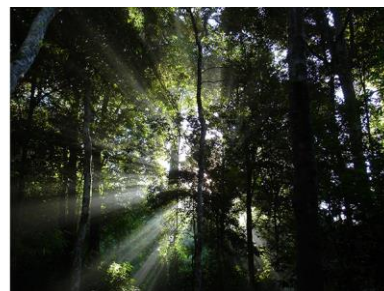


REDD+ in Keo Seima Wildlife Sanctuary, Cambodia Monitoring & Implementation Report



Project Title	Reduced Emissions from Deforestation and Degradation in Keo Seima Wildlife Sanctuary
Version	3.3
Report ID	
Date of Issue	15 December 2016
Monitoring Period	1 January 2010 to 31 December 2015
Prepared By	Wildlife Conservation Society for the Ministry of Environment of the Royal Government of Cambodia
Contact	H.E. Dr. Paris Choup, National Council for Sustainable Development, Ministry of Environment, Royal Government of Cambodia # 48, Samdach Preah Sihanouk Boulevard, Phnom Penh 12301, Cambodia +855 23 213 908, paris.ncgg@gmail.com, www.moe.gov.kh Dr Ross Sinclair, Wildlife Conservation Society, #21, Street 21, Sangkat Tonle Bassac, Phnom Penh, Cambodia, +855 23 219 443 / 217 205, rsinclair@wcs.org, www.wcscambodia.org



Region, Country	Project Start	First Verification
Mondulhiri Province, Cambodia	January 1 2010	2016

GHG Accounting Period
Project crediting period is 60 years, 1 January 2010 to 31 December 2069

Project Proponent and Contact	Auditor Contact Details
Royal Government of Cambodia (RGC), National Council for Sustainable Development, Ministry of Environment. H.E. Dr. Paris Choup, Deputy Secretary-General/ National REDD+ Focal Point +855 23 213 908 paris.ncgg@gmail.com	SCS Global Services 2000 Powell Street Emeryville, CA 94608 Zane Haxtema, Senior Forester +1 510 292 5968 zhaxtema@scsglobalservices.com

Project Audit History
CCB validation December 2015, Third Edition CCBA Standards

Project Expected and Achieved Benefits
Climate Benefits - The project has resulted in emission reductions of over 10 million tCO₂e from avoided unplanned deforestation in the first five years of operation. - Over 10 million tCO₂e of emission reductions from avoided unplanned deforestation were achieved during the first verification period. Community Benefits - Preserves forest areas that provide the basic needs and traditional cultural identity for over 2,500 households (approximately 12,500 people) within the 20 REDD+ participating villages. Nearly 25,000 hectares of unplanned deforestation of culturally significant forest was prevented during the verification period. - Strengthens tenure rights and reduces landlessness of Seima forest communities through legal and planning support for indigenous communal land titling (ICT), participatory land-use planning (PLUP), and land-use agreements. Seven ICT areas were established during the verification period. - Supports alternative livelihoods that reduce deforestation providing income generation and skill development opportunities. This includes literacy and numeracy education for increased off farm livelihood options. Numerous livelihood activities were initiated during the verification period including the establishment of the Jahoo Gibbon Camp ecotourism enterprise, community savings groups, and market garden development. Value chain research - Provides agricultural extension and infrastructure support increasing food security, incomes, and resilience to climate change. The project provided extensive enhanced agricultural and livestock productivity trainings during the verification period.

Biodiversity Benefits

- Nearly 25,000 hectares of unplanned deforestation of ecologically significant forest was prevented during the verification period.
- Ongoing patrolling has reduced the rate of illegal land conversion, logging, and unsustainable NTFP harvest which has reduced loss, degradation, or disturbance of ecologically functional habitats.
- Likewise patrolling has reduced poaching of wildlife by active hunters as well as removal of thousands of snares which are responsible for indiscriminate killing of numerous species of global conservation concern. Some notable species protected include the Asian Elephant, the largest remaining world population of Black-shanked Douc, Yellow-cheeked Crested Gibbon, Eld's Deer, Gaur, Banteng, and Green Peafowl.

Biodiversity Gold

- The Seima REDD+ Project qualifies for CCB Biodiversity Gold for the following criteria:
 - a. Vulnerability – over 40 confirmed Globally Threatened species occur in the Project Zone.
 - b. Irreplaceability – the Project Zone holds significant populations of at least three restricted-range species and large proportions of the world's population of at least five other species.

Table of Contents

1	General.....	7
1.1	Summary Description of the Project (G3)	7
1.2	Project Location (G1 & G3)	8
1.3	Project Proponent (G4)	10
1.4	Other Entities Involved in the Project (G4).....	10
1.5	Project Start Date (G3).....	13
1.6	Project Crediting Period (G3)	13
2	Implementation of Design.....	14
2.1	Sectoral Scope and Project Type.....	14
2.2	Description of Project Activities (G3).....	14
2.2.1	Direct interventions	17
2.2.2	Supporting Interventions	22
2.3	Management of Risks to Project Benefits (G3).....	25
2.3.1	Measures to ensure permanence	25
2.4	Measures to Maintain High Conservation Values (G3).....	26
2.5	Project Financing (G3 & G4)	27
2.5.1	Financial health of the implementing organizations	27
2.5.2	Funds for Project Implementation	28
2.6	Employment Opportunities and Worker Safety (G4).....	28
2.6.1	Training	28
2.6.2	Equal opportunities	30
2.6.3	Health and safety	31
2.7	Stakeholders (G3)	31
2.7.1	Stakeholder consultation during project design	31
2.7.2	Public Comment Period	32
2.7.3	Conflict Resolution	33
3	Legal Status	33
3.1	Compliance with Laws, Statutes, Property Rights and Regulatory Frameworks (G4 & G5)	33
3.1.1	Evidence of Approval for the Project.....	33
3.1.1	List of relevant laws.....	33

3.1.2	Compliance with labor laws.....	34
3.2	Evidence of Right of Use (G5)	35
3.2.1	State-owned forest land	35
3.2.2	Samling International logging concession.....	36
3.3	Emissions Trading Programs and Other Binding Limits (CL1)	36
3.4	Participation under Other GHG Programs (CL1)	36
3.5	Other Forms of Environmental Credit (CL1)	37
3.6	Projects Rejected by Other GHG Programs (CL1)	37
3.7	Respect for Rights and No Involuntary Relocation (G5).....	37
3.7.1	Free, Prior and Informed Consent (FPIC)	37
3.7.2	Involuntary Relocation.....	37
3.8	Illegal Activities and Project Benefits (G5)	38
4	Application of Methodology	38
4.1	Title and Reference of Methodology	38
4.2	Deviations from the Monitoring Plan	38
4.3	Project Boundary (G1)	39
4.3.1	Project Area.....	39
4.3.2	Leakage Belt	39
4.3.3	Leakage Management Area.....	39
4.3.4	Carbon Pools.....	40
4.3.5	Sources of GHG Emissions	41
4.4	Baseline Scenario (G2)	42
4.4.1	Historic Deforestation.....	42
4.4.2	Deforestation Drivers	43
4.4.3	Driver Variables Explaining Quantity and Location of Deforestation	43
4.4.4	Identification of Underlying Causes of Deforestation	45
4.4.5	Projected Baseline	47
4.4.6	Baseline Scenario with Respect to Biodiversity	49
4.4.7	Baseline Scenario with Respect to Communities	49
4.5	Additionality (G2).....	50
5	Monitoring Data and Parameters	50
5.1	Description of the Monitoring Plan (CL3, CM3 & B3).....	50

5.1.1	Adaptive Management and Annual Monitoring Cycle	50
5.1.2	Monitoring Carbon Stock Changes and GHG Emissions (Task 1)	51
5.1.3	Revisiting the baseline projections for future fixed baseline period (Task 2).....	58
5.1.4	Monitoring Community Impacts (Task 3)	58
5.1.5	Monitoring Biodiversity Impacts (Task 4)	61
5.2	Data and Parameters Available at Validation (CL3)	66
5.3	Data and Parameters Monitored (CL3, CM3 & B3)	75
6	Quantification of GHG Emission Reductions and Removals (CLIMATE)	88
6.1	Baseline Emissions (G2).....	88
6.2	Project Emissions.....	95
6.3	Leakage.....	95
6.4	Summary of GHG Emission Reductions and Removals (CL1 & CL2).....	96
7	Community	97
7.1	Net Positive Community Impacts (CM1)	97
7.2	Negative Offsite Stakeholder impacts (CM2).....	99
8	Biodiversity	99
8.1	Net Positive Biodiversity Impacts (B1)	99
8.2	Negative Offsite Biodiversity Impacts (B2).....	101

1 GENERAL

1.1 Summary Description of the Project (G3)

The Keo Seima Wildlife Sanctuary (KSWS) covers 292,690 ha. It is located in eastern Cambodia, mainly in Mondulkiri Province with a small area extending into Kratie Province. The REDD+ Project Area covers 166,983 ha of forest in the KSWS Core Protection Area. The KSWS was created by a Prime Ministerial Sub-decree in late 2009. This upgraded the conservation status of the former Seima Biodiversity Conservation Area, which operated during 2002-2009. Until 2016, the Seima Protection Forest (SPF) was reclassified by the Royal Government of Cambodia as KSWS under the Sub-Decree No. 83 dated 09 May, 2016 and managed by the Ministry of Environment. The site is part of the ancestral homeland of large number of ethnic Bunong people, for whom the forest is a key source of income and central to their spiritual beliefs. The area is also a meeting place for two important ecoregions – the Annamite Mountains (notable for high levels of local endemism among evergreen forest species) and the lower Mekong dry forests (which are crucial for the survival of many species typical of lowland deciduous forests). There are 41 Globally Threatened vertebrate species recorded in the Project Area (including 4 Critically Endangered and 14 Endangered). Many of these occur in globally or regionally outstanding populations, including Asian Elephants, primates, wild cattle, several carnivores and birds such as the Giant Ibis and Green Peafowl.

The KSWS is currently under threat from accelerating forest clearance for agriculture together with unsustainable resource extraction (including hunting, logging and fishing). These activities harm both biodiversity and local forest-dependent livelihoods. Current drivers of these direct threats include improved road access, population growth, weak law enforcement and governance frameworks, limited recognition of the value of biodiversity and environmental services and rising market demand for both wild products and agricultural produce. The development of mines and agro-industrial plantations could also become potential future deforestation drivers if the area lacked full protection by the government. The illegal selective harvesting of rare luxury-grade tree species is a serious law enforcement issue at the site, as elsewhere in Cambodia, but has negligible long-term effect on carbon stocks.

Since 2002, the Forestry Administration (FA) has collaborated with the Wildlife Conservation Society (WCS) and other local NGO partners to develop management systems for the KSWS, both to conserve and restore the biodiversity values and to protect the livelihoods of local people. The conservation project has a holistic approach with four direct interventions: strengthening legal mechanisms and political support, direct law enforcement, strengthening community natural resource management and developing alternative livelihoods. Effective law enforcement is essential as it underpins all other activities. The sustained investment in supporting land titling for all indigenous communities in the landscape is particularly notable as it protects livelihoods and land rights while also forming a strong basis for cooperation in project implementation.

In 2016, the KSWS was transferred to the Ministry of Environment (MoE) as part of a national jurisdictional transfer of all protected areas to MoE management. At this time MoE renamed SPF to KSWS and assumed management of project area operations and REDD+ activity implementation. Most of the KSWS staff were retained and transferred to the MoE with their titles and duties unchanged. WCS has partnered with the MoE since 2000 through protected area co-management of the Prek Toal Conservation Project and Kulen Promtep Wildlife Sanctuary.

Conservation interventions prior to the REDD+ project have been on a fairly limited scale. Law enforcement activities have been successful in moderating (but not preventing) major threats across some parts of the KSWs, moderating deforestation rates and allowing several key wildlife species to persist in large populations. This limited level of intervention has been assumed to continue as part of the future baseline scenario. However, it falls well below the level needed to match the scale of the threats. Most threats remain severe and are increasing in scale and diversity. Deforestation rates and logging have increased, at least one flagship species (Tiger) has been lost from the reserve and declines are suspected for other species. Boundary demarcation, effective patrolling, community outreach, alternative livelihoods activities etc. have been implemented in only a minority of the reserve. The effectiveness of conservation management is severely constrained by insufficient, irregular and declining funding and competition with other land-uses. Hence sustainable financing from carbon revenue for the site is essential to enable conservation action to be expanded and sustained in the long-term. It will allow the Royal Government of Cambodia and its NGO partners to expand activities to match the level of threat; ensure long-term support by covering operating costs; and generate financial incentives for conservation at local and national level.

1.2 Project Location (G1 & G3)

The project takes place almost entirely within KSWs¹, which lies mainly in Mondulkiri Province with some sections extending into Kratie Province. The site abuts the Vietnamese border and is bisected by Cambodian National Route 76. The KSWs headquarters lie at the south-western entrance to the reserve in Keo Seima District at 106°55'15.7"E, 12°8'13.109"N².

The methodology requires the definition of several non-overlapping management zones, as described in detail in Section 4.4 and summarized here. The Project Area (which is the area from which credits will be generated), comprises those parts of the Core Protection Forest Area (as defined in Sub-decree 143; 2009) that were forested as of the project start date, with the exception of areas excluded because of issues relating to complex land tenure. The Leakage Belt encompasses adjacent areas of forest into which the project might risk displacing some deforestation activities. The Leakage Management Area where selected livelihood improvement activities will take place comprises the non-forest, agricultural areas used by the participating villages. Together these three areas constitute the basis of the Project Zone which must be defined under the CCB Standard. Figure 1.2.1 shows an overview of the location of the Project Area; for a detailed map of all areas please refer to Section 4.

¹ The full legal name is *Keo Seima Wildlife Sanctuary*

² The project uses the India-Thailand 1960 (also called Indian 1960) datum throughout. This datum has been a long-established standard for the KSWs project, chosen for conformity with topographic maps widely used by the field teams.

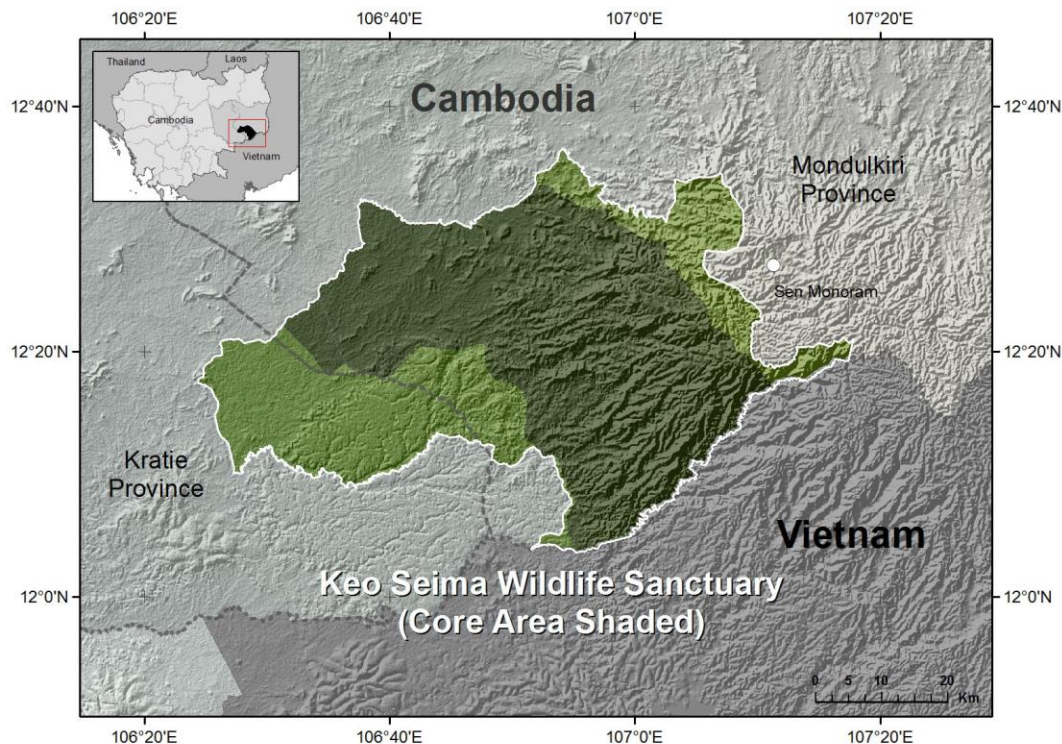


Figure 1.2.1. Project Location showing adjoining provinces.

Topography

The KSWS and its surroundings form a topographically diverse landscape ranging from 60-750 m asl. The lower parts in the north and west of the Project Area lie in the Eastern Plains. Further east, the area climbs in elevation to the Sen Monorom plateau, forming the south-western extremity of the Annamite mountain range, one of Asia's great centers of endemism.

Soils

Soils are of moderate to high potential fertility on the younger rocks associated with the plateau, while the lowlands are mostly of low to moderate fertility except for pockets of alluvial soil (SCW 2006).

Hydrology

Two medium-sized tributaries of the Mekong drain most of the area whilst the southernmost valleys drain into the Dong Nai river system in Vietnam. Many of the rivers cease to flow during the prolonged dry season. The plains are characterized by hundreds of small seasonal grassy wetlands and pools ('trapeang' in Khmer) dotted across the forest.

Climate

The climate is tropical monsoonal: the dry season from November to April with north easterly winds and the wet season from May to October with south-westerly winds (SCW 2006). Total annual rainfall is

2200–2800 mm at the KSWs headquarters, higher on the plateau and probably lower in the plains³. Over 85% of rain at the headquarters falls during May–October; December–April typically record less than 100 mm of rain per month and hence there are typically 5 'dry' months.

1.3 Project Proponent (G4)

The project proponent is the Royal Government of Cambodia (RGC), represented by the Ministry of Environment (MoE).

With regard to the REDD+ project, MoE is responsible for:

- Overall oversight and management (including benefit-sharing frameworks and coordination of partners).
- Assignment of key staff including team leaders and managers.
- Approval of the PD, workplans and monitoring reports.
- Implementation of activities in the workplan for which MoE is responsible.
- Coordination of the REDD+ work with other aspects of KSWs management.

Ministry of Environment of the Royal Government of Cambodia	
Name of Contact Person:	H.E. Dr. Paris Choup
Title:	Deputy General of the National Council for Sustainable Development (NCSD)
Address:	Ministry of Environment, Royal Government of Cambodia # 48, Samdach Preah Sihanouk Boulevard, Phnom Penh 12301, Cambodia
Telephone:	+855 23 213 908
Fax:	
Email:	paris.ncgg@gmail.com
Website:	www.moe.gov.kh

1.4 Other Entities Involved in the Project (G4)

WCS Cambodia is the lead technical partner.

With regard to the REDD+ project, WCS is responsible for:

- Provision of technical advice on all aspects of conservation at the site.
- Assisting in the drafting of certain project documents such as the PD, annual reports and verification reports.
- Management of their own non-governmental staff associated with the project.
- Coordination of the inputs of livelihood/development NGOs.

³ Combined results from WCS/FA and Nomad RSI (unpublished).

- Co-operating in efforts to secure non-REDD funding required for business as usual activities.

The other principal ongoing implementation partners are local NGOs. The exact partners will depend on levels of funding and technical requirements of the project, and will vary over the course of the project on the basis of negotiated contracts for service provision. Current partners include the Cambodia Rural Development Team (CRDT) and the Sam Veasna Centre (SVC).

- Support livelihood and development activities (CRDT,SVC)
- Ecotourism (SVC)

Wildlife Conservation Society	
Name of Contact Person:	Dr. Ross Sinclair
Title:	Country Director
Address:	House 21, Street 21, Sangkat Tonle Bassac, Phnom Penh Postal: WCS, PO Box 1620, Phnom Penh, Cambodia
Telephone:	+855 23 219 443/217205
Email:	rsinclair@wcs.org
Website:	http://www.wcscambodia.org
Cambodia Rural Development Team (CRDT)	
Name of Contact Person:	Mr. Or Channy
Title:	Executive Director
Address:	#695, Street 2, Kratie Town, Kratie Province Postal: PO Box 2539, Phnom Penh 3
Telephone:	+855 72 6666 771
Email:	or_channy@crdt.org.kh
Website:	http://www.crdt.org.kh/

Sam Veasna Centre (SVC)	
Name of Contact Person:	Mr. Johnny Orn
Title:	Director
Address:	#0552, Group 12, Wat Bo, Siem Reap. Cambodia. PO Box 93045
Telephone:	+855-89-700-301 +855-97-896-1735 +855-10-788-652
Email:	promgr@samveasna.org
Website:	www.samveasna.org

The project activities (sub-objectives) require a broad range of skills, all of which can be provided by the project participants as set out in Table 1.4.1.

Table 1.4.1. Key skills required to implement the project

Sub-objective	Key skills required	Main partners
#1: Key legal and planning documents for the Seima Protection Forest and surrounding landscape are approved and implemented	Protected area management planning, coordination with senior government officials, understanding of private sector	MoE, WCS
#2: To reduce forest and wildlife crime by direct law enforcement	Implementation of enforcement patrols, monitoring outcomes	MoE, WCS
#3: Land and resource use by all core zone communities is sustainable	Participatory land-use planning, implementation of Land Law and Forestry Law, natural resource management systems	MoE, WCS
#4: Support for alternative livelihoods that reduce deforestation	Promotion of alternative livelihoods (forestry, tourism, agriculture, savings groups)	MoE, WCS, CRDT, SVC, other NGOs
#5: Collect information on long-term ecological and social trends	Scientific monitoring (remote sensing, wildlife and plant species, socio-economics)	MoE, WCS,
#6: Effective administrative, accounting and logistical procedures are in place	Administration and accounting systems	MoE, WCS
#7: Long-term financial security	Fund-raising from traditional donors, management of REDD activities	MoE, WCS, CRDT other NGOs and tech. partners

The implementing organization and several of the implementing partners had been active in conservation at the site for up to eight years prior to the project start date (Evans et al. 2013) and already had a well-established core team which will be expanded to achieve the additional activities required for the REDD+ project as resources become available. The team draws on the combined strengths of a government agency (MoE), an international conservation NGO (WCS) and a number of local and international development NGOs.

The MoE has the legal mandate to manage forest and forest resources in Cambodia, including Protected Forests. It has over 1500 staff, including senior managers and core technical offices in Phnom Penh and a network of local offices extending out to every district (RGC 2010). Senior FA management staff assigned to the KSW REDD+ project vary over time. They are mainly drawn from the Department of Wildlife and Biodiversity and the Department of Forestry and Community Forestry, with involvement of other technical offices as required. These managers have extensive experience in protected area management, implementation of forestry law enforcement, design of community engagement programs, wildlife monitoring, coordination with other stakeholders and management of large budgets. They also provide training to and coordinate the involvement of officers from the provincial and district branches of the FA, who have skills in matters such as forest estate demarcation, law enforcement, oversight of community forestry and forest tree nurseries, and members of the Royal Cambodian Armed Forces who participate in law enforcement patrols.

WCS has strong institutional capacity to support the work of the project proponent. WCS, founded in 1895 as the New York Zoological Society, is an internationally recognized organization dedicated to preserving the Earth's wildlife and wild landscapes and seascapes. WCS currently oversees a portfolio of more than 500 conservation projects in 60 countries in Asia, Africa, Latin America, and North America. WCS works

with national governments, universities, non-governmental organizations (NGOs) and dedicated individuals to increase understanding and awareness of the importance of wildlife through the establishment and strengthening of protected areas, conducting scientific research, strengthening national governmental organizations and NGO capacity, and training the next generation of conservation professionals.

Specific REDD+ project management experience within the WCS Global Conservation Program includes three VCS and CCBA dually validated and verified Avoided Unplanned Deforestation projects. These projects are Makira REDD+ in Madagascar, Oddar Meanchey Community Forestry REDD+ in Cambodia, and Kulera Landscape REDD+ in Malawi. WCS has successfully managed the Makira REDD+ project, of similar scale and type as Seima REDD+, from inception through periodic verifications. This includes strong institutional capacity in technical aspects of carbon measurement and monitoring ranging from locating and applying IPCC Tier 1 defaults and Tier 2 data sources to conducting the Tier 3 GHG estimation procedures required by the Seima REDD+ methodological approach. Technical skills include carbon density estimations of forest strata from biomass plots, remote sensing monitoring and ex-ante modeling of activity data, calculation of change matrices and application of emission factors, application of leakage corrections, and uncertainty estimation and the calculation and application of deductions. The WCS Global Conservation program has foresters, modelers, remote sensing specialists, and REDD+ technical experts who are available to support Seima REDD+ activities. Additionally WCS maintains strong relationships with numerous technical partners and academic institutions who are available on a contractual basis if further technical support is required.

1.5 Project Start Date (G3)

The project start date was 1 January 2010.

1.6 Project Crediting Period (G3)

The duration of the VCS project crediting period is 60 years, 1 January 2010–31 December 2069. In CCBA terminology, this is both the project lifetime and the GHG accounting period.

The methodology (page 8) requires that the baseline is fixed for periods of ten years and then adjusted as necessary. Each ten year period is called a fixed baseline period. The first fixed baseline period will run from 1 January 2010–31 December 2019.

2 IMPLEMENTATION OF DESIGN

2.1 Sectoral Scope and Project Type

This project is an Agriculture, Forestry and Other Land Use (AFOLU) project under the Reduced Emissions from Deforestation and Degradation (REDD+) project category. Specifically, the project is of the 'Avoiding unplanned deforestation and degradation' (AUD) type. This project is not a grouped project.

The project is only claiming credits generated from avoided unplanned deforestation. This is a conservative approach since the planned activities should also avoid the risk of future planned deforestation and avoid any future worsening of degradation (currently occurring at negligible levels from the perspective of GHG emissions).

Increased carbon sequestration from reforestation or assisted natural regeneration is not a major objective of the project. Some of the forest areas where deforestation is prevented may increase in carbon stock naturally due to recovery from past logging, and in theory this might be eligible for additional credits, but to reduce project complexity no credits will be claimed for this during the first fixed baseline period.

2.2 Description of Project Activities (G3)

The objectives of the REDD+ project are directly linked to management objectives of the KSWs. Figure 2.2.1 provides an overview of the Seima Protection Forest conceptual model supporting the over-arching goal of *"A well-managed forest landscape that supports increasing wildlife populations and improving livelihoods for the people who currently live there"*. The conceptual model links the goal to four key measurable targets, a set of direct and indirect threats and a set of interventions.

Sub-decree 143 (2009), which defines the core area of KSWs, lists nine management objectives for KSWs, which map closely to the four high level Targets in the conceptual model. These are listed in Table 2.2.1 in relation to the three CCBA themes - climate, community and biodiversity. The direct and supporting Interventions on the model diagram are the project activities, or Sub-objectives as detailed in the KSWs workplans.

Table 2.2.1. Sub-decree 143 objectives mapped to project activity targets and CCBA themes.

Obj.	Description	Targets	Type
1	To protect, conserve and rehabilitate genetic resources of fauna and flora which are globally threatened.	Increase populations of wildlife of conservation concern.	Biodiversity
2	To maintain and rehabilitate important ecosystems as habitat for all forms of biodiversity.	Increase populations of wildlife of conservation concern.	Biodiversity
3	To contribute to protection and conservation, to meet the goals of the National Millennium Development Plan of the Royal Government of Cambodia, and to maintain forest cover.	Maintain the variety, integrity and extent of all forest types.	Climate

4	To conserve the culture and tradition of indigenous communities and local communities where they are living within the Protection Forest area.	Increase security and productivity of natural resources to support local livelihoods. Sufficient farmland to support the livelihoods of current residents.	Community
5	To maintain the natural resources that these communities depend on for their livelihoods and to implement the program of poverty reduction of the Royal Government of Cambodia.	Increase security and productivity of natural resources to support local livelihoods. Sufficient farmland to support the livelihoods of current residents.	Community
6	To contribute to sustainable socio-economic development through participation in the management of harvesting forest resources by the local communities, development of ecotourism and other similar activities which have very small impact to biological resources, forest and wildlife.	Increase security and productivity of natural resources to support local livelihoods. Sufficient farmland to support the livelihoods of current residents.	Community
7	To maintain carbon stored in vegetation in order to reduce carbon dioxide (CO ₂) emissions into the atmosphere.	'Maintain the variety, integrity and extent of all forest types.	Climate
8	To prevent soil erosion, to protect soil fertility and to maintain the stability and quality of water sources.	Increase security and productivity of natural resources to support local livelihoods. Sufficient farmland to support the livelihoods of current residents.	Community
9	To support other activities including technical and scientific research, education, training, community development, and environmental studies which are related to sustainable development and conservation at local, national and international levels.	All Targets.	Cross-cutting

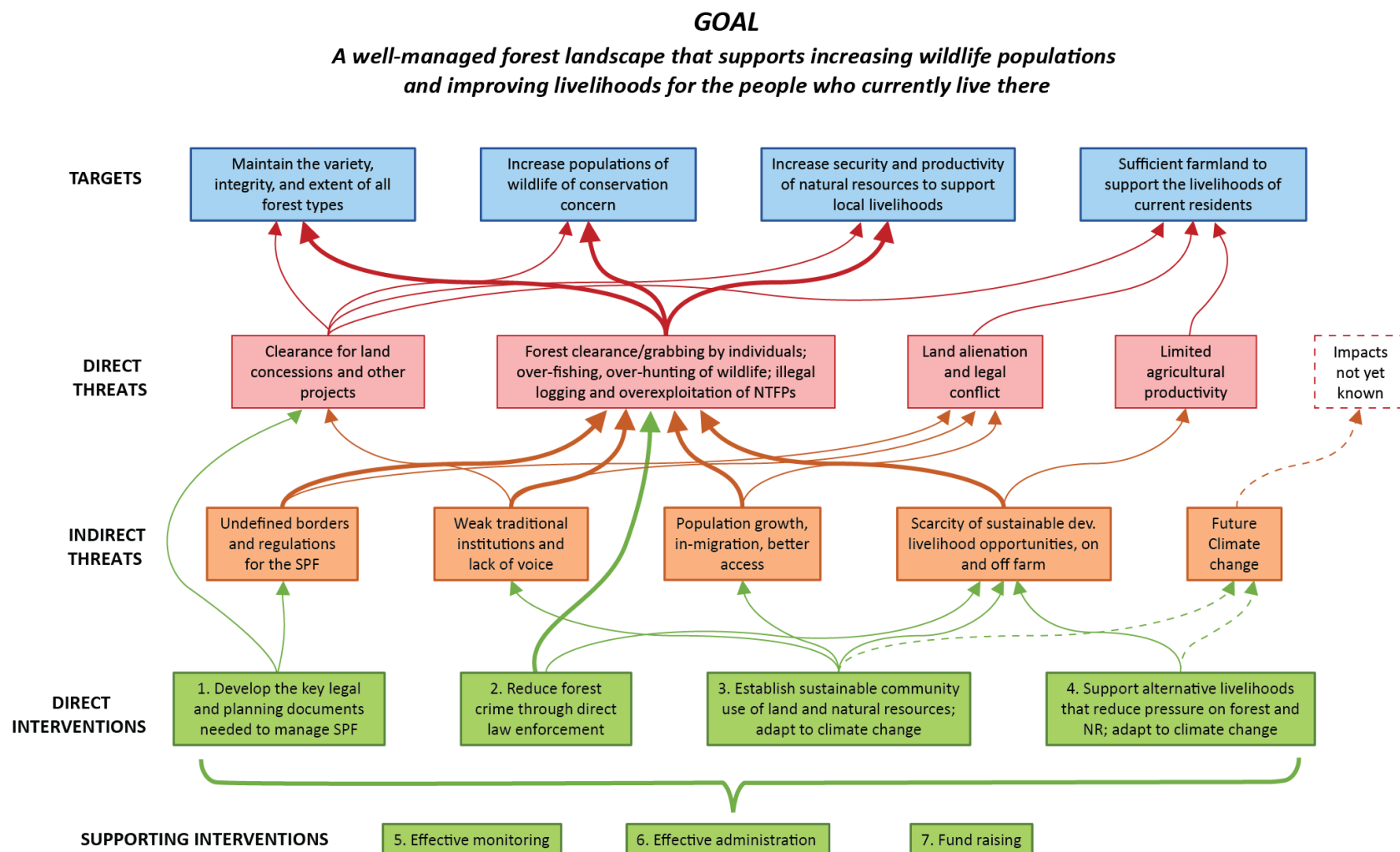


Figure 2.2.1. Conceptual model for the project. Links to the Forest Clearing key threat box have been emphasized, for clarity.

2.2.1 Direct interventions

Sub-Objective #1: Key legal and planning documents for the SPF/KSWS and surrounding landscape are approved and implemented

- Action #1: Maintain support for sub-decree among senior government and general public
- Action #2: Approve and implement Management Plan
- Action #3: Implement Monduliri Provincial Corridors strategy
- Action #4: Develop partnerships with the private sector
- Action #5: Develop international cross-border dialogue
- Action #6: Implement adaptive management systems

This group of actions addresses the indirect threat of weak legal protection and undefined borders and regulations for the site.

Sub-Decree 143 was approved in 2010 and distributed to local communities, organizations and partners. In addition, the project teams promoted KSWS REDD+ project work through meetings, workshops, media (e.g. video, newsletters, and case studies). Several visits by governments, NGOs, local communities and others were hosted to raise awareness to the general public. KSWS REDD+ leaflets were developed and shared among stakeholders. A summary of the Project Design Documents was translated into Khmer and distributed to the stakeholders in the project along with video clips on climate change and REDD+.

Overall legal protection for the site was enhanced early in the project through the development of a landscape-scale management plan with zoning and regulations for the network of protected areas, including KSWS, called the Eastern Plains Landscape. This provincial-level plan helps to maintain KSWS connectivity to other forest blocks (see WWF/WCS 2010) and has informed a national-scale forest corridor design being developed by the Ministry of Environment (MoE) that is anticipated to go into effect in 2017.

Ongoing dialogue has been maintained with private sector actors and cross-border authorities to minimize certain classes of threat. The KSWS project manager regularly participates at provincial and district levels meetings which include a range stakeholders. Furthermore, regular meetings with Vietnamese counterparts in Bu Gia Map national park which border with KSWS are held to discuss a cross border collaboration to address forest crimes and wildlife trafficking issues.

Annual public stakeholder meetings, community consultations, and ongoing monitoring activities inform the production of annual workplans and allow for adaptive management.

All of these activities, summarized in Table 2.2.2, have helped to reduce the direct threats that arise from forest clearance/grabbing by individuals, over-fishing, and over-hunting of wildlife, illegal logging and overexploitation of NTFPs. They also address the direct threat from issuance of large scale land concessions within the Project Area.

Table 2.2.2. Key activities under Sub-Objective 1: “Key legal and planning documents for the SPF/KWS and surrounding landscape are approved and implemented”.

Sub-Objective #1	Key Activities	Status
Action #1: Support for sub-decree maintained among senior levels of government and general public	• KWS Sub-decree approved 2010 • Sub decree in Khmer distributed to local communities representative and partners	Complete
	• Promote KWS REDD+ project work through meetings, conferences, media (video, newsletters, case studies) • KWS REDD+ leaflets, PD, and video distributed	Ongoing
Action #2: Management plan approved and implemented	• Management plan for the greater Eastern Plains Landscape developed in 2010	Complete
	• KWS produces annual management plans following the zonation defined in the PD	Ongoing
Action #3: Monduliri Provincial Corridors strategy implemented	• Still in discussion with provincial stakeholders	Ongoing
Action #4: Develop partnerships with the private sector	• Regularly participate in meetings at the provincial and district level with public and private stakeholders	Ongoing
Action #5: Develop international cross-border dialogue	• Regular meetings with Vietnamese counterparts in Bu Gia Map to discuss the cross border collaboration on forest crimes and wildlife trafficking issues	Ongoing
Action #6: Adaptive Management system	• Regular meetings to revise activities and work-plan. • Annual Planning Workshops (2011, 2012, 2013, 2014)	Ongoing

Sub-Objective #2: To reduce forest and wildlife crime by direct law enforcement

- Action #1: Enforce wildlife, forest and protected forest laws and sub-decree through patrols
- Action #2: Establish and implement law enforcement monitoring framework
- Action #3: Ensure sufficient patrol buildings, equipment and staffing
- Action #4: Ensure sufficient patrol personnel capacity
- Action #5: Liaise with Provincial, National and other authorities
- Action #6: Establish Community-based Patrolling and/or monitoring system

This group of actions centers on support to government-led law enforcement teams who conduct direct patrols, legal extension, stakeholder liaison and intelligence-gathering activities. Patrol activity and results are managed using the Spatial Monitoring and Reporting Tool (SMART) which provides both an ongoing database of illegal activities recorded in the field and for targeted patrol planning. KWS has maintained regular patrolling activities since the inception of the REDD+ project.

These activities, summarized in Table 2.2.3, address the direct threats that arise from forest clearance/grabbing by individuals, over-fishing, over-hunting of wildlife, illegal logging and

overexploitation of NTFPs as well as the indirect threat of illegal in-migration, which in turn will reduce the direct threat of land alienation and legal conflicts over land.

Table 2.2.3. Key activities under Sub-Objective 2: “To reduce forest and wildlife crime by direct law enforcement”.

Sub-Objective #2	Key Activities	Status
Action #1: Enforce wildlife, forest and protected area laws and sub-decree through patrols	Regular patrols by foot and vehicle	Ongoing
Action #2: Establish and implement law enforcement monitoring framework	SMART system in place and used to monitor patrol activities	Ongoing
Action #3: Ensure sufficient patrol buildings, equipment and staffing	Regular patrol equipment updates, sub-station maintenance	Ongoing
	Patrol staff numbers to be increased	Forthcoming
Action #4: Ensure sufficient patrol personnel capacity	Trainings provided for law enforcement and community patrol teams	Ongoing
Action #5: Liaise with Provincial, National and other authorities	Frequent communication with relevant provincial and national authorities for law enforcement	Ongoing
Action #6: Establish Community-based patrolling and/or monitoring system	- Identify participating communities and recruit patrol members - Extend SMART system to include community patrols - Provide equipment, training	Ongoing

Community patrol teams are being established. Communities are assisted both with resources and training to conduct patrols. These community-based patrol teams have been formed to supplement regular the law enforcement activities. The community patrols use the same SMART system as the government law enforcement to monitor patrol activities. Ongoing trainings and exchange visits are also provided to the law enforcement and community patrol teams. The community teams work directly with local authorities to counter illegal forest activities. While the project performance has exceeded ex-ante predictions, increasing pressure from illegal land grabbing and poaching will require an increase in patrol staffing levels (both government and community) to meet these expanded threats. The carbon revenue distribution system will allow for increased patrol staff numbers.

Sub-Objective #3: Land and resource use by all core zone communities is sustainable

- Action #1: Form and maintain land-use agreements with communities
- Action #2: Legally register communities and users
- Action #3: Support indigenous communal land titling (ICT) in appropriate communities
- Action #4: Demarcate the Forest Estate; reforest areas of recent clearance
- Action #5: Conduct extension and communication activities
- Action #6: Liaise with Commune Council and other agencies

- Action #7: Engage with civil society organizations operating in the Project Area
- Action #8: Ensure the capacity of Project staff is sufficient

This group of actions harnesses the motivation and capacity of community members to address three important indirect threats – (1) weak traditional institutions and lack of voice; (2) population growth, immigration and better access; and (3) scarcity of sustainable development livelihood opportunities, on and off farm. These activities center on the formation of community groups who are then assisted to develop systems for protection and sustainable use of the resources they depend upon. Some community groups, and some areas of land, can be legally registered to increase their level of protection. Communities are also encouraged to participate in government-led forest boundary demarcation activities.

Outreach activities are necessary to ensure the understanding and support of all community, local government and NGO stakeholders. By addressing these indirect threats the four direct threats – (1) forest clearance/grabbing by individuals, over-fishing, over-hunting of wildlife, illegal logging and overexploitation of NTFPs; (2) land alienation and legal conflicts over land; (3) issuance of large scale land concessions; and (4) limited land productivity will be reduced. There are a number of ongoing activities, Table 2.2.4, which support efforts to achieve all four of the project targets, as well as contributing to leakage management goals.

Table 2.2.4. Key activities under Sub-Objective 3: “Land and resource use by all core zone communities is sustainable”.

Sub-Objective #3	Key Activities	Status
Action #1: Form and maintain land-use agreements with communities	• Participatory land use plans are being established with the communities	Ongoing
Action #2: Legally register communities and users	• 7 out of 20 communities registered their land under ICT and other communities are in the ICT process	Ongoing
Action #3: Indigenous land titling in appropriate communities		
Action #4: Demarcation of the Forest Estate; reforestation of recent clearance	• KWS Sub-decree approved 2010 • Sub decree in Khmer distributed to local communities representative and partners	Complete
	• Boundary poles trialed	Ineffective
	• Boundary trench method trialed	Ongoing
Action #5: Conduct extension and communication activities	• Regular meetings with communities and stakeholders to strength the existing ICT and address some of their issues	Ongoing
Action #6: Liaise with Commune Council and other agencies	• Collaborate with commune council, village chiefs and other provincial department regarding ICT process	Ongoing
Action #7: Engage with civil society organizations operating in the Project area	• Working closely with local NGO partners (e.g. CRDT)	Ongoing
Action #8: Ensure the capacity of Project staff is sufficient	• Various trainings are given to the staff like ICT, participatory land use planning, genders, REDD+ safeguards	Ongoing

The project continues to support the ICT process and land use planning within the project communities of which 7 of out 20 villages have been officially granted communal titles. This represents the most successful example of ICT in Cambodia where only 4 titles have been granted outside of the Seima Project Zone. While the formal designation of the Seima Core Area has prevented government authorized land conversion and slowed large scale illegal conversion, demarcation has proven to be more challenging in regards to smallholder land grabbing. Boundary posts were trialed but were found to be too easy to ignore. A trench method of defining the core area boundary is currently being trialed in an area with a high risk of encroachment. To strengthen the existing ICT villages, regular meetings with local communities and stakeholders were held and also addressed some of their land issues. The project teams are also working closely with local NGOs who focus on community livelihoods, ICT and eco-tourism.

Sub-Objective #4: Support for alternative livelihoods that reduce deforestation

- Action #1: Establish sustainable timber harvests in buffer zone areas
- Action #2: Establish community-based ecotourism
- Action #3: Support agricultural extension activities
- Action #4: Provide infrastructure support linked to conservation activities
- Action #5: Develop NTFP-based livelihood projects
- Action #6: Develop and manage a system to share carbon benefits
- Action #7: Improve literacy and numeracy

This group of actions addresses the indirect threat of scarcity of sustainable development livelihood opportunities, on and off farm. These activities have provided alternative livelihoods that are less dependent on deforestation and NR harvests. They have also reduced two of the key direct threats, (1) limited land productivity and (2) forest clearance/grabbing by individuals, over-fishing, over-hunting of wildlife, illegal logging and overexploitation of NTFPs and hence provide benefits for all four of the project targets. The exact alternative livelihoods, Table 2.2.5, vary from village to village and depend on opportunities and on the preferences of the local people.

Table 2.2.5. Key activities under Sub-Objective 4: “Support for alternative livelihoods that reduce deforestation”.

Sub-Objective #4	Key Activities	Status
Action #1: Establish sustainable timber harvests in buffer zone areas	• Community Based Production Forest (CBPF) system designed • Provide trainings on CBPF	Complete
	• Establish legal agreements to allow commercial sales from CBPF activities	Forthcoming
Action #2: Establish community-based ecotourism	• Community-based ecotourism is implemented in Andoung Kralong • Develop ecotourism activities in partnership with private tour operators	Ongoing

Sub-Objective #4	Key Activities	Status
Action #3: Support agricultural extension activities	• Trainings provided on vegetable growing and livestock raising methods	Ongoing
Action #4: Provide infrastructure support linked to conservation activities	• Ecotourism facilities established • Establish agriculture and livestock demonstration sites	Ongoing
Action #5: Develop NTFP-based livelihood projects	• NTFP assessment study produced	Complete
	• Identify potential NTFP markets	Ongoing
Action #6: Develop and manage a system to share carbon benefits	• Drafting legal framework	Ongoing
Action #7: Improve literacy and numeracy	• Literacy trainings were conducted in O Rona and Gati villages	Complete

In the buffer zone of the KSWs area, community based production forest (CBPF) has been trialed and local communities trained to pilot this concept. This initiative aim to generate income for local community through sustainable timber harvesting in the buffer area. A clear legal process to allow commercial timber activities by CBPFs is being developed with the Cambodian government. To incentive communities in conservation activities, community based eco-tourism have been initiated in Andoung Kraleong village where gibbon habituation has been implemented. A tourist camping site, the Jahoo Gibbon Camp, was set to accommodate visitors in the area. Additional eco-tourism activities, particular bird watching, have been conducted in partnership with the Sam Veasna Center (SVC). Through the collaboration with local NGO partner, CRDT, several livelihood initiatives have been implemented in some villages such as vegetable growing, livestock raising, micro-credit groups, savings groups, and rainwater collection. In addition, primary assessment for potential NTFPs in the area has been completed. Efforts to identify NTFP markets are ongoing. A carbon revenue benefit sharing system and legal framework is being negotiated with the RGC.

The Conservation through Literacy Project (CLP) was a joint project of World Education and the WCS and the project was implemented from January 2010 through June 2011 in O Rona and Gati villages. The project aimed to increase the knowledge and practices of conservation among Bunong communities in the KSWs area through the implementation of a literacy and livelihoods program. The program had three primary goals: the Bunong communities would learn to read and write in Khmer language, the communities would learn financial management skills, and the project would create a viable financial literacy curriculum and model for the Bunong people. The project also worked in partnership with the provincial and district Offices of Education and supported their efforts in non-formal education in Monduliri province.

2.2.2 Supporting Interventions

The remaining groups of actions do not relate directly to specific threats but rather create the enabling conditions for implementation of the four previous groups of actions. The monitoring programs are essential to enable project management to track success, identify weaknesses, take corrective action and communicate with stakeholders in-country; many are also necessary to ensure full reporting in accordance with VCS and CCB requirements. The importance of effective administration and staff

capacity-building is self-evident. Effective fund-raising includes financial administration of the REDD+ project and is also important as the baseline scenario for the project assumes that donors will continue to support a certain level of activities through non-carbon funds.

Sub-Objective #5: Collect information on long-term ecological and social trends

Ongoing monitoring and research activities at SPF/KSWS make this landscape one of the most studied in Southeast Asia. WCS seeks to maintain continuity of long-term data collection efforts, Table 2.2.6, to support both conservation and science objectives.

Table 2.2.6. . Key activities under Sub-Objective 5: “Collect information on long-term ecological and social trends”.

Sub-Objective #5	Key Activities	Status
Action #1: Monitoring of trends in forest cover	• Create forest cover benchmark map for year 2010	Complete
	• Regular change monitoring of satellite imagery • Periodic quantitative land cover classification • Periodic review published forest loss data • Adopt new data and forest cover monitoring methods	Ongoing
Action #2: Monitoring of key wildlife species and threats to them	• Record poaching events, snare locations, and illegal forest activities in SMART database • Annual transect-based or species specific surveys	Ongoing
Action #3: Socio-economic and demography monitoring	• High Conservation Value (HCV) assessment conducted	Complete
	• Basic Necessities and Demographic Surveys (BNS) • Annual meeting • Community consultation workshops • Consultations with local NGOs	Ongoing
Action #4: Facilitate research that will benefit the management of the KSWS	• Research collaborations with agencies, universities, and organizations	Ongoing
Action #5: Ensure sufficient staff capacity is available	• Capacity needs assessment produced	Complete
	• Remote sensing monitoring trainings conducted • SMART trainings conducted • Task-specific trainings conducted	Ongoing

Monitoring via remote sensing is a vital aspect of the project and allows managers to identify new areas of clearance and forest loss, and track existing hotspot areas. GIS technicians take advantage of freely available, high resolution imagery provided by various satellites in order to monitor forest loss. The LANDSAT satellites (previously LANDSAT 7, more recently LANDSAT 8) which were launched by NASA but are now operated by the United States Geological Survey (USGS) provide satellite images every 16 days at a resolution of 30m x 30m. SMART software provides a database for managing current and historic set of ground-based observations within the Seima Protection Forest.

BNS produces a participatory, locally appropriate measure of relative economic well-being that is cheap, simple, easy to analyze and avoids many of the data quality problems with income-based measures. It measures levels of household ownership of/access to a list of essential items/services. It is very good for comparisons over time, over space and between social groups.

Comprehensive transect-based species surveys or species-specific surveys are conducted annually by the Seima science team.

Sub-Objective #6: Effective administrative, accounting and logistical procedures are in place

To facilitate the operation of KSWs, administrative and accounting system procedures were developed in order to provide an effective management of the site. Primary finance management provided by WCS Cambodia main office. Site-based administrative and finance staff were also hired to support the operation.

Table 2.2.7. Key activities under Sub-Objective 6:” Effective administrative, accounting and logistical procedures are in place”

Sub-Objective #6	Key Activities	Status
Action #1: Evaluation and feedback on staff capacity, effectiveness and training needs	Capacity needs assessment produced	Complete
Action #2: Develop and maintain effective management, administrative and accounting systems	- Adaptive management plan - Annual workplan - Monthly meetings - Interim use of WCS accounting systems - Logistical systems developed as needed	Ongoing

Sub-Objective #7: Long-term financial security

See Section 2.5 for financial security discussion.

Table 2.2.8. . Key activities under Sub-Objective 7: “Long-term financial security”

Sub-Objective #7	Key Activities	Status
Action #1: Develop and Implement REDD+ project	Validation of the KSWs REDD+ Project	Complete
	- Conduct verification - Marketing of Seima credits	Ongoing
Action #2: Continued support of a wide range of donor partners	Seek and apply for donor opportunities	Ongoing
Action #3: Increase use of commune development funds for project activities	Participate in commune investment planning meetings	Ongoing

2.3 Management of Risks to Project Benefits (G3)

2.3.1 Measures to Ensure Permanence

Most of the project activities are designed to ensure project permanence. The project incorporates a number of measures to ensure long-term sustainability of the outcomes. The key implementation of measures to mitigate risks were:

1. The project has a strong legal basis, including the permanent declaration of the Protected Forest in the 2009 Sub-decree and the program to support permanent titling of eligible land to all relevant villages. The project assists all villages who wish to obtain ICT to secure their access rights to land and natural resources for their livelihood, thereby strengthening their ability to participate in conserving their own resources. To date, 17 communities who live within and around Seima Protected Forest have engaged in the process in which 7 villages have received their ICT. These titles provide a valuable safeguard to their land and culture as well as security to the village against a range of external threats while strengthening conservation goals. The rest of villages are at various stages in the process of registration.
2. The Seima Protected Forest is experimenting with demarcation measures in the high effected areas such highly populated areas and high illegal land encroachment. It is hoped that the demarcation will slow the rate of illegal land clearance in this protected forest. Headquarter at Seima has been built in 2014 for improving the management of KSWs. Eight sub-stations have been built for increasing its effectiveness of management.
3. Seima Trust Fund, a financial model, was proposed to ensure long-term sustainability financing of KSWs. The funds to support Seima Trust Fund are to come from carbon sale, donors and eco-tourism. Currently, the community-based eco-tourism was set up in Andong Kraloeung for long term of community livelihood development with the conditionality of wildlife and forest conservation.
4. The use of adaptive management approaches to ensure work planning responds to changing conditions.
5. For long-term engagement and involvement of communities in management planning and implementation, the project carries several activities including outreach, consultation and awareness raising. The consultation process was conducted with 20 villagers who live within and around the KSWs. The residents of these villages depend upon resources inside the KSWs for their livelihoods, particularly for farming of cash crops and subsistence shifting agriculture. Thus the Free Prior and Informed Consent (FPIC) process engaged the residents of all of these 20 villages – a total of more than 2600 families or approximately 13,000 people. The FPIC process has taken over two years with awareness-raising, participation, consultation and finally seeking of local people's consent for REDD+. As result, all 20 villages have provided their free prior and informed consent for the REDD+ project to proceed.

The right to FPIC for indigenous peoples with regard to activities that impact their lands, territories and cultural, intellectual, religious and spiritual property is enshrined in the UN Declaration on the Rights of Indigenous Peoples (United Nations, 2007).

6. In partnership with the Cambodia Rural Development Team (CRDT), sustainable livelihood activities are being piloted at KSWs communities that seek to provide long-term alternatives to deforestation, unsustainable hunting and the growing risks connected to indigenous peoples' current natural-resource-based livelihoods. The livelihoods activities include micro-credit, savings, vegetables, chicken raising and increasing the yield of rice crops, water and sanitation. The eco-tourism was also created for generate income for local communities. The project is continuing to provide alternative sustainable livelihoods, and help communities generate an income from these activities and provide them with information on environmental conservation and sustainable livelihood development.
7. The inclusion of environmental awareness activities in the community engagement program. Community members were trained in different skills including tree measurement and inventory, and involved in all forest survey activities. Various activities of awareness raising of KSWs REDD+ project were conducted for local communities via meetings, consultations, video, leaflet, and exchange visits.
8. Measures to ensure an increasing proportion of staff are drawn from local communities and to develop staff capacity. Staff at KSWs are recruited locally with high priority given to IP communities for roles supporting relevant project activities including ICT, forest monitoring, and eco-tourism. Capacity building opportunities are provided to the local staff including literacy program, livelihood development, eco-tourism, FPIC, carbon accounting, and patrolling.

2.4 Measures to Maintain High Conservation Values (G3)

Project activities are designed to mitigate both the direct and indirect threats to the project targets. These targets correspond closely to the identified HCVs, Table 2.4.1, and no additional activities are planned that manage HCVs alone.

Table 2.4.1. Implemented management interventions to maintain or enhance HCVs in the Project Zone.

High Conservation Value	Project targets	Implemented Interventions
HCV1: Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values.	Increase populations of wildlife of conservation concern	Law enforcement activities to reduce hunting & trapping of Globally Threatened and endemic Species
		Law enforcement to reduce conversion of forest and wetland habitats
		Livelihood support activities to improve management for forest resources and reduce hunting pressure
HCV2: Forest areas containing globally, regionally or nationally significant large landscape level forests.	Maintain the variety, integrity, and extent of all forest types	Law enforcement to reduce conversion of forest and wetland habitats
		Land-use planning at village, Provincial and National level to reduce conversion and fragmentation of KSWs and wider landscape
HCV3: Forest areas that are in or contain rare, threatened or	Maintain the variety, integrity, and extent of	Law enforcement to reduce conversion of forest and wetland habitats

High Conservation Value	Project targets	Implemented Interventions
endangered ecosystems.	all forest types	Land-use planning at village, Provincial and National level to reduce conversion and fragmentation of KSWs and wider landscape
HCV5: Forest areas fundamental to meeting basic needs of local communities	Increase security and productivity of natural resources to support local livelihoods	Land-use planning at a village level to protect forest resources
		Development of community natural resources management rules to encourage more sustainable use of resources
	Maintain the variety, integrity, and extent of all forest types	Livelihood support activities to reduce the pressure to harvest resources unsustainably.
		Law enforcement to protect forest and aquatic resources from external pressures
HCV6: Forest areas critical to local communities' traditional cultural identity	Increase security and productivity of natural resources to support local livelihoods	Appropriate zoning of the KSWs that recognizes NTFP collection and compensates any unreasonable reductions in access
		Village level land-use planning to map and protect spiritual sites
	Law enforcement to protect spiritual sites from outside threats	
	Maintain the variety, integrity, and extent of all forest types	Appropriate zoning of the KSWs that recognizes spiritual sites

2.5 Project Financing (G3 & G4)

2.5.1 Financial Health of the Implementing Organizations

The MoE is a legally constituted branch of the Royal Government of Cambodia and as such receives annual allocations from the national budget. Hence the basic financial health and long-term stability are strong. One of the key strategies of KSWs REDD+ project is to obtain funding from carbon financing through REDD (voluntary carbon market and/or future compliance markets) which enable KSWs to be strengthened, scaled up to cover the whole of the site, and sustainably funded for the long term.

The Wildlife Conservation Society (WCS) was founded in 1895 as the New York Zoological Society. WCS is an internationally recognized not-for profit conservation organization dedicated to preserving the Earth's wildlife and wild landscapes and seascapes. WCS currently oversees a portfolio of more than 500 conservation projects in 60 countries in Asia, Africa, Latin America, and North America. The WCS financial report ending fiscal year 2014 (WCS Annual Report, 2014) demonstrates the financial stability of the organization with operating revenue of USD\$234.6 million. These operating revenue and support exceeded expenditures by USD\$1.2 million. The WCS Cambodia program has been operational since 1999 and has a strong record of financial health and effective financial management. It has maintained a broad base of donors that enables it to avoid an excessive reliance on any one source of funds.

2.5.2 Funds for Project Implementation

The work in Seima Protection Forest (now Keo Seima Wildlife Sanctuary) has been supported mostly by international donors, including private foundations, bilateral aid agencies and multilateral institutions. Donor funding for KSWs has been enough to maintain core operations, however the project seeks carbon finance to ensure the long term sustainability of the project. Table 2.5.1 shows the summary of grant revenue received for project implementation from 2010 to 2015.

Table 2.5.1. Revenue received for project implementation.

	2010	2011	2012	2013	2014	2015
Total revenue	399,241	329,703	320,355	511,898	692,274	680,389

2.6 Employment Opportunities and Worker Safety (G4)

2.6.1 Training

The core Forestry Administration (FA), WCS staff, and participating community members received training specific to their respective responsibilities, Table 2.6.1. In addition to the provision shown, all partner organizations also encourage staff with special potential to pursue further education through day-release or sabbatical arrangements. As shown, most training activities occur on an annual basis, or more frequently, so that new staff can rapidly be inducted. The project has a generally low level of staff turnover, reducing the need for retraining.

Table 2.6.1. Training activities implemented for project staff.

Group/Topics	Training Type	Status
<u>Group:</u> Senior management and technical advisors <u>Topics:</u> Conservation project design, project management and administration.	- External mentoring through existing WCS and FA systems – ad hoc basis at least quarterly - Short professional training courses, exchange visits, attendance at conferences – ad hoc	Ongoing
<u>Group:</u> Law enforcement teams <u>Topics:</u> Patrol techniques, equipment and weapons handling; Outcome monitoring methods (e.g. SMART); Human rights and related issues	- Induction and orientation for new staff – as needed - Intensive training courses (typically with other sites and agencies) – annual (8 days+) - On-the-job mentoring from technical advisors – monthly or more frequent contact - Refresher trainings in use of SMART monitoring system – quarterly or more frequent - Formal training courses through existing government systems – ad hoc	Ongoing
<u>Group:</u> Community engagement team <u>Topics:</u> Legal systems, effective communication techniques, technical forestry, forest zoning and indigenous land titling, agricultural development skills	- Nationally provided trainings on Indigenous Land Titling – semi-annual on average - Training and mentoring on facilitation techniques – annual or more frequent - Training on legal issues related to land and communities – annual or more frequent	Ongoing

Group/Topics	Training Type	Status
	• Training on community outreach and consultation, in particular related to REDD+ – annual or more frequent • Involvement in adaptive management, including annual planning – monthly meetings • Other training and mentoring as relevant to the position, e.g. tourism development – ad hoc • Short professional training courses, exchange visits – ad hoc	
Group: Monitoring team Topics: Technical and reporting skills relating to measurement of biodiversity, remote sensing and social factors	• Intensive FA/WCS joint wildlife monitoring training course – annual at start of field season • On-the-job training for GIS/RS officer – monthly during supervision visits- • Training courses on social survey methods – as needed prior to each survey	Ongoing

Technical trainings for community members, Table 2.6.2, are used to build capacity, raise interest and promote informed participation. They are usually conducted on specific village-level activities, most notably those under Sub-Objectives 3 & 4 (sustainable land-use and alternative livelihoods). These are conducted on an as-needed basis by the community engagement team or the officers of local NGO partners.

Table 2.6.2. Training activities implemented for community participants.

Objective/Topics	Training Type	Status
Objective: Community-based patrolling Topics: Legal framework; rights and responsibilities of communities; safety and security; patrolling strategies	• Combined training course (2+ days) - annual • Regular village meetings, including local authorities – bimonthly or more frequent • Mentoring during patrolling events – bimonthly or more frequent	Ongoing
Objective: Land-use agreements, legal registration of communities and titles Topics: Community land rights; legal framework; procedural steps and documentation; mapping methods; community self-organization; conflict resolution	• Capacity building and mentoring of indigenous community commissions – as needed • Training on mapping and conflict resolution – as needed • Short training courses on relevant topics – annual or more frequent	Ongoing
Objective: Forest Estate Demarcation Topics: Community land rights; legal framework; procedural steps and documentation; mapping methods; conflict resolution	• Training on mapping and GPS use – as needed prior to mapping events	Ongoing
	• Training on legal aspects and conflict resolution – as needed	Forthcoming
Objective: Ecotourism Topics: Roles and responsibilities, legal framework, coordination with authorities, service provision and service standards	• Community organization, and coordination with authorities – annual or as needed • Training and mentoring on tourism service provision – at least monthly in target areas	Ongoing

Objective/Topics	Training Type	Status
	Exposure visits to other tourism sites – as needed	Forthcoming
<u>Objective:</u> Agricultural extension <u>Topics:</u> Product identification and value-chain, sustainability, pest and disease management, post-harvest storage and value adding, product marketing	- Introductory training – as needed prior to extension - Support to model farmers to demonstrate the relevant technique – as needed - Training on relevant techniques – as needed depending on commodity	Ongoing
<u>Objective:</u> NTFP-based livelihoods <u>Topics:</u> Product identification and value chain, sustainability and harvest management, value-adding, product marketing.	- Introductory training –as needed prior to extension and product development - Support to interested community members on product value chain, sustainability, value adding, and marketing – as needed	Forthcoming

2.6.2 Equal opportunities

The Labor Law article 12, requires that all employers ‘not discriminate against any individual based on race, religion, sex, age, wealth, disability, marital status, parental status, or sexual orientation.’ This also makes sense for sound practical reasons, such as increasing the ability of the project workforce to communicate with local indigenous communities, and to deal with cultural gender barriers. Government staff assigned to the project is selected according to government procedures and policies, which can be assumed to be compliant with the law. Non-governmental positions with WCS are subject to an advertising and selection procedure that also aims to comply with the law, as follows:

- In general employment opportunities in the project are announced publicly at local and national level. Special effort is made to encourage applications from typically under-represented groups – notably women and ethnic minority applicants. This is achieved particularly by advertising locally around Seima through posters, announcements through local networks and/or word of mouth as appropriate.
- Selection is conducted in each case by an ad hoc panel of at least two people, according to a pre-agreed set of criteria that includes an emphasis on increasing the diversity of the workforce. Interviews are conducted in such a way as to minimize language or gender barriers. Final approval is given by the Country Director who also gives attention to the issue of diversity. Other relevant employment policies are listed in the WCS Cambodia Policy Manual.

Given the difficulty of recruiting directly to more senior positions by local recruitment due to the low levels of formal education prevalent in Monduliri, project staff are committed to identifying local people with advancement potential, taking them on as junior staff, interns or volunteers and investing in their professional development. These staff will be promoted to more senior positions as their capacity grows. There is a high proportion of local staff in the more junior levels of the community team, wildlife monitoring team and ancillary support staff (cooks, drivers etc.).

Education and experience is steadily increasing in local communities as Cambodia develops, and the project regularly seeks staff from local communities who are fluent in Khmer and Bunong languages. During the past year six new indigenous Bunong field staff were employed who have all recently completed Bachelor's degrees; these are some of the first generation of indigenous people in Cambodia who have attained such a level of education.

2.6.3 Health and Safety

All project staff and counterparts receive protection from WCS Health and Safety policies. In the unlikely event of a work-related incident or illness, the project provides health and accident insurance to staff and all healthcare expenses will be covered. Health and safety in the workplace is both an individual and shared responsibility of staff and the employer. WCS is committed to providing a safe working environment for all employees, contractors, volunteers and visitors. Every effort is made to minimize work-related risks to the extent reasonably possible in a field setting.

A risk assessment has been conducted for the project, and will be formally updated at appropriate intervals. This document is made available to staff. Project supervisors monitor workplace risks, to identify any significant changes in the level of risk and to report them to their line managers who, in turn, communicate with staff members.

The participating community members who involving in project activities such as patrolling and eco-tourism received trainings related to safety and security at work and most training activities occur on an annual basis, or more frequently, so that local communities can rapidly be inducted. The trainings on community patrol and SMART reports in Khmer provides information on how safety and security of the patrol teams are addressed in order to minimize risks during the patrol. In the SMART patrol books, the key information on safety procedure were provided, including first aid kit with all the patrol teams. To minimize risk of confrontation between the local communities and illegal loggers/hunters, the FA official and Military Polices (MP) along with WCS Community Patrol staff accompany the community patrol so the safety and security of the community members who going on patrol can be ensured. The FA official and WCS staff used to received training on first aid and patrol strategy to ensure that they conduct a proper patrol work. Moreover, the patrols are conducted in the form of patrol teams which comprise of 5-7 members both reducing the vulnerability of individual patrol members and increasing situational awareness. In addition, the community patrol could also contact the Mobile Law Enforcement Unit (MLEU) which comprise of FA official and MP from Seima or nearby if they encounter any trouble and the MLEU will back up the community as needed.

2.7 Stakeholders (G3)

2.7.1 Stakeholder Consultation During Project Design

The existing conservation project has engaged in extensive consultation with community members and local officials since the project start in 2002. These consultations have informed the design of project interventions and ensured consent and participation in previously implemented activities. They have also built up a high level of community buy-in for many aspects of the project, raised awareness of the legal framework, delivered initial livelihood benefits and built a good level of trust between project staff and the communities.

An updated stakeholder consultation process was conducted to ensure full community understanding of and consent for the additional REDD-specific activities. This started with the project team going through the updated analysis described in the previous section, and the identification of the 20 participating villages.

A formal consultation process was then developed on the basis of a review of Cambodian law, best practice guidelines from the literature and comments from a range of stakeholders. The design of the

process is set out in detail in WCS/FA (2011). The process began with a series of preparatory meetings and workshops at provincial, district and commune level before the main village consultations.

Table 2.7.1. Consultation activities.

Event	Frequency	Participants	Status
Community Forum	Annual.	Community representatives from all villages will be invited to attend at central location.	Ongoing
Formal monitoring of social benefits and impacts	Every 5 years	Sample households, community leaders, focus groups.	Ongoing
Consultations on design of benefit-sharing arrangements	Multiple meetings	Community representatives plus plenary discussions with all families invited. Central location and village-level meetings.	Ongoing
Consultations on implementation of benefit-sharing arrangements	At least annual once carbon finance is available	Community representatives plus plenary discussions with all families invited. Central location and village-level meetings.	Forthcoming
Consultations on specific KWS policies as required	Single or multiple events	Community representatives plus plenary discussions with all affected families invited. Central location and village-level meetings.	Ongoing
Consultations on implementation of specific village level activities	Routine component of all activities	Community representatives plus plenary discussions with all affected families invited. Village-level meetings.	Ongoing
Participation in Commune Development Planning process	Annual	Commune Councils, village representatives.	Ongoing
Participation in District Integration Workshop	Annual as necessary	Commune Councils, village representatives, NGOs	Ongoing
District Commission Meeting	Quarterly	Department of Environment (DoE)	Ongoing
Provincial Commission Meeting	As needed	Department of Environment (DoE)	Ongoing
Participation with Monduliri NGO Network	Periodic as necessary	NGOs working in and around the Project Area	Ongoing
The Civil Society Organizations REDD+ Network	Annual	Cambodia civil society involved in REDD+	Ongoing

2.7.2 Monitoring Plan Dissemination

In the Seima annual meetings, the update on REDD+ project implementation is presented to the community representatives, local authorities and local partners and in addition, the process for validation and/or verification against CCBA standards is informed in those meetings. Furthermore, during the CCBA public comment period for the project validation in 2014, the project teams visited the

20 villages to explain about CCBA and validation/verification process against the standard. Recently, during the CCBA MIR public comment period, the project teams visited the villages in the project area to explain the verification process to the local communities as well. During the community meetings in the 20 villages, the project teams informed all the participants that there would be independent auditors who come to visit their villages and interview some of them regarding the project. This was a part of the process for project validation/verification against CCB standards. During the visit of the auditors to the project sites, the local communities in the selected villages were informed in advance prior to the visit at least two to three days in advance through phone call (only some villages could be reach via phone call) and direct visits of the project teams to the villages so they could inform other community members to be available for the meeting with the auditors. The heads of the local communities were introduced to the auditors for further discussion and arrangement of the discussion and interview with community members. The project teams guided the auditors to the selected villages and let community members openly talk to auditors.

2.7.3 Public Comment Period

No comments received.

2.7.4 Conflict Resolution

No formal grievances registered to date.

3 LEGAL STATUS

3.1 Compliance with Laws, Statutes, Property Rights and Other Regulatory Frameworks (G4 & G5)

3.1.1 Evidence of Approval for the Project

The KSWs REDD+ project is one of the country's first REDD+ demonstration projects and is specifically listed as such in Cambodia's National REDD+ Readiness Roadmap (RGC 2010). This constitutes evidence of approval from the formal authorities. Evidence that the project has approval from the appropriate traditional authorities is set out in Section 3.7.

3.1.1 List of relevant laws

The project is in compliance with the following relevant laws, policies and regulations.

National laws

1. Constitution of Cambodia (1993).
2. Land Law (2001).
3. Forestry Law (2002).
4. Labor Law (1997).
5. Sub-decree #146 on Economic Land Concessions (2005).
6. Sub-decree # 118 on State land Management (2005).

7. Sub-decree #83 on Procedures for the Registration of Land of Indigenous Communities (2009).
8. Sub-decree #143 on Establishment of Seima Protected Forest and Biodiversity Conservation Area (2009).
9. Sub-decree # 83 on Establishment of Keo Seima Wildlife Sanctuary (2016).

Local laws and regulations

1. Forest Policy (2002).
2. Declaration on the Establishment of Seima Biodiversity Conservation Area in Samling Forest Concession in Mondul Kiri and Kratie Provinces (2002).
3. Sar Chor Nor #699 on the designation of the Forestry Administration as the representative of Royal Government of Cambodia to execute the sale of Cambodia forest carbon with consultation within the TWG-F&E (2008).
4. National Forest Program 2010 –2029 (2010).
5. Cambodia REDD+ National Roadmap (2011).
6. Directive 001 (2012) on the Titling of Lands in Land-conflict Areas.

3.1.2 Compliance with labor laws

Employees of government agencies including the MoE are covered by the employment conditions of their host Ministries. These can be assumed to adhere to all relevant government law and policies, and government employees are informed of their rights and responsibilities through routine government employment procedures.

For NGO partner staff, employer-employee rights and responsibilities are governed by the above laws, and additionally by their Employment Contracts, and by WCS's Internal Policies and Regulations. These policies meet or exceed the requirements of the laws and regulations covering workers' rights and conditions. All staff are given a copy of their employment contracts, which outline their rights, and refer to other relevant documents. A policy manual, working regulations and Site Operating Procedures are routinely distributed to new staff on commencement, and relevant documents are available in Khmer language at project offices.

3.2 Evidence of Right of Use (G5)

The evidence for right of use arises under law (in accordance with VCS Standard Version 3.3. Section 3.11.1) for state-owned forest land.

3.2.1 State-owned forest land

The Project Area that will generate credits was 100% State land at the project start date, under the territorial mandate of the Ministry of Agriculture, Forestry and Fisheries (MAFF) through the Forestry Administration (FA). It was first formally designated as Permanent Forest Estate in 1994, at which time it was implicitly classified as Production Forest.

It was first made a conservation area in 2002 by a government regulation ('prakas') that was signed by the Minister of Agriculture, Forestry and Fisheries. This status co-existed with its status as Production Forest. The land status of the area was reclassified to Protection Forest on September 4th, 2009 by the endorsement of a sub-decree (No. 143, 2009) by the Council of Ministers and Prime Minister Samdech Hun Sen, thus enhancing its conservation status. This legal action created the Seima Protection Forest and reaffirmed MAFF, through the FA, as the government body responsible for managing it. The Sub-decree has nine objectives, which are listed below:

1. Protect, conserve and rehabilitate genetic resources of fauna and flora which are globally threatened.
2. Maintain and rehabilitate important ecosystems as habitat for all forms of biodiversity.
3. Contribute to protection and conservation, to meet the goals of the National Millennium Development Plan of the Royal Government of Cambodia, and to maintain forest cover.
4. Conserve the culture and tradition of indigenous communities and local communities where they are living within the Protection Forest area.
5. Maintain the natural resources that these communities depend on for their livelihoods and to implement the program of poverty reduction of the Royal Government of Cambodia.
6. Contribute to sustainable socio-economic development through participation in the management of harvesting forest resources by the local communities, development of ecotourism and other similar activities which have very small impact to biological resources, forest and wildlife.
7. Maintain carbon stored in vegetation in order to reduce carbon dioxide (CO₂) emissions into the atmosphere.
8. Prevent soil erosion, to protect soil fertility and to maintain the stability and quality of water sources.
9. Support other activities including technical and scientific research, education, training, community development, and environmental studies, which are related to sustainable development and conservation at local, national and international levels.

This sub-decree is the necessary proof of title/right of use for the Forestry Administration to develop and manage a REDD+ project within the Seima Protection Forest on behalf of the RGC as the land is clearly government owned. Also objective seven gives the FA a clear mandate to implement policies to manage

the area for avoidance of carbon emissions. In April, 2016, the Project Area was transferred to under jurisdiction of Ministry of Environment (MoE) by the Sub-Decree 69. The Seima Protection Forest was changed to Keo Seima Wildlife Sanctuary (KWS) by the Sub-Decree No. 83 in 09 May 2016. The Sub-decree has three objectives:

1. Ensure the protection of wildlife habitat and ecosystems, and to ensure the necessary conditions for any type of fauna, flora and biodiversity
2. Provide natural products and services for sustainable uses of natural resources
3. Promote the participation and contributions of local communities in protected area management and conservation of biodiversity and natural resources in the areas.

3.2.1.1 Note on forest eligible to be transferred to Communal Land titles

Parts of KWS have been claimed as Indigenous Communal Title lands (ICT) under Land Law Articles 23–28, or are potentially eligible. In such areas ownership is eventually transferred by process of law to the communities and the land ceases to be part of the Permanent Forest Estate, although some parcels remain on the Land Register as State Land and the communities have no right of sale for these. Issuance of these titles is a core strategy of the project as it will help to stabilize permitted land-uses and protect community rights, and so most eligible areas will likely be titled during the first fixed baseline period. Several such titles were issued during 2012–2013.

Given uncertainty over the carbon rights in these areas, and the difficulties of establishing VCS-compliant, 60-year, ‘irrevocable’ agreements on rights of use for these areas before benefit-share arrangements and long-term income streams are secure, these areas have been excluded from the Project Area. They remain within the Leakage Belt of the project and will still be a focus of activities but will not contribute to the generation of credits.

3.2.2 Samling International logging concession

The Project Area lies within the Samling International Ltd Chhlong logging concession, issued in 1994. The concession ceased timber operations in 1999 as part of the national moratorium on logging concession operations which remains in place and is not expected to be lifted for any concession in the country (RGC 2010). Hence there is no plausible risk of resumed commercial logging by Samling at this site. This has been reinforced by the 2009 Sub-decree declaring the KWS which reassigns the whole area to Protection Forest, a land category that does not permit timber concession operations. The existence of the concession contract is not believed to entitle Samling International to any role in the management or benefit-sharing arrangements for the Seima REDD+ project.

3.3 Emissions Trading Programs and Other Binding Limits (CL1)

Cambodia is a non-Annex I signatory of the Kyoto Protocol and hence it does not have binding limits on its GHG emissions.

3.4 Participation under Other GHG Programs (CL1)

The project is only seeking registration under the VCS and CCB programs.

3.5 Other Forms of Environmental Credit (CL1)

Carbon credits are currently the only environmental credit being generated from this project. There is no intent to generate other GHG-related environmental credits for reductions claimed under the VCS program.

3.6 Projects Rejected by Other GHG Programs (CL1)

The project has not been rejected by any other GHG program.

3.7 Respect for Rights and No Involuntary Relocation (G5)

3.7.1 Free, Prior and Informed Consent (FPIC)

Consent for REDD+ activities is required from the communities that use the land, if the activities affect them. Furthermore, under VCS and CCBA rules the owner of carbon rights for a piece of land must formally agree to the sales of credits derived from these rights. The Project Area is 100% State Public Land in the Permanent Forest Estate, leading to a simple situation where all carbon rights were the property of the state which was therefore the primary decision-maker. However, the communities do have customary rights, recognized in law, to use State Public Land. Therefore explicit written community consent was obtained from all 20 participating communities. This demonstrates government commitment to treating the communities as active project participants and rights holders.

Consent was obtained through a process starting in the early stages of the project, prior to any steps to validate the project or make sales of credits. The consent was freely given and based on extensive efforts to ensure signatories were well-informed. The design of the community consent aimed to follow best practice in all important aspects. Project staff believe that it meets the requirements of Cambodian national law, and conforms to VCS and CCB requirements and the UN Declaration on the Rights of Indigenous Peoples (UNDRIP; 2007). It describes in detail what is being consented to, the term of the agreement, the rights and liabilities it confers and so on. The consent agreements were signed by the most appropriate community representatives, as well as with a thumbprint from the great majority of families in each village.

3.7.2 Involuntary Relocation

The project anticipates no involuntary relocations of legitimate occupants of the area from either residential land or farmland. However, illegal settlers or land grabbers attempting to occupy state or community land may be arrested by the relevant authorities and removed without compensation, and possibly prosecuted, in accordance with the law.

In general the project will impose no restrictions on customary use of forest resources beyond the basic legal requirements for sustainable practices, and in many cases will improve security of access and the status of these resources. The one exception is that the project is expected to propose some restrictions on customary use rights in areas to be designated as strict protection zones which will be areas of zero or near zero human use, designed to improve the survival prospects of the most vulnerable wildlife species.

The size and location of the proposed strict protection zones have yet to be decided, but they will be placed to minimize the number of forest users affected. Restriction of use falls within the CCBA definition

of 'relocation', but this will not be an involuntary process. Designation of such zones will be preceded by detailed consultations and consent process with potentially affected villages, identification of affected individuals/families and the negotiation of mutually acceptable compensation packages, which might include, but would not be limited to, employment opportunities, in-kind compensation (e.g. alternative livelihoods) or financial compensation (e.g. substituting the value of any resin tree income foregone). Confirmation that this process will entail consent is included in the text of the Community Consent Agreements.

Due to complex tenure boundaries within the project site, methods for referencing formal boundaries by patrol staff is requirement of the law enforcement monitoring framework. Field staff identify boundary areas in the field through (a) the use of boundary polygons loaded onto GPS units carried within the field and (b) site visits accompanied by on-site GIS coordinator. Regular training in the use of the GPS and recognition of the boundaries are provided to the patrol staff to the on-site GIS coordinator. These boundaries, including the formal delineation of Directive 001 (2012), are clearly visible in the GPS display. For patrol staff using paper maps, coordinates are checked with GIS officer prior to action taken. Additionally, a further check, in office, is conducted with field collected data. Any suspected encroachment is recorded by patrol staff and entered in the Spatial Monitoring and Reporting Tool (SMART) against which the formal boundaries (including Directive 001) can be checked.

3.8 Illegal Activities and Project Benefits (G5)

Project activities combine efforts to prevent illegal activities and efforts to enhance livelihoods through interventions that are clearly legal. All project spending is reviewed to ensure that it is not used to promote illegal activities.

Illegal activities drive many of the threats to climate, biodiversity and community well-being in the baseline scenario and so the project has been explicitly designed to address them. Actions under Sub-objective 2 are all designed to enhance direct law enforcement, mainly by government-led patrol teams but also by community-led patrols and other measures, including monthly and annual monitoring of the levels of illegal activity. Sub-objective 1 aims to put in place the legal and planning frameworks that deter illegal activity and Sub-objective 3 aims to establish legal land tenure and land management systems for community areas.

4 APPLICATION OF METHODOLOGY

4.1 Title and Reference of Methodology

This project is using the methodology entitled 'Methodology for avoided unplanned deforestation' which is the VCS's approved VM 0015, version 1.1 (December 2012).

4.2 Deviations from the Monitoring Plan and/or Project Document

The Project Proponent representative was changed from the Forestry Administration (FA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF) to the Ministry of Environment (MoE).

4.3 Project Boundary (G1)

The Project Area, Leakage Belt and Leakage Management Areas are non-overlapping regions that collectively comprise the Project Zone which is 296,769 ha in size. To ensure that the Project Zone is inclusive of all project activities, the boundary was expanded to include all participating villages within the entire core area.

4.3.1 Project Area

The Project Area comprises 166,983 ha of forested land located within the Core Protection Area of the Seima Protection Forest (Figure 4.3.1). It excludes non-forest land within the boundary. It includes all forest in the Core Area as designated at the time of the 2009 Sub-decree except for areas with complex tenure arrangements, as follows:

1. Areas mapped for issuance of private titles during the national 2012 land amnesty.
2. Areas issued Indigenous Communal Land titles.
3. Areas mapped as proposed ICT by eligible villages.
4. Areas potentially eligible for ICT in villages that have not yet done mapping.
5. A small area along the western margin that has subsequently been reallocated to the Binh Phouc I rubber concession. This small area is now potentially subject to planned rather than unplanned deforestation and so is no longer covered by the scope of the Methodology.

4.3.2 Leakage Belt

The Leakage Belt (Figure 4.3.1) is the forest land surrounding or adjacent to the Project Area in which baseline activities could be displaced due to project activities implemented in the Project Area. The project has defined the Leakage Belt through a mobility analysis (Annex 3.2 of the PD) by developing buffers around local community areas that are located within or adjacent to the park and around access routes near the boundaries along which new farming areas and settlements might develop. Some parts of the Leakage Belt applicable from 2010 became unavailable for unplanned deforestation from 2012 onwards due to the presence of active Economic Land Concessions. The Leakage Belt has been delineated in a GIS shape file and provided to the auditor.

4.3.3 Leakage Management Area

Since the project seeks to prevent leakage partly through agricultural intensification, the Leakage Management Area includes all anthropogenic non-forest land that was located within the Project Zone at the project start date (Figure 4.3.1).

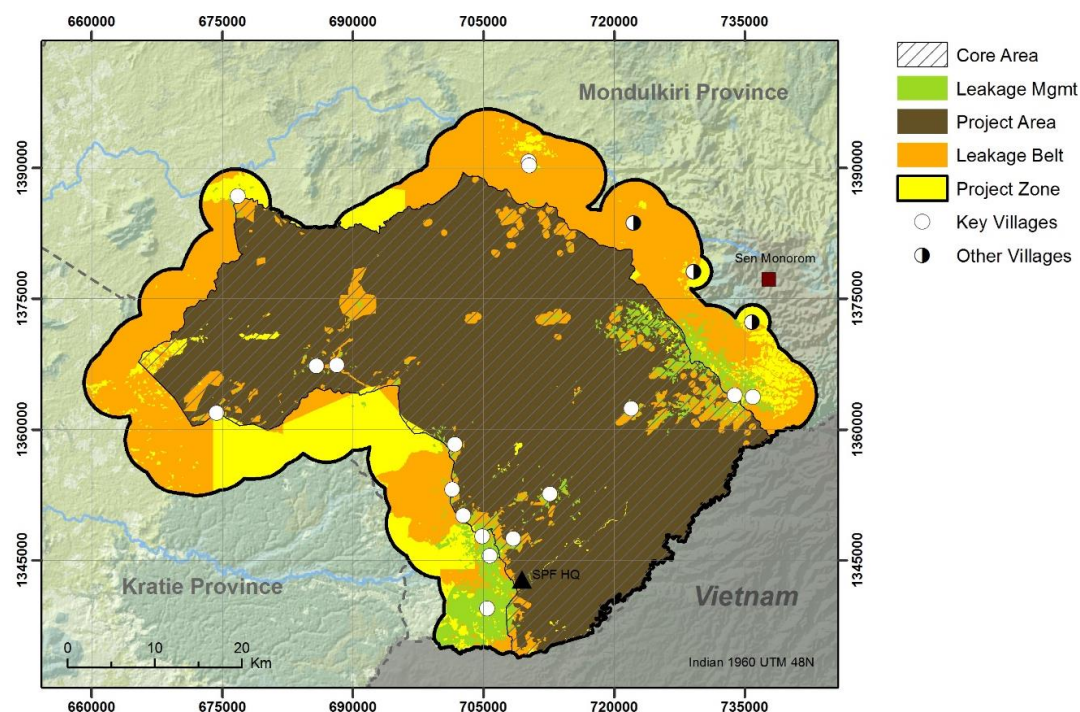


Figure 4.3.1. Project boundaries.

4.3.4 Carbon Pools

Table 4.3.1 shows which of the six carbon pools considered by the Methodology have been selected for measurement under this project. The project will measure above and below ground tree biomass and dead wood. Other pools are deemed insignificant.

Table 4.3.1. Carbon pools included or excluded within the boundary of the proposed project.

Carbon Pools	Included/Excluded	Justification/Explanation of Choice
Above Ground	Tree: Included	Carbon stock change in this pool is always significant.
	Non-tree: Excluded	This pool will be larger in the with-project case and so it is conservative to omit it. It is also not of significant size.
Below Ground	Included	This pool represents roughly 9.1% of the emission reductions of the project making it significant.
Deadwood	Included	This pool represents about 2.5% of the emission reductions of the project in each forest class, making optional whether to include it.
Harvested Wood Products	Excluded	Not Significant
Litter	Excluded	Not Significant
Soil Organic Carbon	Excluded	Not to be measured in conversions which include perennial crops, as is the case in the current project.

4.3.5 Sources of GHG Emissions

The Methodology only considers non-CO₂ emissions from biomass burning and livestock as sources of GHG emissions. Sources of emissions must be determined for the baseline and project scenarios as well as for leakage prevention activities. Emissions included in the baseline scenario consist of CO₂ emissions from deforestation and degradation. In terms of project activities, the Methodology excludes GHG emissions from fossil fuel consumption. The Methodology excludes emissions from fertilizer use. Table 4.3.2 shows that all non-CO₂ emission sources have been excluded from the project design.

Table 4.3.2. Sources of GHG included or excluded within the boundary of the project activity.

Source		Gas	Included?	Justification/Explanation
Baseline Scenario	Biomass Burning	CO ₂	Excluded	Counted as carbon stock change
		CH ₄	Excluded	It is optional to include this source of emissions.
		N ₂ O	Excluded	Considered Insignificant according to VCS program update of May 24th, 2010.
	Livestock Emissions	CO ₂	Excluded	Livestock are not found in significant numbers in the baseline or with project scenario, and emissions from them will be smaller in the with-project scenario so it is conservative to omit them
		CH ₄	Excluded	
		N ₂ O	Excluded	
Project Scenario	Biomass Burning	CO ₂	Excluded	Counted as carbon stock change
		CH ₄	Included	It is mandatory to include this source if it is significant, so it must be monitored.
		N ₂ O	Excluded	Considered Insignificant according to VCS program update of May 24th, 2010.

4.4 Baseline Scenario (G2)

See Section 5.3 and related Annexes of the PD for the full description and justification of the baseline scenarios. A summary of the key components is provided below.

The most plausible baseline scenario for the Project Area is accelerating unplanned deforestation from small holder farmers partly mitigated by continued grant-funded conservation activities at declining levels. In this scenario the Project Area would continue to be managed as it was during 2002–2010, as an area of Production Forest designated as a Biodiversity Conservation Area by Ministerial Decree. This management approach would take place against a background of threats that are similar in nature but greater in intensity compared to the historical period..

In this baseline scenario operational funds would continue to derive from short-term grants that are raised by WCS from a variety donors. Management effectiveness would decline under this baseline scenario due to declining availability of grant funds and concomitant declines in political support. The funding history of the site and the reasons for projecting a decline in funding for core protection activities are set out in Annex 3.4 of the PD. Past levels of funding have been enough to mitigate but not prevent the effects of these drivers on deforestation rates (see Section 5.3 of the PD, and Evans et al. 2013). Hence a decline in funding will exacerbate the impact of rising threats on rates of deforestation.

4.4.1 Historic Deforestation

Historic deforestation in the Reference Region was measured using land cover classification of 14 historic Landsat images ranging from 1998 to 2010. A detailed description of the analysis of historical land use and land cover change within the Reference Region can be found in Annex 3.5 of the PD. Figure 4.4.1 shows the results of the classification and change detection.

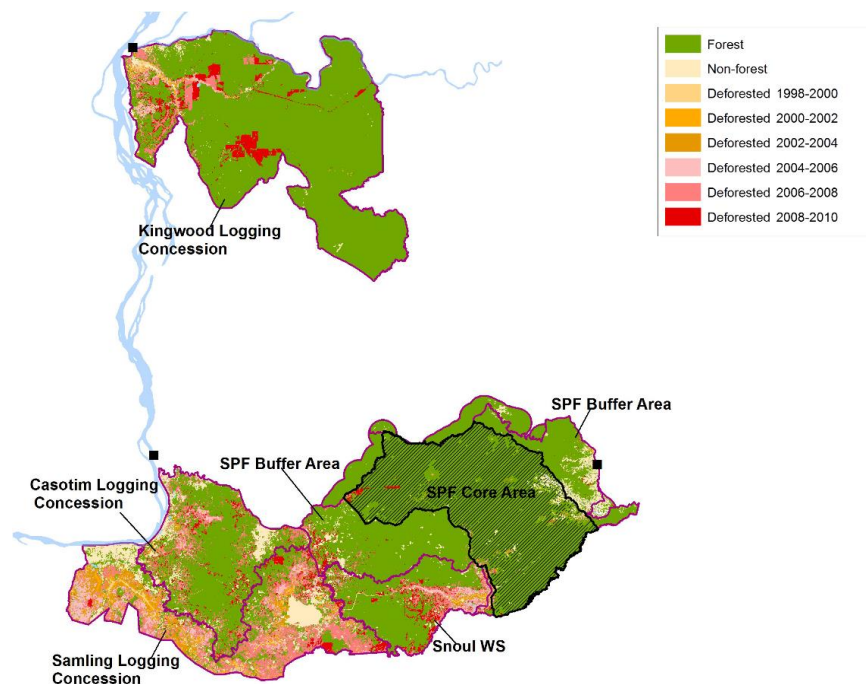


Figure 4.4.1. Deforestation over reference region from 1998 to 2010.

4.4.2 Deforestation Drivers

An analysis of the causes of deforestation, see Section 4.5.2 of the PD, identified two main agents of deforestation in the Reference Region, Table 4.4.1, and the relative contribution of these agents to historic deforestation, Table 4.4.2.

Table 4.4.1. . Summary of the main agents of deforestation in the Reference Region.

Agent group	Type of deforestation	Stratum (see Annex 3.1)	Occurs in Project Area	Comments
Smallholder farmers	Unplanned	1 (Non-ELC)	Yes	Active throughout the historical reference period
Economic Land Concessions	Planned	2 (ELC)	No	Very limited prior to 2008; greatly increased through 2008 –2012

Table 4.4.2. Deforestation attributable to each of the main groups of agents.

Agent or Group	Deforestation (ha) by Period					
	1998–1999	2000 –2001	2002 –2003	2004–2005	2006–2007	2008–2009
Smallholder Farmers						
Extent of forest at start of period	933,598	928,404	917,658	898,255	843,139	715,296
Deforestation during period	5,194	10,747	19,403	27,413	80,622	25,633
Cumulative deforestation	5,194	15,941	35,344	62,757	143,379	169,012
Economic Land Concessions						
Extent of forest at start of period	0	0	0	0	27,703	71,436
Deforestation during period	0	0	0	0	3,488	11,800
Cumulative deforestation	0	0	0	0	3,488	15,288
All Agents						
Extent of forest at start of period	933,598	928,404	917,658	898,255	870,841	786,732
Deforestation during period	5,194	10,747	19,403	27,413	84,110	37,433
Cumulative deforestation	5,194	15,941	35,344	62,757	146,867	184,300

4.4.3 Driver Variables Explaining Quantity and Location of Deforestation

Table 4.4.3 summarizes key proximate driver variables which affect the rate of deforestation in the Reference Region while Table 4.4.4 summarizes the most important factors influencing the two main agents of deforestation and the likely trends in the drivers over time. See Annex 4.2 of the PD for the formal statistical analysis.

Table 4.4.4 summarizes factors correlated with the location of deforestation. Some of the drivers can be partly mitigated by project activities, within the Project Area and Leakage Belt. No statistical model was developed for planned deforestation since no quantitative projection is required, so the conclusions in Table 4.4.3, in this case, are based on qualitative sources and are provided mainly for illustration.

Table 4.4.3. Proximate drivers of the rate of deforestation in the Reference Region as a whole..

Factor	Relevance for smallholder farmers	Relevance for ELC	Likely trend in first fixed baseline period	Project measures to control drivers
Population size/density	More families interested in farm expansion; proxy for higher local market demand and reduced costs through access to local markets	Unknown. Implies better accessibility, available labor and lower input costs. It also implies higher risk of land conflict.	Likely to increase across the region, with rates varying from place to place.	Deterring in-migration. Decouple population density from forest pressure by facilitating move to off-farm/off-site livelihoods
Availability of fertile land to deforest	Areas with extensive fertile land are attractive	Companies are likely to prefer areas with a high % of forest, since they need large blocks of land for economies of scale	Likely to decline due to progressive forest loss and exclusion from land under ELCs but remain high relative to demand for land	No action possible.
Access to external markets	Regions closer to large centers have better market access and so higher returns of farming	Regions closer to large centers have better market access and so higher returns of farming	Increasing access as regional transport networks and infrastructure expand	No action possible.
Road density	Increases accessibility and lowers input costs; also a proxy for general levels of economic development	Increased accessibility and lowers input costs; also a proxy for general levels of economic development	Likely to increase significantly	Prevent the creation of unnecessary secondary roads in areas with high carbon density
Proportion of the region under effective protection	Deters deforestation	Reduces likelihood of permits being issued	Likely to decrease in the absence of REDD funding; government policies promote the region as a 'development pole'	Increase the extent of effectively protected areas; promote application of current environmental protection policies

Table 4.4.4 summarizes the most important factors influencing the two main agents of deforestation and the likely trends in the drivers over time. See Annex 4.2 of the PD for the formal statistical analysis.

Table 4.4.4. Factors correlated with location of deforestation during the historical reference period.

Factor	Relevance for small holders	Relevance for ELCs	Likely trend in first baseline period	Project measures to control drivers
Distance to recently deforested land	Economies of scale, minimized travel cost, preference to live near others, proven fertility of area	Probably not relevant (may even be a negative factor)	Increased relative risk - Declining distance to nearest recent deforestation as deforestation expands according to modelled trends	Reduce the total extent of deforestation and limit it to near existing locations where possible; decouple risk from this variable by improved demarcation, patrolling and community acceptance of forest boundaries
Travel time to nearest district town and distance to Mekong River	Proximity to markets/suppliers	Proximity to markets/suppliers	Increased relative risk - reducing travel times to remote areas as road network improves	Prevent the creation/upgrading of unnecessary secondary roads; increased controls on movement along forest roads through better law enforcement and community-based management
Protection status (combination of legal status and level of investment/ technical support)	Ease of deforesting without intervention of the authorities	Difficulty of obtaining permits; risk of public criticism	Increased relative risk - flat or declining effectiveness, due to increasingly constrained funding opportunities	Enhance protection status and effectiveness
Vegetation type (dense vs. open forest)	Presumably an indicator of better soils for farming	Presumably an indicator of better soils for farming	No change	Not applicable
Elevation	Steep slopes are impractical to farm and often of lower fertility	Steep slopes are impractical to farm and often of lower fertility	No change	Not applicable

4.4.4 Identification of Underlying Causes of Deforestation

As elsewhere in the world the fundamental driving force for deforestation in the reference area by both smallholder farmers and large economic concessions is the general aspiration of people to improve their material standard of living. For the poorest this means attaining food security, for the less poor, middle-

income and rich smallholders it means seeking increasing levels of wealth and for companies it means achieving a strong return on investments. Deforestation results when it is perceived as the easiest way of fulfilling these aspirations in a given location. Project interventions are aimed both at reducing the factors that encourage deforestation whilst strengthening some of the opportunities for people to follow other paths for improving their well-being.

In the Reference Region, as in most of Cambodia, agriculture is currently a dominant source of income, and one of a number of sectors where smallholders and large companies seek income growth. Several factors encourage a focus on agriculture rather than other sectors, in particular the rising prices of agricultural products, limited rural education levels that make it difficult to enter other sectors and the relatively limited availability of employment in other sectors in Cambodia. Within the agricultural sector, growth can come about through expansion or intensification. While intensification does not directly cause deforestation, expansion usually does (since most unfarmed land with agronomic potential in Cambodia is still forested). Several factors encourage people to expand the area of land they farm rather than intensifying or concentrating on other economic activities. Five of the dominant underlying factors are listed in Table 4.4.5. For some of these underlying drivers the trends are predicted to be either flat or rising. It should be noted that flat levels of underlying drivers (e.g. governance effectiveness) combined with rising levels of proximate drivers (e.g. human population size) still combine to give a rising level of threat of deforestation.

Table 4.4.5. Underlying causes encouraging expansion of agriculture into forest that are relevant to both smallholders and ELCs.

Factor	Likely trend	Project measures to control drivers
Barriers to farm intensification or moving into other sectors	Flat or rising (and hence an increasing driver)	Reduce barriers to intensification; promote access to other sectors (alternative livelihoods)
Weak governance and poor funding to enforce laws protecting forest	Rising (and hence an increasing driver)	Increase funding, strengthen governance
Limited ability of local stakeholders who value forest to prevent clearance	Flat, currently very low (and hence a steady driver)	Empower community approaches and increase formal land tenure
Low perceived value of standing forest by many stakeholders (costs of clearance externalized)	Flat currently very low (and hence a steady driver)	Increase value through environmental payments (REDD+ etc.)
High and rising prices for agricultural products, linked to national, regional and global demand trends	Rising (and hence an increasing driver)	Outside scope of project

Based on the historical relationship between the main agent groups, key drivers and underlying causes, it has been found that the following two sequences of causative steps have typically led to and will lead to deforestation.

1. Sequence for smallholder farmers:

- Small-holder farmers wish to achieve food security and improve their levels of income.
- Income growth is mainly dependent on agriculture as opportunities to move into other sectors are often limited.

- Opportunities to intensify agriculture are often limited. By contrast, expansion of farmland into forest areas is relatively easy under current conditions, despite the law.
- Weak forest governance, low investment in forest protection, poor recognition of non-monetary forest values, and limited opportunities for current forest-users to protect their resources all facilitate expansion of farmland into forest areas.
- This process is accelerated by rising commodity prices, improving road networks, rising populations and other economic development factors.

2. Sequence for ELCs:

- Companies and investors increasingly wish to invest in profitable ventures in Cambodia.
- Rising regional and global demand creates strong markets for crops.
- Good soils, climate and access make the Reference Region potentially attractive and so companies propose projects.

Rising availability of foreign direct investment and pro-business government policies interact with weak forest governance, low investment in forest protection, poor recognition of non-monetary forest values, and limited opportunities for current forest-users to protect their resources to facilitate issuance of concessions in forest areas.

Many of the direct and underlying drivers of deforestation in the Reference Region (and specifically in the Project Area) are expected to increase during the project crediting period compared to the historical reference period with respect to both smallholder farmers and ELCs, and, while some may remain stable none are likely to decline. This can be considered conclusive evidence that deforestation rates rise will across the Reference Region, and within the Project Area, through the first project crediting period. This provides a basis for the quantitative projection of the most credible baseline scenario.

4.4.5 Projected Baseline

A linear regression was identified as the best time series function for projecting deforestation and a regression with good fit to the historical data was found (Figure 4.4.2). This regression also provides a very close fit to the first data point of the with-project period. As the regression projects an increase without limit the Methodology requires a cap to be set once a certain cumulative amount of deforestation has been predicted. This process is explained in Annex 4.1 of the PD.

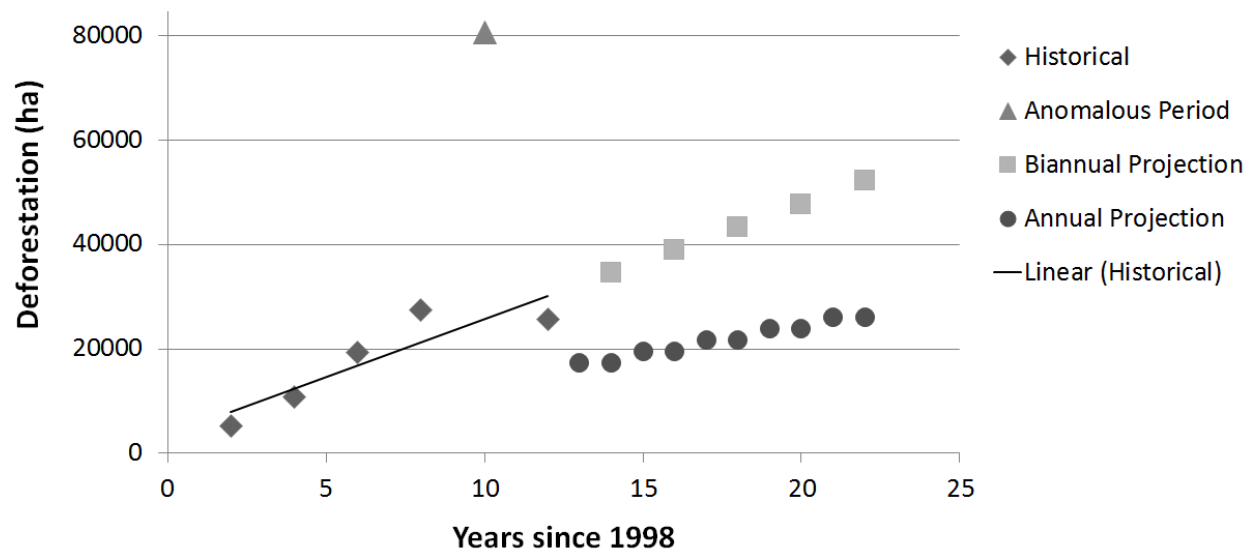


Figure 4.4.2. Modelled deforestation 2010–2019 in comparison to observations from the historical reference period.

A Generalized Linear Model (GLM) using spatially explicit deforestation risk explanatory variables was used to determine deforestation probabilities. Combined with the projected deforestation baseline these probabilities were used to model future deforestation, Figure 4.4.3, under the baseline scenario.

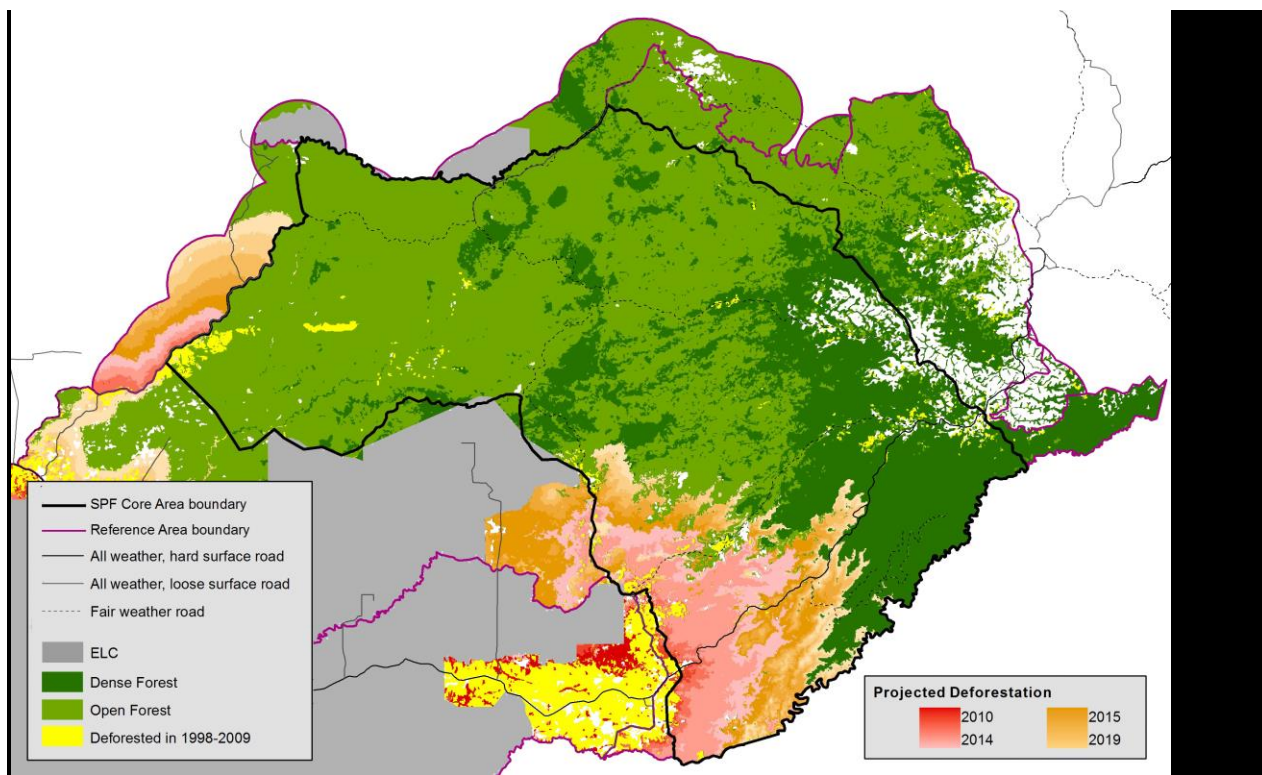


Figure 4.4.3. Total projected deforestation over the Project Area from 2010 – 2019.

4.4.6 Baseline Scenario with Respect to Biodiversity

The main threats to biodiversity in the Project Zone are similar to those familiar to conservationists throughout tropical Asia (e.g. Corlett 2009), most notably deforestation, illegal logging, unsustainable fishing and hunting. These threats were first documented for the site in 2000 (Walston et al. 2001) and have been systematically documented since 2005, providing an indication of historical baseline trends and informing predictions. The threats are grouped into three major, widespread threats:

- Hunting. The most significant threat to key wildlife populations is over-hunting. This has already probably long ago eliminated several species from the Project Zone (e.g. Kouprey Bos sauvelii, Wild Water Buffalo Bubalus arnee,), and over recent decades has dramatically reduced populations of ungulates. Tigers are now believed to have been extirpated from Mondul Kiri Province as a whole, due to direct hunting and loss of prey species through hunting.
- Habitat loss. Deforestation and other forms of habitat conversion have severe impacts on biodiversity. This usually leads to the total destruction of natural habitats and their replacement with farmland or residential areas. These habitats typically support very few of the species present in the original forest, and almost none of those are currently of conservation significance in Indochina.
- Selective logging/overharvest of NTFPs. Unsustainable illegal logging of rare luxury class timber species takes place in almost any dense forest area across the Project Zone. Several other plant resources are over-harvested as well, including the large bamboo species *russei* thngor (Mann Mouy 2010), several species of rattan and trees with valuable fruit such as *Strychnos nux-vomica* (sleng) and *Sterculia lychnophora* (samraong).

4.4.7 Baseline Scenario with Respect to Communities

The widely used Sustainable Livelihoods Approach (SLA) formed the basis to determine the community baseline scenario. This conceptualizes wellbeing as the combination of family or personal assets in five broad classes (natural, physical, social, human, and financial) and predicts trends in assets on the basis of the immediate pressures families face ('the vulnerability context' such as health risks and crop failures) and a set of external 'transforming structures and processes' such as changing government policies and social norms. The following overall changes are expected in the major livelihood outcomes as defined by the SLA. Average income may increase or decrease overall, depending on the macro-economic situation. It is suspected that long-term it will tend to increase in most plausible scenarios, due to underlying national trends. However, it is noted that these average increases conceal differences between groups and some may become worse off. In particular, increasingly unsustainable use of the NR base (rattan, timber, bamboo, sleng fruits, fish, wildlife, etc.) is likely to produce brief income peaks as each resource is over-harvested, followed by a decline until the next resource is targeted, with an overall long-term decline in NR-based income. Dipterocarp resin is the most important harvested natural resource. Although resin harvests are thought to be sustainable (Evans et al. 2003), the trees themselves are at risk from deforestation and logging and so will decline. This will be true for both Khmer and indigenous families, but more significant for the latter due to their higher dependence on NR. Declines in water supply and quality are also predicted.

Some farmers will benefit from the expansion of their land holdings, but many others, especially weaker indigenous families, may experience land alienation and lose income or subsistence products from this source, increasing vulnerability and reducing food security. Many Khmer families may experience high insecurity due to insecure tenure on illegally grabbed land, and all families face the potential risk of dispossession and conflict due to problems with land concessions, which have been widely documented in Cambodia. Land fertility is likely to decline in many areas due to unsustainable practices made worse by insecure tenure, lowering farm-based incomes after brief peaks due to the exploitation of freshly exposed forest soils.

Indigenous communities are also likely to suffer declines in non-material aspects of well-being, due to weakening of cultural institutions, loss of access to spiritually important forest and land, the shift from farming to laboring and so on. Trends in labor rights and gender equality are hard to predict, and could improve or decline depending on many factors. Health and child education levels seem likely to improve with increasing public investment, but again there will be losers who cannot afford to buy into these services, and there is little prospect of non-formal education to address the persistent very low levels of adult literacy.

4.5 Additionality (G2)

See the results of VCS Tool VT0001 demonstrating additionality in Section 4.6 of the PD. This analysis concludes that the climate, community and biodiversity benefits of the project can be considered additional in comparison to the most plausible yet conservative baseline scenario.

5 MONITORING DATA AND PARAMETERS

5.1 Description of the Monitoring Plan (CL3, CM3 & B3)

5.1.1 Adaptive Management and Annual Monitoring Cycle

5.1.1.1 Organizational structure, responsibilities and competencies

Figure 5.1.1 shows the general organization structure of the KSWS site. The Project Manager (1) manages technical teams (4–8) who in turn manage field activities (9–15). The Project Manager is supported by one or more Technical Advisors. Responsibility for the monitoring of project implementation rests with the Project Manager, in collaboration with a KSWS Technical Advisor (2). Additional technical support is provided by the Country Program main office including a REDD+ Technical Advisor and a National REDD Specialist. The GIS/SMART team is managed from the Country Program main office by a GIS Team Leader and a SMART Training Coordinator. The GIS Team also includes an on-site GIS Officer and/or GIS Analyst. Occasional support is also provided by the WCS global network of specialists.

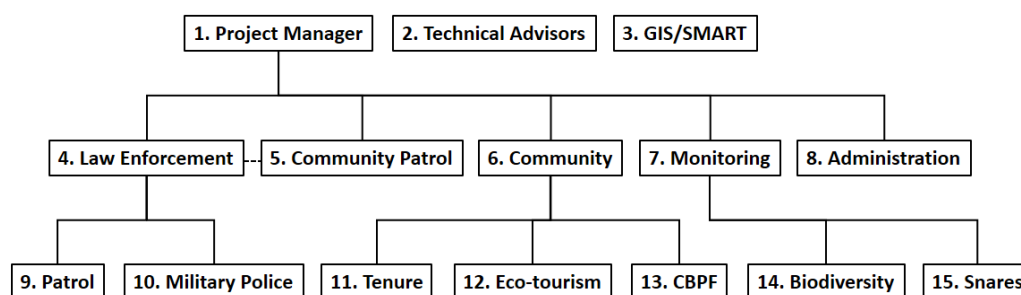


Figure 5.1.1. Organizational structure of KSWs project staff.

KSWs operates an adaptive management system based on an annual work-planning cycle. A new annual plan is developed each year. The new plan is based on two main inputs – the strategic management plan and the results of implementing the previous year’s plan.

Monitoring responsibility is distributed across the KSWs organizational structure. Specific roles and responsibilities for the three required monitoring tasks are listed in Table 5.1.1.

Table 5.1.1. Three monitoring tasks and their responsible parties and required competencies.

Monitoring Task	Responsible Parties	Competencies
Monitoring of carbon stock changes and GHG emissions	Project Manager, GIS Team Leader, Technical Advisor(s)	Remote sensing, land cover classification, GIS, carbon measurement, data analysis
Monitoring community impacts	Project Manager, GIS Team Leader, Community Team Leader, Technical Advisor(s), Consultants	Social survey methods, community outreach, networking, socio-economic analyses
Monitoring biodiversity impacts	Project Manager, Law Enforcement Team Leader, GIS Team Leader, Monitoring Team Leader, Technical Advisor(s)	Law enforcement patrol planning and implementation, biodiversity survey methods, wildlife and plant species identification, data analysis

5.1.2 Monitoring Carbon Stock Changes and GHG Emissions (Task 1)

5.1.2.1 Monitoring C-stock changes and GHG emissions within the Project Area (Task 1.1)

Task 1.1 is divided into four components: monitoring of project implementation; monitoring of land-use and land-cover change (i.e. activity data), monitoring of carbon stock changes and non CO₂ emissions from forest fires (i.e. emission factors) and monitoring of impacts of natural disturbances and other unexpected events.

Task 1.1.1: Monitoring of project implementation

Project activities are carefully monitored and recorded with monthly reporting from Team Leaders to the Project Manager who in turn reports to the Ministry of Environment (MoE). Annual reports are also produced during annual work-planning meetings. Law enforcement activity is recorded in a SMART database. All information is archived with the MoE (various offices), on-site, and/or at the WCS Country Program office.

Task 1.1.2. Monitoring of land-use and land-cover change

Qualitative monitoring is conducted regularly to identify locations of deforestation to inform management decisions. This monitoring includes visual identification of deforestation areas on satellite imagery, rapid non-rigorous land cover classifications, and occasional review of globally available deforestation datasets.

Quantitative monitoring, using land cover classification Landsat imagery, was conducted in preparation for verification. The only mandatory category of change subject to MRV in the KSWs project is Category I, the area of forest land converted to non-forest land (Methodology Table 37). No existing national monitoring program exists that is comparable to those used to determine the project baseline, so data must be collected specifically for the project.

The monitoring task was conducted in as similar a fashion as possible to the analysis of the historical baseline period (see Annex 3.5 of the PD). The remote sensing imagery used, however, is from Landsat 8 which began recording in 2013. The deforestation monitoring method from Annex 3.5 of the PD uses a change detection method which requires the comparison of imagery values for two time points. The scenes for the two time points are combined into a single multiband file prior to classification. While Landsat 8 records similar band ranges as the previous Landsat-based sensors, the bit-depth was expanded from 8-bit (0-255) to 12-bit (0-4095). For the change detection method to work, band value properties between dates must be similar. It was found that, after scaling the 12-bit pixel values to 8-bit, Landsat 8 still had much greater dynamic range (increments of data between minimum and maximum values) than the prior Landsat images making the pairing unsuitable for the change detection method. Therefore the final Landsat 8 scene classified, 28 February 2016, was paired with the earliest suitable Landsat 8 scene, 24 April 2013 (Table 5.1.2).

Table 5.1.2. Landsat 8 scenes used for land cover classification.

Sensor	Path-Row	Date	Notes
Landsat 8 OLI	125-051	24 April 2013	Earliest suitable image
Landsat 8 OLI	125-052	24 April 2013	Earliest suitable image
Landsat 8 OLI	125-051	28 February 2016	First suitable image after 2015/2016 rainy season
Landsat 8 OLI	125-052	28 February 2016	First suitable image after 2015/2016 rainy season

The Forest Benchmark Map, as described in the PD, was created from Landsat imagery dated 23 April 2010. As a result, there are two monitoring periods for the first verification (1) 23 April 2010 to 24 April 2013, and (2) 24 April 2013 to 28 February 2016. The full processing steps used for the land cover classification were as follows.

1. Download Landsat imagery from USGS.
2. Ensure both dates are co-registered (L1T processing level from USGS was sufficient)
3. Mosaic and create single multiband file from all four scenes
4. Clip to Area of Interest (AOI)
5. Create training areas for supervised classification
6. Use LNCD Sampling Tool to sample the training and imagery

7. Use See5 data mining tool to construct classifier
8. Use See5 Image Classifier to generate classification with change detection
9. Iterate Steps 5 through 8 until diminished returns
10. Edit classification error areas
11. Filter 3 by 3 pixels to eliminate isolated pixels
12. Accuracy assessment, using 10m resolution Sentinel 2 imagery
13. Mask to the full KSWs boundary and Project Zone

The classification validation was conducted by creating an error matrix, Table 5.1.3, from high resolution image interpretation by on-site staff. The sample design used contiguous areas of land cover 2.25 ha or greater (area of a 5x5 pixel grid) and less than 212 m (diagonal distance across 5x5 pixel grid) from cover type boundaries to ensure clearly identifiable cover areas. The imagery was from the ESA Sentinel 2 satellite with an overpass date of 13 February 2016. This is 10 m resolution multispectral imagery, an example shown Figure 5.1.3.

Table 5.1.3. Results of the verification classification accuracy assessment.

Cover Type	Area Weighting	Accuracy Measure	Accuracy
N=400		Overall	98.24%
Dense forest	28%	Users	98.2%
Open forest	54%	Producers	97.5%
Non-forest	18%	Kappa	97.06%

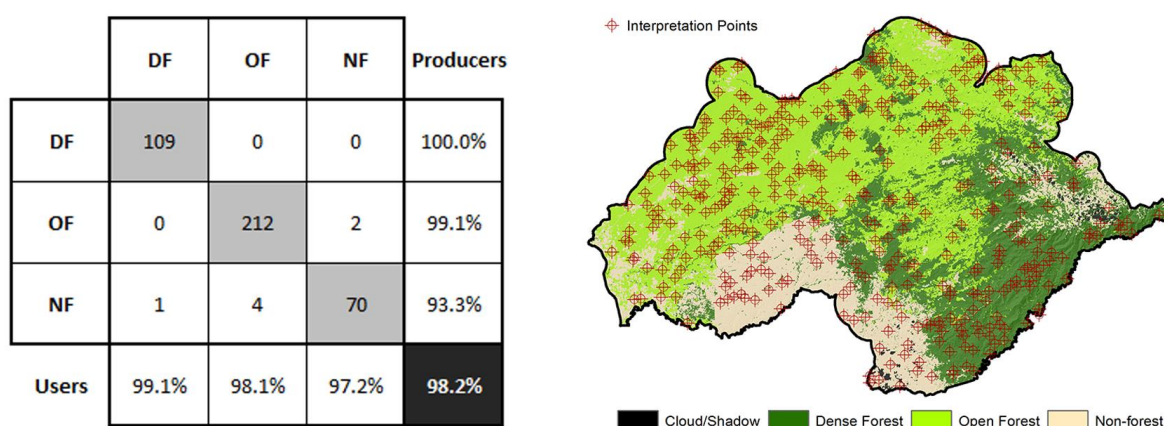


Figure 5.1.2. Accuracy assessment matrix showing overall accuracy (left) and distribution of sample plots (right). DF = Dense Forest, OF = Open Forest, NF = Non-forest.

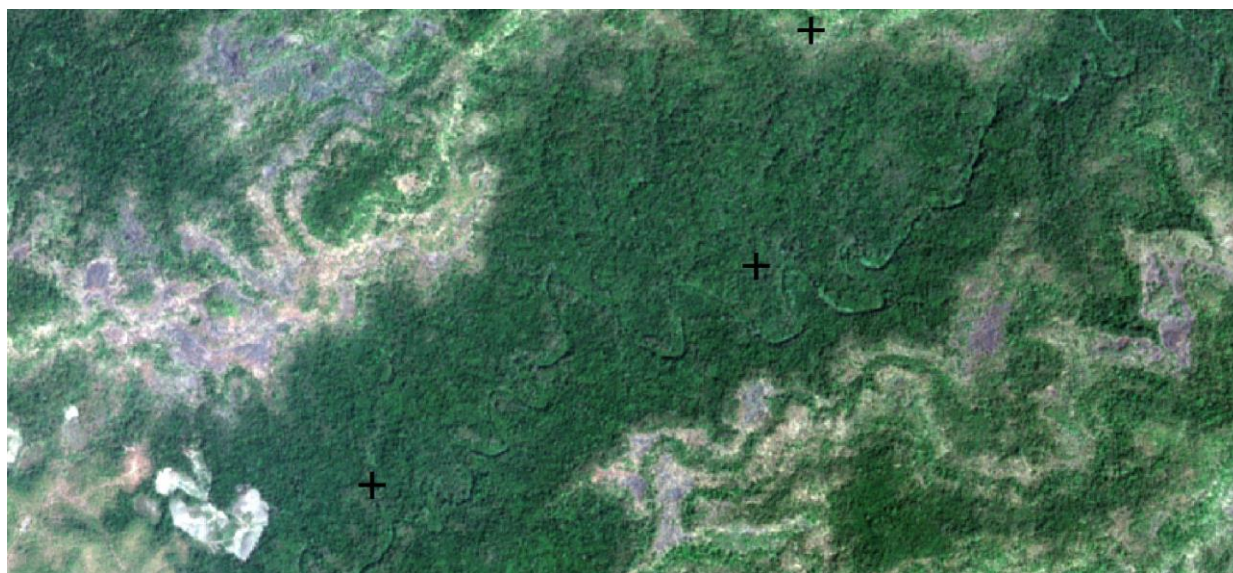


Figure 5.1.3. Example of the 10 m Sentinel 2 image quality for an area inside the Project Area.

Due to the importance of the 2010 Forest Benchmark Map for quantifying forest cover change, an additional accuracy assessment was conducted. The image interpretation was conducted by the same offsite staff using 23 April 2010 Landsat imagery. Results are shown in Table 5.1.4.

Table 5.1.4. Results of the Forest Benchmark accuracy assessment.

Cover Type	Area Weighting	Accuracy Measure	Accuracy
N=398		Overall	95.24%
Dense forest	39%	Users	92.2%
Open forest	56%	Producers	94.9%
Non-forest	5%	Kappa	91.03%

Task 1.1.3. Monitoring of carbon stock changes and non CO2 emissions from forest fires

Ongoing qualitative forest monitoring includes forest fire observations. No controlled deforestation and planned harvest occurred during the verification period. No significant deforestation from forest fires was observed during the verification period. Fire frequencies are also monitored using the USGS Fire Information Resource Management System (FIRMS), a point-based dataset derived from the Moderate Resolution Imaging Spectroradiometer (MODIS). Fire occurrences are created when middle and thermal infrared thresholds are exceeded by measured reflectance within a 1km pixel. Table 5.1.5 shows fire counts from MODIS from 2006 onwards. This point-based dataset also provides intensity values with Fire Radiative Power (FRP) in megawatts. There is a notable decrease in fire intensity during the with-project period when compared to the 2000 to 2010 pre-project period, Figure 5.1.4. With no significant increase in frequency or intensity there is no reason to suspect significant emissions over the baseline assessment.

Table 5.1.5. Fire point occurrences with greater than 75% certainty in the Project Area as detected by MODIS FIRMS.

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
75	20	63	69	54	39	28	69	77	59

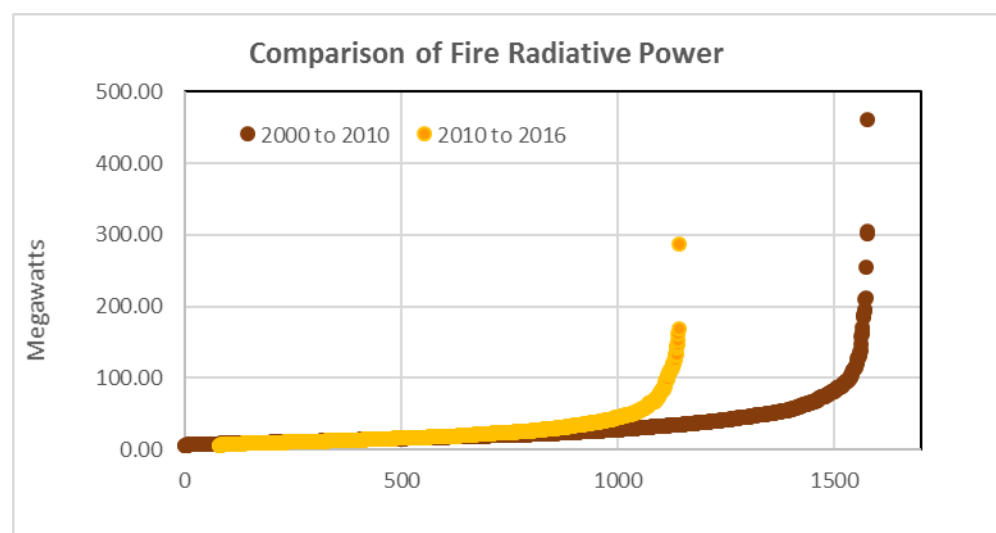


Figure 5.1.4. Comparison fire intensity between pre-project and project periods.

Task 1.1.4. Monitoring of impacts of natural disturbances and other catastrophic events

No forest loss from natural disturbances or catastrophic events recorded during the verification period.

Task 1.1.5. Total ex-post estimated actual net changes in carbon stocks and emissions of GHG gases in the Project Area

See Section 6.

5.1.2.2 Monitoring of leakage (Task 1.2)

The extent of deforestation in the Leakage Belt is detected and reported during the analysis described above under Task 1.1, which will cover the Project Area and Leakage Belt simultaneously. The framework for analysis of activity displacement leakage by smallholders in the project is set out in Annex 3.2 of the PD, following the Methodology. This is called the Displacement Leakage Factor (DLF).

The approach described for assessing leakage in the Methodology for Step 8.2 omits one potential source of leakage — those potential future in-migrant smallholders who are deterred from moving to the site by project activities and who are therefore not spatially constrained in the same way as those who have already settled at the site. Therefore a conservative addition to the approach described was made to take account of this.

Leakage due to activity displacement was analyzed for smallholders who are either:

- i. Resident/newly settled at the site.
- ii. Those who are deterred from moving to the site by project activities.

Displacement of group (i) is analyzed within a spatially delimited Leakage Belt, defined in Section 4.4.1.6 of the PD following the procedure described in the Methodology Step 8.2. Displacement of group (ii) is estimated in comparison to projected levels of business-as-usual in-migration extrapolated from the historical reference period. DLF is calculated as the sum of two components, as follows:

$$DLF = DLFr + DLFa$$

Where:

DLF = Displacement Leakage Factor, i.e. the percentage of deforestation expected to be displaced outside the project boundary, %

DLFr = Displacement Leakage Factor for Residents, i.e. the percentage of deforestation attributable to resident smallholders (including those who have settled in the participating villages since the start of the project crediting period) expected to be displaced outside the project boundary, %

DLFa = Displacement Leakage Factor for Avoided Migrants, i.e. the percentage of baseline deforestation attributable to potential in-migrants who were deterred from settling due to the existence of the project and have hence been displaced outside the project boundary, %

Activity Shifting by Residents

DLFr must be estimated from an analysis of the proportion of local residents engaged in leakage management activities (activities listed in Table 5.1.6).

Table 5.1.6. Summary of leakage management activities.

Sub-objective	Leakage management activities
1. Legal and planning	Maintain legal support for the whole KSWs (including Buffer Areas); KSWs Management plan covers Buffer Areas; Corridor activities address leakage risks (e.g. through liaison with Ministry of Environment)
2. Direct law enforcement	Law enforcement also covers areas of the Leakage Belt within FA mandate
3. Community land-use	Extend land-use agreements, titling and demarcation to sections of village land adjacent to Project Area (especially Leakage Belt and Leakage Management Areas); encourage parallel work by civil society organizations
4. Alternative livelihoods	Support a full range of alternative livelihood support activities in Leakage Belt and Leakage Management Area, including agricultural extension and NTFP-based livelihoods; include leakage management in REDD+ benefit-share criteria

DLFr was estimated, Table 5.1.7, based on the degree of participation observed during project activities. The rates were lower than the ex-ante prediction due to slower than anticipated adoption of the full range of leakage displacement activities.

Table 5.1.7. Ex-post estimated proportion of households able to participate in leakage management activities.

	2010	2011	2012	2013	2014	2015
% Participating	40%	40%	60%	60%	80%	80%
% Not participating (=DLFr)	60%	60%	40%	40%	20%	20%

Activity shifting due to avoided in-migration

The baseline scenario assumes continuing in-migration to the site. It was anticipated that a proportion of these expected migrants may not come to inhabit the area in the with-project scenario, because project activities are expected to reduce the attractiveness of the area for new migrants. By definition these people cannot participate in leakage management activities, and they may decide to settle (and perhaps deforest) at some distant location outside the monitored Leakage Belt. The most recent population data, from 2013 (Table 5.1.7), indicate a trend exceeding the linear ex-ante with-project projection. Observed population for 2013 was 16,325 versus a predicted BAU population of 15,280 (Annex 3.2 of PD). Growth continues to proceed at a linear BAU rate. More recent census data is not available, the project will be collecting new demographic data during the 2017 social assessment. Observed DLFa is therefore set to 0%. Table 5.1.8 shows the completed DLF calculation.

Table 5.1.8. 2013 Census (unpublished) for the 20 participating villages.

Commune	Village	No. Families	No. Males	No. Females
Memang	Pongol	95	208	213
	Pokes	133	279	279
Srae Chhuk	Kmom	85	228	222
	Chorkcha	197	470	455
Srae Khtum	Ou am	1016	2467	2450
	Ou Rona	248	425	420

Commune	Village	No. Families	No. Males	No. Females
	Srelovi	37	148	71
	Srae Khtum	139	268	285
Srae Preah	Gati	62	168	172
	Pu Char	73	178	173
	Pu kong	75	174	191
	Ou Chrar	35	71	73
	Srae Preah	211	497	468
Saen Monorom	Pu Hiem	337	668	664
	Andoung Kraloeng	115	260	286
	Pu tru	94	176	211
	Pu rang	98	247	248
Romonea	Pu Trom	220	487	446
	Pu Tang	186	434	455
	Srae I	129	297	393

Table 5.1.9. Ex-post calculated DLF for residents and in-migrants.

Displacement Leakage Factors	2010	2011	2012	2013	2014	2015
DLFr	60%	60%	40%	40%	20%	20%
DLFa	0%	0%	0%	0%	0%	0%
DLF	60%	60%	40%	40%	20%	20%

5.1.2.3 Ex post calculation of net anthropogenic GHG emission reduction (Task 1.3)

See Section 6.

5.1.3 Revisiting the baseline projections for future fixed baseline period (Task 2)

No baseline update required.

5.1.4 Monitoring Community Impacts (Task 3)

5.1.4.1 Community Impact Monitoring Plan

A community impact monitoring plan (including social HCVs) has been developed (WCS 2013, WCS 2015) and is underway at the time of submission of the PD. A full monitoring program has been put in place. Furthermore, the project will disseminate the plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the Community Groups and other stakeholders.

5.1.4.2 Household Survey (HHS) and Demographic Surveys

The program involves a combination of quantitative and qualitative measures for each of the indicators including an extensive, periodic questionnaire-based household survey and a range of qualitative, participatory approaches. This baseline survey was conducted in 2012. The next household survey is scheduled for 2017, with 2016 preparatory activities. Coupled with demographic identification of community member's ethnicity, all analyses are conducted to assess Khmer and Indigenous Community Groups collectively and separately allowing for differentiation of impacts, benefits, costs and risks with results made available to Community Groups for evaluation.

Respondents in the survey villages are asked to rank the importance of various livelihoods in their settlement: paddy rice, hill rice, cash crops, liquid resin, and others. This forms the basis for regular monitoring of social well-being indicators, which will in turn allow for the assessment and monitoring of social impacts associated with conservation measures implemented as part of the project after the 2017 survey analyses are complete.

5.1.4.3 Annual meeting and Consultation Workshops

Annual meetings have been held each year. These involve the senior staff, team leaders, representatives of major partner organizations, and key technical advisors. The meetings typically occur around June, to harmonize with the WCS financial year (1 July–30 June). The meeting typically spans several days. These meeting allow for the following monitoring and response activities:

- Annual project evaluation and adaptive project planning.
- Provide community forum for voicing grievances.
- Allow for monitoring participation of traditional institutions.
- Consultation on community perceptions of the condition of HCVs.

Community feedback on the REDD+ project is opportunistically collected during periodic consultation workshops. These workshops also allow for a review of any negative impacts arising, including unexpected impacts. Wherever possible, these discussions will be combined with other project activities (e.g. consultations for the annual work planning process), so as to minimize the financial burden of monitoring. The consultation process improves communication between stakeholders and therefore strengthens project implementation.

In every annual meeting, the community representatives are invited to Seima Headquarter to provide an update on the project implementation. The methods and results from community and biodiversity impact assessment are presented at the meeting by the project teams. During the CCBA public comment period in 2014, the PDD in Khmer were disseminated in the 20 villages and for Bunong Indigenous Communities, they do not have a written languages so only PDD in Khmer were produced. In the PDD in Khmer, key parameters to be monitor for the project which taken from the monitoring plans for the community and biodiversity were included and explained in the meetings in Khmer and Bunong languages as well. The project organized a meeting with the communities to present the PDD in each community. Furthermore, during the CCBA MIR public comment period, the report in Khmer were distributed to the communities in the 20 villages of the project area and the report also contained information on the key parameters to be monitor in the project. In addition to the CCBA website, the

project team also uploaded the monitoring plans into WCS Cambodia website (<https://cambodia.wcs.org/About-Us/Publications.aspx>) as well and the plans are available in Khmer and English.

5.1.4.4 Monitoring Community HCV

An HCV assessment was conducted in 2010 (Pollard and Evans 2012) and identified HCV5 and HCV6 community values, Table 5.1.10.

Table 5.1.10. Summary of social HCVs identified in the KSWC Core Area.

High Conservation Value	Details
HCV5: Forest areas fundamental to meeting basic needs of local communities	Approximately 12,500 people live in 20 villages using the KSWC Core Area, of whom a large proportion depend on forest resources. Collection of liquid resin from forest trees, mainly <i>Dipterocarpus alatus</i> is the most important source of cash income for remote communities, providing income that is essential for purchasing rice and other basic needs. The fisheries of the rivers and pools of the KSWC Core Area are of fundamental importance as the main protein source for most households. Other important resources include rattan, bamboo, honey and medicinal plants.
HCV6: Forest areas critical to local communities' traditional cultural identity	19 of the 20 villages are predominately ethnic Bunong who are animist with very strong cultural links to the forest. Culturally important areas ('spirit forests', 'spirit pools' and grave forests) have been mapped for 9 villages and are known to exist for most other communities.

The demographic component of the 2012 HHS collected basic data on the number of individuals and households in each village. The baseline survey also collected information on dominant livelihoods and use of various NTFPs. These data can be used to track the status of critically important values (HCV5) when compared with the upcoming 2017 HHS.

Remote sensing is used primarily to monitor land use change will detect disturbances due to deforestation, in spirit forest areas (HCV6). This information is supplemented with data gathered by law enforcement teams, and managed by the SMART database.

Annual meetings allow key community representatives to review project activities, impact and progress. The meetings include consultation on community perceptions of the condition of HCVs. Table 5.1.11 summarizes the HCV indicators and monitoring methods.

Table 5.1.11. HCV indicators monitored.

High Conservation Value	Indicators	Monitoring Method
<i>HCV 5: Basic needs</i>	Resin productivity, bamboo sustainability, fish catches	Demography monitoring, socio-economic monitoring protocol
<i>HCV 6: Cultural values</i>	Maintenance of spirit forest & pools; involvement of indigenous communities in management planning	Socio-economic monitoring, remote sensing, threats monitoring.

5.1.4.5 Monitoring Other Stakeholders

Project impacts to local government and NGOs are monitored through continued consultation both opportunistically, during various meetings and shared activities, and formally through consultation meetings (Table 5.1.1).

Table 5.1.12. Consultations for monitoring project impacts to Other Stakeholders.

Stakeholder	Consultation Meeting	Frequency
NGO/Civil Society	Mondulkiri NGO Network	Periodic as necessary
	The Civil Society Organizations REDD+ Network	Annual
Provincial Government	Provincial Commission Meeting	As needed (when KSWS related issues arise)
District Government	District Commission Meeting	Quarterly
	District Integration Workshop	Annual as needed
Commune Government	Commune Development Planning meeting	Annual

5.1.5 Monitoring Biodiversity Impacts (Task 4)

Current biodiversity monitoring in KSWS is conducted using three broad methodologies, listed below. Incidental records of rare or important species are also collected and the main monitoring program is complemented by various studies conducted by independent researchers.

- Distance-sampling methods
- Capture-recapture methods
- Occupancy methods

5.1.5.1 Distance-sampling methods

These are the most frequent systematic quantitative conducted during the verification period. These surveys use fixed transect locations, Figure 5.1.5, that are revisited during subsequent surveys.

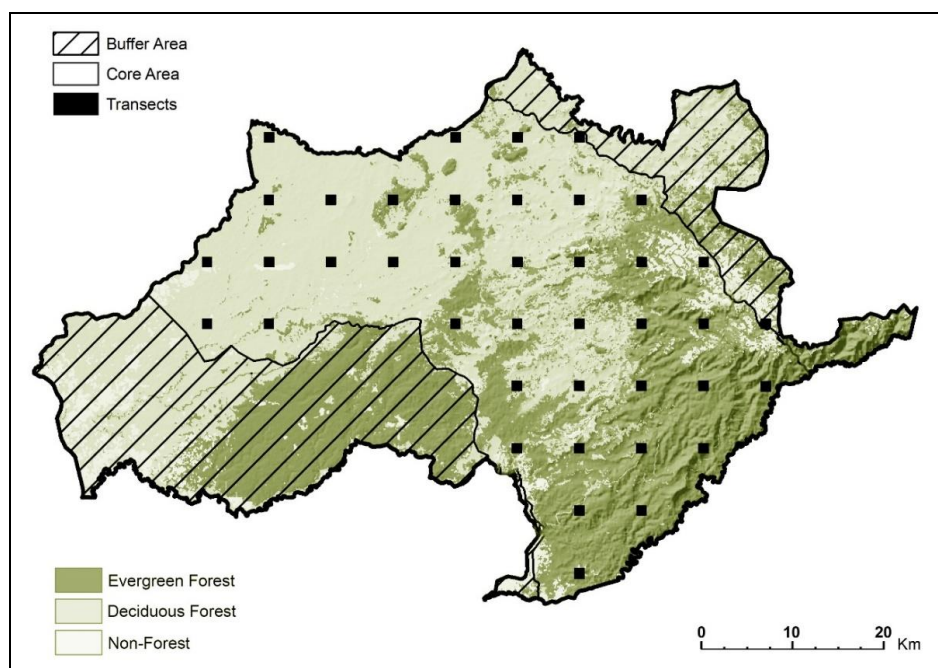


Figure 5.1.5. Location of KWS transects.

Survey targets are individual or groups of animals and detections are visual observations of these animals (i.e. animal sounds or signs are not recorded). Multiple species are recorded during these surveys, including five ungulate species, six primates and one bird species (Table 5.1.2).

Table 5.1.13. Species surveyed on the line transects.

English Name	Scientific Name	Status*
Black-Shanked Douc	<i>Pygathrix nigripes</i>	EN
Yellow-cheeked Crested Gibbon	<i>Nomascus gabriellae</i>	EN
Banteng	<i>Bos javanicus</i>	EN
Gaur	<i>Bos gaurus</i>	VU
Sambar	<i>Rusa unicolor</i>	VU
Eld's Deer	<i>Rucervus eldii</i>	EN
Green Peafowl	<i>Pavo muticus</i>	EN
Northern Pig-Tailed Macaque	<i>Macaca leonina</i>	VU
Stump-Tailed Macaque	<i>Macaca arctoides</i>	VU
Long-Tailed Macaque	<i>Macaca fascicularis</i>	lc
Germain's Silvered Langur	<i>Trachypithecus germaini</i>	EN
Red Muntjac	<i>Muntiacus muntiacus</i>	lc
Wild Pig	<i>Sus scrofa</i>	lc

5.1.5.2 Capture-recapture methods

Fecal DNA based capture-recapture is currently being used to monitor the population of Asian Elephants in the Project Area. This survey was conducted in 2015, with results of DNS testing still pending. This is the preferred method specified by the CITES MIKE monitoring protocols. Survey protocols involve firstly conducting a thorough reccie survey to identify and map known elephant hotspots (i.e. areas that elephants frequently visit and congregate at, such as around streams, saltlicks and wallows, and in bamboo forest patches) throughout the Project Area. This is done based on local expert knowledge and past records. Sampling involved repeated visits to these hotspots to collect samples of fresh dung from which microsatellite DNA was extracted. Survey teams visited each hotspot a number of times, leaving sufficient time in-between visits for fresh dung to accumulate. Teams destroyed dung piles after taking samples to ensure they cannot be mistakenly re-sampled. They also searched for additional dung piles whilst traveling between hotspots. Figure 5.1.6 shows the survey locations relative to salt licks and dung locations.

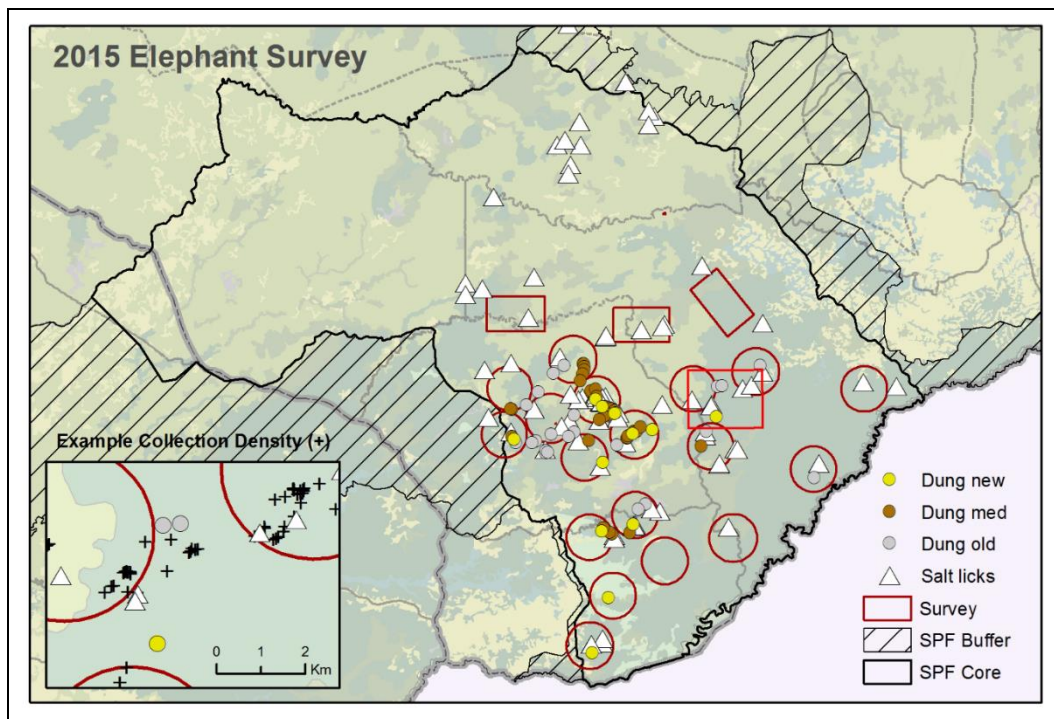


Figure 5.1.6. Elephant dung DNA sampling design.

5.1.5.3 Occupancy methods

Traditional wildlife monitoring techniques are generally concerned with estimating population size (i.e. density or abundance) but over the last 10-15 years the distribution or 'occupancy' of a population has been increasingly adopted as an alternative parameter of interest. Occupancy is defined as the probability that a sampling unit is occupied by a species, or generalized to mean the proportion of an area occupied by a species. This has been found to be a relevant and useful measure when assessing the impact of management actions, especially in long-term monitoring programs, and a large body of research now exists surrounding occupancy-type approaches. Occupancy methods in KWS are currently in

development for otter, and will likely be based on surveys for sign within segments of rivers. Occupancy surveys may also be implemented for rarer ungulates such as banteng and Eld's deer and would likely utilize camera-traps and/or dung searches.

5.1.5.4 SMART data based CPUE indices

Ongoing law enforcement efforts both outside and inside the Project Area are based upon regular patrols. Whilst patrolling teams collect information on threats (e.g. snares, hunting camps, illegal hunters encountered, etc.). This information is entered into a SMART database that allows for subsequent analyses and tracking of threats through the use of catch-per-unit-effort (CPUE) indices. CPUE indices are a relative measure derived by dividing total 'catch' (in this case, observations of hunting, logging and other illegal activities) by some standard unit of the effort required to obtain this catch (e.g. days patrolled, kilometers patrolled or number of patrol visits to a grid cell). In this way, variable survey or search efforts can be corrected for, and, by assuming that catch is proportional to both the number of ongoing infractions and the amount of search effort expended, CPUE can be used as an index of true levels of underlying illegal activity. When applied to the rate of encounters of infractions by patrol teams, this metric describes the relative frequency of occurrence of illegal activities.

Patrol teams also collect biological information (i.e. observations of animals or animal sign) which is recorded in the SMART database in exactly the same way and can be used to generate relative indices of abundance. It is important to recognize such data collection is a secondary function for patrol teams and this has implications in terms of data quality. Nevertheless, these data are used to supplement other sources of biological data. Such measures are especially useful for areas outside the Project Area, for which few other data are available. In addition, dedicated biological monitoring teams also collect SMART data on threats whilst they travel to and from survey locations throughout the Project Area. These CPUE indices can be generated frequently and repeatedly from routinely collected SMART data and will provide important information on trends in wildlife presence and threat levels in between the major biological monitoring events outlined above.

5.1.5.5 Trigger Species Monitoring

Three 'trigger species' were selected for KWS on the basis of not just the global importance of the site for them, but also their suitability to be indicative of changing management effectiveness. Monitoring methods for the trigger species are outlined in Table 5.1.14.

Table 5.1.14. Trigger species and monitoring methods used.

Species	Monitoring data source	Reference
Asian Elephant	Fecal DNA based capture-recapture	(Pollard <i>et al.</i> , 2008)
	CITES Monitoring of Illegal Killing of Elephants (MIKE) program	(Hedges and Lawson, 2006)
	SMART data based indices (from patrol teams and monitoring teams)	(Stokes, 2012)
	Incidental records from communities	
Black-Shanked Douc	Distance sampling based line transects	(Pollard <i>et al.</i> , 2007)
	SMART data based indices (from patrol teams and monitoring teams)	(Nuttall <i>et al.</i> , 2013)
	Tourism related records	(Stokes, 2012)

	Independent researcher data	(Rawson, 2009)
S. Yellow-cheeked Crested Gibbon	Distance sampling based line transects	(Pollard <i>et al.</i> , 2007)
	SMART data based indices (from patrol teams and monitoring teams)	(Nuttall <i>et al.</i> , 2013)
	Tourism related records	(Stokes, 2012)
	Independent researcher data	(Rawson, 2009)

5.1.5.6 Opportunistic records and studies

Notable records of all species encountered in the Project Zone are documented, whether or not they were collected during formal structured surveys such as transects. Records of observations, signs (tracks and dung), and calls are collated from monitoring team members, project staff and visiting researchers and bird tour groups. For highly vocal species, such as gibbons, peafowl and Germain's Peacock Pheasant call records are a particularly important source of information.

These records supplement the routine quantitative methods and in particular enhance understanding of the presence and distribution of lesser-known species. They can help to alert project managers to possible changes in population size, ranging behavior, altered group sizes and other factors that may indicate changed threat levels and call for more detailed study. Although they do not provide absolute measures of varying population size over time, they do confirm the continued presence of target species in each sector and also help to identify areas of critical importance. For example records of tracks, and occasional observations of Eld's Deer reveal that they are currently to be found only in the far west of the Project Zone, in areas of very open deciduous dipterocarp forest with large natural grasslands.

From time to time selected species will also be the subject of focused studies by visiting researchers facilitated by the project (e.g. recent PhD studies on Green Peafowl and Germain's Silvered Langur). These are valuable in clarifying threats, identifying management priorities and informing design of future monitoring efforts.

5.1.5.7 Monitoring impacts outside the Project Area

Impacts of project activities outside the Project Area are monitored in a number of ways (Table 5.1.15). Routine law enforcement patrols take place across the wider landscape outside the Project Area and forest cover monitoring extends beyond the boundaries of the Project Zone. Project staff are in regular communication with villages using the outer parts of the Project Zone and gain qualitative information from this. There is an ongoing system of collaboration between the KWS management team and government agencies and NGOs working in neighboring areas. This has been further strengthened recently by the implementation of the 2015 elephant survey which spanned three PAs and involved WCS, WWF, MoE and FA. These agencies also carry out their own additional biodiversity and threats monitoring activities and data and results of biodiversity monitoring are shared by all of these partners. This information will indicate whether there is significant displaced negative impacts on the most important concentrations of biodiversity adjacent to the Project Zone.

Table 5.1.15. Methods used to monitor biodiversity outside of the project area.

Data source	Indicator	Extent	Frequency
-------------	-----------	--------	-----------

Fecal DNA based capture-recapture surveys	Asian Elephant density/abundance	Entire Landscape	Every 8 years
CITES Monitoring of Illegal Killing of Elephants (MIKE) program	Asian Elephant mortalities	Entire Landscape	Ongoing (reported annually)
Line transect based Distance sampling surveys	Banteng density Gaur density Eld's Deer density Muntjac density	Adjacent PAs (PPWS & MPF)	Every 2 years
Remote sensing data	Forest cover loss %	Entire Landscape	Ongoing (reported annually)
SMART data	CPUE Indices threats	Inside and outside Project Area	Ongoing (reported monthly)
SMART data	CPUE Indices key wildlife species	Inside and outside Project Area	Ongoing (reported monthly)

5.1.5.8 Monitoring of ecological High Conservation Values

The monitoring of HCVs is outlined in more detail in the HCV assessment report (Pollard and Evans 2012). Monitoring of ecological HCVs (HCV 1-3) is effectively covered by the overall project monitoring framework outlined above since the same methods are suitable for assessing whether the project activities maintain or enhance the HCVs. A summary of the methods used to monitor the values is provided in Table 5.1.16.

Table 5.1.16. Methodologies used for monitoring High Conservation Values in KWS

High Conservation Value	Indicators	Monitoring Method
<i>HCV 1: Significant concentrations of biodiversity values</i>	See relevant sections	Line transects, fecal DNA capture-recapture, occupancy surveys (see above)
<i>HCV 2: Landscape level forests</i>	Forest cover	Remote sensing forest cover assessments
<i>HCV 3: Threatened ecosystems</i>	Forest cover & condition	Remote sensing forest cover assessments; measurements of forest condition during reassessment of the project baseline

5.2 Data and Parameters Available at Validation (CL3)

Data / Parameter	Forest cover maps for selected years of the historical reference period
Data unit	Pixels of 30-m resolution
Description	Land cover classes listed in Table 4.5.1. of the PD.
Source of data	Analysis of satellite imagery described in the PD.
Value applied:	Maps for each time point listed in PD 4.5.2.4 (Step 2.4 of the Methodology).
Justification of choice of data or	The data and methods are justified in detail in the Methodological Annex

description of measurement methods and procedures applied	to the PD.
Purpose of Data	Determination of baseline scenario. To inform development of models of rate and location of deforestation to allow projections for the first fixed crediting period. The map for the year 2010 referred to as 'Forest Benchmark Map'.

Data / Parameter	Reference region map
Data unit	Shapefile - no specific unit of measurement
Description	Outer boundary of Reference Region.
Source of data	Created by applying the definitions set out in PD 4.4.1 (Step 1.1 (1) of the Methodology).
Value applied:	Fixed boundaries for the whole historical reference period (Fig 4.4.1 of the PD).
Justification of choice of data or description of measurement methods and procedures applied	The choice of definition for the reference region is set out in detail in PD 4.4.1.1 (Step 1.1 (1) of the Methodology).
Purpose of Data	Determination of baseline scenario, calculation of baseline emissions, project emissions and leakage. To define an area within which deforestation patterns and drivers in the past are comparable with those in the project area in the future and so allow the development of predictive models.

Data / Parameter	Leakage belt map
Data unit	Shapefile - no specific unit of measurement
Description	Area within which spatially constrained agents of deforestation may conduct deforestation that has been displaced from within the project area by project activities.
Source of data	Created by applying the definitions set out in PD 4.4.1.6 (Step 1.1 (3) of the Methodology).
Value applied:	One boundary is applied during 2010-2011 and a second, slightly reduced one from 2012 onwards, as a result of parcels of land moving into Stratum 2 and becoming unavailable for unplanned deforestation (Fig 4.4.2 of the PD).
Justification of choice of data or description of measurement methods and procedures applied	The choice of definition for the leakage belt is set out in detail in PD 4.4.1.6 (Step 1.1 (3) of the Methodology).
Purpose of Data	Calculation of leakage.

Data / Parameter	Stratum boundaries map
Data unit	Shapefile - no specific unit of measurement
Description	Divides reference region into areas where unplanned deforestation takes

	place and areas where planned deforestation takes place.
Source of data	The choice of definition for the stratum boundaries is described in Annex 3.1 of the PD.
Value applied:	The strata are dynamically defined and so vary over time. Stratum boundaries were updated every two years during the historical reference period as shown by a set of shapefiles supplied to the validator. They were updated again in 2012 and can be updated again if new ELCs become active in the reference region.
Justification of choice of data or description of measurement methods and procedures applied	The choice of definition is set out in detail in Annex 3.1 of the PD.
Purpose of Data	Determination of baseline scenario, calculation of baseline emissions, project emissions and leakage. To define the area within which unplanned deforestation takes place, to set a frame for deforestation modelling, projections and monitoring

Data / Parameter	ABSLK1,t
Data unit	ha
Description	Area of Stratum 1 deforested at time t within the leakage belt in the baseline case.
Source of data	Raster files of annual deforestation projections conducted according to the methods set out in Step 4 of the PD, intersected with a shapefile of the Leakage Belt boundary.
Value applied:	See Table 5.3.3 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	The model used to develop the projections is justified in PD 5.3.1 (Step 4 of the Methodology).
Purpose of Data	Calculation of baseline emissions.

Data / Parameter	ABSLPA1,t
Data unit	ha
Description	Area of Stratum 1 deforested at time t within the project area in the baseline case.
Source of data	Raster files of annual deforestation projections conducted according to the methods set out in PD 5.3.1 (Step 4 of the Methodology). Intersected with a shapefile of the Project Area boundary.
Value applied:	See Table 5.3.2 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	The model used to develop the projections is justified in PD 5.3.1 (Step 4 of the Methodology).
Purpose of Data	Calculation of baseline emissions.

Data / Parameter	ABSLRR1,t
Data unit	ha
Description	Area of Stratum 1 deforested at time t within the reference region in the baseline case.
Source of data	Raster files of annual deforestation projections conducted according to the methods set out in Section 5.3.2 (Step 4) of the PD.
Value applied:	See Table 5.3.1 of the PD
Justification of choice of data or description of measurement methods and procedures applied	The model used to develop the projections is justified Section 5.3.2 (Step 4) of the PD.
Purpose of Data	Calculation of baseline emissions

Data / Parameter	ABSLKct,t
Data unit	ha
Description	Area of forest type ct deforested at time t within the leakage belt in the baseline case
Source of data	Raster files of annual deforestation projections conducted according to the methods set out in Section 5.3.2 (Step 4) of the PD, intersected with a shapefile of the Leakage Belt boundary and with boundaries of land cover categories mapped at start of historical reference period.
Value applied:	See Table 5.3.7 of the PD
Justification of choice of data or description of measurement methods and procedures applied	The model used to develop the projections is justified in Section 5.3.2 (Step 4) of the PD.
Purpose of Data	Calculation of baseline emissions

Data / Parameter	ABSLPAct,t
Data unit	ha
Description	Area of forest type ct deforested at time t within the project area in the baseline case
Source of data	Raster of annual deforestation projections created according to methods set out in Section 5.3.2 (Step 4) of the PD, intersected by a shapefile of the Project Area boundary and with boundaries of land cover categories mapped at start of the historical reference period.
Value applied:	See Table 5.3.6 of the PD
Justification of choice of data or description of measurement methods and procedures applied	The model used to develop the projections is justified in Section 5.3.2 (Step 4) of the PD.

Purpose of Data	Calculation of baseline emissions
Data / Parameter	ABSLRRct,t

Data unit	ha
Description	Area of forest type ct deforested at time t within the reference region in the baseline case
Source of data	Raster files of annual deforestation projections conducted according to the methods set out in Step 4 of the PD intersected with the boundaries of the land cover categories mapped at the start of the historical reference period (1998).
Value applied:	See Table 5.3.5 of the PD
Justification of choice of data or description of measurement methods and procedures applied	The model used to develop the projections is justified in Section 5.3.2 (Step 4) of the PD.
Purpose of Data	Calculation of baseline emissions

Data / Parameter	AP
Data unit	m2
Description	Plot area
Source of data	Measured
Value applied:	Different plot sizes are applied to different size classes of tree and standing dead wood, and in forest versus non-forest vegetation types. The plot diameters are listed in the PD Annex 4.3 Table 1 and Annex 4.5 Table 2 - in each case the plot area is calculated as $AP = (\pi) (Diameter/2)^2$.
Justification of choice of data or description of measurement methods and procedures applied	The diameter of the plot is measured as twice the radius, with the radius measured using standard forestry techniques such as a measuring tape or Digital Measuring Equipment. Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions. The plot area is used to convert the plot biomass to a biomass per unit area measure that can be used to calculate an average for the vegetation type being sampled.

Data / Parameter	CFdc
Data unit	tC/tDM
Description	Carbon fraction of the dead wood density class dc.
Source of data	IPCC 2003 Good Practice Guidance for Land Use, Chapter 3.2 Forest Land, page 3.25.
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value, as allowed by the Methodology.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	CFj
Data unit	tC/tDM
Description	Carbon fraction of trees in forest type j.
Source of data	IPCC 2003 Good Practice Guidance for Land Use, Chapter 3.2 Forest Land, page 3.25.
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value, as allowed by the Methodology.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	cl
Data unit	Dimensionless
Description	1, 2, 3 ... CI LU/LC classes.
Source of data	Measured
Value applied:	See Table 4.5.1 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	See 3 Annex 3.5 of the PD.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	d1, d2, ..., dn
Data unit	cm
Description	Diameters of intersecting pieces of dead wood.
Source of data	Measured
Value applied:	Different for each piece of wood. See supporting files to Annex 4.3 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	DBH
Data unit	cm
Description	Diameter at Breast Height.
Source of data	Measured
Value applied:	Different for each tree. See supporting files to Annex 4.3 and 4.5 of the PD.

Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	Ddc
Data unit	tonnes d. m. m-3
Description	Dead wood density of class dc.
Source of data	Measured
Value applied:	See Annex 4.3 table 3 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed. A methodology deviation was proposed to allow this.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	No abbreviation given [alternate parameter to Dj]
Data unit	t d.m.m-3 [=gcm ⁻³]
Description	Mean wood density of all tree species.
Source of data	Estimated from literature
Value applied:	0.57 (see Table 3, Annex 4.3 of the PD)
Justification of choice of data or description of measurement methods and procedures applied	Literature value was used, as permitted by the Methodology. The conservativeness of biomass estimates using this figure was confirmed in Annex 4.4 of the PD.
Purpose of Data	Calculation of baseline, project and leakage emissions

Data / Parameter	fcl
Data unit	Dimensionless
Description	Final (post deforestation) non-forest classes
Source of data	Measured
Value applied:	See PD Table 4.5.1.
Justification of choice of data or description of measurement methods and procedures applied	The selection of non-forest classes is justified in the PD Annex 4.5 Section 2.2
Purpose of Data	Calculation of baseline, project and leakage emissions

Data / Parameter	fj(DBH,H)ab
Data unit	Dimensionless
Description	An allometric equation for species, or group of species, or forest type j, linking above- ground tree biomass (in kg tree ⁻¹) to diameter at breast

	height (DBH) and possibly tree height (H).
Source of data	Estimated from literature
Value applied:	The chosen equation is set out in the PD Annex 4.3.
Justification of choice of data or description of measurement methods and procedures applied	The choice of equation is justified in PD Annex 4.4.
Purpose of Data	Calculation of baseline, project and leakage emissions

Data / Parameter	H
Data unit	m
Description	Height of the tree.
Source of data	Measured
Value applied:	Different for each tree. See supporting files to Annex 4.3 and 4.5 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	icl
Data unit	Dimensionless
Description	1, 2, 3 ... Icl initial (pre- deforestation) forest classes.
Source of data	Measured
Value applied:	See PD Table 4.5.1.
Justification of choice of data or description of measurement methods and procedures applied	The selection of forest classes is justified in the PD Annex 3.5 Section 2.2.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	L
Data unit	m
Description	Length of the line.
Source of data	Measured
Value applied:	100 m
Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	PP
Data unit	Number of people
Description	Projected population size of the 20 participating villages in each year of the first fixed crediting period.
Source of data	Measured
Value applied:	See PD Annex 3.2 Appendix 3
Justification of choice of data or description of measurement methods and procedures applied	See Annex 3.2 and associated Methodology Deviations
Purpose of Data	Calculation of leakage emissions

Data / Parameter	r1
Data unit	m
Description	Radius at the base of the tree.
Source of data	Measured
Value applied:	Different for each tree. See supporting files to Annex 4.3 and 4.5 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	r2
Data unit	m
Description	Radius at the top of the tree.
Source of data	Measured
Value applied:	Different for each tree. See supporting files to Annex 4.3 and 4.5 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	Rj
Data unit	Dimensionless
Description	Root-shoot ratio appropriate for species, group of species or forest type j.
Source of data	Estimated from literature.
Value applied:	0.22
Justification of choice of data or	The choice of ratio is justified in PD Annex 4.3.

description of measurement methods and procedures applied	
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	tr
Data unit	Dimensionless
Description	1, 2, 3, ... TRpl number of trees in plot pl.
Source of data	Measured
Value applied:	Different for each plot See supporting files to Annex 4.3 and 4.5 of the PD.
Justification of choice of data or description of measurement methods and procedures applied	Winrock SOPs (supplied) were followed.
Purpose of Data	Calculation of baseline, project and leakage emissions.

Data / Parameter	z
Data unit	Dimensionless
Description	Post deforestation zones having a characteristic mix of final post deforestation classes.
Source of data	Measured
Value applied:	See PD 5.3.2.2 (Step 5.2).
Justification of choice of data or description of measurement methods and procedures applied	See PD 5.3.2.2 (Step 5.2).
Purpose of Data	Calculation of baseline, project and leakage emissions.

5.3 Data and Parameters Monitored (CL3, CM3 & B3)

Data / Parameter	Forest cover maps for each monitored year
Data unit	Pixels of 30-m resolution
Description	Land cover classes listed in Table 4.5.1 of the PD.
Source of data	Measured
Description of measurement methods and procedures to be applied	Analysis of satellite imagery. The data and methods are justified in detail in the Methodological Annex to the PD. Responsibility rests with the National Project Manager, in collaboration with the KWS Senior Technical Advisor.
Frequency of monitoring/recording	At a minimum before each verification event, but more often if preferred.
Value applied:	Forest cover maps for 24 April 2013 and 28 February 2016 produced. .
Monitoring equipment	n/a
QA/QC procedures to be applied	Accuracy assessment using confusion matrix, reporting overall accuracy, users accuracy, producers accuracy, and kappa.

Purpose of data	Calculation of project emissions and leakage.
Calculation method	n/a

Data / Parameter	Leakage belt map
Data unit	Shapefile - no specific unit of measurement
Description	Area within which spatially constrained agents of deforestation may conduct deforestation that has been displaced from within the project area by project activities.
Source of data	Measured
Description of measurement methods and procedures to be applied	Determined by intersecting the leakage belt boundary mapped for 2010 in the PD with the extent of Stratum 1.
Frequency of monitoring/recording	When establishing the second fixed baseline.
Value applied:	No ex-ante value can be presented other than those presented at validation.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	Stratum boundaries map
Data unit	Shapefile - no specific unit of measurement
Description	Divides reference region into areas where unplanned deforestation takes place and areas where planned deforestation takes place.
Source of data	Measured
Description of measurement methods and procedures to be applied	The procedure for defining the stratum boundaries is set out in PD Annex 3.1.
Frequency of monitoring/recording	When establishing the second fixed baseline.
Value applied:	No ex-ante value can be presented other than those at validation.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of project emissions and leakage
Calculation method	n/a

Data / Parameter	ACPA _{icl,t}
Data unit	ha
Description	Annual area within the Project Area affected by catastrophic events in class icl at year t
Source of data	Measured

Description of measurement methods and procedures to be applied	See PD Section 8.1 Task 1.1.4 for procedures for detecting and mapping such events.
Frequency of monitoring/recording	Annual
Value applied:	0
Monitoring equipment	n/a
QA/QC procedures to be applied	See PD Section 8.1 Task 1.1.4 for procedures for detecting and mapping such events.
Purpose of data	Calculation of project emissions and leakage.
Calculation method	Area of loss is estimated from boundaries using standard GIS tools.

Data / Parameter	AP
Data unit	m2
Description	Plot area
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	Different plot sizes are applied to different size classes of tree and standing dead wood, and in forest versus non-forest vegetation types. The plot diameters are listed in the PD Annex 5.3 Table 1 and Annex 5.5 Table 2 - in each case the plot area is calculated as $AP = (\pi) (Diameter/2)^2$.
Monitoring equipment	The diameter of the plot is measured as twice the radius, with the radius measured using standard forestry techniques such as a measuring tape or Digital Measuring Equipment as convenient.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	See SOPs.

Data / Parameter	APDPA _{icl,t}
Data unit	ha
Description	Area of planned deforestation in forest class icl at year t in the project area
Source of data	Measured
Description of measurement methods and procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Frequency of monitoring/recording	Annual
Value applied:	0
Monitoring equipment	n/a

QA/QC procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Purpose of data	Calculation of project emissions and leakage.
Calculation method	Area of loss is estimated from boundaries using standard GIS tools.

Data / Parameter	APFPAicl,t
Data unit	ha
Description	Area of planned fuelwood and charcoal activities in forest class icl at year t in the project area
Source of data	Measured
Description of measurement methods and procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Frequency of monitoring/recording	Annual
Value applied:	0
Monitoring equipment	n/a
QA/QC procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Purpose of data	Calculation of project emissions and leakage.
Calculation method	Area of loss is estimated from boundaries using standard GIS tools.

Data / Parameter	APLPAicl,t
Data unit	ha
Description	Area of planned logging activities in forest class icl at year t in the project area
Source of data	Measured
Description of measurement methods and procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Frequency of monitoring/recording	Annual
Value applied:	0
Monitoring equipment	n/a
QA/QC procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Purpose of data	Calculation of project emissions and leakage.
Calculation method	Area of loss is estimated from boundaries using standard GIS tools.

Data / Parameter	APNiPAicl,t
Data unit	ha
Description	Area of forest class icl with increasing carbon stock without harvest at year t in the project area.

Source of data	Measured
Description of measurement methods and procedures to be applied	See PD Section 8.1 Task 1.1.2 & 4 for procedures for detecting and mapping such events.
Frequency of monitoring/recording	Annual
Value applied:	0
Monitoring equipment	n/a
QA/QC procedures to be applied	See PD Section 8.1 Task 1.1.2 & 4 for procedures for detecting and mapping such events.
Purpose of data	Calculation of project emissions and leakage.
Calculation method	Area affected is estimated from boundaries using standard GIS tools.

Data / Parameter	APSLKfcl,t
Data unit	ha
Description	Annual area of class fcl with decreasing carbon stock in leakage management areas in the project case at year t
Source of data	Measured
Description of measurement methods and procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Frequency of monitoring/recording	Annual
Value applied:	0
Monitoring equipment	n/a
QA/QC procedures to be applied	See PD Section 8.1 Task 1.1.2 for procedures for detecting and mapping such events.
Purpose of data	Calculation of project emissions and leakage.
Calculation method	The area affected is estimated from mapped boundaries using standard GIS tools.

Data / Parameter	AUFPAicl,t
Data unit	ha
Description	Areas affected by forest fires in class icl in which carbon stock recovery occurs at year t.
Source of data	Measured
Description of measurement methods and procedures to be applied	See PD Section 8.1 Task 1.1.4 for procedures for detecting and mapping such events.
Frequency of monitoring/recording	Annual
Value applied:	0
Monitoring equipment	n/a
QA/QC procedures to be applied	See PD Section 8.1 Task 1.1.4 for procedures for detecting and mapping such events.

Purpose of data	Calculation of project emissions and leakage.
Calculation method	The area affected is estimated from mapped boundaries using standard GIS tools.

Data / Parameter	CFdc
Data unit	tC/tDM
Description	Carbon fraction of the dead wood density class dc
Source of data	IPCC 2003 Good Practice Guidance for Land Use, Chapter 3.2 Forest Land, page 3.25
Description of measurement methods and procedures to be applied	n/a
Frequency of monitoring/recording	Whenever mandatory
Value applied:	0.5
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	cl
Data unit	Dimensionless
Description	1, 2, 3 ... CI LU/LC classes
Source of data	Measured
Description of measurement methods and procedures to be applied	The Methodology specifies criteria for selection of these classes.
Frequency of monitoring/recording	Reassessed at baseline renewal.
Value applied:	See Table 4.5.1 of the PD for current values.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	d1, d2, ..., dn
Data unit	cm
Description	Diameters of intersecting pieces of dead wood
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.

Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	Cannot be estimated ex ante.
Monitoring equipment	Standard forestry equipment, according to SOPs.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	DBH
Data unit	cm
Description	Diameter at Breast Height
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	Cannot be estimated ex ante.
Monitoring equipment	Standard forestry equipment, according to SOPs.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	Ddc
Data unit	tonnes d. m. m ⁻³
Description	Dead wood density of class dc
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When establishing the second fixed baseline.
Value applied:	See Annex 5.3 table 3 of the PD for current values.
Monitoring equipment	Standard forestry equipment, according to SOPs.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	See SOPs.
Comments	

Data / Parameter	No abbreviation given [alternate parameter to Dj]
Data unit	t d.m.m ⁻³ [=gcm ⁻³]

Description	Mean wood density of all tree species
Source of data	Estimated from literature
Description of measurement methods and procedures to be applied	n/a
Frequency of monitoring/recording	Reassess when establishing the second fixed baseline.
Value applied:	0.57
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	fcl
Data unit	Dimensionless
Description	Final (post deforestation) non-forest classes
Source of data	Measured
Description of measurement methods and procedures to be applied	The Methodology specifies criteria for selection of these classes.
Frequency of monitoring/recording	Reassessed at baseline renewal.
Value applied:	See Table 4.5.1 of the PD for current values.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	fj(DBH,H)ab
Data unit	Dimensionless
Description	An allometric equation for species, or group of species, or forest type j, linking above- ground tree biomass (in kg tree ⁻¹) to diameter at breast height (DBH) and possibly tree height (H).
Source of data	Estimated from literature
Description of measurement methods and procedures to be applied	The Methodology sets out criteria for selection and validation of this equation.
Frequency of monitoring/recording	Reassessed at baseline renewal.
Value applied:	The current chosen equation is set out in the PD Annex 5.3.
Monitoring equipment	See Methodology.
QA/QC procedures to be applied	See Methodology.
Purpose of data	Calculation of baseline, project and leakage emissions
Calculation method	See Methodology.

Data / Parameter	H
Data unit	meters
Description	Height of the tree
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	Cannot be estimated ex ante.
Monitoring equipment	Standard forestry equipment, according to SOPs.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	icl
Data unit	Dimensionless
Description	1, 2, 3 ... Icl initial (pre- deforestation) forest classes
Source of data	Measured
Description of measurement methods and procedures to be applied	The Methodology specifies criteria for selection of these classes.
Frequency of monitoring/recording	Reassessed at baseline renewal.
Value applied:	See Table 4.5.1 of the PD for current values.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	L
Data unit	m
Description	Length of the line
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	100 m
Monitoring equipment	Standard forestry equipment, according to SOPs.

QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	OP
Data unit	number of people
Description	Observed population size of the 20 participating villages in each year of the first fixed crediting period
Source of data	Measured
Description of measurement methods and procedures to be applied	See Annex 4.2 and associated Methodology Deviations. Data derived from Commune Database or a directly comparable source.
Frequency of monitoring/recording	Required at each verification event; can be measured at higher frequency if preferred.
Value applied:	For 2013. 16,325.
Monitoring equipment	n/a
QA/QC procedures to be applied	Expert inspection of the data and correction of any evident errors (with written justification). Periodic comparison with other datasets of comparable or better quality if available and selection of the most conservative.
Purpose of data	Calculation of leakage.
Calculation method	n/a

Data / Parameter	r1
Data unit	meters
Description	Radius at the base of the tree
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	Cannot be estimated ex ante.
Monitoring equipment	Standard forestry equipment, according to SOPs.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	r2
Data unit	meters
Description	Radius at the top of the tree

Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	Cannot be estimated ex ante.
Monitoring equipment	Standard forestry equipment, according to SOPs.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	tr
Data unit	Dimensionless
Description	1, 2, 3, ... TRpl number of trees in plot pl
Source of data	Measured
Description of measurement methods and procedures to be applied	Winrock SOPs (supplied) will be followed.
Frequency of monitoring/recording	When plots are required for assessing catastrophic losses and comparable unplanned events, and in establishing the second fixed baseline.
Value applied:	Cannot be estimated ex ante.
Monitoring equipment	Standard forestry equipment, according to SOPs.
QA/QC procedures to be applied	See SOPs.
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	z
Data unit	Dimensionless
Description	Post deforestation zones having a characteristic mix of final post deforestation classes
Source of data	Measured
Description of measurement methods and procedures to be applied	The Methodology specifies criteria for selection of these classes.
Frequency of monitoring/recording	Reassessed at baseline renewal.
Value applied:	See Table 4.5.1 of the PD for current values.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of baseline emissions, project emissions and leakage.
Calculation method	n/a

Data / Parameter	Fburnt[ic]
Data unit	%
Description	Proportion of forest area burned during the historical reference period in the forest class
Source of data	Estimated from the literature
Description of measurement methods and procedures to be applied	n/a
Frequency of monitoring/recording	Once at start of project
Value applied:	A conservative value of 100% is used both for forest converted to smallholder cropping mosaics and for deforestation resulting from catastrophic fires without conversion to agriculture.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of project emissions and leakage.
Calculation method	n/a

Data / Parameter	Pburnt[p,ic]
Data unit	%
Description	Average proportion of mass burnt in the carbon pool p in the forest class ic;
Source of data	Estimated from the literature
Description of measurement methods and procedures to be applied	n/a
Frequency of monitoring/recording	Once at start of project
Value applied:	A value of 0.50 is used for both open and dense forest classes. This is the value for 'primary tropical moist forest' listed in Table 2.6 of IPCC, 2006 (Annex 2) http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf . This is consistent with the climate regime at the site and is also the most conservative option in the table.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of project emissions and leakage.
Calculation method	n/a

Data / Parameter	CE[p,ic]
Data unit	Dimensionless
Description	Average combustion efficiency of the carbon pool p in the forest class
Source of data	Estimated from the literature

Description of measurement methods and procedures to be applied	n/a
Frequency of monitoring/recording	Once at start of project
Value applied:	Value of 0.30 is used for both open and dense forest. This is the upper bound of the range for drying seasons <6 months (and also the value for drying seasons >6 months) for primary tropical forests in Table 3A.1.14 of the 2003 Good Practice Guidelines for LULULCF Chapter 3.
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of project emissions and leakage.
Calculation method	n/a

6 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS (CLIMATE)

6.1 Baseline Emissions (G2)

The baseline carbon stock changes in the initial forest classes in the project area during the monitoring period are shown in Table 6.1.1.

Table 6.1.1. Annual area of baseline deforestation in the Project Area.

Project year [t]	Projected deforestation in the Project Area [ABSLPA1,t] ha	Cumulative total
	[= total ABSLPA _t]	[ABSLPA] ha
1	-	-
2	130	130
3	663	793
4	6,975	7,768
5	4,959	12,727
6	3,606	16,333

The baseline carbon stock changes in the initial forest classes in the project area during the monitoring period are shown in Table 6.1.2.

Table 6.1.2. Annual area of baseline deforestation in the Leakage Belt.

Project year [t]	Projected deforestation in the Leakage Belt [ABSLLK1,t] ha	Cumulative total [ABSLLK] ha
	[= total ABSLPA _t]	
1	936	936
2	456	1,392
3	1,516	2,908
4	3,127	6,035
5	2,281	8,316
6	4,176	12,492

Table 6.1.3. Baseline carbon stock change in the above-ground biomass in the Project Area [= Table 21.b.1 of the Methodology].

Carbon stock changes in the above-ground biomass per initial forest class icl				Total C stock change in the above-ground biomass of the initial forest classes in the Project Area	
	ID[cl]>	1	2	$\Delta\text{CabBSLP A}$ [icl,t]	$\Delta\text{CabBSLPA}$ icl,t]
	Name>	Dense Forest	Open Forest	Annual	Cumulative
Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1
0		-	-	-	-
1	t*	-	-	-	-
2	t*+1	(98,683)	(13)	(98,696)	(98,696)
3	t*+2	(504,363)	(81)	(504,445)	(603,141)
4	t*+3	(5,291,640)	(6,704)	(5,298,344)	(5,901,485)
5	t*+4	(3,724,999)	(22,845)	(3,747,844)	(9,649,329)
6	t*+5	(2,645,165)	(46,953)	(2,692,118)	(12,341,447)
7	t*+6	(2,611,043)	(61,470)	(2,672,513)	(15,013,959)
8	t*+7	(2,070,119)	(53,837)	(2,123,956)	(17,137,916)
9	t*+8	(1,901,824)	(59,364)	(1,961,189)	(19,099,104)
10	t*+9	(1,936,896)	(106,394)	(2,043,290)	(21,142,394)

Carbon stock changes in the above-ground biomass per post defor zone z			Total C stock change in the above-ground biomass of post defor zones in the Project Area	
	ID[cl]>	1	$\Delta\text{CabBSLPA}$ [icl,t]	$\Delta\text{CabBSLPA}$ [icl,t]
	Name >	Mixed Crop	Annual	Cumulative
Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1
0		-	-	-
1	t*	-	-	-
2	t*+1	705	705	705
3	t*+2	4,307	4,307	5,011
4	t*+3	42,184	42,184	47,195
5	t*+4	69,117	69,117	116,313
6	t*+5	88,700	88,700	205,013
7	t*+6	108,255	108,255	313,268
8	t*+7	123,835	123,835	437,103
9	t*+8	138,296	138,296	575,398
10	t*+9	153,706	153,706	729,105

Total net C stock change in the above-ground biomass of the Project Area	
$\Delta\text{CabBSLP A}$ t	$\Delta\text{CabBSLPA}$
Annual	Cumulative
tCO ₂ eha-1	tCO ₂ eha-1
-	-
-	-
(97,991)	(97,991)
(500,138)	(598,129)
(5,256,160)	(5,854,289)
(3,678,727)	(9,533,016)
(2,603,418)	(12,136,434)
(2,564,258)	(14,700,692)
(2,000,121)	(16,700,813)
(1,822,893)	(18,523,706)
(1,889,583)	(20,413,289)

Table 6.1.4. Baseline carbon stock change in the below-ground biomass in the Project Area [= Table 21.b.2 of the Methodology].

Carbon stock changes in the below-ground biomass per initial forest class icl				Total C stock change in the below-ground biomass of the initial forest classes in the Project Area		Carbon stock changes in the below-ground biomass per post defor zone z			Total C stock change in the below-ground biomass of post defor zones in the Project Area		Total net C stock change in the below-ground biomass of the Project Area	
	ID[cl]>	1	2	ΔCbbBSLPA [icl,t]	ΔCbbBSLPA [icl,t]		ID[cl]>	1	ΔCbbBSLPA [icl,t]	ΔCbbBSLPA [icl,t]	ΔCbbBSLP At	ΔCbbBSLPA
	Name>	Dense Forest	Open Forest	Annual	Cumulative		Name>	Mixed Crop	Annual	Cumulative	Annual	Cumulative
Project Year t	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	Project Year t	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1
0		-	-	-	-	0		-	-	-	-	-
1	t*	-	-	-	-	1	t*	-	-	-	-	-
2	t*+1	(2,171)	(0)	(2,171)	(2,171)	2	t*+1	176	176	176	(1,995)	(1,995)
3	t*+2	(13,267)	(2)	(13,269)	(15,440)	3	t*+2	1,077	1,077	1,253	(12,192)	(14,187)
4	t*+3	(129,680)	(149)	(129,829)	(145,269)	4	t*+3	10,546	10,546	11,799	(119,283)	(133,470)
5	t*+4	(211,628)	(652)	(212,279)	(357,549)	5	t*+4	17,279	17,279	29,078	(195,000)	(328,470)
6	t*+5	(269,820)	(1,684)	(271,504)	(629,053)	6	t*+5	22,175	22,175	51,253	(249,329)	(577,799)
7	t*+6	(327,261)	(3,036)	(330,297)	(959,350)	7	t*+6	27,064	27,064	78,317	(303,233)	(881,033)
8	t*+7	(372,802)	(4,220)	(377,022)	(1,336,372)	8	t*+7	30,959	30,959	109,276	(346,064)	(1,227,097)
9	t*+8	(414,641)	(5,525)	(420,167)	(1,756,539)	9	t*+8	34,574	34,574	143,850	(385,593)	(1,612,690)
10	t*+9	(457,252)	(7,865)	(465,117)	(2,221,656)	10	t*+9	38,427	38,427	182,276	(426,691)	(2,039,380)

Table 6.1.5. Baseline carbon stock change in the deadwood pool in the Project Area [= Table 21.b.3 of the Methodology].

Carbon stock changes in the deadwood pool per initial forest class icl				Total C stock change in the deadwood pool of the initial forest classes in the Project Area		Carbon stock changes in the deadwood pool per post defor zone z			Total C stock change in the deadwood pool of post defor zones in the Project Area		Total net C stock change in the deadwood pool of the Project Area	
	ID[cl]>	1	2	$\Delta CdwBSLP_A$ [icl,t]	$\Delta CdwBSLPA$ [icl,t]		ID[cl]>	1	$\Delta CdwBSLP_A$ [icl,t]	$\Delta CdwBSLP_A$ [icl,t]	$\Delta CdwBSLPA_t$	$\Delta CdwBSLP_A$
	Name >	Dense Forest	Open Forest	Annual	Cumulative		Name>	Mixed Crop	Annual	Cumulative	Annual	Cumulative
Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1
0		-	-	-	-	0		-	-	-	-	-
1	t*	-	-	-	-	1	t*	-	-	-	-	-
2	t*+1	(826)	-	(826)	(826)	2	t*+1	171	171	171	(655)	(655)
3	t*+2	(5,046)	(1)	(5,047)	(5,873)	3	t*+2	1,044	1,044	1,214	(4,003)	(4,658)
4	t*+3	(49,326)	(54)	(49,380)	(55,253)	4	t*+3	10,222	10,222	11,437	(39,158)	(43,816)
5	t*+4	(80,496)	(237)	(80,733)	(135,986)	5	t*+4	16,749	16,749	28,186	(63,984)	(107,801)
6	t*+5	(102,631)	(612)	(103,243)	(239,229)	6	t*+5	21,494	21,494	49,680	(81,748)	(189,549)
7	t*+6	(124,480)	(1,103)	(125,583)	(364,812)	7	t*+6	26,233	26,233	75,913	(99,349)	(288,898)
8	t*+7	(141,802)	(1,533)	(143,335)	(508,147)	8	t*+7	30,009	30,009	105,922	(113,327)	(402,225)
9	t*+8	(157,716)	(2,007)	(159,724)	(667,871)	9	t*+8	33,513	33,513	139,435	(126,211)	(528,436)
10	t*+9	(173,924)	(2,857)	(176,781)	(844,652)	10	t*+9	37,247	37,247	176,682	(139,534)	(667,970)

Table 6.1.6. Baseline carbon stock change in the above-ground biomass in the Leakage Belt [= Table 21.c.1 of the Methodology].

Carbon stock changes in the above-ground biomass per initial forest class icl				Total C stock change in the above-ground biomass of the initial forest classes in the Leakage Belt		Carbon stock changes in the above-ground biomass per post defor zone z			Total C stock change in the above-ground biomass of post defor zones in the Leakage Belt		Total net C stock change in the above-ground biomass of the Leakage Belt	
	ID[cl]>	1	2	ΔCabBSLLK [icl,t]	ΔCabBSLLK [icl,t]		ID[cl]>	1	ΔCabBSLLK [icl,t]	ΔCabBSLLK [icl,t]	ΔCabBSLLKt	ΔCabBSLLK
	Name>	Dense Forest	Open Forest	Annual	Cumulative		Name>	Mixed Crop	Annual	Cumulative	Annual	Cumulative
Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1
0		-	-	-	-	0		-	-	-	-	-
1	t*	(711,231)	(474)	(711,705)	(711,705)	1	t*	4,125	4,125	4,125	(707,580)	(707,580)
2	t*+1	(343,500)	(2,293)	(345,793)	(1,057,498)	2	t*+1	6,135	6,135	10,260	(339,658)	(1,047,238)
3	t*+2	(530,601)	(419,134)	(949,736)	(2,007,234)	3	t*+2	12,815	12,815	23,075	(936,920)	(1,984,158)
4	t*+3	(1,593,043)	(529,220)	(2,122,264)	(4,129,497)	4	t*+3	26,599	26,599	49,674	(2,095,665)	(4,079,823)
5	t*+4	(850,154)	(596,030)	(1,446,184)	(5,575,681)	5	t*+4	36,652	36,652	86,326	(1,409,532)	(5,489,355)
6	t*+5	(2,336,224)	(566,074)	(2,902,298)	(8,477,979)	6	t*+5	55,059	55,059	141,385	(2,847,239)	(8,336,594)
7	t*+6	(677,579)	(775,025)	(1,452,605)	(9,930,584)	7	t*+6	65,653	65,653	207,038	(1,386,952)	(9,723,547)
8	t*+7	(245,975)	(920,600)	(1,166,575)	(11,097,159)	8	t*+7	74,998	74,998	282,036	(1,091,577)	(10,815,124)
9	t*+8	(112,278)	(903,912)	(1,016,191)	(12,113,350)	9	t*+8	83,425	83,425	365,461	(932,765)	(11,747,889)
10	t*+9	(132,375)	(1,263,546)	(1,395,922)	(13,509,272)	10	t*+9	95,063	95,063	460,525	(1,300,859)	(13,048,747)

Table 6.1.7. Baseline carbon stock change in the below-ground biomass in the Leakage Belt [= Table 21.c.2 of the Methodology].

Carbon stock changes in the below-ground biomass per initial forest class icl				Total C stock change in the below-ground biomass of the initial forest classes in the Leakage Belt		Carbon stock changes in the below-ground biomass per post defor zone z			Total C stock change in the below-ground biomass of post defor zones in Leakage Belt		Total net C stock change in the below-ground biomass of the Leakage Belt	
	ID[cl]>	1	2	ΔCbbBSLLK [icl,t]	ΔCbbBSLLK [icl,t]		ID[cl]>	1	ΔCbbBSLLK [icl,t]	ΔCbbBSLLK [icl,t]	ΔCbbBSLLKt	ΔCbbBSLLK
	Name>	Dense Forest	Open Forest	Annual	Cumulative		Name>	Mixed Crop	Annual	Cumulative	Annual	Cumulative
Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1
0		-	-	-	-	0		-	-	-	-	-
1	t*	(15,647)	(10)	(15,657)	(15,657)	1	t*	1,031	1,031	1,031	(14,626)	(14,626)
2	t*+1	(23,203)	(61)	(23,264)	(38,921)	2	t*+1	1,534	1,534	2,565	(21,731)	(36,356)
3	t*+2	(34,876)	(9,286)	(44,162)	(83,083)	3	t*+2	3,204	3,204	5,769	(40,958)	(77,315)
4	t*+3	(69,922)	(20,933)	(90,856)	(173,939)	4	t*+3	6,650	6,650	12,418	(84,206)	(161,521)
5	t*+4	(88,625)	(34,051)	(122,677)	(296,616)	5	t*+4	9,163	9,163	21,582	(113,513)	(275,034)
6	t*+5	(140,021)	(46,510)	(186,531)	(483,146)	6	t*+5	13,765	13,765	35,346	(172,766)	(447,800)
7	t*+6	(154,927)	(63,567)	(218,495)	(701,641)	7	t*+6	16,413	16,413	51,759	(202,081)	(649,882)
8	t*+7	(160,339)	(83,829)	(244,167)	(945,808)	8	t*+7	18,750	18,750	70,509	(225,418)	(875,299)
9	t*+8	(162,809)	(103,723)	(266,532)	(1,212,340)	9	t*+8	20,856	20,856	91,365	(245,675)	(1,120,975)
10	t*+9	(165,721)	(131,532)	(297,253)	(1,509,593)	10	t*+9	23,766	23,766	115,131	(273,487)	(1,394,462)

Table 6.1.8. Baseline carbon stock change in the deadwood pool in the Leakage Belt [= Table 21.c.3 of the Methodology].

Carbon stock changes in the deadwood pool per initial forest class icl				Total C stock change in the deadwood pool of the initial forest classes in the Leakage Belt		Carbon stock changes in the deadwood pool per post defor zone z			Total C stock change in the deadwood pool of post defor zones in the Leakage Belt		Total net C stock change in the deadwood pool of the Leakage Belt	
	ID[cl]>	1	2	$\Delta C_{dwBSLLK}$ [icl,t]	$\Delta C_{dwBSLLK}$ [icl,t]		ID[cl]>	1	$\Delta C_{dwBSLLK}$ [icl,t]	$\Delta C_{dwBSLLK}$ [icl,t]	$\Delta C_{dwBSLLKt}$	$\Delta C_{dwBSLLK}$
	Name>	Dense Forest	Open Forest	Annual	Cumulative		Name>	Mixed Crop	Annual	Cumulative	Annual	Cumulative
Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	Project Year t		tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1	tCO ₂ eha-1
0		-	-	-	-	0		-	-	-	-	-
1	t*	-	-	-	-	1	t*	-	-	-	-	-
2	t*+1	(826)	-	(826)	(826)	2	t*+1	171	171	171	(655)	(655)
3	t*+2	(5,046)	(1)	(5,047)	(5,873)	3	t*+2	1,044	1,044	1,214	(4,003)	(4,658)
4	t*+3	(49,326)	(54)	(49,380)	(55,253)	4	t*+3	10,222	10,222	11,437	(39,158)	(43,816)
5	t*+4	(80,496)	(237)	(80,733)	(135,986)	5	t*+4	16,749	16,749	28,186	(63,984)	(107,801)
6	t*+5	(102,631)	(612)	(103,243)	(239,229)	6	t*+5	21,494	21,494	49,680	(81,748)	(189,549)
7	t*+6	(124,480)	(1,103)	(125,583)	(364,812)	7	t*+6	26,233	26,233	75,913	(99,349)	(288,898)
8	t*+7	(141,802)	(1,533)	(143,335)	(508,147)	8	t*+7	30,009	30,009	105,922	(113,327)	(402,225)
9	t*+8	(157,716)	(2,007)	(159,724)	(667,871)	9	t*+8	33,513	33,513	139,435	(126,211)	(528,436)
10	t*+9	(173,924)	(2,857)	(176,781)	(844,652)	10	t*+9	37,247	37,247	176,682	(139,534)	(667,970)

6.2 Project Emissions

Table 6.2.1. Ex-post carbon stock changes in the project area during the monitoring period.

	Area deforested per class within the project area		Total ex-post deforestation in the project area		Total net C stock change in all pools in the Project Area	
ID	Fd	Fo	AEXPPA1,t	AEXPPA	ΔCtotEXPPAt	ΔCtotEXPPA
Name	Dense forest	Open forest	annual	cumulative	annual	cumulative
year [t]	ha	ha	ha	ha	tCO ₂ eha-1	tCO ₂ eha-1
1	82	43	125	125	(79,584)	(79,584)
2	82	43	125	250	(80,941)	(160,525)
3	82	43	125	375	(82,298)	(242,822)
4	625	48	673	1,048	(506,539)	(749,361)
5	625	48	673	1,721	(516,049)	(1,265,410)
6	625	48	673	2,393	(525,559)	(1,790,968)

6.3 Leakage

Table 6.3.1. Ex-post carbon stock changes in the project area during the monitoring period.

	Area deforested per class within the leakage area		Total ex-post deforestation in the leakage area		Total net C stock change in all pools in the Leakage Area	
ID	Fd	Fo	AEXPPA1,t	AEXPPA	ΔCtotEXPPAt	ΔCtotEXPPA
Name	Dense forest	Open forest	annual	cumulative	annual	cumulative
year [t]	ha	ha	ha	ha	tCO ₂ eha-1	tCO ₂ eha-1
1	953	451	1,404	1,404	(975,783)	(975,783)
2	953	451	1,404	2,807	(995,821)	(1,971,604)
3	953	451	1,404	4,211	(1,015,860)	(2,987,464)
4	1,483	571	2,054	6,265	(1,510,487)	(4,497,951)
5	1,483	571	2,054	8,318	(1,540,439)	(6,038,390)
6	1,483	571	2,054	10,372	(1,570,390)	(7,608,780)

6.4 Summary of GHG Emission Reductions and Removals (CL1 & CL2)

Table 6.4.1. Ex post net anthropogenic GHG emission reductions (Δ REDDt) and Tradable VCUs.

Yr	Baseline carbon stock change in Project Area		Ex-post project carbon stock change		Baseline carbon stock change in Leakage Area		Ex-post leakage carbon stock change		Ex post net anthropogenic GHG emission reductions		Ex-ante VCUs tradable after 10% risk buffer deduction	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
	Δ CBSLPA[t]	Δ CBSLPA	Δ CPSPA[t]	Δ CPSPA	Δ CPSPA[t]	Δ CPSPA	Δ CLK[t]	Δ CLK	Δ REDDt	Δ REDD	VCU[t]	VCU
t	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e
1	-	-	79,584	79,584	727,201	727,201	975,783	975,783	(328,166)	(328,166)	(320,207)	(320,207)
2	100,641	100,641	80,941	160,525	368,810	1,096,011	995,821	1,971,604	(607,311)	(935,477)	(609,281)	(929,488)
3	516,334	616,975	82,298	242,822	992,032	2,088,042	1,015,860	2,987,464	410,208	(525,269)	366,804	(562,684)
4	5,414,601	6,031,576	506,539	749,361	2,209,001	4,297,044	1,510,487	4,497,951	4,908,063	4,382,794	4,417,256	3,854,572
5	3,937,711	9,969,287	516,049	1,265,410	1,562,419	5,859,463	1,540,439	6,038,390	3,421,662	7,804,456	3,079,496	6,934,068
6	2,934,495	2,903,782	525,559	1,790,968	3,079,837	8,939,299	1,570,390	7,608,780	2,408,936	10,213,393	2,168,043	9,102,111

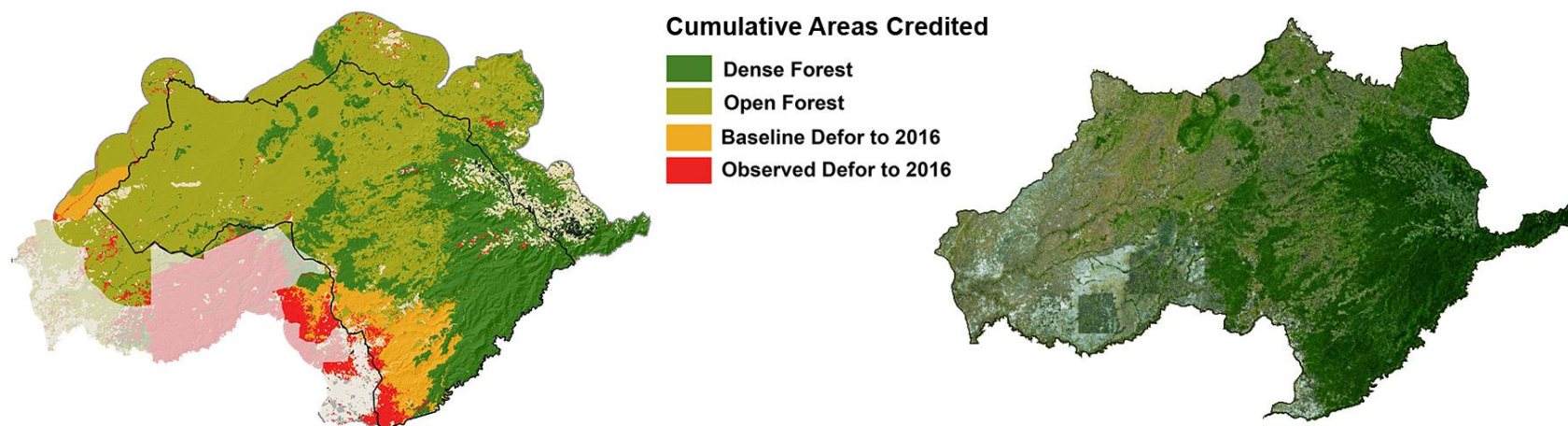


Figure 6.4.1. Cumulative areas credited shown in orange. 2016 Landsat 8 imagery shown on right.

7 COMMUNITY

7.1 Net Positive Community Impacts (CM1)

Table 7.1.1. Positive community impacts of project activities

Project Action	Positive Impacts
Sub-Objective #1: Key legal and planning documents for the SPF/KSWS and surrounding landscape are approved and implemented	
Action #1: Support for sub-decree maintained among senior government and general public.	Recognition of the importance of the KSWS for local communities was reaffirmed during numerous meetings with government and community stakeholders during the verification period.
	Maintenance of natural resources. Nearly 25,000 hectares of deforestation prevented during the verification period preserved forest and NTFP resources.
	Ongoing promotions of KSWS deterred large-scale external threats. Several proposed ELCs and extractive projects were prevented due to the protected status of KSWS.
Action #2: Management plan approved and implemented (including zonation and regulations)	Land-use zoning ensures long-term access for legitimate users. Land use planning for seven ICT communities was completed during the verification period.
	Clarified regulations for forest use help to ensure long-term access and deter damaging activities. Extensive community outreach programs and community events were conducted to raise awareness of ICT zonation regulations during the verification period.
Action #4: Develop partnerships with the private sector (to reduce impacts by companies)	Reduced impact from industrial activities in the landscape minimized disturbance to the KSWS. Key aspects that will be controlled are land-grabbing by company staff, illegal logging, land pollution. Attempts to develop relationships with local ELC companies were largely unsuccessful, however key relationships with private sector markets were developed during the verification period.
Action #5: Develop international cross-border dialogue	Cross-border threats to natural resources were reduced. Two cross border workshops were held to discuss law enforcement and transboundary protected area management goals.
Action #6: Apply adaptive management	Adaptive management increased opportunities for participation and influence on reserve management. Monthly meetings and annual workplans throughout the verification period allowed for continue adaptation to changes circumstances in and around the project area.

Project Action	Positive Impacts
Sub-Objective #2: To reduce forest and wildlife crime by direct law enforcement	
Action #1: Enforce wildlife, forest and protected area laws and sub-decree through patrols	Reduced threats to natural resources, risk of land alienation etc. Ongoing law enforcement patrols were conducted throughout the verification period.
Action #2: Establish and implement law enforcement monitoring framework	Monitoring of law enforcement impacts enabled the project to track effectiveness and improve practices as necessary. All law enforcement activity recorded and reported using the Spatial Monitoring and Reporting Tool (SMART).
Action #3: Ensure sufficient patrol buildings, equipment and staffing and Action #4: Ensure sufficient patrol personnel capacity	Sufficient staff and resources were available which led to improved effectiveness of enforcement efforts and increased protection of natural resources and land against all threats. Patrol personnel numbers and resources increased throughout the verification period. New REDD finance will be used to increase the number of patrol personnel.
Action #5: Liaise with Provincial, National and other authorities	Coordination improved effectiveness, for example in processing criminal cases. All project activities conducted in close partnership with Provincial, National, District and Commune authorities throughout the verification period.
Action #6: Establish Community-based Patrolling and/or monitoring system	Community-based patrolling will increase social capital and increase protection efforts further, ensuring continued protection of species and habitat. A community patrol program was established and ongoing community patrols were conducted throughout the verification period.
Sub-Objective #3: Land and resource use by all core zone communities is sustainable	
Action #1: Form and maintain land-use agreements with communities.	Agreements will strengthen tenure security and use rights. Land use planning agreements established during ICT development have been documented and ratified by seven ICT communities.
	Agreements allow for the improved management of forest resources thus controlling over-harvesting.
Action #2: Legally register communities and users.	Community legal registrations during the verification period further strengthened tenure security and use rights.
Action #3: Support indigenous communal land titling in appropriate communities.	Extensive ICT development support in the project area strengthened community tenure security and use rights.
Action #4: Demarcation of the Forest Estate.	Land use planning and boundary delineation activities during the verification period provided clarification of the forest boundary in order to reduce forest conversion thus protecting natural habitats and reducing future conflict
Action #5: Conduct extension and communication activities.	Workshops during the verification period increased awareness of rights and of the opportunities for better forest management.

Project Action	Positive Impacts
Action #7: Engage with civil society organizations operating in the Project Area.	Ongoing meetings, workshops, and collaborations with civil society improved project services.
Sub-Objective #4: Support for alternative livelihoods that reduce deforestation	
Action #1: Establish community-based ecotourism.	The creation of the Jahoo Gibbon Camp provided income generation and livelihood diversification as well as opportunities for skill development
Action #2: Support agricultural extension activities.	Agricultural extension activities conducted during the verification period Improved agricultural productivity, increased food security, improved incomes, and added resilience to shocks and climate change and livelihood diversity for the REDD+ communities.
Action #3: Provide infrastructure support linked to conservation activities.	Road improvements, well installations, and building activities during the verification period Improved quality of life and income generating opportunities for the REDD+ communities.
Action #4: Develop NTFP-based livelihood projects.	Improved NTFP marketing increased food security, incomes, resilience to shocks and climate change and livelihood diversity.
Action #5: Develop and manage a system to share carbon benefits.	Benefit depends on type of benefits selected – in each community may increase incomes, development activities or both. A benefit distribution system has been established that ensures community benefits from KWS REDD+ revenue.
Action #6: Improve literacy and numeracy.	Classes held in KWS communities increased adult literacy and numeracy, increasing off farm livelihood options

7.2 Negative Offsite Stakeholder impacts (CM2)

No negative offsite stakeholder impacts from project activities observed.

8 BIODIVERSITY

8.1 Net Positive Biodiversity Impacts (B1)

Table 8.1.1. Positive biodiversity impacts of project activities (in *italics* are the threats addressed with major threats underlined)

Project Action	Positive impacts
Sub-Objective #1: Key legal and planning documents for the SPF/KWS and surrounding landscape are approved and implemented	
Action #1: Support for sub-decree maintained among senior government and general public.	Recognition of the importance of the KWS for local communities was reaffirmed during numerous meetings with government and community stakeholders during the verification period.
<i>All threats, especially important in controlling <u>habitat loss</u>.</i>	

Project Action	Positive impacts
Action #2: Management plan approved and implemented (including zonation and regulations). <i>All threats.</i>	Stabilized land-use by residents protected natural habitats. Clarified regulations for forest use reduced damaging activities. Areas of strict protection were identified and managed appropriately, leading to reduced disturbance to wildlife populations.
Action #3: Mondulkiri Provincial Corridors strategy implemented (maintain links to other forests). <u>Habitat loss and fragmentation in the wider landscape</u>	Protection of the wider landscape helped conserve species that range widely through the area, for example Asian Elephants, large carnivores and vultures.
Action #4: Develop partnerships with the private sector (to reduce impacts by companies). <u>Hunting, habitat loss, incidental disturbance, pollution</u>	Reduced impact from industrial activities in the landscape minimized disturbance to the KSWS. Key aspects that were controlled are hunting and trapping by company staff, illegal logging, and pollution.
Sub-Objective #2: To reduce forest and wildlife crime by direct law enforcement	
Action #1: Enforce wildlife, forest and protected area laws and sub-decree through patrols. <u>Hunting, habitat loss, and over-harvest of NTFPs</u>	This is the key strategy to protect biodiversity. Patrols helped protect biodiversity from direct exploitation and disturbance leading to increasing or stable populations of many species of conservation concern and protection of threatened ecosystems.
Action #2: Establish and implement law enforcement monitoring framework. <u>Hunting, habitat loss, and over-harvest of NTFPs</u>	Monitoring of law enforcement impacts enabled the project to track effectiveness and improve practices. This ensured that efforts adapted to changing threats, and protection of species and habitat is maintained. Monitoring of law enforcement impacts will enable the project to track effectiveness and improve practices as necessary. All law enforcement activity recorded and reported using the Spatial Monitoring and Reporting Tool (SMART).
Action #3: Ensure sufficient patrol buildings, equipment and staffing and Action #4: Ensure sufficient patrol personnel capacity. <u>All threats</u>	Sufficient staff and resources are available leading to improved effectiveness of enforcement efforts and increased protection of species and habitat against all threats. . Patrol personnel numbers and resources increased throughout the verification period. New REDD finance will be used to increase the number of patrol personnel.
Action #5: Liaise with Provincial, National and other authorities. <u>All threats</u>	All project activities conducted in close partnership with Provincial, National, District and Commune authorities throughout the verification period. This coordination improved project effectiveness, for example in processing criminal cases and for addressing threats such as wildlife trade that extend beyond the borders of the project.
Action #6: Establish Community-based Patrolling and/or monitoring system <u>Hunting, habitat loss, and over-harvest of NTFPs, incidental disturbance</u>	Community-based patrolling established during the verification period increased community support for activities helping to ensure continued protection of species and habitat.

Project Action	Positive impacts
Sub-Objective #3: Land and resource use by all core zone communities is sustainable	
Action #1: Form and maintain land-use agreements with communities. <u>Habitat loss, over harvesting of NTFPs, incidental disturbance</u>	Agreements helped stabilize land-use and reduced conversion of natural habitats, especially critical areas such as grasslands and wetlands important to large waterbirds and Eld's Deer, bamboo groves used by elephants and salt-licks used by ungulates. Agreements during the verification period allowed for improved management of forest resources thus controlling over-harvesting and minimizing habitat disturbance.
Action #4: Demarcation of the Forest Estate; reforestation of recent clearance. <u>Habitat loss</u>	Clarification of the forest boundary reduced forest conversion thus protecting natural habitats.
Action #5: Conduct extension and communication activities. <u>All threats.</u>	Increased awareness of forest laws, and the impact of activities on the forest and wildlife led to changes in attitude and behavior. Increased compliance with the laws will reduce pressures on species and ecosystems
Sub-Objective #4: Support for alternative livelihoods that reduce deforestation	
Action #1: Establish community-based ecotourism. <u>Habitat loss, over harvesting of NTFPs</u>	Income generation from the legal activities reduced the need for local communities to engage in destructive activities such as hunting, and the conversion of forest to cash crops Tourism links income to forest and species conservation, providing a direct incentive for local residents to protect species and habitats
Action #2: Support agricultural extension activities. <u>Habitat loss</u>	Improved agricultural productivity and diversity helped stabilize land-use, thus reducing habitat conversion. Cash income from farming reduced the need for local communities to engage in destructive activities such as hunting.
Action #3: Develop NTFP-based livelihood projects. <u>Over harvesting of NTFPs</u>	Improved NTFP management led to more sustainable harvesting and reduced habitat disturbance.

8.2 Negative Offsite Biodiversity Impacts (B2)

No negative offsite biodiversity impacts from project activities observed.