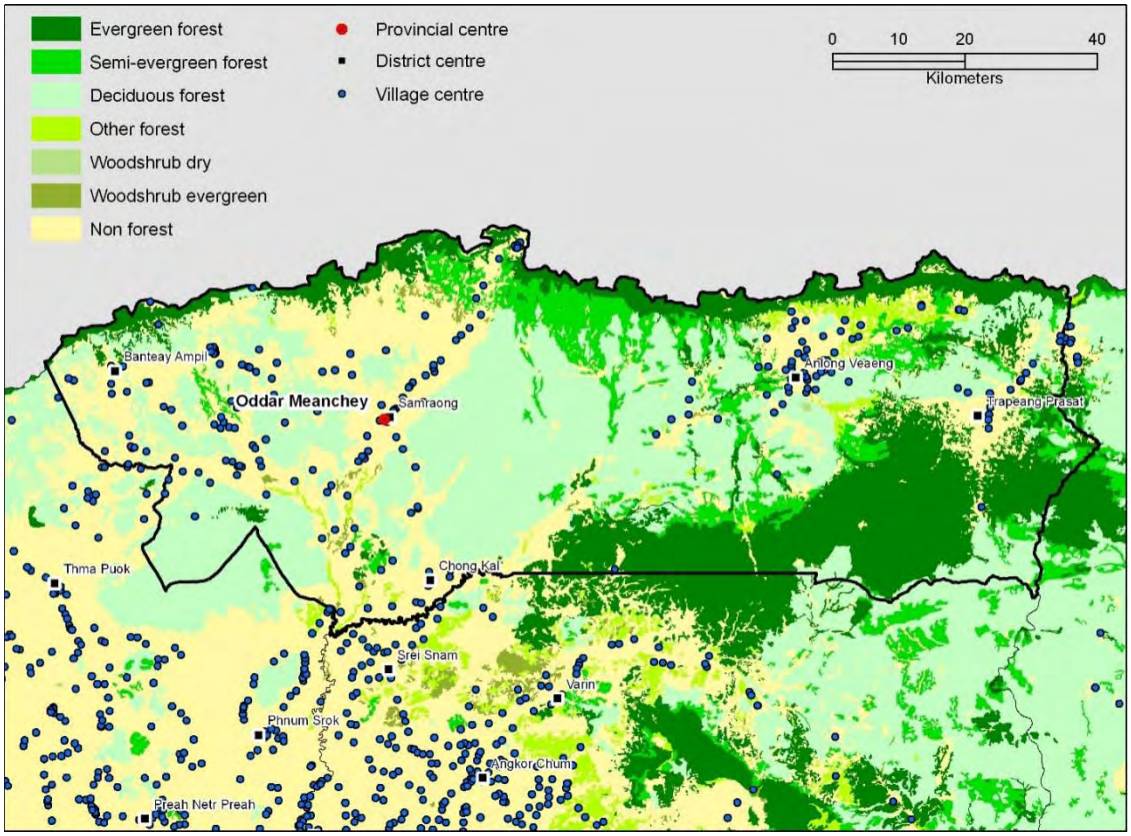

Figure G2. Oddar Meanchey Forest Cover in 2006.

In response to resource pressures, a grassroots forest protection movement has emerged in a number of villages in Oddar Meanchey over the past 5 years, 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. Avoided deforestation and forest degradation (REDD) projects provide a framework to finance these community-based initiatives[2].

[2]Kanninen, M. *et al.* 2006. *Do Trees Grow on Money? The implications of deforestation research for policies to promote RED*. Center for International Forestry Research. Bogor, Indonesia.

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. This analysis found that in Oddar Meanchey Province alone, over 38,594 hectares of forest were cleared between 2002 and 2006, representing approximately 8.4% of the province's forest area and an annual forest loss rate of 2.1%[3] (see Table G1). This rate is over three times Cambodia's national average deforestation rate of 0.6%, well exceeding Indonesia's national rate of 1.6% per year[4]. 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 & Condition	Forest Cover in 2002 (ha)	Forest Cover in 2006 (ha)	% Change	% Annual Loss
Evergreen Forest	166,935	149,119	-11%	-2.8%
Semi-Evergreen Forest	71,319	55,138	-23%	-5.8%
Deciduous Forest	251,728	240,824	-4%	-1.0%
Open Forest	5,743	12,050	110%	27.0%
Total Forest	495,725	457,131	-8%	-2.1%
Barren land	167,440	206,034	23%	5.8%
Total Land Area	663,165	663,165	-	-

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, around 58 villages in Oddar Meanchey have begun to form

[3]Technical Working Group on Forestry & Environment. June 2007. Forest cover changes in Cambodia 2002-2006. Cambodia Development Cooperation Forum, Phnom Penh, Cambodia.

[4]Food and Agricultural Organization of the United Nationas (FAO). 2003. The State of the World's Forests. Rome, Italy.

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 50% of the trees are deciduous are 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*, *Ceibapentandra*, and *Irvingiaoliveri*. 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 et al., 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. *Guttifera*, *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 consists of 13 different discrete parcels scattered across the central section of Oddar Meanchey Province (Figure G3). 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 from 383 hectares to 18,164 hectares, and add up to a total project area of 67,853 hectares (Table G2). Of these 67,853 hectares, 89%, or 60,390 hectares are classified as forest areas according to the FAO definition of a forest. 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). For more detailed maps of the Community Forestry Sites see Annex 1)

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

ID	Community Forest Group Name	CF Size [ha]	Land Class or Forest Stratum			Centroid Coordinate†	
			Evergreen Forest	Mix/Dec* Forest	Non-forest	Lat (X)	Lon (Y)
1	Angdoung Bor	6,114	0%	97%	3%	308429	1546200
2	Chhouk Meas	383	79%	19%	1%	369358	1578210
3	Dung Beng	1,843	40%	53%	7%	320019	1553310
4	Ou Yeay Kaov	960	91%	0%	9%	349815	1592050
5	Phaav	2,025	95%	1%	4%	412697	1587990
6	Prey Srorng	6,344	72%	19%	9%	385545	1552110
7	Prey Srors	1,605	94%	0%	6%	327312	1587110
8	Ratanak Ruka	12,733	4%	90%	5%	385364	1582960
9	Rolus Thom	6,443	62%	3%	35%	344029	1590020
10	Romdoul Veasna	6,009	59%	1%	40%	334244	1587700
11	Samaky	1,079	92%	6%	1%	385364	1582960
12	Sangkrous Preychheu	4,151	89%	6%	5%	398721	1553060
13	Sorng Rokavorn	18,164	9%	85%	6%	371928	1565930
	Total	**67,853**	**36%**	**53%**	**11%**		

†Coordinates are in a UTM48N projection with WGS1984 datum

*Mix/Dec = Mixed and Deciduous Forests

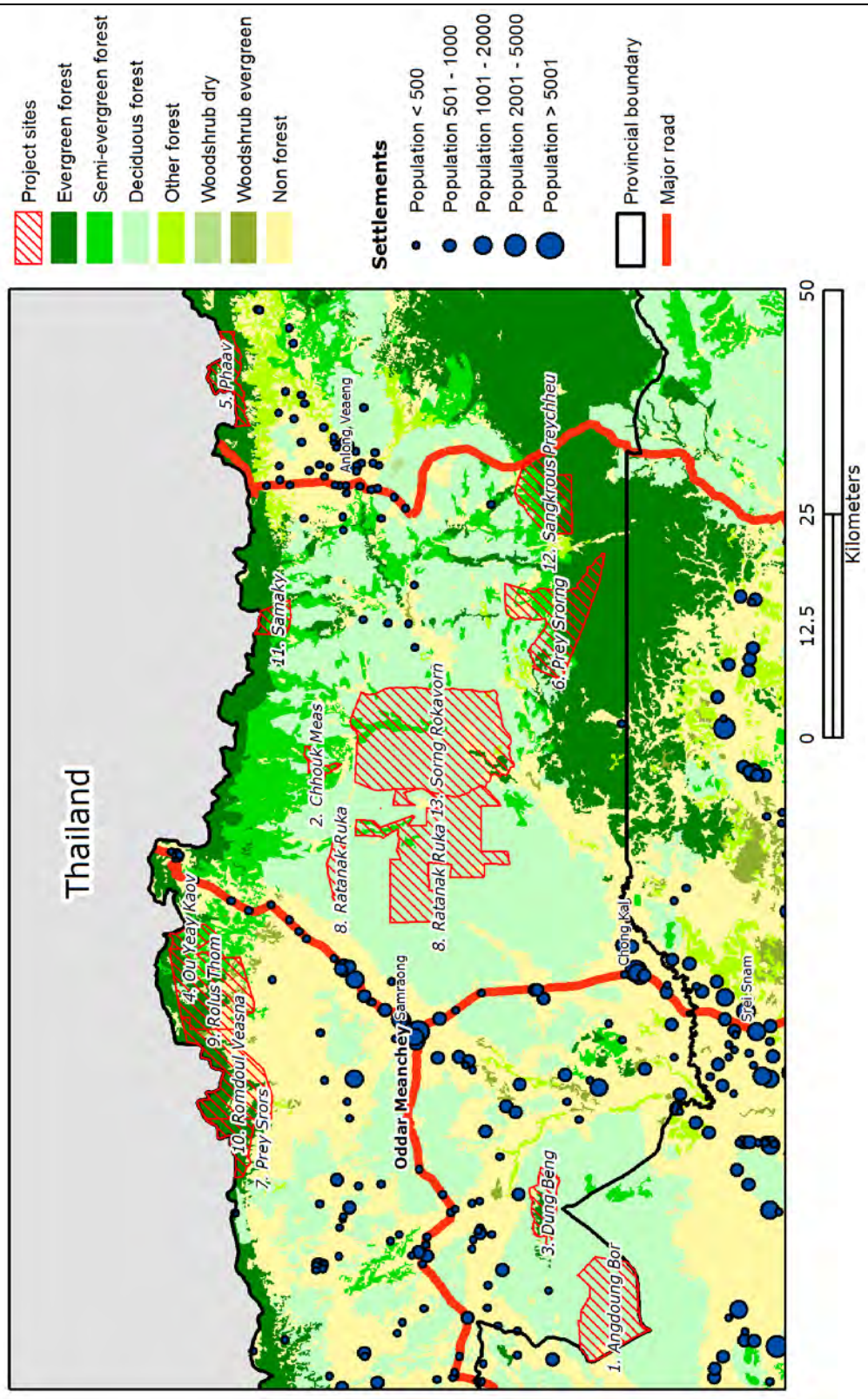

Figure G3. Map of Oddar Meanchey Province with Community Forestry Sites.

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, Kak Seportivong, Kouk Ampil
10	Romdoul Veasna	Samraong	Samraong	Bansay Rak	Samraong	Tnot, Sambur Meas, Romduol Veasna, 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

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).

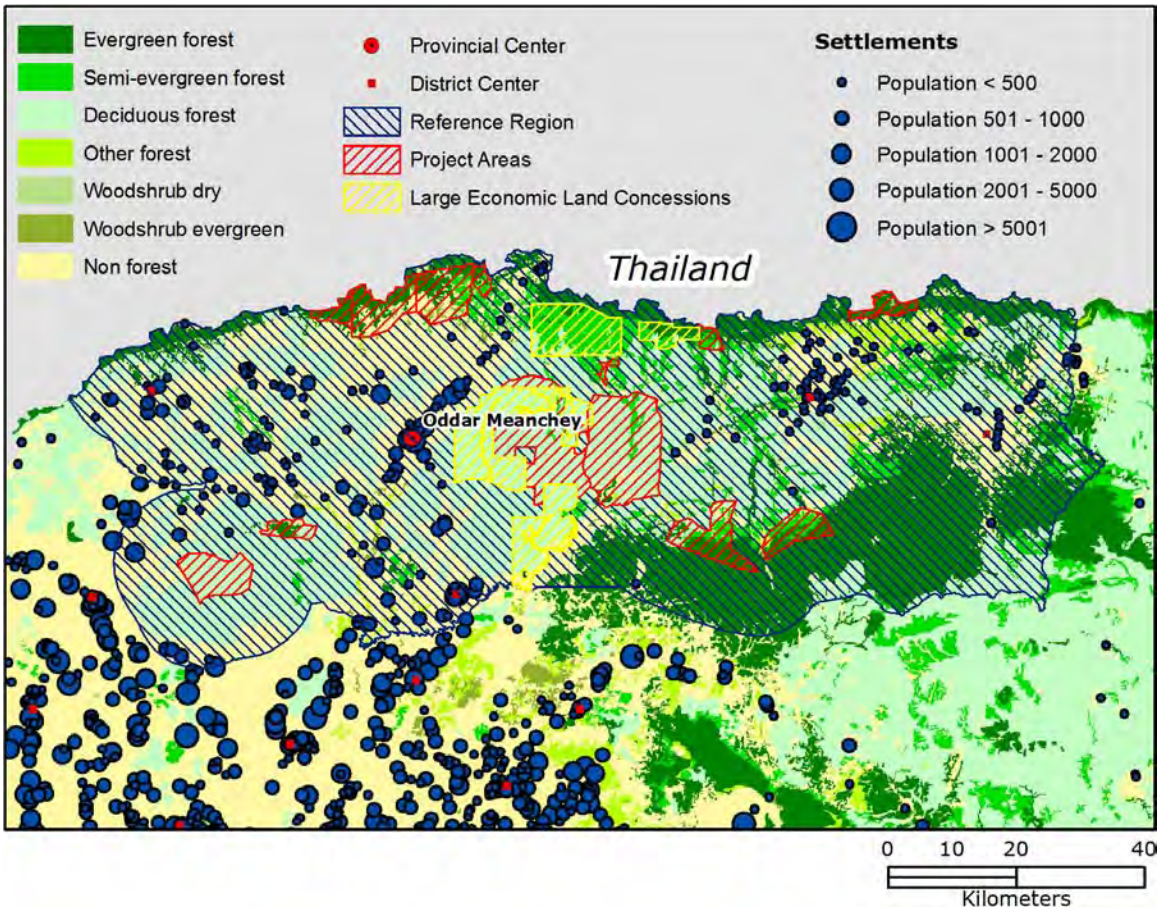

Figure G4. Overview of the Extent and Location of the Reference Region.

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

We identified several forest biomass density classes within dry deciduous 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 based on the Intergovernmental Panel on Climate Change's 2006 Guidelines for National GHG Inventories for Agriculture, Forestry and Other Land Use.

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Table G4. Pictures of the Forest Strata in the Project Areas.

Carbon Density Class	Evergreen	Mixed / Deciduous
Mature		
Medium-density		
Low-density		

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

LULC Class or Forest Strata	Code	Criteria and Thresholds		Seasonality	Management
Agricultural land	AGL	Canopy Closure Tree Height Tree diameter	<10% 2-5 m 10-25 cm	>50 % trees as deciduous species. Open canopy year-round.	Managed as cropland. Some trees may be present along field borders
Degraded wood- or shrub land	DGL	Canopy Closure Tree Height Tree diameter	<10% 2-5 m 10-25 cm	>50 % trees as deciduous species. Open canopy year-round.	Frequent fires, intensive fuel-wood collection
Medium to low-density evergreen forest	EG1	Canopy Closure Tree Height Tree diameter	10-70% 5-20 m 10-75 cm	<50 % trees as deciduous species. Constant canopy cover year-round.	Minimal to minor human intervention (some signs of fire, tree stumps)
Mature evergreen forest	EG2	Canopy Closure Tree Height Tree diameter	70-100% > 20 m 10-175 cm	<50 % trees as deciduous species. Constant canopy cover year-round.	No human intervention, no signs of fire, no tree stumps from logging.
Low-density mixed/deciduous forest	MX1	Canopy Closure Tree Height Tree diameter	10-30% 2-5 m 10-25 cm	>50 % trees as deciduous species. Open canopy during dry season (December-April).	Significant human intervention. Frequent fires (no understory).
Medium-density mixed/deciduous forest	MX2	Canopy Closure Tree Height Tree diameter	30-50% 5-10 m 10-50 cm	>50 % trees as deciduous species. Open canopy during dry season (December-April).	Minimal human intervention. Frequent fires (no understory).
Mature mixed/deciduous forest	MX3	Canopy Closure Tree Height Tree diameter	50-70% 10-20 m 10-75 cm	>50 % trees as deciduous species. Open canopy during dry season (December-April).	No human intervention. Some signs of fire.
Settlement land	STL	Canopy Closure Tree Height Tree diameter	<10% 2-5 m 10-25 cm	>50 % trees as deciduous species. Open canopy year-round.	Very low tree density, mainly fruit trees or young trees managed for fuel-wood

Table G6. Carbon Density and Basic Statistical Measures of the Actual LULC Classes and Forest Strata.

LULC Class or Forest Stratum	Actual Average	Standard Deviation	Number of Observations	Standard Error of the Mean	HCWI
	[Mg DM ha^{-1}]	[Mg DM ha^{-1}]	[-]	[Mg DM ha^{-1}]	[Mg DM ha^{-1}]
AGL	1.0	2.6	19	0.6	1.2
DGL	11.6	18.2	18	4.3	9.0
EG1	254.7	152.0	12	43.9	95.6
EG2	242.4	169.4	53	23.3	46.7

MX1	105.1	62.5	58	8.2	16.4
MX2	108.5	38.7	13	10.7	23.2
MX3	165.0	83.0	25	16.6	34.2
STL	0	0	8	0	0

Mg DM ha^{-1} = Mega-gram (i.e., metric ton) of dry matter per hectare; HCWI = half-width of the 95% confidence interval around the mean

Table G7. Basic Statistical Measures of the Field Measurements per Forest Type.

Carbon density class	Actual average [Mg DM ha^{-1}]	Standard Deviation [Mg DM ha^{-1}]	Maximum [Mg DM ha^{-1}]	Number of Observations [-]	Standard Error of the Mean [Mg DM ha^{-1}]	HCWI [Mg DM ha^{-1}]
Evergreen forest	244.8	165.0	975.6	65	20.5	40.9
Mixed forest	125.6	67.4	451.9	92	7.0	14.0
Non-forest	5.3	12.4	77.5	49	1.8	3.6
SUM	NR	NR	NR	206	NR	NR

Mg DM ha^{-1} = Mega-gram (i.e., metric ton) of dry matter per hectare; HCWI = half-width of the 95% confidence interval around the mean

Table G8. Average and Conservative Emission Factors for Two Forest Types.

Deforestation from	Average Emission Factor [MTCO2e ha^{-1}]	HWCI [MTCO2e ha^{-1}]	Relative Uncertainty [-]	Conservative Emission Factor [MTCO2e ha^{-1}]
Evergreen	439	75	17%	
Mixed	221	27	12%	

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

The project area includes 58 village communities generally ranging in size from 30 to 500 households (Table G9). 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 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[5]. A World Bank study reported that annual per capita income in Cambodia was around $290 in 2002[6].

[5]Royal Government of Cambodia. "Income and Expenditure" (Council for Administrative Reform: www.car.gov.kh/Cambodia/income-expenditure).

[6]World Bank. "Country Brief- Cambodia" (www.worldbank.org/wbsite/external/countries)

Table G9. Population and Gender Distribution in the Participating Community Forest Groups

Nr.	Community Forest Group Name	Village Name	Total Population			Population of CF Members		
			Families	Male	Female	Families	Male	Female
1	Angdong 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
		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

Nr.	Community Forest Group Name	Village Name	Total Population			Population of CF Members		
			Families	Male	Female	Families	Male	Female
		Kiri Vorn	133	327	316	123	317	316
		Bos	216	499	498	147	103	99
9	Rolus Thom	Ktoul	103	366	95	N/A	N/A	N/A
		Traeng Thoung	355	355	491	N/A	N/A	N/A
		Kak Seportivong	332	840	803	N/A	N/A	N/A
		Kouk Ampil	116	256	267	N/A	N/A	N/A
10	Romdoul Veasna	Tnot	525	1,138	1,240	497	890	966
		Sambur Meas	115	258	240	97	253	143
		Romduol Veasna	111	265	234	80	222	234
		Cheung Phnom Meanchey	127	448	429	95	329	326
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
		Dey Thmey	138	359	115	130	216	234
		Ou Ta Meng	185	433	390	157	153	158
13	Sorng Rokavorn	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 Community Forestry Groups**	**58 villages**	**10,036**	**23,405**	**22,350**	**7,434**	**11,516**	**11,082**

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. 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[7].

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[8]. 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 4 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.

[7]McMahon, Dennis. "Assessment of Community Forestry Sites and Migration Patterns in the Oddar Meanchey Province, Cambodia". (CFI: Phnom Penh) 2008.

[8]Forestry Administration. "Cambodian Tree Species". (Forestry Administration, Phnom Penh) April 2004.

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.[9]

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 4).

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 (12,733 ha) and Sorng Rokavorn (18,164 ha). These areas will provide significant habitat to large vertebrates with expansive ranges such as elephants, leopards, tigers and bears. 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.

[9]IUCN. IUCN Red List Categories and Criteria: Version 3.1. (IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK) 2001.

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 forest groups containing evergreen forests are often on areas with higher elevations and provide watershed protection as well as erosion control. Increased canopy cover in both dry deciduous and evergreen forests decrease ground fuels and fire hazard. Through project implementation forest cover will be conserved and increased, providing ecosystem services of watershed protection, erosion control and fuel load reduction.

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

High Conservation Value areas with cultural significance were created to meet the needs of communities. As many of the communities within the project area are dependent on forests for food or income for at least part of the year, High Conservation Value areas are a fundamental part of this project.

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

High Conservation Value areas with cultural significance were created to meet the needs of communities, not only socially, but culturally as well. High Conservation Value areas were chosen by the communities for cultural significance.

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 over the next decade. 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 (Table G10)[10]. Note that the identified ten active drivers of deforestation are not, by any means, 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.

[10]CFI. "Report on Launching Workshop on Avoided Deforestation Community Forestry Carbon Pilot Project in Oddor Meanchey Province." Provincial Department of Agriculture: Samraong, Oddar Meanchey, March 2008.

Table G10. Agents and Drivers 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. Fuel-wood gathering	●		●			
5. Annual forest fires induced to "clean" the land			●			
6. Hunters inducing forest fires				●		
7. Illegal logging for commercial on-sale		●			●	●
8. Timber harvesting for local 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. The Royal Government of Cambodia and local government offices have 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

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

Throughout the project area settlements have been expanding rapidly over the past decade. Settlement growth occurs 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. The area under likely reflect population growth trends in general, currently around 12% per year, though this may be further accelerated by private and public sector investment.

4. Fuel-wood gathering

Communities living in the project area are almost entirely dependent upon fuel-wood for their energy needs. Smoke from the burning of fire wood is often used to repel mosquitoes from livestock and living areas. 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 fuel-wood consumption would continue to rise, rather than stabilize.

In Cambodia 95% of the population is dependent on wood fuel for cooking[11]. A study in the neighboring province of Kampong Thom found that the per capita wood fuel consumption rate was approximately 200 kgs of greenwood per year[12]. A typical household might consume between 1 to 2 Mg of fuel wood annually, reflecting a 6,000 to 12,000 Mg of fuel-wood used in the project area each year.

5. Annual forest fires induced to "clean" the land

Forest fires are frequent occurrences in many areas and there are few resources available for local communities or government agencies to control the damage to woodlands or the resulting carbon emissions. In the projects absence, it is likely that ground fires will continue to degrade forests and suppress natural regeneration.

[11] NIS. *General Population census of Cambodia 1998, Final Resul*t. National Institute of Statistics, Ministry of Planning, Phnom Penh, Cambodia, 199. p. 299.

[12] Top, Neth et. al. "Variation in woodfuel consumption patterns in response to forest availability in Kampong Thom Province, Cambodia," *Biomass and Bioenergy*, 27 (2004) p. 61.

Small scale low intensity forest fires are natural events in dry deciduous forests in Oddar Meanchey Province (see Figure 7). The frequency of fires, however, is greatly increased by human activity. Perhaps 90% of dry season forest fires are caused by people including hunters, children, careless smokers, and farmers burning agricultural residue. In the case of degraded dry deciduous forests, natural regeneration is suppressed due to almost annual ground fires that destroy or damage coppice shoots and saplings. As a result, biomass is lost and regrowth is slowed, at the same time fuel wood and timber is extracted leading to a gradual erosion of vegetative material and forest health.

6. Hunters inducing forest fires

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. High-value “luxury wood” is selectively felled for the booming hotel market in Siem Reap which over two million foreign tourists visit annually. Illegal timber smuggling is widespread, often organized by private sector operators who obtain support from local military and police. Armed soldiers are often involved in these activities presenting control problems for weaker Community Forestry Management Committees. The Samaky CFMC estimated that illegal logging is resulting in a loss of 100 m^3 of timber per year from one forest block. 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 local 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.

9. Large economic land concessions

During the 2007 to 2008 period, the Royal Government of Cambodia leased approximately 44,000 hectares of forest land to private interests. These concessions are currently being cleared of forest for sugar cane (e.g., Figure G7) and palm oil. It is important to understand the economic and political dynamics driving the issuance of concessions. Some government planners maintain that underutilized lands need to be developed to generate revenues for the state however critics argue that past timber and other leases have produced minimal income for the country. Large ELCs are being criticized, including by the Provincial Governor of Oddar Meanchey Province in a recent Cambodian press article, for a failure to follow through on their commitment to implement management plans. There is some speculation that some business interests seek ELCs simply to harvest high value luxury wood, with no intention or financial capacity to invest in the development of their land. As a consequence, between 30% to 40% of all ELCs are cancelled within a few years of issuance for failure to perform. In the case of Oddar Meanchey, the FA sought the support of the Prime Minister to conduct the pilot project as a test case. Without this support, it is unclear if the project would have had the political backing needed to secure the 60,000 hectare project site in a region that was actively sought for 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 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. However, one coup issued on the western side of the Samaky CF block reduced its size from approximately 3,000 hectares to 1,400 hectares, a removal of some 2,600 hectares in total. 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

Based on field observations, the issuance of large land concessions, migrant encroachment, forest clearing for cropland, and fuel-wood gathering are the four drivers that are believed to have the largest impact on forest loss (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.

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

Driver of Deforestation	$contribution_{DF}(d)$
1. Migrant encroachment	30%
2. Conversion to cropland	30%
3. Conversion to settlements	10%
4. Fuel-wood gathering	10%
5. Forest fires induced to "clean" the land	5%
6. Hunters inducing forest fires	5%
7. Illegal logging for commercial on-sale	5%
8. Timber harvesting for local use	5%
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)[13], it has also adopted policies to accelerate economic growth and encourage private sector investment. While 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

[13]Oberndorf, Robert B. "Legal Analysis of Forest and land Laws in Cambodia," (Community Forestry International, Phnom Penh) 2006.

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. Fuel-wood gathering	• Rapidly growing domestic consumption; • Unsustainable exploitation in CF Areas; • Transfer of pressures to forests neighboring CF areas; • Growth of community-based commercial fuel-wood collection; • Existence or growth of charcoal industry
5. Annual forest fires induced to "clean" the land	• Suppressed natural regeneration of degraded forests • Carbon emissions from forest destruction
6.Hunters inducing forest fires	• 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.

Figure G8 and Figure G9 show the progressive deforestation from 1990 – 2006 within the reference region, based on a Landsat 5 and 7 analysis of the land cover. A comparison with an independent dataset of ground-truthing samples revealed that the land classification was carried out with an overall accuracy of minimally 95% (Table G13).

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

Image	Overall accuracy	Average producer's error	Average user's error	Kappa coefficient
1990	87%	92%	87%	84%
2000	95%	95%	95%	94%
2003	96%	96%	96%	95%
2004	96%	96%	96%	95%
2006	97%	97%	97%	97%

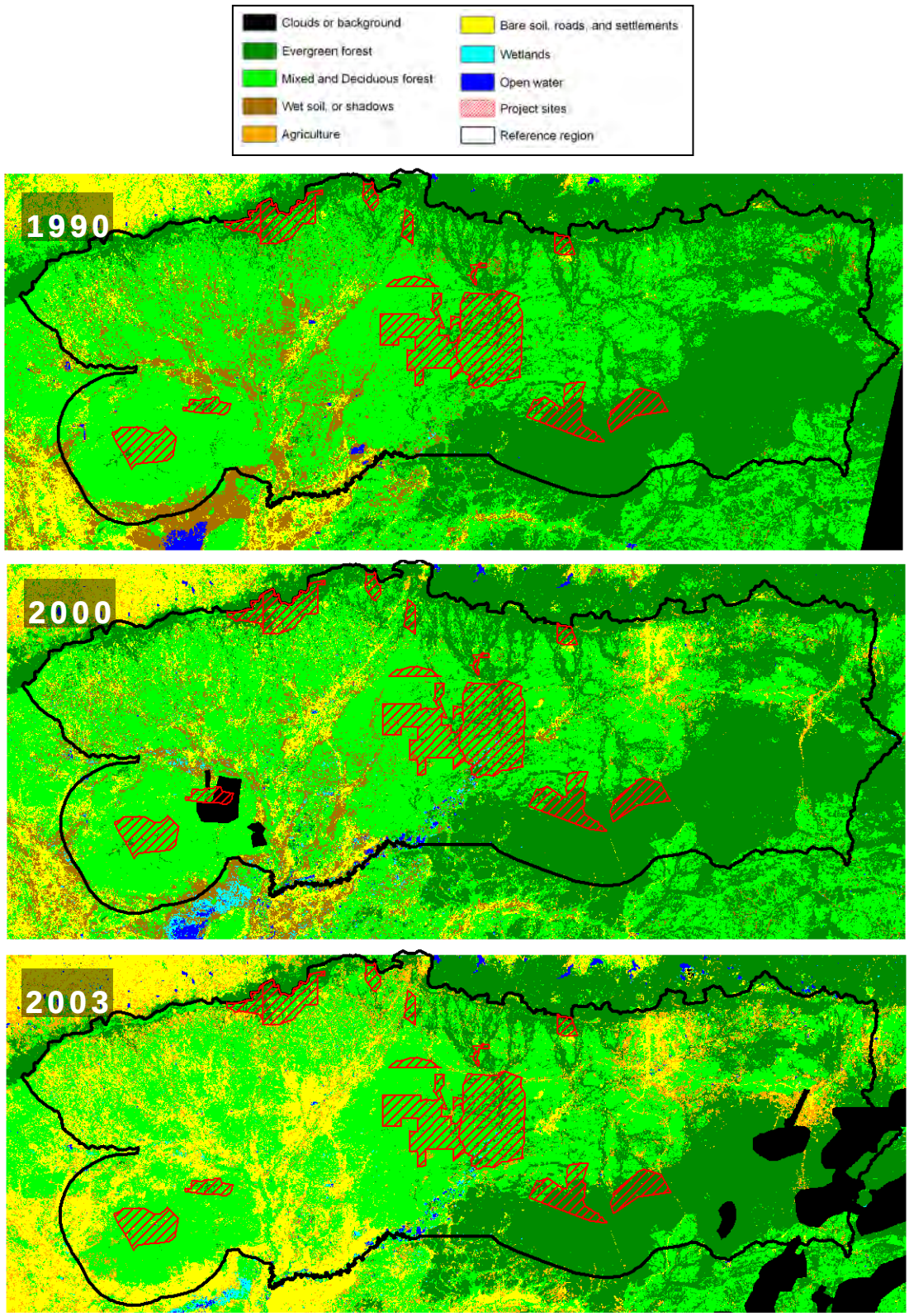


Figure G8. Time Series of Land-use and Land Cover Maps in Oddar Meanchey Province for 1990, 2000 and 2003.

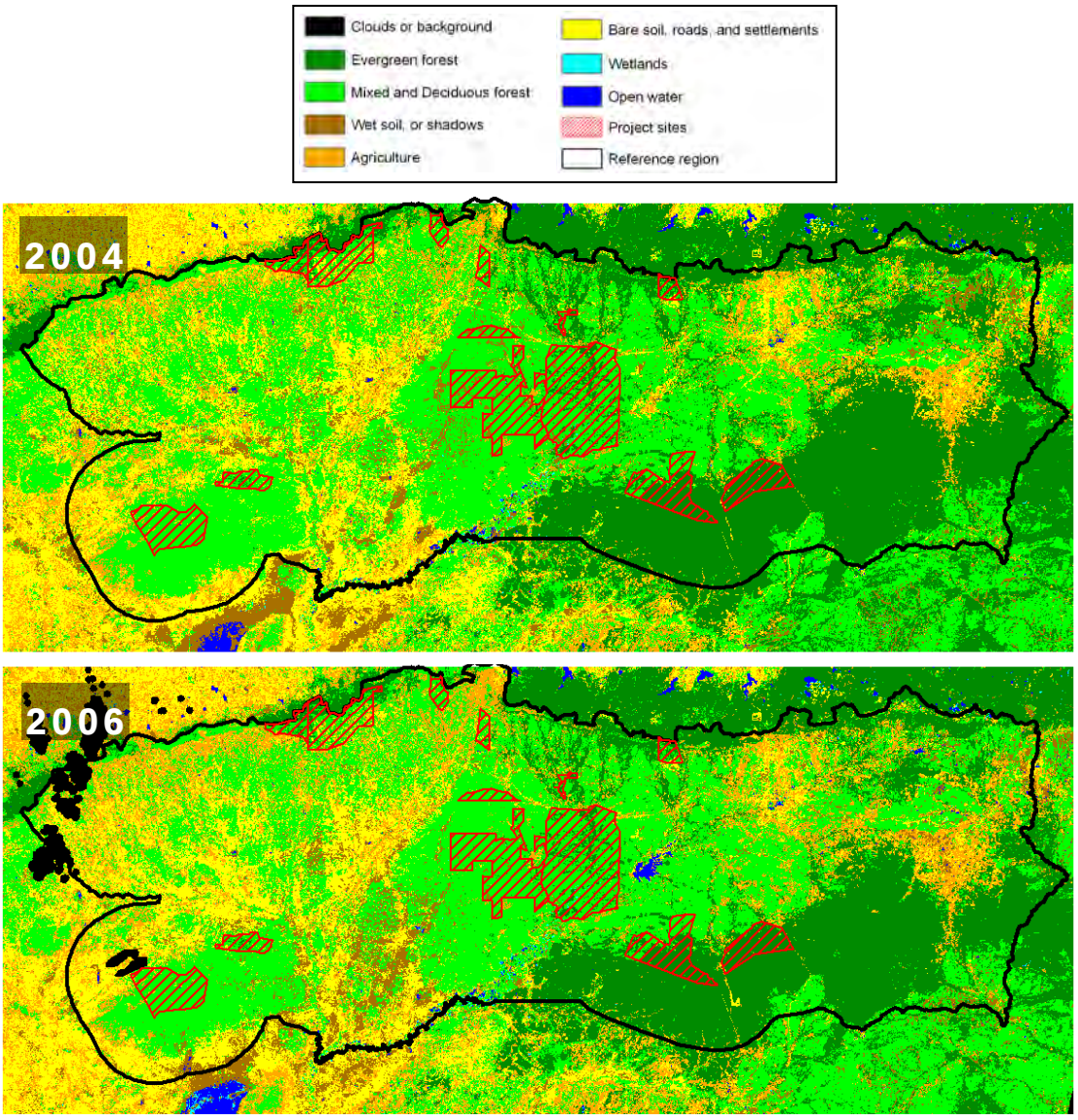


Figure G9. Time Series of Land-use and Land Cover Maps in Oddar Meanchey Province for 2004 and 2006.

Table G14. Summary of the Average Historical Deforestation Rate in the Reference Region (662,000 ha).

From class	To class	Average Rate [ha yr^{-1}]
Mixed forest	Agriculture	5405
	Wet soil or shadows	2580
	Dry soil, roads, or settlement	7869
Total deforestation rate in mixed forest		**15855**
Evergreen forest	Agriculture	6856
	Wet soil or shadows	356
	Dry soil, roads, or settlement	1119
Total deforestation rate in evergreen forest		**8331**

The baseline deforestation rates in the project area can be conservatively extrapolated from the historical deforestation rates in the reference region by multiplying the average annual rates with a factor representing the difference in areas (60,245 ha/662,000 ha). This is conservative since the reference region only contains around 30% forest, while the project areas contain 100% forest. The average deforestation rate within the mixed forests of the project area is 1,443 ha^{-1} yr^{-1}, while it is 758 ha^{-1} yr^{-1} within the evergreen forests of the project area. This represents a relative deforestation rate of 4.2% in the areas of mixed forests, and 2.9% in the areas of evergreen forests, which is very close to the values reported before by the study conducted by the University of Copenhagen and the Forestry Administration (Table G1).

It is well documented that deforestation rates decrease when forest areas are gradually disappearing. The "forest transition" theory (Mather and Needle, 1998[14]) 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 is initially 1, but gradually decreases as the proportion of remaining forest decreases (Figure G10). This scarcity factor was calibrated in a conservative way by using a land-use change model. According to the calculation,

[14] Mather AS, Needle CL (1998) The forest transition: a theoretical basis. Area, 30, 117–124.

deforestation will start to decrease when around 50% of the current forest area in the project area is deforested, and completely stops when around 80% of the forest area has disappeared. A very similar pattern was reported by Meyfroidt and Lambin (2008)[15] 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.

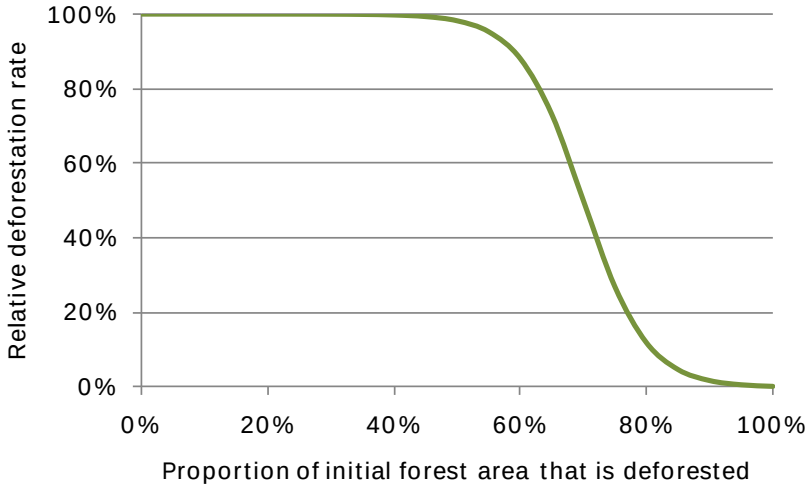


Figure G10. Relative Deforestation Rate as a Function of Proportion of Initial Forest Area that is Deforested.

Table G15 contains the annual deforestation rates in the project area under the baseline scenario. It was conservatively assumed that only 90% of the total project area of 68,696 ha were forests, totaling 61,826 ha. About 57% of the forests are mixed, while 43% is evergreen. Analogous to the situation in Vietnam, it is predicted that around 70% of the forest area will disappear under the baseline scenario in the project area within the 30 years, and that deforestation rates will drop to 10% of current rates within this period. Note that in all carbon calculations will be discounted for based on the uncertainty around the

[15] Meyfroidt P, Lambin EF (2008) Forest transition in Vietnam and its environmental impacts. Global Change Biology, 14 (6), 1319-1336

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. This section also contains an overview of all emissions sources from non-CO_2 emissions and fuel-related emissions from project activities.

Table G15. Projected Remaining Forest Areas, and Deforestation Rates Under Baseline Scenario in the Project Area within a 30-year Period. Net Changes in C Stocks are Calculated using the Emission Factors in Table G8.

Project Year	Calendar Year	Remaining Forest Area Mix/Dec [ha]	Remaining Forest Area Evergreen [ha]	Deforestation Rate Mix/Dec [ha yr^{-1}]	Deforestation Rate Evergreen [ha yr^{-1}]	Net Changes in C Stock [MTCO2e yr^{-1}]
0	2007	35,241	26,585			
1	2008	33,760	25,807	1,481	778	570,405
2	2009	32,280	25,029	1,481	778	570,405
3	2010	30,799	24,251	1,481	778	570,404
4	2011	29,318	23,473	1,481	778	570,401
5	2012	27,838	22,695	1,481	778	570,396
6	2013	26,357	21,917	1,481	778	570,385
7	2014	24,876	21,139	1,481	778	570,361
8	2015	23,396	20,361	1,480	778	570,306
9	2016	21,917	19,583	1,480	778	570,182
10	2017	20,438	18,805	1,478	778	569,901
11	2018	18,963	18,027	1,475	778	569,264
12	2019	17,495	17,249	1,468	778	567,823
13	2020	16,043	16,472	1,452	777	564,599
14	2021	14,625	15,695	1,417	777	557,600
15	2022	13,280	14,919	1,346	776	543,381
16	2023	12,061	14,145	1,219	774	518,018
17	2024	11,025	13,375	1,036	771	481,360
18	2025	10,190	12,610	835	765	440,317
19	2026	9,530	11,855	660	755	402,822
20	2027	9,002	11,117	528	738	370,935
21	2028	8,572	10,405	431	711	342,308
22	2029	8,212	9,735	360	670	313,743
23	2030	7,904	9,121	307	615	283,206
24	2031	7,637	8,574	267	547	250,798
25	2032	7,402	8,099	235	475	218,535
26	2033	7,192	7,691	210	407	188,859
27	2034	7,002	7,344	190	348	163,253
28	2035	6,830	7,046	172	298	141,993
29	2036	6,672	6,787	158	258	124,631
30	2037	6,526	6,561	146	226	110,484
SUM				**28715**	**20024**	**12,857,076**

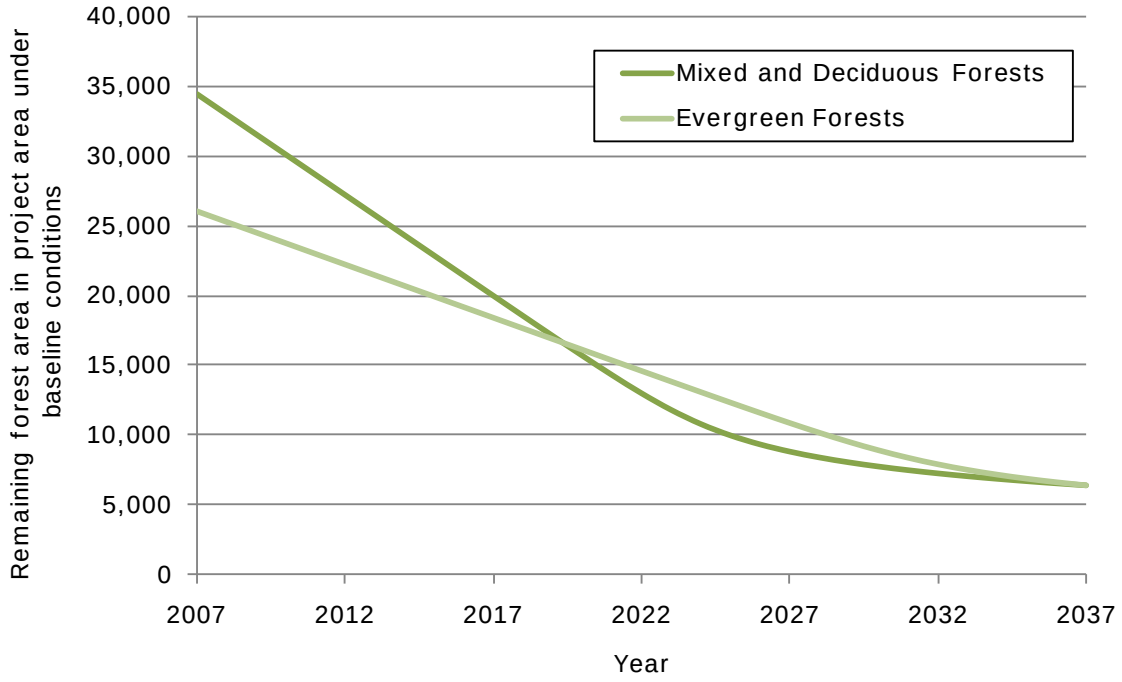


Figure G11. Remaining Forest Area in the Project Area Under Baseline Conditions as a Function of Time.

Figure G11 illustrates the remaining forest area under baseline conditions during the project lifetime. It is predicted that deforestation rates decrease around 2025 for the mixed forests, and around 2030 for the evergreen forest.

The appropriate emission factors associated with the above activity data (deforestation rates) are calculated from the forest inventories (Table G16). The uncertainty is expressed as the half-width of the 95% confidence interval around the mean of the difference between the average biomass densities between the forest and non-forest land classes using standard error propagation rules. A carbon concentration of 50% of the biomass is assumed. The following example illustrates the calculation methodology:

$$439 = (244.8 - 5.3) \cdot 0.5 \cdot 44/12$$

$$75 = \sqrt{40.9^2 + 14^2}$$

Final carbon calculations are discounted for using the relative uncertainty associated with these emission factors.

Table G16. Emission Factors for the Two Forest Types in the Project Area.

Transition	Average Emission Factor [MTCO2e ha^{-1}]	Uncertainty (HWCI) [MTCO2e ha^{-1}]	Relative Uncertainty (HWCI) [-]
From evergreen forest to non-forest	439	75	17%
From mixed forest to non-forest	221	27	12%

HWCI=Half-width of the 95% confidence interval around the mean. Relative uncertainty is calculated using standard error propagation rules.

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, fuel-wood, 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.[16] 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.

[16] See www.ruralpovertyportal.org/english/regions/asia/khm

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. 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. 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[17]. In addition, hunting and poaching are wide-spread, resulting in an increasing number of endangered 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.

[17] Cambodian Tree Seed Project. Cambodian Tree Species. (Forestry Administration: Phnom Penh, Cambodia) 2004.

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[18]. 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. 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.

[18]Bailleux, Renaud. The Tonle Sap Great Lake. (FAO/Asia Horizons Books Co., Bangkok) 2003, p.140

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 67,853 hectares of project area with 61,826 of forests. This will lead to an avoided emission of about 7 million $MTCO_2$ 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.[19]

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

[19]Letter from the Council of Ministers, Sar. Chor. Nor. No. 699, Council of Ministers, Kingdom of Cambodia, Phnom Penh May 2008.

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 G17). 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 G17. Summary of the Project Activities and which Driver of Deforestation they Target.

	Project Activity									
Driver of Deforestation	**1. Reinforcing land-tenure**	**2. Land-use plans**	**3. Forest Protection**	**4. ANR**	**5. Fuel-efficient Stoves**	**6. Mosquito Nets**	**7. Agricultural Intensification**	**8. Water Resource Development Projects**	**9. NTFP Development**	**10. Fire Prevention**
1. Forest clearing for land sales	●		●							
2. Conversion to cropland		●		●			●	●	●	
3. Conversion to settlements		●								
4. Fuel-wood gathering			●		●	●				
5. Annual Forest fires induced to "clean" the land			●					●		●
6. Hunters inducing forest fires			●							●
7. Illegal logging for commercial on-sale			●							
8. Timber harvesting for local use		●	●	●						
9. Large Economic Land Concessions	●									
11. 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.

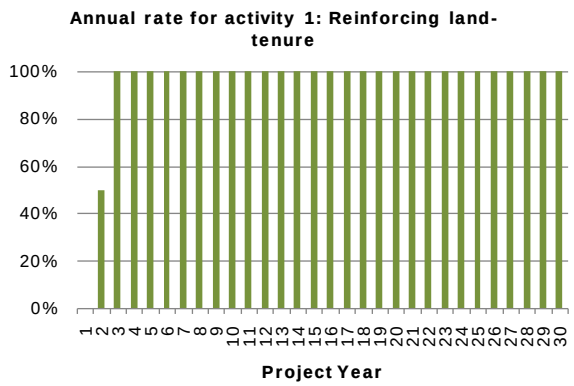
1. Reinforcing the land-tenure status

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: Strengthening 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 10 (small economic land concessions)	100%. Idem to above.
• 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.

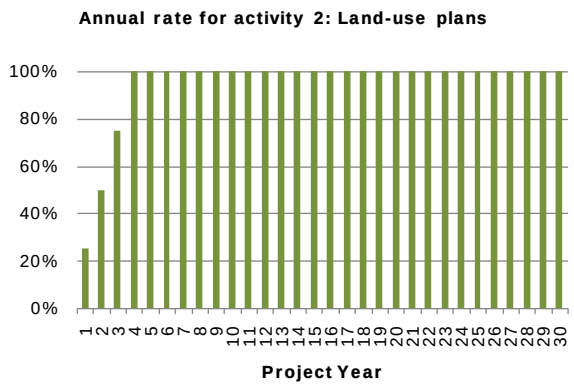
2. Sustainable forest and land-use plans

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 support communities in developing water resource development 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.

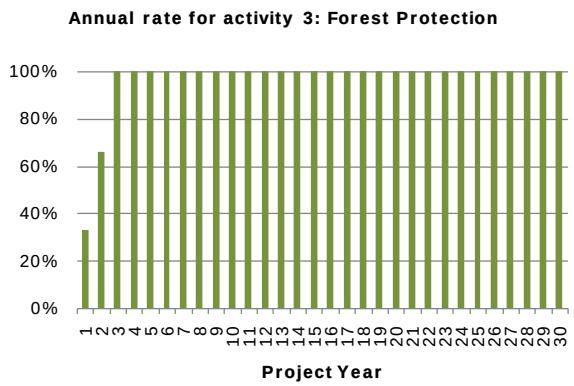
Project Action 2: Land-use Plans	
	Land-use plans are fully supported by the project proponents from the first year of the project. However, it is expected that a period of 5 years is necessary before the full effect (rate) of land use plans is reached due to the often challenging negotiations to design 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 fuel-wood collection. Therefore, if the conversion to cropland will occur in an ordered fashion, deforestation from this conversion can be reduced to 50%.
• driver 5 (Annual Forest fires induced to "clean" the land)	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 management planning, 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 fuel-wood 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 (Fuel-wood gathering)	25%. Without enforcing the rules in the management and land-use plans, it can be expected that some community members will still collect fuel-wood in the forests. An effective patrolling system will reduce the fuel-wood gathering by discouraging people to collect fuel-wood. However, some fuel-wood gathering will be unavoidable. Therefore, the reduction is predicted to be around 25%.
• driver 5 (Annual forest fires induced to "clean" the land)	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 (Hunters inducing forest fires)	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 10,000 hectares of degraded forest over 20 years of the project. Community members will be employed to clear degraded forests of weeds, clean healthy tree stumps and thin shoots to encourage growth, and plant tree saplings in gaps. This activity is designed to generate approximately 20 days of employment per project households during the agricultural off-season (February through April).

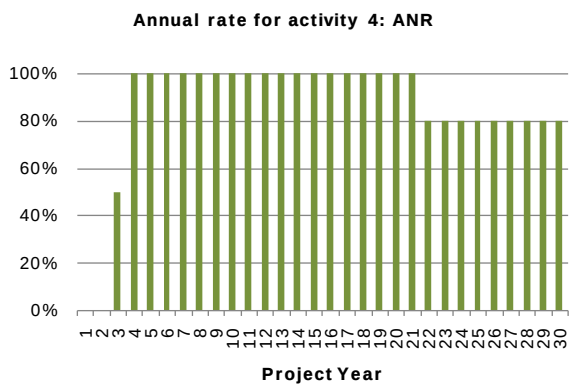
A key to forest restoration will be fire control in the dry deciduous forests. The fire control activities will include community identification of high-potential regrowth areas based on biotic capital assessments reflected in the density and health coppicing shoots and seedlings, soil moisture, and location. Fire lines of 5 meters width will be established around the regeneration areas with priority given to fire control in these areas for at least 5 years (see “fire prevention” section).

Apart from the fire control, the CFMCs will plant approximately 60,000 tree seedlings each year in gaps between areas being treated with ANR. The planting is scheduled to begin in year 3 and continue through year 30, 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. Enrichment planting will be done in gaps with indigenous companion species including *Dalbergia oliveri*, *Pterocarpus macrocarpus*, *Dipterocarpus tubinatus* and others. 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 into the degraded forests. 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 will be selected using a three-step process; (1) using a GIS, areas will be selected that were forest in 2000, but deforested in 2008, that are within 5 km of settlements, and that are land-mine free, (2) this map of potential ANR areas will be presented to the local communities, so that they can select the areas of the highest potential in map-sketching meetings, (3) the sketched maps will be digitized in a GIS, and concrete management plans will be developed.

If the demand for fuel-wood increases beyond the production of dead-wood in the protected forests, and coppice culture, then fuel-wood generating small woodlots will be planted.

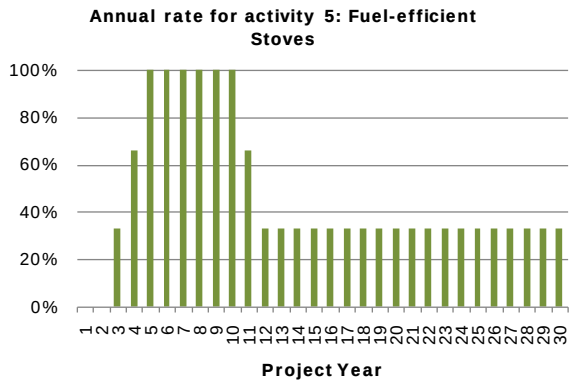
Project Action 4: Assisted Natural Regeneration	
	Assisted natural regeneration activities consist of (1) silvicultural activities such as thinning, removal of exotic and invasive species, and coppicing, and (2) enrichment planting. Silvicultural activities are planned for years 3-20, while enrichment 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 7,500 households in the project area. Such programs are reported to have a 70% adoption rate and reduce fuel consumption by up to 45%[20]. Conservatively, a fuel consumption reduction of 20% is assumed. More than 90% of Cambodians use biomass as cooking fuel, typically fuel-wood gathered from the forest in rural areas and charcoal in urban areas. While harvesting of fuel-wood provides the added benefit of ground detritus clearing, which can help prevent forest fires, fuel-wood 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 fuel-wood. The stoves will cost approximately $10 each and will reduce fuel-wood consumption by 2.5 to 2.8 metric tons per stove per year, reducing the approximate annual

[20]Sam Vitou and Ouch Ngak. Dissemination of New Lao Bucket Stove. Undated newsletter.

CO_2 emission per stove by 4 Mg[21]. These fuel-wood 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.

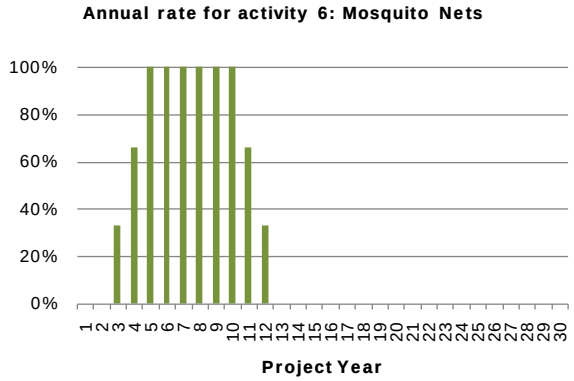
Project Action 5: Introduction of Fuel-efficient Stoves	
	The project plans to distribute 500 fuel-efficient stoves annually for year 3 until 10. It is assumed that a fuel efficient stove has a lifetime of about 3 years. Therefore, from year 5 onwards, when the project activity has the greatest effect, 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 fuel-wood. This represents around 5% of all the households in the project area.
Maximal reduction in driver-induced deforestation	
• driver 4 (Fuel-wood gathering)	7.5%. Fuel-wood 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 fuel-wood at a maximal rate of 0.45*1,500/9,000 = 7.5%.

6. Mosquito Nets

One of the largest contributors to fuel-wood consumption is the burning of wood to generate smoke for the purpose of repelling mosquitoes around cattle and water buffalo enclosures.

[21]Based on an analysis of data provided by Valerie-Anne Taillandier (2006) "Cambodia Fuel wood Saving Project Phase 2".

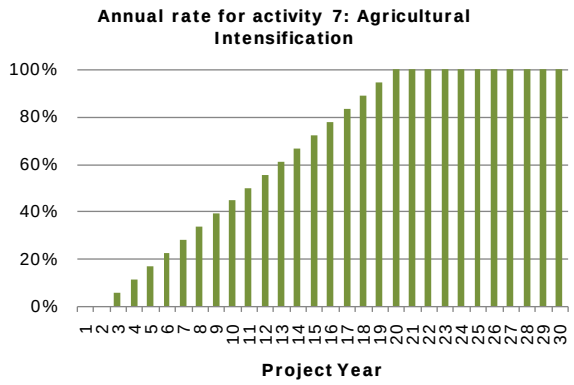
Livestock are the most valuable possessions rural farmers have, often worth years of wages. Protection of these animals from insects and related maladies is of utmost importance, and often the lowest cost option is to generate wood-smoke to repel mosquitoes. The project would provide large mosquito nets treated with insecticide at a reduced price to local households to cover livestock pens. The use of netting will dramatically reduce the amount of fuel-wood consumed by rural families, and will help to decrease the burden on forest land. The nets would be sold through revolving credit associations, as they are often too expensive for farmers to purchase outright.

Project action 6: Introduction of Mosquito Nets	
	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 (Fuel-wood 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 fuel-wood 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. The Director of the FA noted that rapid deforestation in Cambodia has expanded potential agricultural land to approximately 3.8 million hectares. He also noted that Cambodia's need is not to clear more forests for farming, but rather to intensify agriculture on existing farmlands. Improved farming

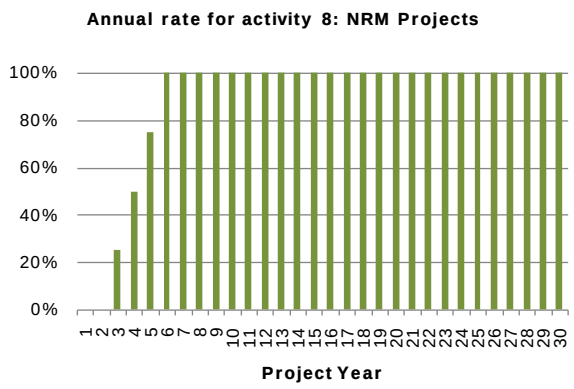
systems, as well as better access to irrigation, financing, and markets could allow existing farmland to become two to three times as productive. In order to take pressure off further forest clearing for agriculture, the project would provide technical and financial support to local farmers to develop 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. Water Resource Development Projects

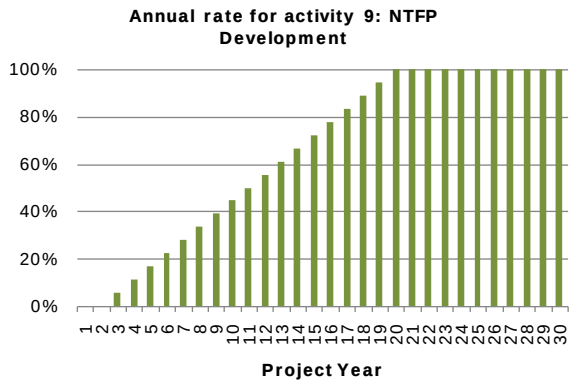
Many project communities have requested assistance to develop their domestic water resources, especially the de-silting of tanks. The project would make ten small grants each year ranging in size from $1,000 to $2,000, to communities based on their water resource development proposals. Proposals will 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: Water Resource Development 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 (Annual forest fires induced to "clean" the land)	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

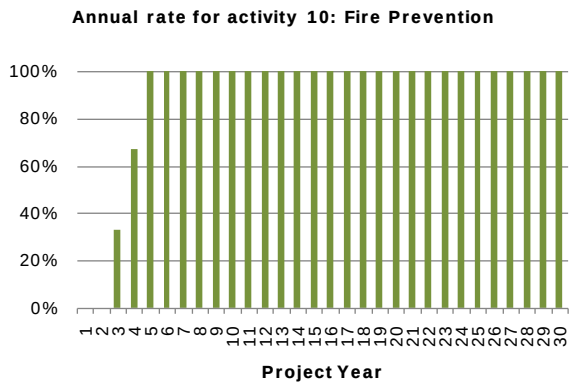
The project plans several livelihood enhancement activities to boost the incomes of project households. These include enhancing production, processing, and marketing of non-timber forest products including honey, rattan, and bamboo and resin oil. The sale of these products will help to increase rural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

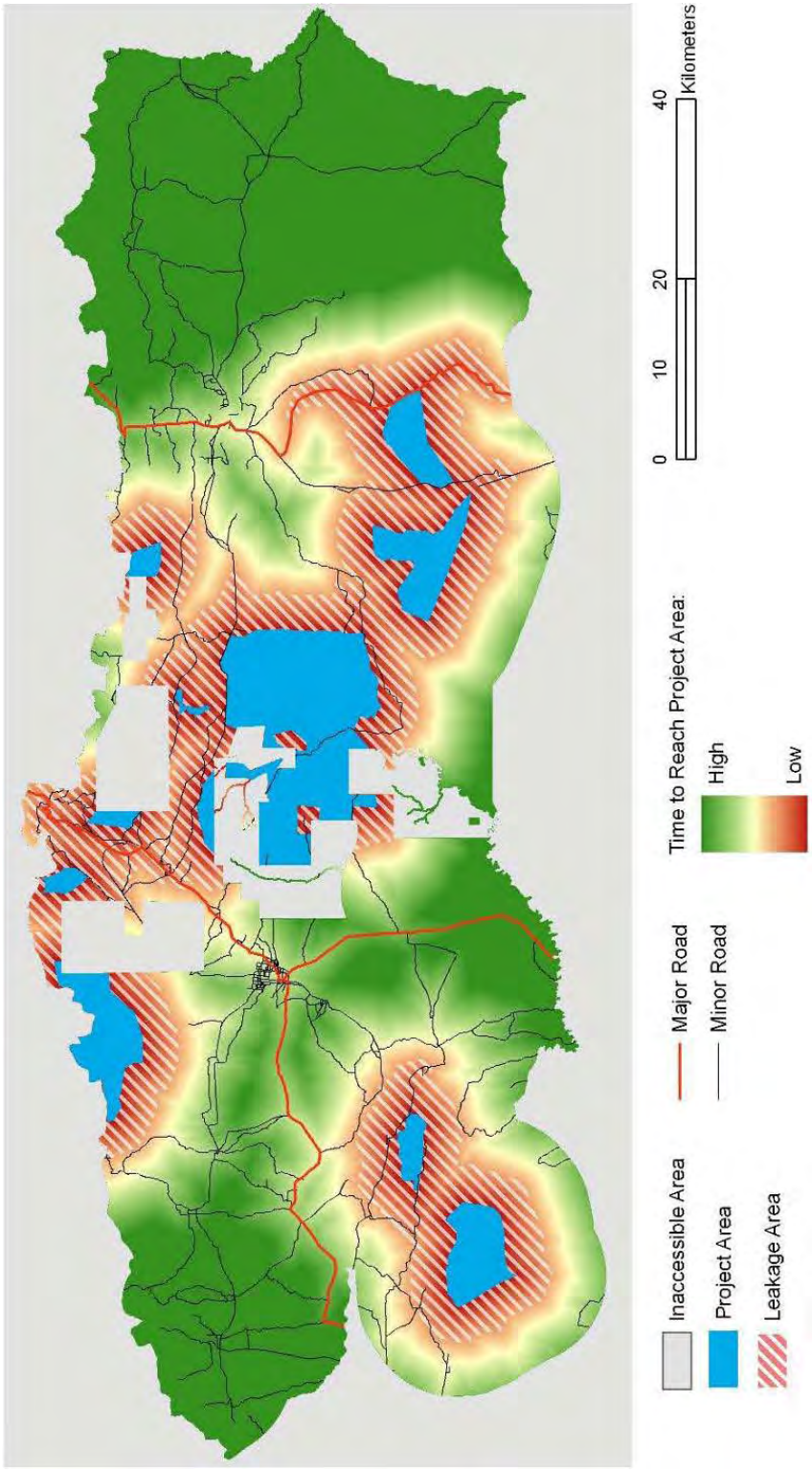


Figure G12. Location and Extent of the Leakage Area.

The leakage area was selected 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's lifetime is 30 years, excluding the 12 month project preparation period (Year 0) that involves stakeholder consultations, PRAs, mapping, boundary demarcation, community training and initial livelihood activities, and negotiations with Royal Government of Cambodia, brokers, and buyers. The first 5 years of the project (i.e. Years 1-5) represent the project establishment period.

The goal of this period includes:

- stabilizing project boundaries;
- controlling drivers of deforestation and degradation in the project areas;
- developing community project management institutions;
- building REDD and A/R project development and management capacity in the Forestry Administration;
- regenerating degraded forest lands within the project boundaries;
- instituting monitoring and measurement systems for carbon accounting, biodiversity, and livelihood generation.

During Years 6-30, the project will move into the maintenance period during which the management will be supported by the project communities, the Forestry Administration, and local NGOs. Net revenues from carbon payments during this period will be used to benefit local communities by enhancing livelihoods and improving the quality of the forest. The project started on January 1, 2008 and will end on December 31, 2038.

The project lifetime was designed to allow sufficient time to:

- stabilize threatened forest cover;

- restore degraded forests;
- build enduring community forest management institutions. These encourage livelihoods activities that support the long term conservation of the area.

Though the planned life of the project is 30 years, the benefits and the returns from the project will last far beyond the project timeline. 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

Potential risks at the community level include the following:

1. Community lack of effectiveness to control the CF area

The project seeks to sustain the authority of the CFMCs over the project forests by 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."[22] The project hopes that, by addressing these

[22]Van Acker, Frank. "Natural Resource Management and Decentralization" Support Programme for the Agricultural Sector in Cambodia. (PRASAC II, Phnom Penh) August 2003, p.5

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.

2. Community members experience loss of confidence in the CFMC

The project 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.

3. Population growth forces agricultural expansion in project area

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,[23] however as available forest lands decrease it is anticipated that migration into the province will slow. 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 extended periods (1989-2008)[24]. 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…".[25] 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

[23]Save Cambodia's Wildlife. The Atlas of Cambodia: National Poverty and Environment Maps (SCW: Phnom Penh) 2006, p.129.

[24]Fox, Jefferson M. *et al.* "Land Use and Tenure Change in Ratanakiri: 1989-2006." (Community Forestry International: Phnom Penh) 2008.

[25]Min Bunnara *et al.* "Participatory Land Use Planning in Cambodia". The Development of Community-based Natural Resource Management (CBNRM-LI) in Cambodia. (CBNRM-LI Leaning Institute: Phnom Penh) 2005, p.157

productivity was related to poor soil, irregular rainfall, and low input techniques[26] 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 extension information on sustainably productive farming systems and provide small grants to innovative local farmers willing to conduct cropping trials.

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

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.

[26]Evans, Tom D. *et al.* "A Study of Resin-Tapping and Livelihoods in Southern Modulkiri, Cambodia" (World Conservation Society, Phnom Penh) January 2003, p.5

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.

5. Insufficient Funding or Inappropriate Use of the Revenues

Project planning and implementation costs are funded through an initial grant from the 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[27] 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.

6. Site Preparation

Since the project will rely on manual labor provided by the community to carry out Assisted Natural Regeneration measures such as thinning, stump cleaning, multiple-shoot cutting, and weeding. No disturbance to soils or use of heavy equipment is anticipated as part of the site preparation.

7. Fertilizer and Pesticides

Although farmers in participating communities may use more fertilizer for saplings in enrichment planting as well as in their agricultural fields, no use of pesticides is anticipated, and thus no significant risk to biodiversity is anticipated. The project will seek to encourage the use of organic farming techniques in the project area to reduce the use of chemical fertilizers.

[27] Sar. Chor. Nor. No. 699, Council of Ministers, Kingdom of Cambodia, Phnom Penh May 2008.

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 over the past 4 years 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[28] 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

[28]Sar. Chor. Nor. No. 699, Council of Ministers, Kingdom of Cambodia, Phnom Penh May 2008.

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 in 2008 and 2009 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 3). 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 level 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.

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 project relies on existing and emerging institutions to mediate any conflict arising from project related activities. The CFMCs will be the focal point in the community for preparing

annual work plans and ensuring a transparent and participatory process among members. Since the CFMCs have close interaction with the local commune government and FA staff, and will receive support from the local NGOs (CDA or the Buddhist Monk's Association), this process allows a consensus plan to emerge that will minimize the chance for conflict. Leading up to the start of project implementation, the project team will meet with all CFMCs to receive their input into the first year work plan.

Conflicts that may arise during the course of project implementation will be presented and vetted during regular (monthly) CFMC meetings. Conflicts that cannot be resolved at the level of the CFMC groups will be mediated by a mutually agreed upon, neutral third party, as stated in the Community Forestry Agreement signed by the CFMCs and the Forestry Administration. Local NGOs and the Forestry Administration will attempt to resolve conflicts raised based on the Forestry Laws, and the Community Forestry Agreements, and will provide a written response to grievances within 30 days (by the next monthly meeting). Project conflicts and their associated responses will be documented.

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, totaling approximately US$31 million 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 Forestry Administration (FA) of the Royal Government of Cambodia is the implementing organization. They will be helped 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 organization 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.

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 .

G4.4. Compliance with Regulations Covering Worker Rights and Plan to Communicate Regulations

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 project managers will inform workers of their employment rights during community meetings. Documents explaining national rules on worker's rights and the obligations of both contracting parties will be made available in local languages when relevant. For a list of all relevant laws and regulations covering worker's rights see Section 0

G4.5. 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 fire fighting 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.

G4.6. 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 2008, Pact managed over $150 million in funds from bilateral, multilateral, and private donors utilizing a highly transparent and effective organizational financial management system. In 2009, Pact anticipates overall turnover will exceed $163 million. Currently, Pact implements over 100 projects in 59 countries, with offices in 23 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 2008, Pact partnered with 12,090 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 1,700 staff members worldwide, 70 of whom are based at headquarters in Washington, DC.

Pact established an office in Cambodia in 1991 and currently has a staff of sixty-four, of which sixty are local. The office has an annual budget of approximately $6 million and manages over 400 sub-grants with local NGOs and government. Pact has an MOU with the Ministry of Foreign Affairs which was recently extended until December 2010 as is the protocol for all international organizations. Pact has worked with more than 150 villages throughout the country to establish community managed forests. Many 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.

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. The project complies with the following national and local laws and regulations and international treaties and agreements.

- 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.

The project proponents hereby assure that the project has and will comply with all the regulations mentioned in this section. The extensive stakeholder consultation process will ensure that compliance is achieved.

G5.2. Demonstration of Approval from Authorities

Over the last 5 years, 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 fully approved 9 out of the 13 CF agreements until now; the approval of the four other CF agreements is expected to follow

soon. This agreement is renewable after 15-years and grants the CFMC groups utilization rights to the forests for subsistence needs. These agreements were officially signed in May 2009 during a public ceremony. 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 (see Annex 3)[29].

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, 67,853 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. MAFF has formally approved nine out of the 13 CFMC areas with the CF agreement signing ceremony conducted during May 2009. 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

[29] See Sar. Chor. Nor. No. 699, Council of Ministers, Kingdom of Cambodia, Phnom Penh May 2008.

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[30]. 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"[31].

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.

[30]RGC, Community Forestry Sub-Decree. 2003.

[31]Oberndorf, Robert B. "Legal Analysis of Forest and land Laws in Cambodia," (Community Forestry International, Phnom Penh) 2006.

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, nine 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. Community Forestry Agreements with the four other communities is being prepared and will follow soon. A signing ceremony for these CF Carbon Agreements was organized in May 2009, demonstrating the full consent of these nine 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 a VCS methodology submitted for validation. 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 Maenchey REDD project. [-]
$nrDrivers$	=	Total number of deforestation drivers = 11 for the Oddar Maenchey 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. The full impact of the REDD project is reached after 5 years, during which it is estimated that the deforestation rate is about 20% of the deforestation rate under baseline conditions.

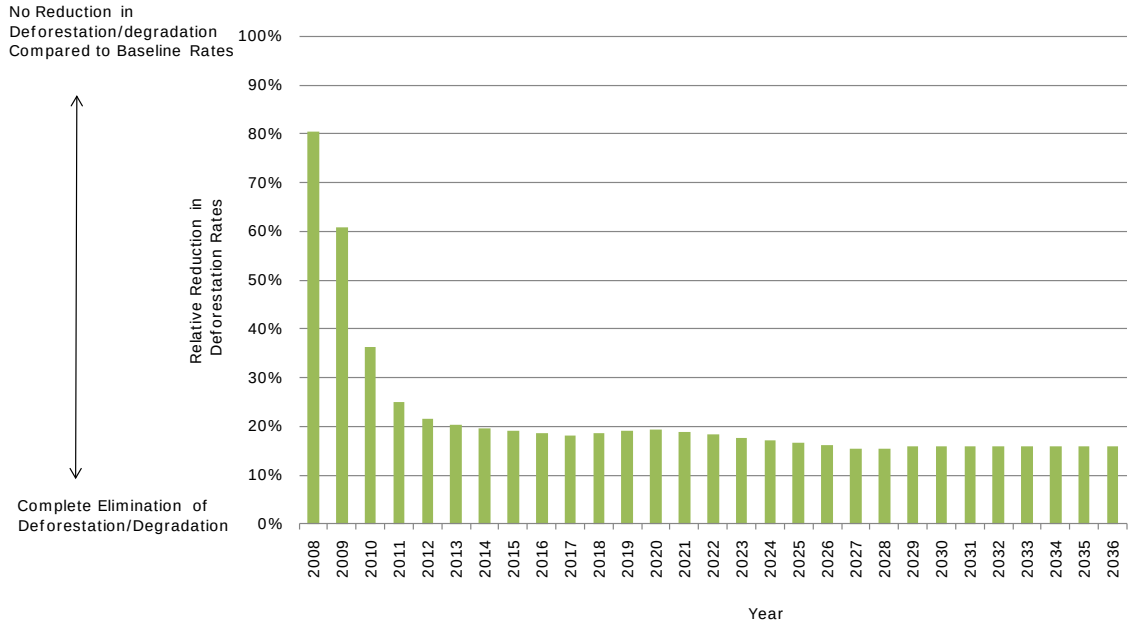


Figure CL1. Relative Reduction in Deforestation Rate (Compared to Baseline Deforestation Rates).

Table CL1. Relative Reduction in the Impact of Each Deforestation Driver due to the Different Project Activities, $effectiveness(a,d)$.

	Project Activity										
Driver of Deforestation	**1. Reinforcing Land-tenure**	**2. Land-use Plans**	**3. Forest Protection**	**4. ANR**	**5. Fuel-efficient Stoves**	**6. Mosquito Nets**	**7. Agricultural Intensification**	**8. Water Resource Development Projects**	**9. NTFP Development**	**10. Fire Prevention**	**Total Impact Reduction**
1. Forest clearing for land sales	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%
2. Conversion to cropland	0%	50%	0%	5%	0%	0%	30%	0%	10%	0%	95%
3. Conversion to settlements	0%	75%	0%	0%	0%	0%	0%	0%	0%	0%	75%
4. Fuel-wood gathering	0%	0%	25%	0%	8%	25%	0%	0%	0%	0%	58%
5. Annual Forest fires induced to "clean" the land	0%	20%	20%	0%	0%	0%	0%	25%	0%	25%	90%
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. Small economic land concessions	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
11. Timber concessions	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
Total reduction in deforestation	0%	27%	39%	2%	1%	3%	8%	3%	3%	4%	

Table CL2. Relative Degree of Activity (Effectiveness) and Adoption Rates during the Project Period, $rate(a,t)$.

		Relative Degree of Activity and Adoption Rates during the Project Course									
Project Year	Calendar Year	1. Reinforcing Land-tenure	2. Land-use Plans	3. Forest Protection	4. ANR	5. Fuel-efficient Stoves	6. Mosquito Nets	7. Agricultural Intensification	8. Water Resource Development Projects	9. NTFP Development	10. Fire Prevention
0	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1	2008	0%	20%	20%	0%	0%	0%	0%	0%	0%	0%
2	2009	50%	40%	40%	0%	0%	0%	0%	0%	0%	0%
3	2010	100%	60%	60%	100%	33%	33%	10%	100%	100%	100%
4	2011	100%	80%	80%	100%	66%	66%	20%	100%	100%	100%
5	2012	100%	100%	100%	100%	100%	100%	30%	100%	100%	100%
6	2013	100%	100%	100%	100%	100%	100%	40%	100%	100%	100%
7	2014	100%	100%	100%	100%	100%	100%	50%	100%	100%	100%
8	2015	100%	100%	100%	100%	100%	100%	60%	100%	100%	100%
9	2016	100%	100%	100%	100%	100%	100%	70%	100%	100%	100%
10	2017	100%	100%	100%	100%	100%	100%	80%	100%	100%	100%
11	2018	100%	100%	100%	100%	66%	66%	90%	100%	100%	100%
12	2019	100%	100%	100%	100%	33%	33%	100%	100%	100%	100%
13	2020	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
14	2021	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
15	2022	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
16	2023	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
17	2024	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
18	2025	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
19	2026	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
20	2027	100%	100%	100%	100%	33%	0%	100%	100%	100%	100%
21	2028	100%	100%	100%	50%	33%	0%	90%	100%	66%	100%
22	2029	100%	100%	100%	50%	33%	0%	80%	100%	33%	100%
23	2030	100%	100%	100%	50%	33%	0%	70%	100%	33%	100%
24	2031	100%	100%	100%	50%	33%	0%	60%	100%	33%	100%
25	2032	100%	100%	100%	50%	33%	0%	50%	100%	33%	100%
26	2033	100%	100%	100%	50%	33%	0%	40%	100%	33%	100%
27	2034	100%	100%	100%	50%	33%	0%	30%	100%	33%	100%
28	2035	100%	100%	100%	50%	33%	0%	30%	100%	33%	100%
29	2036	100%	100%	100%	50%	33%	0%	30%	100%	33%	100%
30	2037	100%	100%	100%	50%	33%	0%	30%	100%	33%	100%

Table CL3. Deforestation Rate in the Project Scenario. Net Changes in C Stocks are Calculated using the Emission Factors in Table G8.

Project Year	Calendar Year	$RelativeProjectImpact_{DF}$ (Relative Change in Deforestation Rate due to Project Activities)	$D_{projectArea,projectScenario,DF}$ (Absolute Deforestation Rate in the Project Scenario)		Change in C Stocks
			Mixed and Deciduous	Evergreen	
		[-]	[ha yr^{-1}]	[ha yr^{-1}]	[MTCO2e yr^{-1}]
1	2008	80%	1,163	611	448,116
2	2009	61%	880	463	339,168
3	2010	36%	525	276	202,336
4	2011	25%	361	190	139,161
5	2012	21%	310	163	119,535
6	2013	20%	293	154	112,956
7	2014	20%	285	150	109,857
8	2015	19%	277	146	106,752
9	2016	19%	269	141	103,635
10	2017	18%	261	137	100,492
11	2018	19%	268	141	103,434
12	2019	19%	274	145	106,039
13	2020	19%	275	147	106,923
14	2021	19%	261	143	102,572
15	2022	18%	240	138	97,008
16	2023	18%	211	134	89,670
17	2024	17%	174	129	80,712
18	2025	17%	135	124	71,442
19	2026	16%	104	118	63,172
20	2027	16%	80	112	56,159
21	2028	16%	65	108	51,825
22	2029	16%	56	104	48,879
23	2030	16%	48	96	44,122
24	2031	16%	42	85	39,073
25	2032	16%	37	74	34,046
26	2033	16%	33	63	29,423
27	2034	16%	30	54	25,434
28	2035	16%	27	46	22,122
29	2036	16%	25	40	19,417
30	2037	16%	23	35	17,213
SUM			**7,031**	**4,470**	**2,990,691**

Net Change in Carbon Stocks due to a Assisted Natural Regeneration

Assisted natural regeneration (ANR) will be carried out by a combination of silvicultural activities such as removal of invasive species, coppicing, thinning and enrichment planting. The project will implement the removal of species, thinning and coppicing on 500 ha yr^{-1} during years 3-20 of the project. Half of this area will be subjected to enrichment planting. During years 21-30 enrichment planting will be continued on 250 ha yr^{-1}. The "baseline" natural regeneration rate without any interventions is 10 Mg AG+BG DM ha^{-1} yr^{-1}. Assisting natural regeneration activities can increase this regeneration rate with 30% to around 13 Mg AG+BG DM ha^{-1} yr^{-1}. Most of this increase will take place right after the assisted natural regeneration procedure, and will slowly fall back to baseline rates. The following graph indicates the expected regeneration rates under natural and assisted conditions:

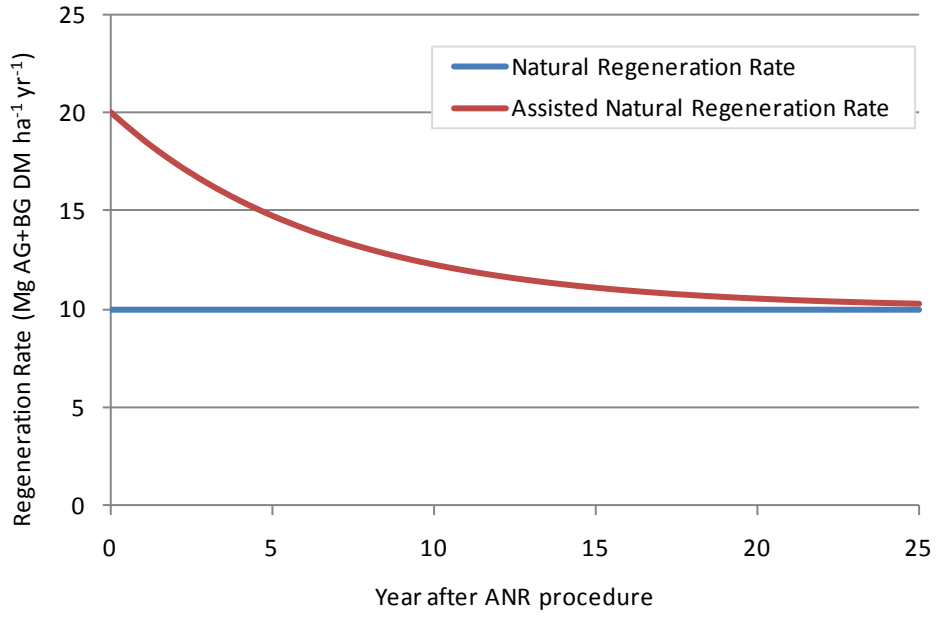


Figure CL2. Regeneration Rates under Natural and Assisted Conditions.

Due to the project duration 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 CL4. Sequestration Benefits from ANR Activities

Project Year	Calendar Year	S_(ANR,bio) [MTCO2e]
1	2008	0
2	2009	0
3	2010	9,167
4	2011	17,056
5	2012	23,847
6	2013	29,692
7	2014	34,723
8	2015	39,053
9	2016	42,780
10	2017	45,988
11	2018	48,749
12	2019	51,125
13	2020	53,170
14	2021	54,931
15	2022	56,446
16	2023	57,750
17	2024	58,873
18	2025	59,839
19	2026	60,671
20	2027	61,386
21	2028	57,419
22	2029	54,004
23	2030	51,065
24	2031	48,536
25	2032	46,358
26	2033	44,484
27	2034	42,871
28	2035	41,483
29	2036	40,288
30	2037	34,676
SUM		**1,266,432**

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-CO2 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, forest patrolling, and increased fertilizer use. N_2O emissions from forest fires in the baseline scenario were conservatively omitted. Table CL5 contains a justification of which gases were included, and which gases were excluded.

Table CL5. 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	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.
	N_2O	no	
Fossil fuel use	CO_2	yes	Significant source in patrolling activities and transport of materials for ANR activities.
	CH_4	no	Insignificant.
	N_2O	no	Insignificant.
Increased use of irrigation (including rice production)	CH_4	no	No planned increases in rice production or flood irrigation.
	N_2O	no	
Increased Fertilizer Use	N_2O	yes	Some agricultural intensification measures are included.
Increased emissions from enteric fermentation from livestock stocking	CH_4	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.
	N_2O	no	
Manure management	CH_4	no	The manure management system is not changed or anticipated to change during the project scenario.
	N_2O	no	

The following hypotheses were made to calculate the increase in emissions (Table CL10).

Fuel Emissions from Patrolling

Standard IPCC equations are used to calculate emissions from patrolling. For forest patrolling, 17 motorbikes and 1 mobile unit will be acquired and operated during the project period. The total fuel consumption was calculated by multiplying the number of days per year that these will be used (5 days per week for 52 weeks = 260 days), the hours per day

that these 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. [MTCO2e 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. These variables are summarized in Table CL6. 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 estimated that in total, 5,556 liters of fuel will be used per annum. With an average fuel price of US$1.2 per liter, this equals to $6,667. This corresponds to 66% of the annual budget for fuel and maintenance of the project's vehicles.

Using standard values for vehicle gasoline, an annual total of 13,442 MTCO2e yr^{-1} is emitted due to fuel use during forest patrolling.

Table CL6. Parameters Used to Estimate GHG Emissions from Fuel Used for Vehicles

Variable	Acronym / Symbol	Moto	Mobile Unit	Unit
Number of units		17	1	[unit]
Days of operation per year		260	260	[day yr^{-1} $unit^{-1}$]
Hours of operation per day		1	1.5	[hr day^{-1} $unit^{-1}$]
Average speed during operation		20	40	[km hr^{-1}]
Fuel efficiency		4.6	9.55	[l/100 km]
Total fuel consumption	$FC(t)$	4,066	1,490	[l yr^{-1}]
Fuel density	ρ_{fuel}	0.737	0.737	[kg l^{-1}]
Net caloric value of fuel	NCV	44.3	44.3	[TJ Gg^{-1}]
CO_2 emission factor for fuel	$EF_{fuel,CO2}$	74,100	74,100	[kg TJ^{-1}]
Total emissions from fuel per vehicle		9,838	3,604	[MTCO2e yr^{-1}]
Total emissions from fuel	$E_{vehicle}$	**13,442**		**[MTCO2e yr^{-1}]**

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 fire break of 5 m, this corresponds to clearing 10 ha per year. If it is assumed that previously installed firebreaks must be maintained every 2 years, the total annual area of biomass removal for firebreaks is 15 ha. Since most of the fire danger is in mixed forest, 10 ha will be treated in mixed forests, and 5 ha in evergreen forests. About 50% of the biomass will be removed by controlled burning. The carbon lost by removing trees or biomass and from N_2O and CH_4 emissions from controlled burning 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. [MTCO2e yr^{-1}]
$nrFireClasses$	=	Number of forest strata in which fire breaks 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, 60 hectares per year will be treated for fire prevention measures. This comprises of the installation of fire breaks (30 ha per year), and some thinning of fire-sensitive forest areas (30 ha per year). For installing a firebreak, most of the forest has to be removed. Therefore, this treatment is considered “intense” (see Table CL7). For thinning, only some trees are removed. Therefore, this treatment is referred to as “medium”. Fires dominantly occur in the lower carbon 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. It is assumed that during thinning about 30% of the biomass is removed. Therefore, 30% of the average carbon density was used for this carbon stock difference.

Table CL7. Parameters Used to Estimate GHG Emissions from Fire Prevention Measures

Variable	Acronym / Symbol	Value	Unit
Annual treated area in mixed forest	$area_{biomassLoss}(1)$	10	[ha yr^{-1}]
Annual treated area in evergreen forest	$area_{biomassLoss}(2)$	5	[ha^{-1}]
Annual treated area in mixed forest using controlled burning	$area_{fireBiomassLoss}(1)$	5	[ha yr^{-1}]
Annual treated area in evergreen forest using controlled burning	$area_{fireBiomassLoss}(2)$	7.5	[ha^{-1}]
Carbon stock of mixed forests	$C(1)$	63	[Mg C ha^{-1}]
Carbon stock of evergreen forests	$C(2)$	122	[Mg C ha^{-1}]
Annual GHG emissions from fire prevention	$E_{fireBreaks}$	5,006	[MTCO2e yr^{-1}]

In total, 5,006 MTCO2e 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. 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 CL8), the maximal total annual emissions are 7,000 MTCO2e yr^{-1}:

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

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. [MTCO2e 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 CL8. GHG Emissions from Increased Fertilization

Variable	Acronym / Symbol	Value	Unit
Organic fertilization rate	$N_{organic}$	80	[kg N ha^{-1}]
Synthetic fertilization rate	$N_{synthetic}$	100	[kg N ha^{-1}]
Volatilization factor for synthetic fertilizer	f_{GASM}	0.1	[-]
Volatilization factor for organic fertilizer	f_{GASM}	0.2	[-]
Emission factor for N_2O	$EF_{N\text{-}inputs}$	0.0125	[-]
Global warming potential for N_2O	GWP_{N2O}	310	[-]

Table CL9. Annual Increase in N_2O Emissions from Increased Fertilization Use as an Agricultural Intensification Measure

Calendar Year	Project Year	Adoption Area [ha]	GHG Emissions from Fertilization [MTCO2e yr^{-1}]
2008	1	0	0
2009	2	0	0
2010	3	389	365
2011	4	778	729
2012	5	1,167	1,094
2013	6	1,556	1,459
2014	7	1,944	1,823
2015	8	2,333	2,188
2016	9	2,722	2,553
2017	10	3,111	2,917
2018	11	3,500	3,282
2019	12	3,889	3,647
2020	13	4,278	4,011
2021	14	4,667	4,376
2022	15	5,056	4,741
2023	16	5,444	5,106
2024	17	5,833	5,470
2025	18	6,222	5,835
2026	19	6,611	6,200
2027	20	7,000	6,564
2028	21	7,000	6,564
2029	22	7,000	6,564
2030	23	7,000	6,564
2031	24	7,000	6,564
2032	25	7,000	6,564
2033	26	7,000	6,564
2034	27	7,000	6,564
2035	28	7,000	6,564
2036	29	7,000	6,564
2037	30	7,000	6,564

Emissions from Biomass clearing for Assisted Natural Regeneration

The clearing of biomass for Assisted Natural Regeneration decreases the carbon stocks in the project area, and therefore must be accounted for. A similar calculation procedure as the one used for biomass removal from fire prevention measures is used. However, since only about one third of the biomass is removed during thinning or the removal of exotic species, calculations are not based on the full carbon stock of an average forest, but on one third of a low-stocked mixed forest, where most of the ANR activities will take place. This results in a decrease of 12 Mg DM ha^{-1} from the ANR treatment. As mentioned before, 500

ha are treated from years 3-20, and 250 ha (only enrichment planting) from years 21-30. About half of the decrease in carbon stocks will be executed using controlled burning. Therefore, annual emissions from the ANR treatments are 11,555 MTCO2e yr^{-1} during years 3-20, and 5,778 yr^{-1} during years 21-30.

Combined Emissions and Test of Significance

In decreasing order of magnitude, sums of GHG emissions include (see Table CL10)

- Fuel use by vehicles **403,263 MTCO2e**
- Biomass Clearing for ANR **250,947 MTCO2e**
- Fire Breaks **150,168 MTCO2e**
- Fertilization **128,003 MTCO2e**

The total benefits of the project are 8,580,000 MTCO2e. All GHG emissions that together account for less than 5% of the total benefits of the project, or 430,000 MTCO2e, are considered insignificant and can be omitted. The sum of the emissions from fire breaks and fertilization is 280,000 MTCO2e. Therefore, these are insignificant and can be omitted from the calculations.

Table CL10. Overview of the Emission Sources from Non-CO_2 Gases and Fuel-related Emissions from Project Activities.

Project Year	Calendar Year	$E_{vehicle}$ [MTCO2e]	$E_{fireBreaks}$ [MTCO2e]	$\Delta E_{fertilization}$ [MTCO2e]	E_{ANR} [MTCO2e]	Sum Significant Emissions [MTCO2e]
1	2008	13,442	5,006	0	0	13,442
2	2009	13,442	5,006	0	0	13,442
3	2010	13,442	5,006	365	0	13,442
4	2011	13,442	5,006	729	11,555	24,997
5	2012	13,442	5,006	1,094	11,555	24,997
6	2013	13,442	5,006	1,459	11,555	24,997
7	2014	13,442	5,006	1,823	11,555	24,997
8	2015	13,442	5,006	2,188	11,555	24,997
9	2016	13,442	5,006	2,553	11,555	24,997
10	2017	13,442	5,006	2,917	11,555	24,997
11	2018	13,442	5,006	3,282	11,555	24,997
12	2019	13,442	5,006	3,647	11,555	24,997
13	2020	13,442	5,006	4,011	11,555	24,997
14	2021	13,442	5,006	4,376	11,555	24,997
15	2022	13,442	5,006	4,741	11,555	24,997
16	2023	13,442	5,006	5,106	11,555	24,997
17	2024	13,442	5,006	5,470	11,555	24,997
18	2025	13,442	5,006	5,835	11,555	24,997
19	2026	13,442	5,006	6,200	11,555	24,997
20	2027	13,442	5,006	6,564	5,778	19,220
21	2028	13,442	5,006	6,564	5,778	19,220
22	2029	13,442	5,006	6,564	5,778	19,220
23	2030	13,442	5,006	6,564	5,778	19,220
24	2031	13,442	5,006	6,564	5,778	19,220
25	2032	13,442	5,006	6,564	5,778	19,220
26	2033	13,442	5,006	6,564	5,778	19,220
27	2034	13,442	5,006	6,564	5,778	19,220
28	2035	13,442	5,006	6,564	5,778	19,220
29	2036	13,442	5,006	6,564	5,778	19,220
30	2037	13,442	5,006	6,564	8,289	21,731
SUM		**403,263**	**150,168**	**128,003**	**250,947**	**654,210**

CL1.4. Net Climate Impact of the Project

The project has a positive net climate impact; about 9.2 million MTCO2e are generated during its 30 year duration (Table CL11).

Table CL11. Overview of the Net Climate Impact of the REDD Project without Considering Leakage

Project Year	Calendar Year	C Stock Change (Baseline) [MTCO2e]	C Stock Change (Project) [MTCO2e]	Project-Related C Stock Change (*) [MTCO2e]	ANR-related C Stock Change [MTCO2e]	GHG Emissions [MTCO2e]	Net Carbon Benefit without Leakage [MTCO2e]
1	2008	557,063	448,116	98,053	0	13,442	84,611
2	2009	557,063	339,168	196,106	0	13,442	182,664
3	2010	557,062	202,336	318,975	9,167	13,442	314,978
4	2011	557,060	139,161	375,552	17,056	24,997	368,168
5	2012	557,055	119,535	392,932	23,847	24,997	392,618
6	2013	557,044	112,956	398,565	29,692	24,997	404,374
7	2014	557,020	109,857	401,054	34,723	24,997	412,173
8	2015	556,966	106,752	403,522	39,053	24,997	419,249
9	2016	556,845	103,635	405,940	42,780	24,997	425,672
10	2017	556,571	100,492	408,245	45,988	24,997	431,462
11	2018	555,949	103,434	404,761	48,749	24,997	431,015
12	2019	554,541	106,039	400,879	51,125	24,997	429,780
13	2020	551,393	106,923	396,990	53,170	24,997	428,196
14	2021	544,557	102,572	394,520	54,931	24,997	427,721
15	2022	530,671	97,008	386,848	56,446	24,997	421,746
16	2023	505,901	89,670	371,067	57,750	24,997	407,362
17	2024	470,101	80,712	346,924	58,873	24,997	384,326
18	2025	430,018	71,442	319,279	59,839	24,997	357,561
19	2026	393,400	63,172	293,861	60,671	24,997	332,878
20	2027	362,259	56,159	272,229	61,386	19,220	317,656
21	2028	334,301	51,825	251,220	57,419	19,220	292,427
22	2029	306,405	48,879	229,015	54,004	19,220	266,557
23	2030	276,582	44,122	206,725	51,065	19,220	241,059
24	2031	244,932	39,073	183,069	48,536	19,220	214,589
25	2032	213,423	34,046	159,518	46,358	19,220	188,577
26	2033	184,441	29,423	137,857	44,484	19,220	164,781
27	2034	159,435	25,434	119,166	42,871	19,220	144,252
28	2035	138,672	22,122	103,647	41,483	19,220	127,158
29	2036	121,716	19,417	90,974	40,288	19,220	113,137
30	2037	107,900	17,213	80,648	34,676	21,731	94,564
SUM		**12,556,347**	**2,990,691**	**8,548,141**	**1,266,432**	**654,210**	**9,221,312**

(*) This value is obtained by subtracting the C stock change under baseline scenario from the C stock change under the project scenario and multiplying with a classification uncertainty discounting factor of 0.9.

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[1]. The conservative quantification of market leakage is based on coefficients set by the VCS AFOLU guidance.

[1] Aukland, L., P.M. Costa, and S. Brown. 2003. A conceptual framework and its application for addressing leakage; the case of avoided deforestation. Climate Policy 3:123–136.

- **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 fuel-wood 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 CL12.

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%. The following section contains a justification of the selected leakage cancellation rate for every identified driver

- **1. Migrant Encroachment**. It is likely that migrants that were not able to settle in the project area due to the forest patrolling will move elsewhere. Therefore, the risk for leakage from reducing migrant encroachment in the project area is high. In addition, migrants are willing to move long distances to find forest areas to encroach. Therefore, encroachment is not a geographically constrained driver. It is conservatively expected that 50% of the benefits from forest protection will be annulled by increased encroachment outside of the project area. A net decrease in encroachment is expected since forest patrolling will discourage some migrants and the Community Forestry Agreements will reduce the attractiveness of the region for migrant settlement and the reputation to have a substantial amount of land that can be grabbed. Migrant encroachment includes the anticipated impacts of planned settlement (new villages) proposed by the Provincial Governor to Ministry of Interior
- **2. Conversion to Cropland**. Project participants will have approved binding forestry agreements preventing 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. Still, it is expected that about 10% of the impacts of reducing the conversion to cropland within the project area will be annulled in the leakage area.
- **3. Conversion to Settlements**. Project participants will have approved binding forestry agreements that prevent the clearing of forestland for the creation of new settlements. In addition participatory land use plans will reduce the accelerated deforestation from random conversion to settlements. Furthermore, improvements in infrastructure subsidized including water distribution and purification in existing settlements will reduce the need for settlement expansion. With these measures, it is estimated that 10% of the benefits from reducing the forest area for conversion to settlements will be cancelled due to increased conversion in the leakage area.
- **4. Fuel-wood Gathering**. Adoption of more efficient cooking stoves and mosquito netting will significantly reduce the amount of fuel-wood use, and should not result in significant leakage. However, to remain conservative, we conservatively estimate a 10% leakage cancellation rate within the leakage area.
- **5. Forest Fires Induced to Clean the Land**. The adoption of alternative land management techniques will replace the need to use forest fires to clean the land. These

alternative techniques will be implemented on existing forest and agriculture lands within the project area. It is unlikely that community members will increase the use of fire to clean the land outside of the project area. However, a 10% leakage rate within the leakage area is assumed to remain conservative.

- **6. 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 70% leakage cancellation rate. Since hunters are usually not living within the project area, but roaming around, the leakage is not confined to the leakage belt.
- **7. 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 70% leakage cancellation rate, mainly due to market leakage outside of the leakage belt.
- **8. 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. The need for timber for construction will not change due to the project. However, some wood can be harvested from areas undergoing assisted natural regeneration (where allowed) and by controlling the timber harvesting, the adverse effects of timber harvesting will be controlled. Therefore, a moderate 50% leakage cancellation rate is assumed. Since the timber is harvested for local use, leakage from this driver will be confined to the leakage belt.
- **9. Large Economic Land Concessions**. Economic Land Concessions granted by the MAFF will not be allowed within the project areas. However, a number of large ELCs will continue to be granted at the national level. Since the project design will have affected national policies to a certain extent, the effective cancelling rate is envisioned to be around 50% outside of the project area.
- **10. 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 50% leakage cancellation rate as a result, similar to the Economic Land Concessions.

Table CL12 summarizes the leakage extent for every driver and divided into the three leakage types.

Table CL12. Anticipated Leakage Cancellation Rates per Deforestation Driver.

Deforestation Driver	Leakage Cancellation Rate (%) Activity-Shifting Inside Leakage Belt	Activity-Shifting Outside Leakage Belt	Market
1. Migrant encroachment	0%	50%	0%
2. Conversion to cropland	10%	0%	0%
3. Conversion to settlements	10%	0%	0%
4. Fuel-wood gathering	10%	0%	0%
5. Forest fires induced to "clean" the land	10%	0%	0%
6. Hunters inducing forest fires	0%	70%	0%
7. Illegal logging for commercial on-sale	0%	0%	70%
8. Timber harvesting for local use	0%	50%	0%
9. Large economic land concessions	0%	50%	0%
10. Timber concessions	0%	50%	0%

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

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

- 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 wood-stoves and introducing mosquito nets to reduce the use of wood for smoke to repel mosquitoes. The adoption rate of the fuel-efficient wood-stoves, 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 a VCS methodology that is currently undergoing validation. 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, activity-shifting leakage outside of the leakage belt, and market leakage. The following formula can be used:

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

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 fuel-wood collection. [-]
$RelativeDriverImpact_{DF}(t,d)$	=	Relative impact of a driver d on deforestation for year t of the crediting period. [-]

About 25% 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 or market leakage (Figure CL3 and Table CL13). 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.

Following VCS regulation, part of the calculated emission reductions must be deposited in a VCS-managed buffer pool according to the non-permanence risk. Therefore, only part of the calculated emission reductions is issued as Voluntary Carbon Units. The non-permanence risk and the exact proportion of the emission reductions that are withheld are quantified according to the "tool for AFOLU non-permanence risk analysis and buffer determination", developed by the VCS. This risk assessment must be verified by VCS-accredited verifiers.

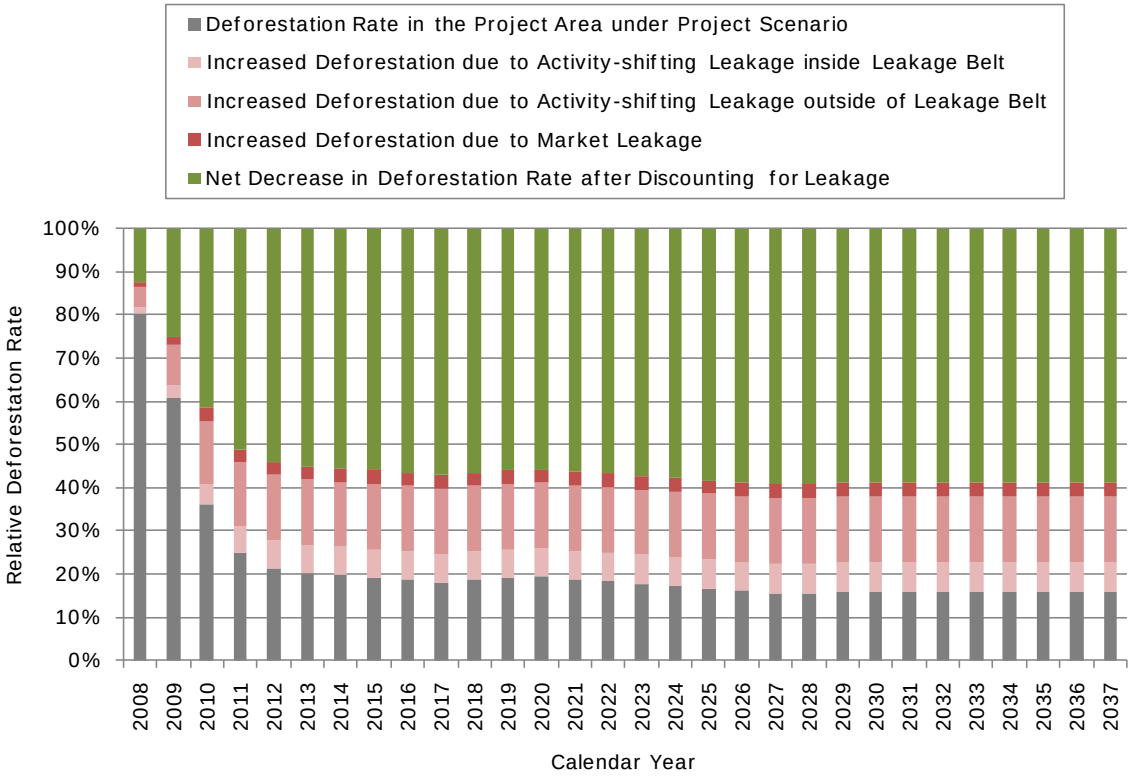


Figure CL3. Impact of the Project on Deforestation Rates Inside and Outside of the Project Area (Leakage).

Table CL13. Losses of Carbon Credits Through Leakage.

Project Year	Calendar Year	Activity-shifting Leakage Inside Leakage Belt [MTCO2e]	Activity-shifting Leakage Outside Leakage Belt [MTCO2e]	Market Leakage [MTCO2e]	Leakage SUM [MTCO2e]
1	2008	1,304	4,611	1,019	6,934
2	2009	5,215	18,444	4,077	27,736
3	2010	14,770	46,415	10,056	71,242
4	2011	22,635	55,800	11,847	90,282
5	2012	24,922	59,557	12,404	96,883
6	2013	25,768	60,451	12,590	98,810
7	2014	26,170	60,870	12,677	99,717
8	2015	26,574	61,285	12,764	100,623
9	2016	26,977	61,693	12,849	101,519
10	2017	27,376	62,084	12,930	102,390
11	2018	26,938	61,599	12,829	101,366
12	2019	26,491	61,052	12,715	100,258
13	2020	26,145	60,503	12,601	99,249
14	2021	26,220	60,165	12,530	98,915
15	2022	25,943	59,032	12,294	97,270
16	2023	25,108	56,660	11,800	93,568
17	2024	23,684	53,006	11,039	87,728
18	2025	21,989	48,811	10,166	80,966
19	2026	20,416	44,952	9,362	74,730
20	2027	19,077	41,668	8,678	69,423
21	2028	17,605	38,452	8,008	64,065
22	2029	15,760	35,056	7,301	58,116
23	2030	14,226	31,644	6,590	52,460
24	2031	12,598	28,023	5,836	46,457
25	2032	10,977	24,418	5,085	40,480
26	2033	9,487	21,102	4,395	34,983
27	2034	8,201	18,241	3,799	30,240
28	2035	7,133	15,865	3,304	26,302
29	2036	6,260	13,925	2,900	23,086
30	2037	5,550	12,345	2,571	20,466
SUM		**551,519**	**1,277,730**	**267,017**	**2,096,266**

Table CL14. Final Carbon Benefits from Project Including Losses from Leakage.

Project Year	Calendar Year	Carbon Benefits without Leakage [MTCO2e]	Total Leakage [MTCO2e]	Carbon Benefits After Leakage [MTCO2e]
1	2008	84,611	6,934	77,677
2	2009	182,664	27,736	154,927
3	2010	314,978	71,242	243,736
4	2011	368,168	90,282	277,886
5	2012	392,618	96,883	295,735
6	2013	404,374	98,810	305,565
7	2014	412,173	99,717	312,456
8	2015	419,249	100,623	318,626
9	2016	425,672	101,519	324,153
10	2017	431,462	102,390	329,072
11	2018	431,015	101,366	329,649
12	2019	429,780	100,258	329,522
13	2020	428,196	99,249	328,947
14	2021	427,721	98,915	328,805
15	2022	421,746	97,270	324,476
16	2023	407,362	93,568	313,794
17	2024	384,326	87,728	296,597
18	2025	357,561	80,966	276,595
19	2026	332,878	74,730	258,149
20	2027	317,656	69,423	248,233
21	2028	292,427	64,065	228,362
22	2029	266,557	58,116	208,441
23	2030	241,059	52,460	188,600
24	2031	214,589	46,457	168,132
25	2032	188,577	40,480	148,097
26	2033	164,781	34,983	129,797
27	2034	144,252	30,240	114,012
28	2035	127,158	26,302	100,856
29	2036	113,137	23,086	90,051
30	2037	94,564	20,466	74,098
SUM		**9,221,312**	**2,096,266**	**7,125,046**

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 CL10 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 CL15. Carbon Pools Selected in this Project.

Carbon Pool	Selected	Justification / Explanation of Choice
Above-ground tree biomass	yes	Major carbon pool affected by project activities
Above-ground non-tree biomass	no	Can be conservatively omitted because no conversion occurs to a land use with high non-tree biomass occurs
Below-ground 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 fuel-wood 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. In the spring of 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 every year during the crediting period. The location of plots was selected using a stratified 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. All of the 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. The credits from this project will be registered under the VCS. A 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.

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 (CDA) 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.

Based on project budget projections direct support for community forest protection and restoration will employ 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 another 30 people.

The project strategy includes the following activities:

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 10,000 hectares of degraded forests for regeneration during the first 20 years. 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.

As of October 2009 discussions to define the mechanism to deliver benefits to the local level were 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 better 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 forge 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 CFI 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[1]. A more in-depth research project was conducted on Sorng Rokavorn CF involving extensive dialogue with the organizing monks and community members[2]. 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[3]. 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.

[1]CFI. "Social Appraisal Report- Oddar Meanchey Province." Phnom Penh. 2008.

[2] Elkin, Chantal. "Assessment of the Monk's Forest of Oddar Meanchey." Phnom Penh. 2008.

[3]CFI. "Report on Launching Workshop on Avoided Deforestation Community Forestry Carbon Pilot Project in Oddor Meanchey Province." Provincial Department of Agriculture: Samraong, Oddar Meanchey, March 2008.

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. 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 on the project website.

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 10,000 hectares of degraded forestland. A baseline biodiversity assessment involving community members in surveying and ongoing biodiversity monitoring, will help to define the HCV Areas facilitate plans for their protection. 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 8 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;
- fuel-wood 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) that will lead to more sustainable development in the areas outside the immediate project. Agricultural intensification projects will help boost farm output, encourage farmers to put energy into increased production, rather than further forest clearing. Fuel-wood needs will be reduced through the extension of a fuel-efficient stove program that will reduce fuel-wood consumption for cooking by 25 to 30% among project households. Large mosquito nets will be made available to project households and neighboring households through a revolving credit program that will reduce the need for fuel-wood burning to protect livestock. Forest management plans reflecting ANR and enrichment planting activities will be developed by the CFMC groups to ensure that sufficient timber can be produced on a sustainable basis to meet local house construction requirements.

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

The project partners have already drafted a monitoring plan based on indicators developed as part of the project methodology. The next stage in this process will be to fully involve local communities in developing their own articulation of indicators to track community impacts, the results of which will be integrated in the overall monitoring plan. The project will align to new monitoring standards such as REDD++ as they are further defined.

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.

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 partner 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 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 67,583 hectares included in the project, the project area represents nearly 10% of the land area of Oddar Meanchey Province, and 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 4 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.*[1]. 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.

[1]Danielsen, Finn *et al.* "A simple system for monitoring biodiversity in protected areas of a developing country" Biodiversity and Conservation (9:1671-1705), 2000.

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. The agreements between the FA and CFMC groups include a provision on the protection of wildlife and biodiversity in the project area (Annex 3). 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, stool 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
Scentific Name	Khmer Name	Scentific 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/.

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 to the leakage belts. However, concomitant with the overwhelmingly positive climate impacts of the project area, the net biodiversity impact of the project will be undoubtedly positive.

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. 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. Many of the native species of flora are utilized by resident communities for subsistence purposes. These include a variety of tubers from native climbers and selected green leaves for vegetables. Bamboo is used for both construction and for food. Some hardwoods are used for house and tool construction, while many herbs are utilized as traditional medicines. The community-based biodiversity inventory will document all flora and fauna and their uses. Species that are reported to be scarce may receive protection or harvesting regulations based on these findings.

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's goals, indicators, monitoring frequency, and methodology is described in Table B1 below.

Table B1. Biodiversity Indicators

Goal	Indicators	Monitoring Frequency	Method / data source
Villagers are aware of biodiversity conservation goals	Proportion of villagers who have heard about project conservation activities	5 years	Socio-economic sample survey
Degraded forests are regenerating	Number of hectares of degraded forest where assisted natural regeneration activities undertaken last year (ANR, Enrichment Planting, Fire Control)	Annual	Project Report-field inventory
Forest fires are decreasing	Number of hectares burned last year	Annual	Project report-field inventory
Biodiversity increase and protected	Number of sightings of key indicator species last year by community members or through camera traps	Annual	Project report-field inventory

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

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 to be put on the internet. 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.[1] Extended dry periods are also exacerbating forest fires, resulting in fires burning larger areas with more intensity compared to the past. 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.

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.[2] 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.[3] Wildlife is expected to migrate faster than plant species[4] 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

[1]Houghton, J. T; Y. Ding, D. J. Griggs; M. Noguer; P. J. van der Linden; X. Dai; K. Maskell; C. A. Johnson. 2000. Climate Change 2001: The Scientific Basis: Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change

[2] Millar C.I., N. L. Stephenson, and S.L. Stephens 2007. Climate Change and Forests of the Future: Managing in the Face of Uncertainty. Ecological Applications 17(8): 2145-2151.

[3] Davis, M. B. 1989. Lags in vegetation response to global climate change. Climate Change 15:75-82.

[4] Smith J.E., and D.A. Tirpak, eds. 1989. Potential impacts of climate warming vol. 1, Regional Studies, Chapter 4. EPA-230-05-89-050. Washington D.C.: U.S. Environmental Protection Agency.

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.

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 500 hectares of degraded forests each year for the first 20 years through the use of Assisted Natural Regeneration (ANR) techniques. The project will also result in the enrichment planting of 1,000,000 indigenous trees in forest gaps and deforested 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, 10-30% 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

Of the 59 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.

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 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. The project will also facilitate a number of micro loans that will directly benefit disadvantaged and low-income households by providing the initial capital needed to generate alternative incomes. Village youth from low income families will be engaged as fire watchers, forest monitors, and nursery managers, and in other related roles.

Women will be targeted for training in bookkeeping and management of micro-finance groups. 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 and microfinance organization management, 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.

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. 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.

GL2.5. Community Monitoring of Disadvantaged Groups

Community monitoring will be continual with an annual participatory exercise to assess the extent to which project activities are achieving the community and project goals. The monitoring exercise specifically looks at social indicators and relies on community input. Special attention will be given to disadvantaged groups and women's input, attitudes, behaviors, and levels of participation in the project. If disadvantaged groups are lacking in participation of any part of the project, the local NGO support group and Oddar Meachey

Buddhist Monk's Association, who have worked with the communities in the past, will collaborate on ways to have better communication.

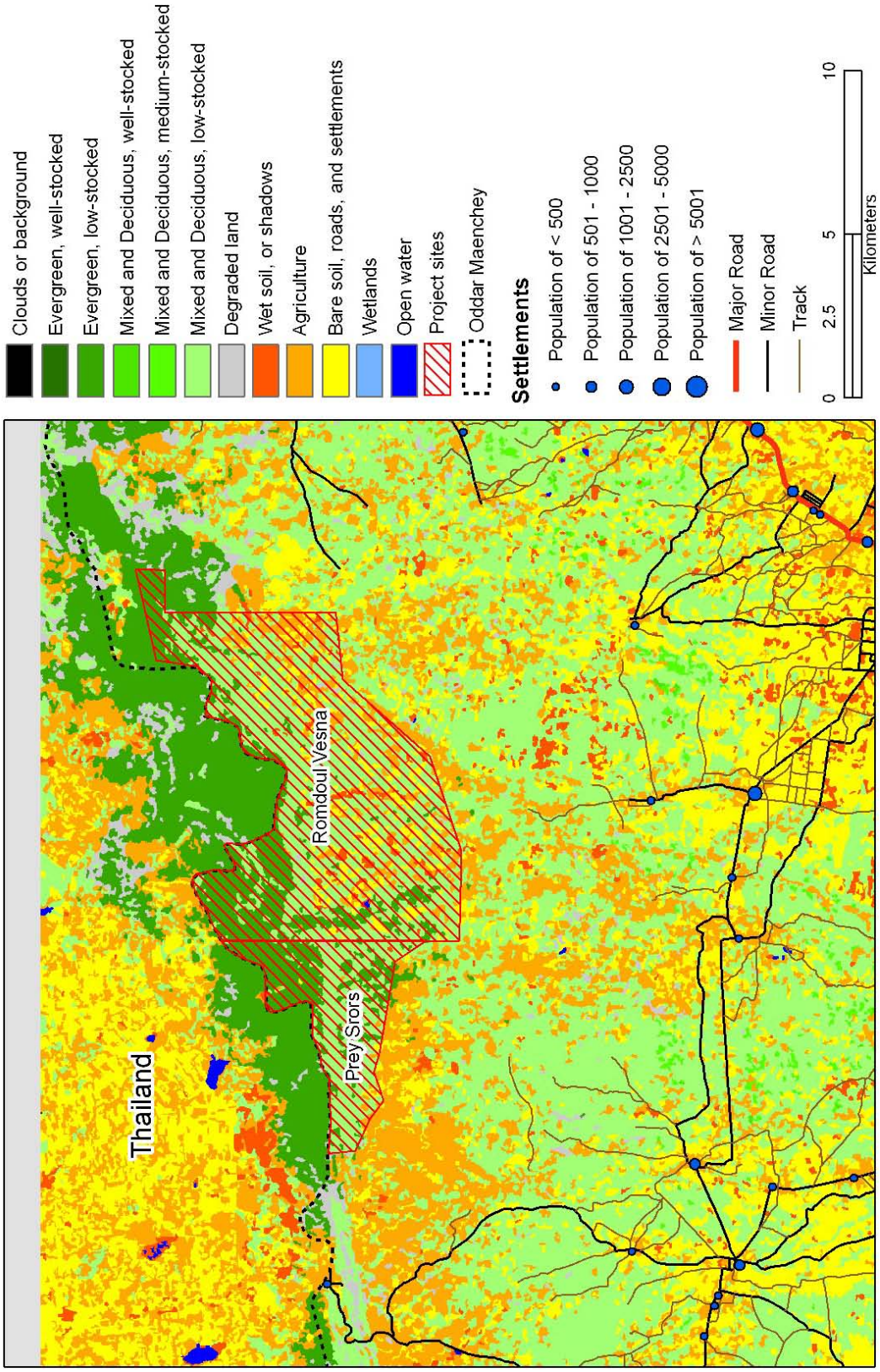
GL3. Exceptional Biodiversity Benefits

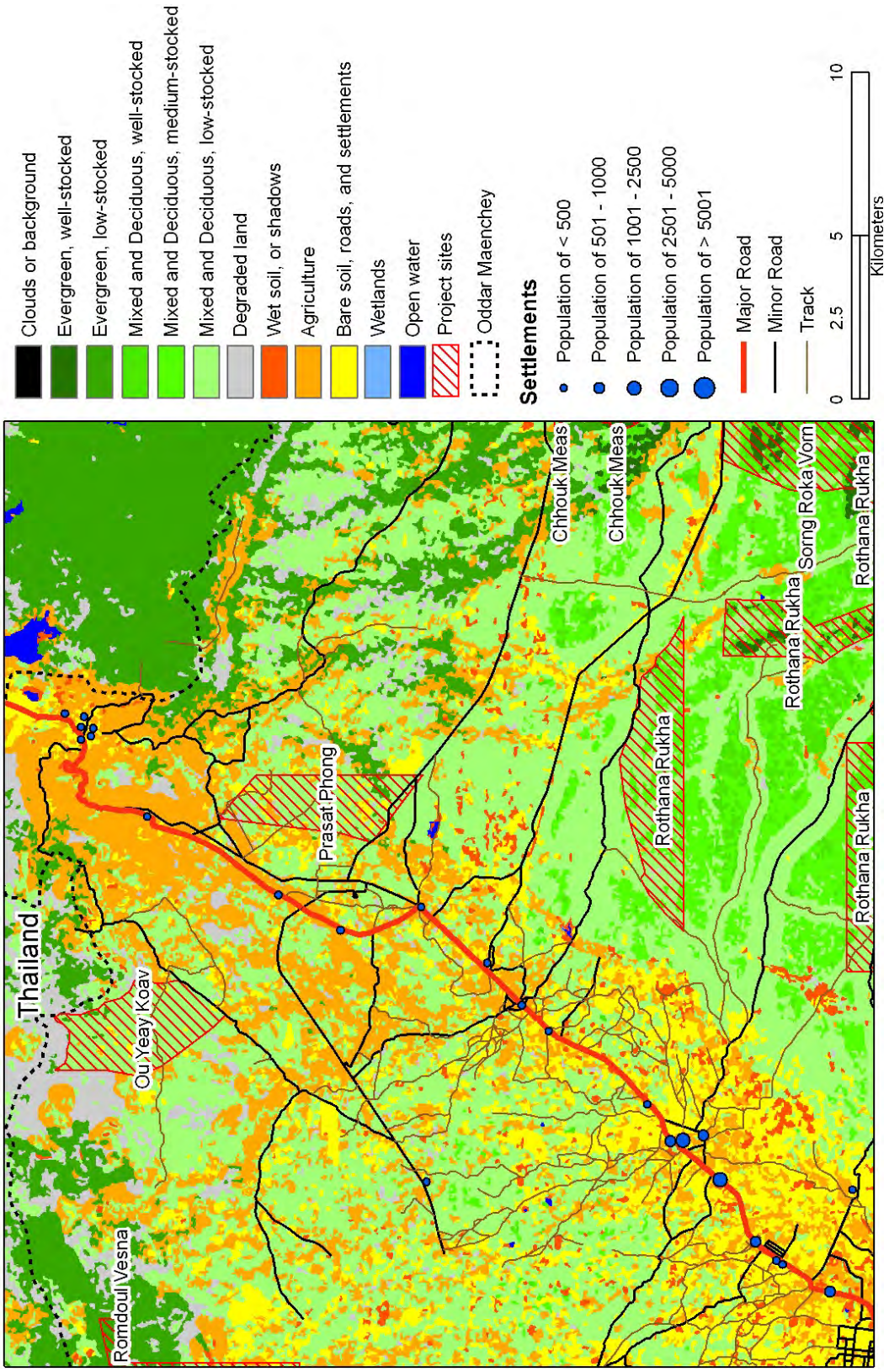
GL3.1. Demonstration of High Biodiversity Conservation Priority through the Vulnerability Criterion

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 4.

Annexes

Annex 1: Villages within Project Sites and Detailed Maps of Project Sites

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Evergreen, low-stocked
Mixed and Deciduous, well-stocked
Mixed and Deciduous, medium-stocked
Mixed and Deciduous, low-stocked
Degraded land
Wet soil, or shadows
Agriculture
Bare soil, roads, and settlements
Wetlands
Open water
Project sites
Oddar Maenchey
Settlements
Population of < 500
Population of 501 - 1000
Population of 1001 - 2500
Population of 2501 - 5000
Population of > 5001
Major Road
Minor Road
Track
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Kilometers
Thailand
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Ou Yeay Koav
Prasat Phong
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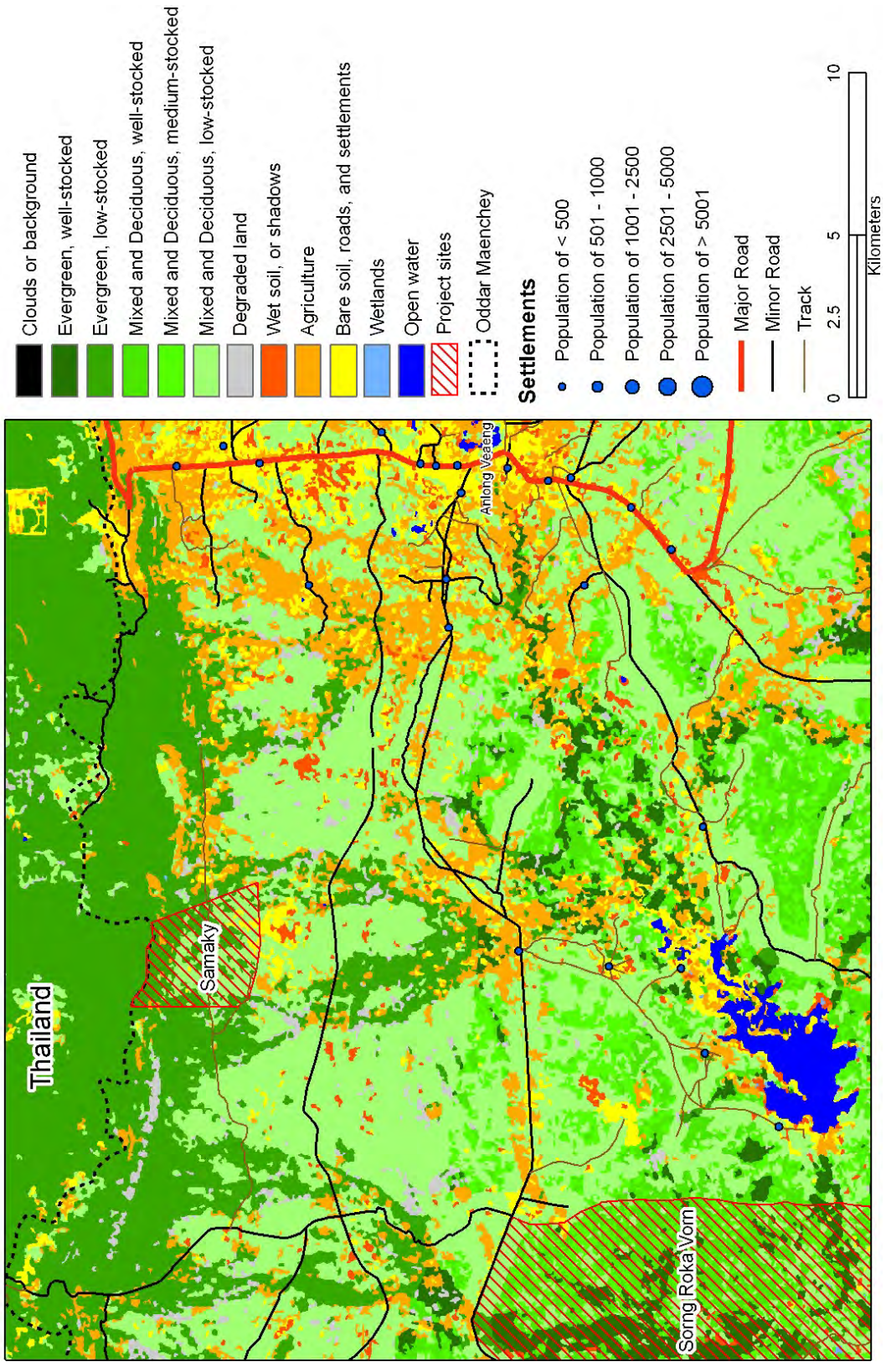
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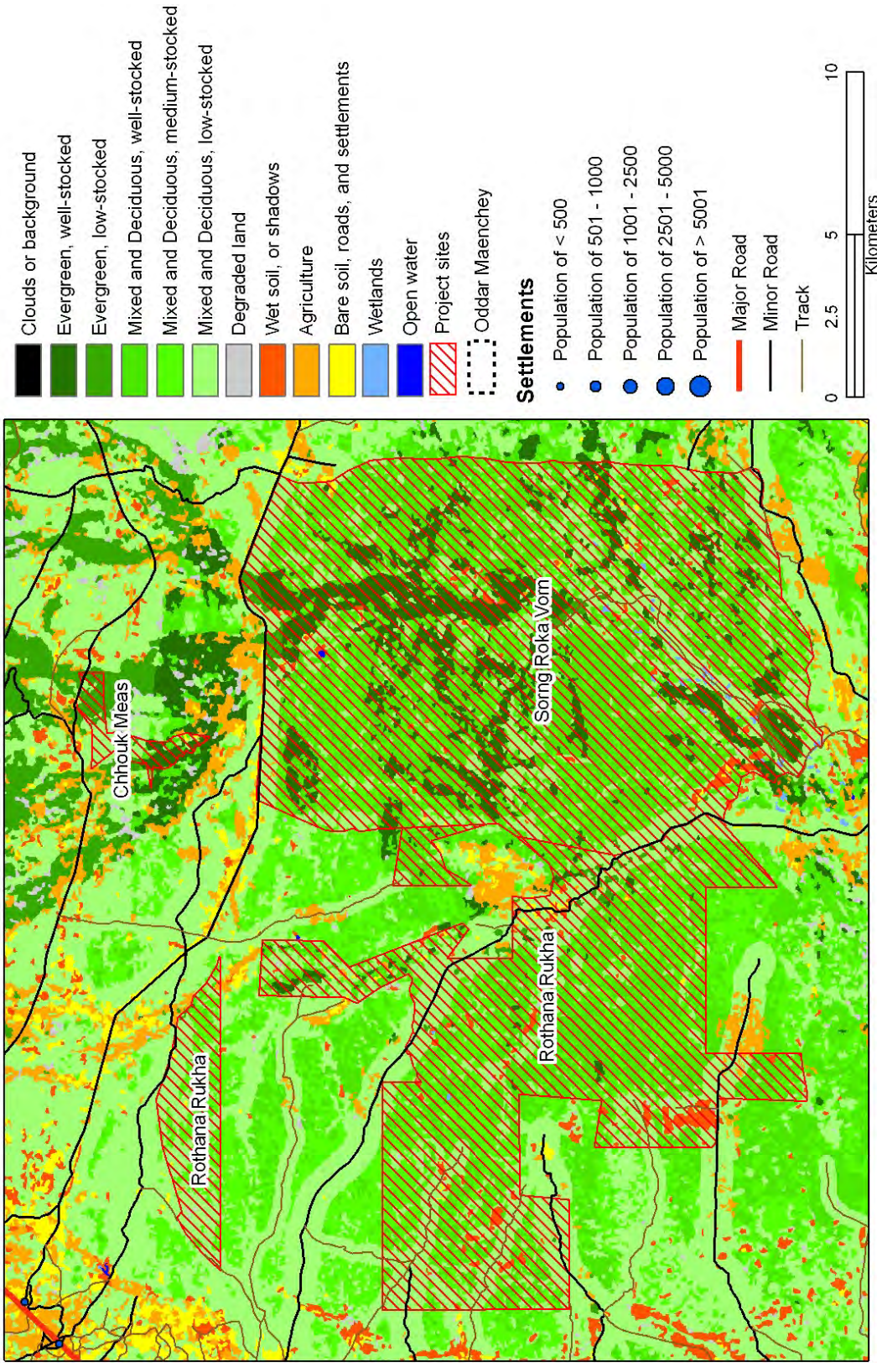
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Rothana Rukha
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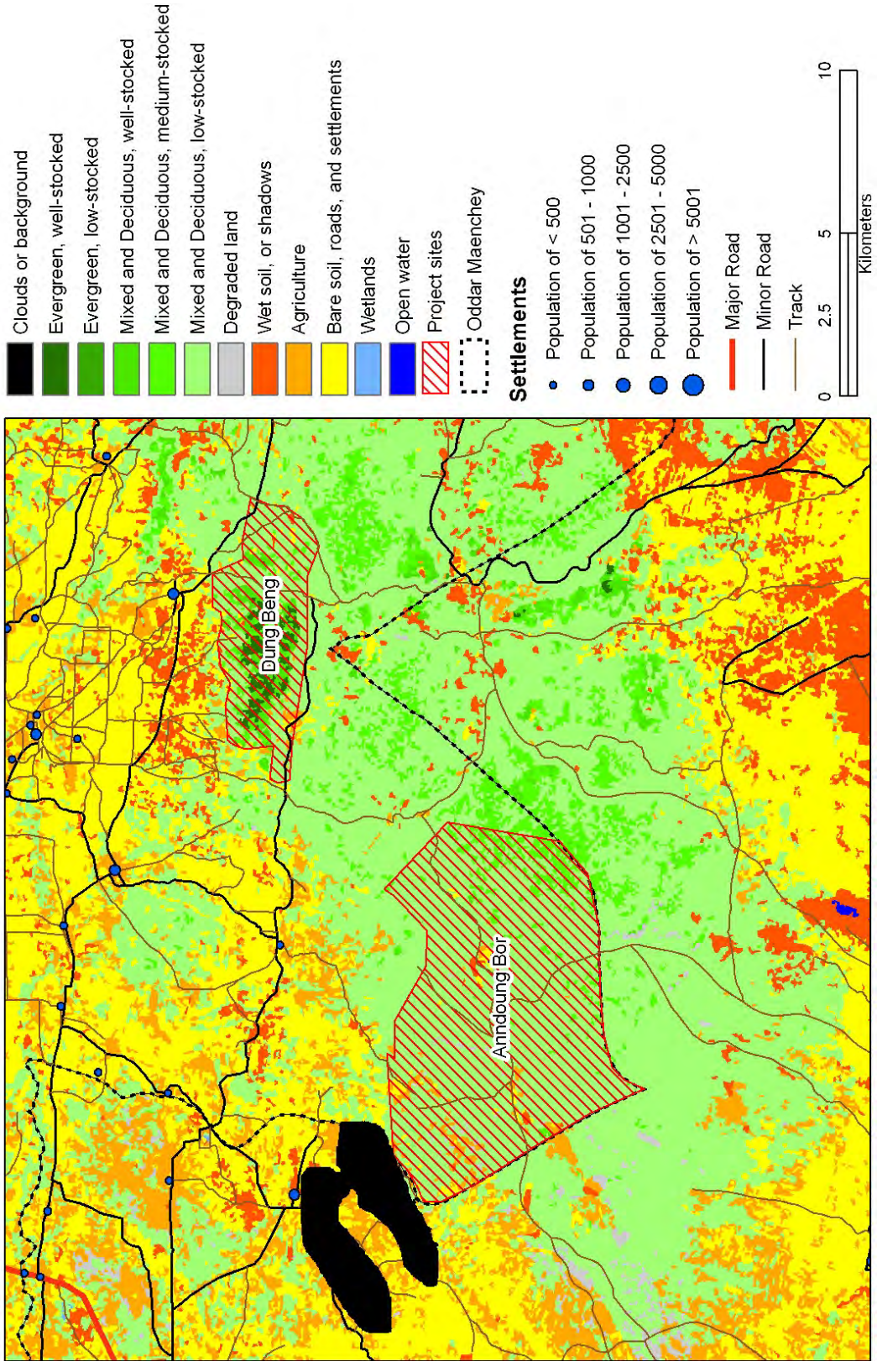
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Population of < 500
Population of 501 - 1000
Population of 1001 - 2500
Population of 2501 - 5000
Population of > 5001
Major Road
Minor Road
Track
0
2.5
5
10
Kilometers
Dung Beng
Anndoung Bor

Annex 2: Project Monitoring Strategies

The goal of project monitoring is to:

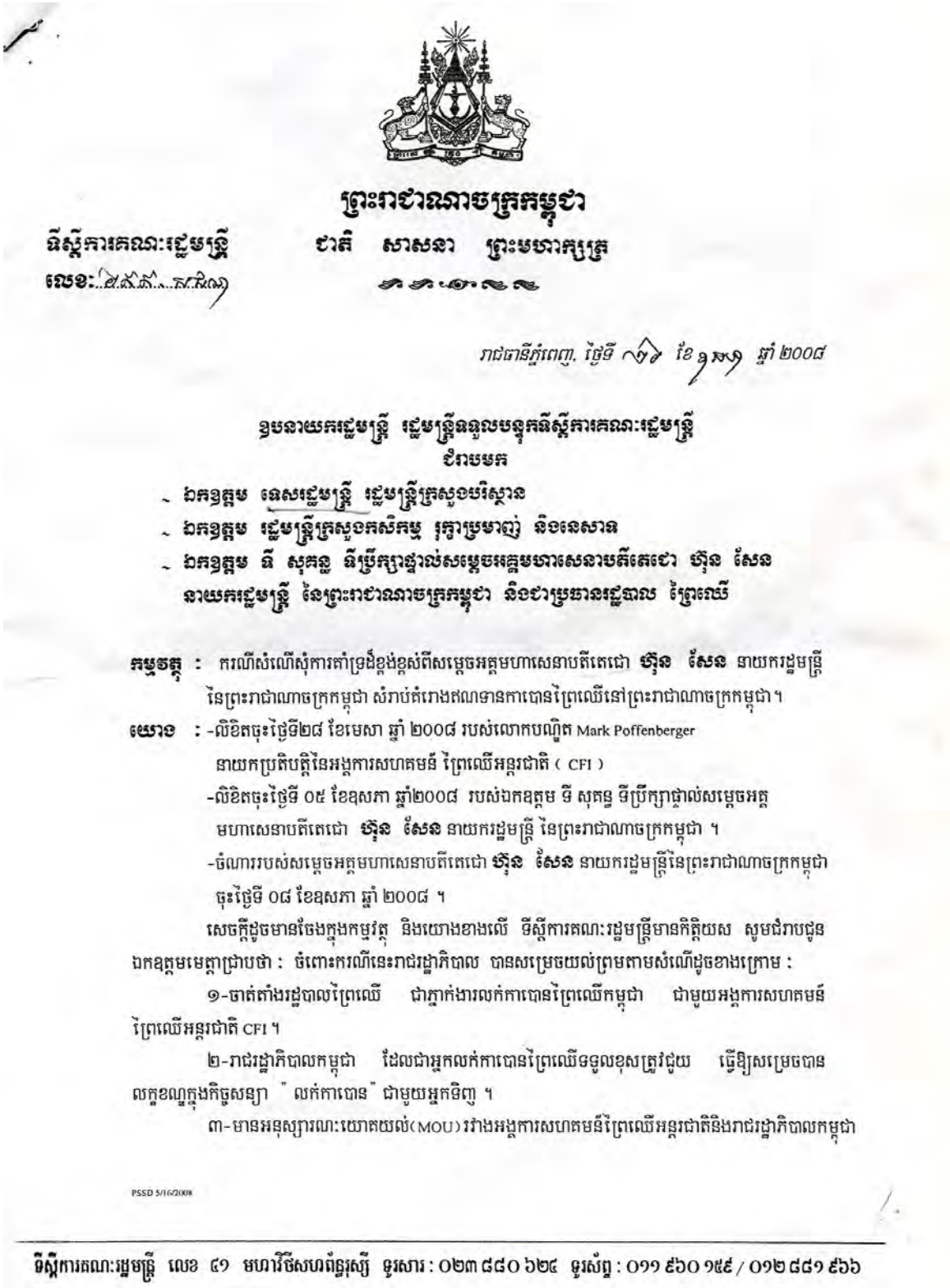
- Assess whether project targets and goals are being met
- Measure the impact of project activities
- Identify problem areas and make adjustments in plans and activities

In the case of carbon projects, where a 3rd party verifier must assess project performance, it is essential that a systematic monitoring system is in place and functioning effectively. Without such a system and the supporting data it provides, verifiers may not be able to certify carbon credits, adversely impacting the financing of the project. As a result, funding staff to perform data collection and monitoring functions should be viewed as a priority for project activities.

TGC has provided the project design team with a list of monitoring data and indicators that would support the approved methodology. This data reflects both the type and impact of mitigation activities as well as estimate types and volumes of project related leakage. Estimates that quantify both mitigation and leakage activities can be used in making carbon calculations.

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

Annex 3: Letter for the Council of Ministers Approving the Project



ព្រះរាជាណាចក្រកម្ពុជា

ជាតិ សាសនា ព្រះមហាក្សត្រ

ទីស្តីការគណៈរដ្ឋមន្ត្រី

លេខ: ...

រាជធានីភ្នំពេញ, ថ្ងៃទី ...

ខ្ញុំបាទឯកឧត្តម 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 ទូរសារ : ០២៣ ៨៨០ ៦២៤ ទូរស័ព្ទ : ០១១ ៥៦០ ១៥៤ / ០១២ ៨៨១ ៥៦៦

ដែលតំណាងដោយរដ្ឋបាលព្រៃឈើដែលនឹងអាចអនុញ្ញាតឱ្យអង្គការ សហគមន៍ ព្រៃឈើអន្តរជាតិ CFI កំណត់ស្វែងរកអ្នកទិញ និងសិក្សាពីលក្ខខណ្ឌ និងតម្លៃ កាបោន ដែលនឹងត្រូវពិនិត្យ និងអនុម័តពីរាជរដ្ឋាភិបាលកម្ពុជា ។ រាជរដ្ឋាភិបាលកម្ពុជាសំរេចនៅក្នុង អនុស្សារណៈយោគយល់ MOU ថា ចំណូលដែលបានពីការលក់សារជាតិកាបោននៃគំរោងឥណទានកាបោនសំរាប់ 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 ។៸

ជ.រដ្ឋមន្ត្រីទទួលបន្ទុកទីស្តីការគណៈរដ្ឋមន្ត្រី

រដ្ឋលេខាធិការ

ប្រាក់ សុខុន

ចម្លងជូន :

- ខុទ្ទកាល័យសម្តេចនាយករដ្ឋមន្ត្រី
- 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 4: 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
Bird	BUCEROTIDAE	*Anthracoceros albirostris*	LC	II

Species Category	Family	Species	IUCN	CITES
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
Plant	CYCADACEAE	*Cycas pectinata*		II

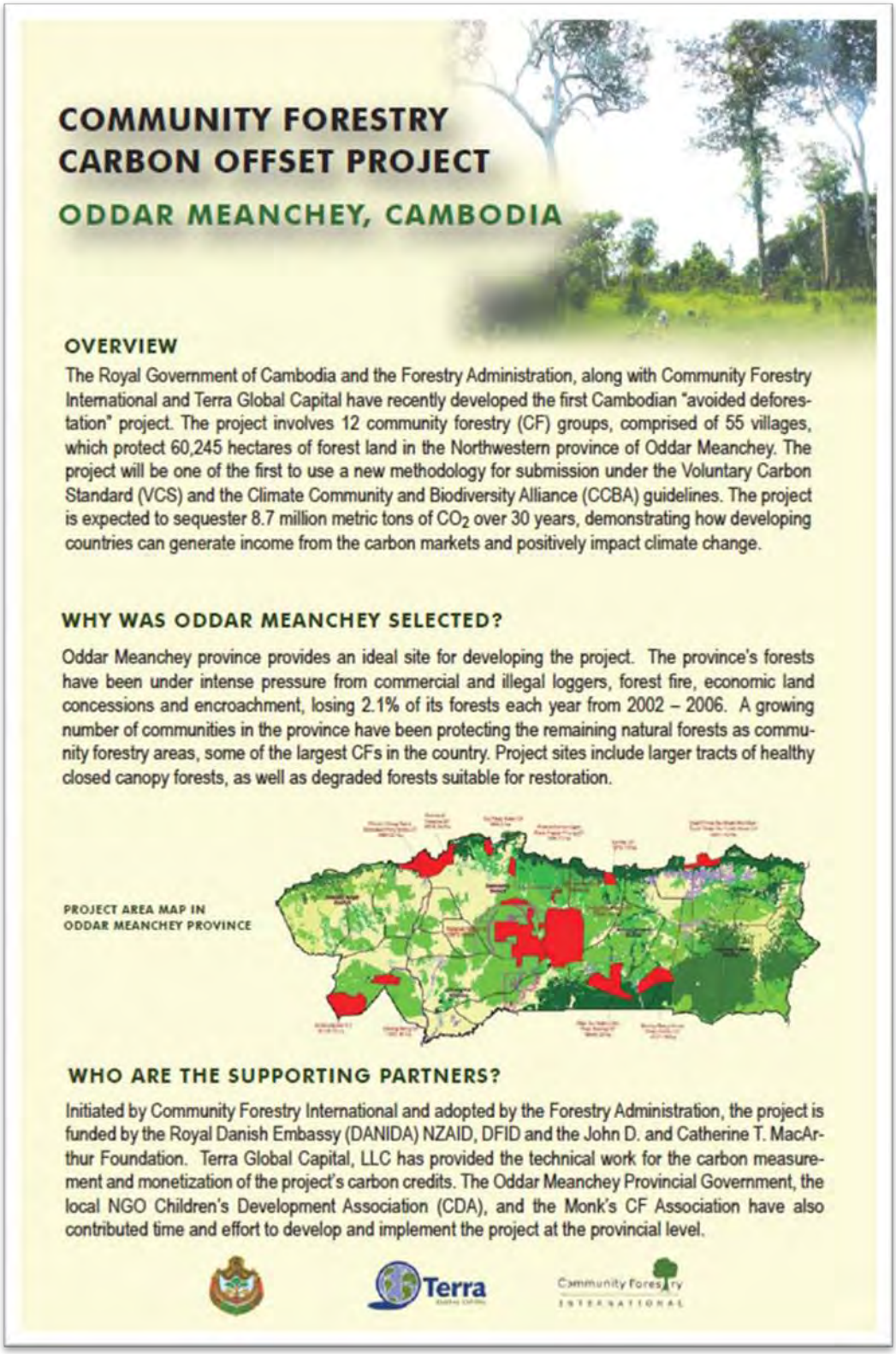
Species Category	Family	Species	IUCN	CITES
Plant	CYCADACEAE	*Cycas rumphii*		II
Plant	DIOSCOREACEAE	*Dioscorea deltoidea*		II
Plant	NEPENTHACEAE	*Nepenthes anamensis*	DD	II
Plant	NEPENTHACEAE	*Nepenthes mirabilis*	LC	II
Plant	ORCHIDACEAE	*Bulbophyllum rufinum*		II
Plant	ORCHIDACEAE	*Cleisostoma discolor*		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
Mammal	CANIDAE	*Cuon alpinus*	EN	II

Species Category	Family	Species	IUCN	CITES
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
Mammal	VIVERRIDAE	*Arctictis binturong*		III

Species Category	Family	Species	IUCN	CITES
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

Annex 5: Project Brochure



COMMUNITY FORESTRY CARBON OFFSET PROJECT

ODDAR MEANCHEY, CAMBODIA

OVERVIEW

The Royal Government of Cambodia and the Forestry Administration, along with Community Forestry International and Terra Global Capital have recently developed the first Cambodian "avoided deforestation" project. The project involves 12 community forestry (CF) groups, comprised of 55 villages, which protect 60,245 hectares of forest land in the Northwestern province of Oddar Meanchey. The project will be one of the first to use a new methodology for submission under the Voluntary Carbon Standard (VCS) and the Climate Community and Biodiversity Alliance (CCBA) guidelines. The project is expected to sequester 8.7 million metric tons of CO_2 over 30 years, demonstrating how developing countries can generate income from the carbon markets and positively impact climate change.

WHY WAS ODDAR MEANCHEY SELECTED?

Oddar Meanchey province provides an ideal site for developing the project. The province's forests have been under intense pressure from commercial and illegal loggers, forest fire, economic land concessions and encroachment, losing 2.1% of its forests each year from 2002 – 2006. A growing number of communities in the province have been protecting the remaining natural forests as community forestry areas, some of the largest CFs in the country. Project sites include larger tracts of healthy closed canopy forests, as well as degraded forests suitable for restoration.

PROJECT AREA MAP IN ODDAR MEANCHEY PROVINCE

WHO ARE THE SUPPORTING PARTNERS?

Initiated by Community Forestry International and adopted by the Forestry Administration, the project is funded by the Royal Danish Embassy (DANIDA) NZAID, DFID and the John D. and Catherine T. MacArthur Foundation. Terra Global Capital, LLC has provided the technical work for the carbon measurement and monetization of the project's carbon credits. The Oddar Meanchey Provincial Government, the local NGO Children's Development Association (CDA), and the Monk's CF Association have also contributed time and effort to develop and implement the project at the provincial level.

Terra

Community Forestry INTERNATIONAL

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 through forest protection. The project not only assists rural people to gain legal tenure rights over local forests, it creates a 30-year income stream that will significantly enhance household livelihoods and natural resource management capacity. The project seeks to retain and increase carbon stocks in these areas, enhancing the hydrology in the upland watersheds of the Tonle Sap Basin, as well as conserving endangered biodiversity. Carbon financing will be used to support rural communities to develop a range of livelihood activities including non-timber forest product enterprises, community-based ecotourism infrastructure, and water resource development. The project would also work with the Forestry Administration and commune, district and provincial government to formulate long term plans for sustainable natural resource management to foster economic growth.

WHAT IS THE COMMITMENT OF THE ROYAL GOVERNMENT OF CAMBODIA?

In May 2008, the project was officially endorsed by H.E. Prime Minister Hun Sen through Sar Chhor Nor 699. The guiding principles ensure that carbon revenues are used to:

- Improve the forest quality
- Provide maximum benefits to local communities which participate in the project activities
- Study the potential area for new REDD projects in Cambodia.

H.E. Ty Sokhun, Head of the Forestry Administration delivers a speech at the Project Launching Workship in March, 2008

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 revenues effectively. The success of the Oddar Meanchey project will open the door for long term financing for Cambodia's national community forestry program, which could eventually encompass and protect over 2 million hectares of forest, according to the Government's stated goals.

BACKGROUND ON AVOIDED DEFORESTATION PROJECTS/REDD

REDD = REDUCED EMISSIONS FROM DEFORESTATION AND DEGRADATION

The initiative is based on a new framework called REDD (Reduced Emissions from Deforestation and Degradation) 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. Currently, these payments are available through Voluntary Emissions Reduction markets. After 2012, A Post-Kyoto agreement may see payments available through the official CDM (Clean Development Mechanism) market as well. REDD is a new 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 17% of global CO_2 emissions originate from the loss of forests associated with land use and land cover changes.

WHAT ARE THE MAJOR PROJECT RISKS?

The major causes of deforestation in Oddar Meanchey include:

- Economic land concessions
- Migrant forest encroachment
- Forest fires
- Illegal logging

Community forestry groups can help control these forces, but only with the support of local and national governments. New payments through carbon credits can deliver long term funding to ensure more sustainable and productive management of Oddar Meanchey's valuable forests.

PROJECT STRATEGY – ENHANCING FOREST PROTECTION

Mobilizing communities to protect forests is already demonstrating effectiveness in halting deforestation and degradation in CF areas. Key activities supported under the project include:

- Social Fencing – CF Group Strengthening, Formulation and Adoption of Management Resolution
- Networking with FA Triage and with neighboring villages
- Strengthening Tenurial Authority – Mapping and boundary demarcation
- Woodfuel Savings – Introduction of Improved Cookstoves
- Fire Control – Fire line construction, fuel load reduction, fire brigade
- Illegal Logging Control – Volunteer patrols, forest watchers
- Stronger Coordination with Commune, District, and Provincial Representatives
- Creation of financial incentives for successful protection
- Development of annual carbon stock monitoring systems
- Agricultural intensification

ENHANCING FOREST CARBON STOCKS

The REDD project provides regeneration contracts to all participating CF Management Committees 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 into commune and community funds that could be used for livelihood and infrastructure development activities.

STAKEHOLDER ROLES AND RESPONSIBILITIES

Stakeholder	Outputs and Responsibilities	Benefits
CF Groups	Forest patrols, assisted natural regeneration (ANR), replanting, fire protection, forest management, livelihood plan development and implementation.	Employment, forest restoration contracts, micro-finance institutions, water resource development, NTFP processing and marketing support, community-based ecotourism plan and activities.
Forestry Administration	Guarantee security of CF areas, law enforcement, capacity building for local communities, monitoring.	Increased budget for FA/MOE operations in Oddar Meanchey, improved forest protection and timber stocks, better biodiversity conservation, reduced conflict.
Local Government & NGOs	Guarantee tenure security of CF areas, law enforcement, coordinate concessions to avoid conflicts, coordinate meetings, development planning.	Development of provincial and district resource management plans with implementation budgets, funds for workshops and meetings.
Community Forestry International (Implementing Organization)	Project design, implementation, and oversight; building local capacity, initial management of programs, support for carbon development.	Increased experience in REDD project development, funds to expand REDD projects in Cambodia. Building capacity of CF groups and NGO partners.
Terra Global Capital	Carbon assessment, stakeholder benefit sharing facilitation, methodology development, design Project Document, negotiate with buyers, coordinate monitoring and verification.	Promote REDD projects with credible carbon accounting by establishing a new REDD methodology under the VCS (likely the first). Demonstrate by working with the government and CFI that highly valuable community based REDD projects can be successfully brought to market

PROJECT TIMEFRAME

Phase I: January 2007 – September 2008
Project Start
- Facilitation/Empowerment with CF groups & local FA
- Mapping, demarcation and social fencing
- Capacity-building for local NGO partner

Phase II: October – December 2008
Project Implementation
- Stakeholder dialogue for project management and benefit-sharing
- Definition of project spatial and temporal boundaries
- Social and carbon data collection and analysis
- CF Agreements approved
- Project Document

Phase III: January – December 2009
Project Submissions
- Certification and verification
- Marketing of Carbon – ERPA

Phase IV: 2010 – 2028
- Project Establishment/On-going Programs

FOR MORE INFORMATION:

Dr. Mark Poffenberger
Executive Director
Community Forestry International (CFI)
mpoffen@aol.com | Tel: (1) 530 721 1440

Ms. Amanda Bradley
Country Director
Community Forestry International (CFI)
amandabradley@cfi-cambodia.org.kh
Tel: (855 12) 909 502

MacArthur

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Ms. Leslie Durschinger
Managing Director
Terra Global Capital
leslie.durschinger@terraglobalcapital.com
Tel: (1) 415 215 5941

Mr. Long Ratanakoma
Deputy
Community Forestry Office
koma-long@yahoo.com | Tel: (855 12) 854 314

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

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