Output 3 REDD+ model for HP/HL/APL is developed at pilot site(s) in West Kalimantan.

Activity 3-1 Conduct studies on conventional management of HP/HL/APL (peatland).

活動 1-7 で検討・実施した。

Activity 3-2 Identify pilot site(s) for improved management of HP/HL/APL (peatland).

活動 1-7 で検討・実施した。

Activity 3-3 Calculate RL/REL for pilot site(s).

（業務実施の活動対象外）

Activity 3-4 Identify policy and measures for improved management of HP/HL/APL (peatland) including the development of performance/safeguard indicators.

（業務実施の活動対象外）

Activity 3-5 Estimate CO2 emission for improved management.

（業務実施の活動対象外）

Activity 3-6 Develop a carbon monitoring method.

活動 1-2 及び 1-6 で検討・実施した。

Activity 3-7 Conduct baseline survey on biodiversity and community livelihood.

（業務実施の活動対象外）

Activity 3-8 Conduct safeguard/co-benefit activities on the improvement of livelihood, biodiversity conservation and the provision of environmental services.

（業務実施の活動対象外）

Activity 3-9 Collect and assess data on land use change and carbon stock, biodiversity conservation and community livelihood.

（業務実施の活動対象外）

Draft an operational manual of REDD+ model by analyzing local conditions, policy instruments, project activities and their impacts.

（業務実施の活動対象外）

Output 4 Capacity of carbon monitoring is enhanced at the provincial level in Central Kalimantan.

Activity 4-1 Assist to organize MRV institution.

（業務実施の活動対象外）

Activity 4-2 Provide training for MRV institution, local governments and communities to enhance knowledge and skills on carbon monitoring.

1. 中部カリマンタンでの炭素モニタリングにかかる研修の実施

中部カリマンタン州政府の泥炭湿地林モニタリング能力向上のため、2015 年 6 月 8 日から 12 日にパランカラヤにてリモートセンシング/GIS 基礎研修を実施し、11 名が参加した（表 65）。

研修初日は、IJ-REDD+チームとパランカラヤ大学の専門家が、リモートセンシング/GIS 概論、REDD+の動向、泥炭概論等、中部カリマンタン州の泥炭地における REDD+活動の理解を深めるための発表を行った。

2 日目以降は、画像解析や GIS 操作実習とともに、研修生が持続的なモニタリング活動を実施できるよう、画像解析の現地検証方法や GPS を用いた調査位置情報の取得及び QGIS での情報管理方法等に重点を置き、半日の日程で 2 日間の現地調査を実施した（表 66）。

表 65　研修参加者リスト

Organization 組織名	Name 名前
Forestry Agency of Central Kalimantan	Mr.Hadriani
BLH kalteng	Mr.Juan Kristiawan
BPK Banjar Baru	Mr.Dian Lazuardi
BPK Banjar Baru	Mr.Dian Cahyo Buwono
BPKH Wilayanh XXI	Mr.Subiyanto
BPKH Wilayah XXI	Mr.Hafiq Prasetiadi
BKSDA Kalteng	Ms.Maulida Indira
Balai Taman Nasional Sebangau	Mr.Tatang Suwardi
BPAS Kahayan	Ms.Mira Lestari
University of Palangka Raya	Ms.Patricia Erosa Putir
University of Palangka Raya	Mr.Fernandes Orlando

図 103　研修参加者の集合写真

表 66　研修プログラム

Date	Training Contents
8th June	Morning session 1. Basics of Remote sensing/GIS（Mr. Kazuyo Hirose, Japan Space Systems） Afternoon session 2. REDD+ and Forest Monitoring（Mr. Shigeru Takahara, IJ-REDD+ project） 3. Fundamental of peatland (Dr. NinaYulianti, UNPAR) 4. REDD+ and peatland (Prof. Jagau Yusurum, UNPAR) 5. Question and answer, discussion
9th June	Practice of GIS basics by QGIS 1. QGIS setup 2. Procedure to download Landsat image 3. Import satellite image to QGIS 4. Map preparation by QGIS for field survey on 10th June
10th June	Field survey (1), QGIS practice 1. Positioning by GPS and site observation at kerangas for mining 2. Positioning by GPS and verification of Landsat images at Tangkiling 3. Import GPS data to QGIS 4. Digitizing and measuring areas of mining site, forest are and paddy field
11th June	Field survey (2), QGIS practice 1. GPS positioning along the road from Karampangan to Tumbang Nusa 2. Verification of Landsat image for canal development at peatland 3. Practice of Vertex for measuring distance and height of tree 4. Observation of peat material by drilling of peat-auger 5. Import position data by delimited text format (csv)
12th June	Practice of land classification, geo-reference and presentation of participants 1. Practice of unsupervised classification by free software (Multispec) 2. Practice of geo-reference function by QGIS 3. Presentation from all participants about the achievement from the training

GPS を用いた位置情報の取得/記録（左上）、衛星画像と現地の状況の比較（右上）
Vertex を用いた泥炭湿地林の高さ測定（左下）、泥炭の観察用コア（右下）

図 104　研修の現地調査の様子（2015 年 6 月実施）

最終日に各参加者が行った発表から、全員がリモートセンシングと GIS の基礎を習得できたと考えられる。参加者から以下の意見があった。

- ✓ GPS を用いた位置情報の取得、位置情報の手入力シートのインポート方法（CSV delimited text）は、実践的で、日々の業務に利用していきたい
- ✓ 泥炭のコアサンプルをはじめて観察したが、泥炭の定義やパランカラヤ周辺でどの程度泥炭が残っているのか調べたい
- ✓ QGIS 上で衛星画像の使い方が分かったので、同僚と共有したい

Activity 4-3 Assess carbon monitoring methods that are applied/being developed by REDD+ projects including JICA-JST in terms of accuracy, costs and accessibility.

（業務実施の活動対象外）

Activity 4-4 Provide technical assistance for MRV institution according to its requirement.

（業務実施の活動対象外）

その他の実施事項

1. REDD+の理解醸成にかかわる活動

REDD+事業を進めることは地域における土地利用方法を変更（改善）することになり、地域住民の生活様式にも影響を及ぼすと考えられる。このため、REDD+事業の検討にあたっては地域住民に十分に REDD+事業で目指す方向性を共有することが求められる。そして、その上で REDD+事業への参加を促していくことが重要となる。

本業務では、REDD+事業の対象地において REDD+の理解醸成を進めるため大判ポスター（A0サイズ）のドラフト版の作成を進めた。大判ポスターはイラストを中心として REDD+事業（≒森林保全活動）の重要性を共有することを目的とした（図 105）。国立公園と周辺村の間で協働管理の取組が進んでいることから、長期専門家による活用が望まれる。

図 105　提案された REDD+説明のポスター

モニタリング

村での協議

泥炭地での森林減少

生計活動　（非木材生産物の利用）

図 106　主だった REDD+活動のイラスト例

Chapter 3 教訓及び提言

1. Output 1

1.1. 西カリマンタン州 FREL の設定の支援

2015 年 12 月 FREL が国連に提出されている。本業務では、IJ-REDD+の対象 4 県についての FREL 試算を行った。今後は、本業務で得られた経験を生かしながら、Kapuas 県での FREL 試算の経験を有する FORCLIME 等とも連携を図り、国連と国で進められている FREL の確定に向けた方法論の開発との調和のとれた西カリマンタン州全体の FREL の設定に向けた支援を図ることが重要になる。

1.2. 西カリマンタン州炭素モニタリング手法の構築の支援

本業務を通じて炭素モニタリングに係る基本事項の動向を整理しながら、西カリマンタン州による炭素モニタリングの計画の促進を試みた。その結果、2016 年当初より西カリマンタン州レベルで MRV 体制に向けた動きが活発化し、州レベルのモニタリングの開始も模索している。今後は、炭素モニタリングに係る基本事項の動向の整理、西カリマンタン州による炭素モニタリングの計画に向けた動向を生かしながら、州レベルの炭素モニタリングの手法の設定に向けた支援を図ることが重要になる。州レベルの炭素モニタリングの開始にあたっては、既に州農園事務所等からの IJREDD+の GIS 研修参加者により土地被覆データの更新等のために活用が始まっているように、本業務で作成した REDD+基本図のデータを活用することが推奨される。

2. Output 2

2.1. 社会経済調査

社会経済調査は、森林減少・劣化のドライバーとエージェントを把握するために調査を実施した。これまで国立公園にはこれらの定量化されたデータがなかったため、本調査によって整備された情報は同目的以外にも、下記のように国立公園周辺の自然資源管理に活用され始めている。

1. 国立公園 20 ヵ年管理計画（2015-2035）策定時の参考データ
2. NGO がカヨウンタラ県内の村および住民との協働管理による保安林管理活動に使用
3. 国立公園周辺村への結果共有による保全意識の醸成
4. プロジェクト及び公園事務所による活動のインパクトを測るにあたってのベースラインデータとしての活用
5. 国立公園周辺の各ステークホルダーで構成される管理フォーラムにおいて、ランドスケープ保全計画を策定する際の基本データとして活用

(1) 継続的なデータの取得

今回の社会経済調査では予算及び調査期間の関係で全世帯データではなくサンプルデータを取得し整備したものである。今後、定期的かつ継続的に取得することや調査の対象世帯を目

的に合わせて増やすことで対象地域の情報をより正確に把握することが可能となる。また、今回使用した質問票およびデータ入力用の様式は一式国立公園に引き渡しており、目的に合わせ必要な項目のみを選択して調査を継続することも可能となっており、よりよい自然資源管理および生計活動の向上を図るためにも継続的に社会経済情報の収集が行われることが望ましい。

(2) 情報収集、データ管理の能力強化

これまで、国立公園に周辺村の情報が数値化された統計的なデータがなかったため、今後管理フォーラム等の場を用いて、データ管理を行う能力が向上されることが望ましい。本調査ではデータプロセスの共有を行ったが、公園職員が自らで管理し、活用できるようにするため、モニタリング能力強化と併せてデータの管理能力強化にも取り組まれることが望ましい。

(3) プロジェクト及び公園事務所による活動の効果測定

今回得られた情報をベースラインのデータとして、今後実施が本格化する REDD+活動または協働管理の活動の効果測定を行うことが推奨される（管理フォーラムではすでに検討が始まっている）。特に、REDD+事業では追加的に行われた活動の森林減少・劣化抑制効果を定量的に評価することが求められるため、モニタリング活動と併せて効果が把握されることが望ましい。

2.2. グヌンパルン国立公園とそのランドスケープ協働管理モデルについて保安林等国有林管理における活用

本業務では、国立公園周辺の対象村落で行われているグヌンパルン国立公園とそのランドスケープの協働管理の促進活動を生かした住民参加型森林炭素モニタリング手法として「村落ベース森林モニタリングモデル」、さらに、炭素モニタリングにおける住民参加を促進するための「現場モニタリング開発モデル」を提案している。今後は、州レベル炭素モニタリング手法の構築にも役立つように、グヌンパルン国立公園とそのランドスケープ協働管理の促進プロセスで獲られた経験と教訓を生かしながら、グヌンパルン国立公園とそのランドスケープ以外、例えば保安林等への波及や適用の試行を図ることが重要になる。

3. Others

3.1. REDD+ポテンシャルサイト選定結果の Output 3 における活用

2015 年 1 月に開催された TC でのコンセプト説明結果にもとづき、主に IJ-REDD+の長期専門家（西カリマンタンベース）は州林業事務所や BKSDA の職員の協力により、以下のように REDD+ポテンシャルサイト選定結果の活用にかかる検討を行っている。

1. 州政府機関によりアクセスが容易なクブラヤ県等における保安林（HL）のパイロットサイト候補地の検討
2. 上記における林業省-JICA 火災対策協力「泥炭湿地林周辺地域における火災予防のためのコミュニティ能力強化プロジェクト（FCP）」の成果の活用（TPD アプローチ試行村落でのデモンストレーション軽減活動等の実施、社会経済調査結果の活用等）の検討

その後、IJ-REDD+プロジェクトチーム側は、上記の検討結果を生かした Output 3 の活動に着手していない。今後は、本業務で作成した REDD+基本図の積極的な活用をしながら、さらに REDD+ポテンシャルサイト選定結果の活用を再検討することも望まれる。

3.2. 泥炭分布図改訂作業

現地調査データと様々な地理空間情報を用いて改訂版泥炭分布図を作成し、WI（2004）及び Ritung et al.（2011）による泥炭分布図の評価を行った。その結果、WIl（2004）、Ritung et al.（2011）及び IJ-REDD+（2015）の泥炭分布面積は大きく異なることが確認され、精度向上を図るために以下の活動が推奨される。

1. 泥炭分布図精度向上のための継続的な現地調査
2. 関係機関による定期的な泥炭分布の情報交換

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Final Report
Appendix

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

Final Report
Appendix 1

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Project Design Matrix

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

Annex VII

Project Design Matrix

Project title: Indonesia Japan Project for Development of REDD+ Implementation Mechanism (IJ-REDD+)
Project period: Three years (2013 – 2016)
Target areas: Ketapang, Kayong Utara, Kubu Raya and Pontianak Districts in West Kalimantan Province including Gunung Palung National Park (GPNP); and Central Kalimantan Province
Target group: MoFor; Provincial governments of West/Central Kalimantan; GPNP office; District governments of target areas; Private companies; Universities; and Communities

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Super Goal: Forest and biodiversity conservation are promoted and REDD+ benefits are generated.			
Overall Goal: REDD+ implementation mechanism developed by the project is integrated into national REDD+ mechanism.	1. REDD+ model developed by the project is utilized as one of REDD+ measures at the national level.	1. Interview to officials of MoFor and Task Force (REDD+ Agency)	The government maintains active policy on REDD+
Project Purpose: REDD+ implementation mechanism is developed in West and Central Kalimantan.	1. Policy document on forest carbon monitoring is developed by the provisional government in West Kalimantan. 2. Application of national park REDD+ model is stipulated in GPNP Management Plan as a conservation strategy of the national park. 3. Dissemination of REDD+ model for HP/HL/APL is planned by provincial/district government(s) in West Kalimantan. 4. Improvement of provincial RL/REL is proposed by MRV institution in Central Kalimantan.	1. Policy document in West Kalimantan 2. GPNP Management Plan 3. Interview to government officials 4. Proposal on RL/REL improvement	The international negotiation on climate change continues
Output 1: Sub-national framework on REDD+ is developed in West Kalimantan.	1-1. Provincial RL/REL is established. 1-2. Carbon monitoring method is developed. 1-3. Potential REDD+ sites for future investment are identified.	Project reports which include RL/REL and potential site map.	Provincial government secures counterpart budget.

Output 2: National park REDD+ model is developed at GPNP.	2-1. Areas under different local conditions in national park are identified in terms of drivers of deforestation and forest degradation. 2-2. Policy and measures to address the above causes are developed for respective areas. 2-3. Amount of CO2 emissions is compared with RL/REL for respective areas. 2-4. Effects of the project to biodiversity conservation and communities are assessed. 2-5. An operational manual of national park REDD+ model is drafted.	Project reports which include baseline survey report, RL/REL, biodiversity assessment and operational manual.	National park office secures counterpart budget.
Output 3: REDD+ model for HP/HL/APL is developed at pilot site(s) in West Kalimantan.	3-1. Policy and measures to reduce CO2 emission are developed for pilot site(s) of HP/HL/APL (mainly in peatland). 3-2. Amount of CO2 emissions is compared with RL/REL for pilot site(s). 3-3. Effects of the project to biodiversity conservation and communities are assessed for pilot site(s). 3-4. An operational manual of REDD+ model for HP/HL/APL is drafted.	Project reports which include RL/REL and operational manual for HP/HL/APL.	There are private companies/local organizations which are interested in REDD+.
Output 4: Capacity of carbon monitoring is enhanced at the provincial level in Central Kalimantan.	4-1. Carbon monitoring methods that are applied by REDD+ projects in Central Kalimantan are compiled by MRV institution.	Compiled report on carbon monitoring.	Provincial government sets up MRV institution.
Output 5: Project findings are referred to in the process of developing REDD+ implementation mechanisms at the national level.	5-1. Findings of the project are presented and recognized in Ministry of Forestry (MoFor) and other national agencies concerning REDD+.	Project reports Interview to officials of MoFor	
<u>Activity</u> 1-1) Organize a team that consists of provincial/district governments and university. 1-2) Provide training on remote sensing analysis and sample plot monitoring. 1-3) Overview drivers of deforestation and forest degradation in West Kalimantan.	<u>Input</u> Japanese side: * Long Term Experts (Chief advisor/Forest & REDD+ Policy, Forest Management/REDD+ Local Institutional Development, Participatory forest management/REDD+ Demonstration, Coordinator/Biodiversity Conservation		<u>Preconditions</u> Provincial and district governments are supportive to REDD+

1-4) Collect data on historical/future land use and carbon stock at the district level. 1-5) Calculate Provincial RL/REL. 1-6) Develop a monitoring plan and implement it. 1-7) Identify potential REDD+ sites and compile information for future REDD+ projects. 1-8) Identify areas of strategic cooperation other than RL/REL and carbon monitoring. 1-9) Provide policy and technical assistance for the execution of strategic cooperation. 2-1) Conduct trainings on facilitation and other professional skills. 2-2) Study drivers of deforestation/degradation and diversity of local conditions. 2-3) Identify target villages and share information on IJ-REDD at the villages. 2-4) Draft a REDD+ activity plan including the development of benefit sharing methods, performance indicators and safeguard indicators. 2-5) Develop RL/REL and carbon monitoring method. 2-6) Conduct baseline survey on biodiversity and community livelihood. 2-7) Facilitate stakeholders to make agreement on resource management rules. 2-8) Conduct safeguard/co-benefit activities on the improvement of livelihood, biodiversity conservation and the provision of environmental services. 2-9) Collect and assess data on land use change and carbon stock, biodiversity conservation and community livelihood. 2-10) Draft an operational manual of REDD+ model by analyzing local conditions, policy instruments, project activities and their impacts. 3-1) Conduct studies on conventional management of HP/HL/APL (peatland). 3-2) Identify pilot site(s) for improved management of HP/HL/APL (peatland). 3-3) Calculate RL/REL for pilot site(s).	* Short Term Experts (when needed, ex. Carbon assessment and monitoring, Satellite data analysis, Market/Funding mechanism) * Employment of National Coordinator, Field Coordinators and National Expert(s) * Training in Japan * Necessary machinery, equipment and materials delivered to project site * Running expenses for the implementation of the Project activities. Indonesian side: * Counterpart Personnel 1. Project Director 2. Project Manager 3. Officers in charge from PHKA * Travel expenses and allowances of counterpart personnel * Suitable office space * Available data and information related to the Project when considered appropriate and permitted by law * Running expenses for the implementation of the Project under MoFor	

3-4) Identify policy and measures for improved management of HP/HL/APL (peatland) including the development of performance/safeguard indicators. 3-5) Estimate CO2 emission for improved management. 3-6) Develop a carbon monitoring method. 3-7) Conduct baseline survey on biodiversity and community livelihood. 3-8) Conduct safeguard/co-benefit activities on the improvement of livelihood, biodiversity conservation and the provision of environmental services. 3-9) Collect and assess data on land use change and carbon stock, biodiversity conservation and community livelihood. 3-10) Draft an operational manual of REDD+ model by analyzing local conditions, policy instruments, project activities and their impacts. 4-1) Assist to organize MRV institution. 4-2) Provide training for MRV institution, local governments and communities to enhance knowledge and skills on carbon monitoring. 4-3) Assess carbon monitoring methods that are applied/being developed by REDD+ projects including JICA-JST in terms of accuracy, costs and accessibility. 4-4) Provide technical assistance for MRV institution according to its requirement. 5-1) Examine policies and strategies of MoFor and other agencies concerned with REDD+. 5-2) Share project findings with MoFor and other agencies concerned with REDD+. 5-3) Provide policy and technical assistance for MoFor and other agencies concerned with REDD+. 5-4) Coordinate Japanese assistance in the REDD+/forest sector. 5-5) Communicate with partners for effective implementation of IJ-REDD.		

Final Report
Appendix 2

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Working Flow Chart

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

Activities	Sub Activities	JFY2013						JFY2014												JFY2015											
		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
		E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L	E M L
Output 1. Sub-national framework on REDD+ is developed in West Kalimantan.	1-2. Provide training on remote sensing analysis and sample spot monitoring.	1-2-1. Local Training on remote sensing analysis and sample spot monitoring by consultant 1-2-2. MRV training in Japan ■Training In Japan															1-2-1. Local Training on remote sensing analysis and sample spot monitoring by consultant 1-2-2. MRV training in Japan ■GIS training in Pontianak							■Training In Japan		■Decision of participants of				
	1-3. Overview drivers of deforestation and forest degradation in West Kalimantan.	1-3-1. Information and material collected (documents, statistics, etc.) 1-3-2. Interview with stakeholders															work in pararel														
	1-4. Collect data on historical/future land use and carbon stock at the district level.	1-4-1. Information and material collected (maps, spatial data, etc.) 1-4-2. Interview with stakeholders 1-4-3. Satellite image data collected												work in pararel			work in pararel ■Discussion with stakeholders(TC)													
	1-5. Calculate provincial RL/REL.	1-5-1. Method of calculating the present Provincial RL/REL grasp 1-5-2. International movement of methodology RL/REL grasp 1-5-3. Organize and analyze about method of evaluation emission from Peat land												work in pararel work in pararel	1-5-4. Propose methodology of measurement and evaluation emission from Peat land		1-5-5. Formulation of Provincial RL/REL ■Discussion with stakeholders(TC)				■Discussion with stakeholders			■Discussion with stakeholders		■Discussion with stakeholders				
	1-6. Develop a monitoring plan and implement it.																1-6-1. Review the present situation about monitoring in Indonesia work in pararel 1-6-2. Review monitoring system in Provincial/District level ■Discussion with			1-6-3. Formulation of Provincial monitoring plan					1-6-4. Propose method of capacity building for plan implementation ■Supporting for formulation of Provincial monitoring				
	1-7. Identify potential REDD+ sites and compile information for future REDD+ projects.	1-7-1. Information and material collected (statistic, map, 1-7-2. Interview with stakeholders 1-7-3. collecting satellite images and analyze it															work in pararel work in pararel 1-7-4. Formulation of Base Map of District level 1-7-5. Arrangement of priorities of site selection 1-7-6. Preliminary investigation for selection of 1-7-7. Identify potential REDD+ site ■Discussion with stakeholders(TC)												

Activities in Japan　Activities in Indonesia

Activities
Sub Activities
JFY2013
JFY2014
JFY2015
10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3
E M L
Output 2. National park REDD+ model is developed at GPNP.
2-1. Conduct trainings on facilitation and other professional skills.
Activities from "2-1-1. Gather information on stakeholders" to "2-1-10. Training on biodiversity conservation"
integrate activities of participatory forest monitoring of Output1
■Participatory monitoring (under discussion)
2-2. Study drivers of deforestation/degradation and diversity of local conditions.
2-2-1. Gather basic information on local
2-2-2. Prepare for socio-economics survey
work in pararel
2-2-3. Implement socio-economics survey
2-2-4. Identify drivers and local diversity
2-2-3. Implement socio-economics survey (additonal survey around HL)
2-2-4. Identify drivers and local diversity
2-5. Develop RL/REL and carbon monitoring method.
2-5-1. Prepare plan for RL/REL development in line with Kayong Utara and Ketapang
2-5-2. Develop basemaps
2-5-3. Prepare monitoring plan for peatland
2-5-4. Conduct forest inventory survey
work in pararel
2-5-5. Develop RL/REL
■Discussion with stakeholders
2-6. Conduct baseline survey on biodiversity and community livelihood.
2-6-1. Prepare for biodiversity survey
2-6-2. Implement biodiversity survey
Work with IJ-REDD+ Long-term Experts
2-6-3. Baseline survey on community livelihood was carried out in Activity 2.2
2-6-3. Baseline survey on community livelihood can be included in Activity
■Sharing results
2-8. Conduct safeguard/co-benefit activities on the improvement of livelihood, biodiversity conservation and the provision of environmental services.
2-8-1. Conduct activities based on action plan (2 villages)
2-8-2. Conduct activities based on action plan (4 villages)
Work with IJ-REDD+ Long-term Experts
2-9. Collect and assess data on land use change and carbon stock, biodiversity conservation and community livelihood
2-9-1. Propose monitoring plan for land use change (Activities conducted
2-9-2. Propose monitoring plan for carbon stock(Activities conducted from
2-9-3. Propose monitoring plan for biodiversity
2-9-4. Propose monitoring plan for community livelihood
Baseline survey on community livelihood was carried out in Activity 2.2
2-9-5. Collect monitoring and assess data (Activities conducted from the 2nd year)
■Discussion with stakeholders
■Discussion with stakeholders
■Sharing results
2-10. Draft an operational manual of REDD+ model by analyzing local conditions, policy instruments, project activities and their impacts.
2-10-1. Draft manual for Collaborative Management (works of IJ-REDD+ long term expert)
2-10-2. Draft Project Design Document
2-10-3. Compile as an operational REDD+ manual
■Sharing REDD+ operation manual
■Discussion with stakeholders
■Sharing results
Activities in Japan
Activities in Indonesia

Final Report
Appendix 3

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Assignment of Consultants Team

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

	Fields	Name	Organization	1st year FY 2013 4	5	6	7	8	9	10	11	12	1	2	3	2nd year FY2014 4	5	6	7	8	9	10	11	12	1	2	3	3rd year FY2015 4	5	6	7	8	9	10	11	12	1	2	3	4	5	Total	MM
Works in Indonesia	[FY2013, FY2014] Satellite imagery analysis/ REL establishment 2	Yano Masato	Mitsubishi UFJ Research and Consulting																																						–	–
	[FY2015] Project management group_Cheif/ REDD+ project development	Yano Masato	Mitsubishi UFJ Research and Consulting																									5/17～23 (7d)														7	0.23
	[FY2013, FY2014] Carbon monitoring design/forest GIS/database 2	Suzuki Kei	Japan Forest Technology Association													4/13～16 (4d)									1/25～30 (6d)																	10	0.33
	[FY2015] Project management group_Vice chief _ Carbon monitoring	Suzuki Kei	Japan Forest Technology Association																									5/17～27 (11d)							11/15～17 (3d)			2/8～10 (3d)					17	0.57
	[FY2013, FY2014] Project management group_Vice chief _ Satellite imagery analysis/	Sasakawa Hiroshi	Japan Forest Technology Association				10/15～19,			10/24～11/2 (5d)	(10d)				2/8～3/5 (25d)						9/10～10/1 (22d)		10/24～11/1 (9d)																				71	2.37
	[FY2015] Satellite imagery analysis/ REL establishment 1	Sasakawa Hiroshi	Japan Forest Technology Association																																								–	–
	Satellite imagery analysis/ REL establishment 2	Furuta Tomoko	Japan Forest Technology Association				10/15～19,			10/24～11/2 (5d)	(10d)				2/17～3/5 (17d)	4/8～19 (12d)							10/7～10/19 (13d)																				57	1.90
	[FY2013, FY2014] Project management group_Cheif/ REDD+ project development	Hiratsuka Motoshi	Mitsubishi UFJ Research and Consulting				10/15～19,			10/24～30 (5d)	(7d)	12/8～13 (6d)			2/18～3/1 (12d)	4/12～16 (5d)		6/2～12 (11d)	7/20～24 (5d)		9/21～22 (2d)	10/6～8 (3d)			1/27～30 (4d)	2/23～26 (4d)																64	2.13
	[FY2015] Satellite imagery analysis/ REL establishment 3	Hiratsuka Motoshi	Waseda University																									5/17～26 (10d)											3/8～11 (3d)			13	0.43
	Forest biomass survey/ Emission factor development 1	Amano Masahiro	Waseda University							10/15～18 (4d)		12/2～8 (7d)			2/20～23 (4d)				7/14～19 (6d)													8/3～9 (7d)			11/8～11 (4d)						32	1.07
	Forest biomass survey/ Emission factor development 2	Niitsuma Kouhei	Japan Forest Technology Association												2/15～3/2 (16d)	4/9～19 (11d)					9/10～19 (10d)				1/24～30 (7d)			5/17～6/10 (25d)						10/18～31 (14d)			2/8～26 (19d)					102	3.40
	Socio-Economic survey	Chikaraishi Haruko	Mitsubishi UFJ Research and Consulting							10/27～11/1 (6d)		12/2～15 (14d)		1/28～2/24 (28d)		4/12～16 (5d)	5/10～19 (10d)		7/14～20 (7d)		9/17～29 (13d)							5/17～6/3 (18d)				8/2～9 (8d)			11/8～25 (18d)			1/31～2/11 (12d)	3/7～12 (6d)			145	4.83
	[FY2013, FY2014] Carbon monitoring design/forest GIS/database 1	Oonishi Seido	Asia Air Survey												2/19～3/2 (12d)	4/15～25 (11d)	5/17～24 (8d)																									31	1.03
	[FY2015] Carbon monitoring design/forest GIS/database 1	Kuno Hiromitsu	Japan Forest Technology Association																															9/27～11/25 (60d)				12/19～25 (7d)	2/8～3/21 (43d)			110	3.67
	Short term expert	Hirose Kazuyo	J-space systems												2/19～3/2 (12d)		5/15～26 (12d)											5/30～6/14 (16d)														–	–
																																								Total (Indonesia)			659	21.96

	Fields	Name	Organization	1st year FY 2013 4	5	6	7	8	9	10	11	12	1	2	3	2nd year FY2014 4	5	6	7	8	9	10	11	12	1	2	3	3rd year FY2015 4	5	6	7	8	9	10	11	12	1	2	3	4	5	Total	MM
Works in Japan	[FY2013, FY2014] Satellite imagery analysis/ REL establishment 2	Yano Masato	Mitsubishi UFJ Research and Consulting													6/8,18-20,23,30(6d)					7/1-4,14(5d) 8/27-29(3d) 9/17,26(2d)			12/1-2,10(3d) 1/26,30(2d) 2/9,10(2d)																			23	1.15
	[FY2015] Project management group_Cheif/ REDD+ project development	Yano Masato	Mitsubishi UFJ Research and Consulting																									4/1,3,14,20(4d) 5/11,12,13(3d) 6/17,18,19(3d)				7/6,8,17,21(4d) 8/4,5,13(3d) 9/2,4,9,10(4d)				10/2,21,23,30(4d) 11/1,2,4,7(4d) 11/12,15,19(3d)			2/1,2,12,17(4d) 3/14-18,22-23,30-31(9d) 4/7,11(2d)			47	2.35
	[FY2013, FY2014] Carbon monitoring design/forest GIS/database 2	Suzuki Kei	Japan Forest Technology Association													6/3,5(2d)					9/2～4,8,10,19(6d) 10/2-3(2d) 1/9,13(2d)																							12	0.60
	[FY2015] Project management group_Vice chief _ Carbon monitoring	Suzuki Kei	Japan Forest Technology Association																																11/27(1d)			1/25,29(2d)		4/7,8(2d)			5	0.25
	[FY2013, FY2014] Project management group_Vice chief _ Satellite imagery analysis/	Sasakawa Hiroshi	Japan Forest Technology Association	9/20,24,30(3d) 10/1,4,10,22,23(5d) 11/7(1d)					12/18,20(2d) 1/6-8(3d) 3/19-20,24-25,27,31(6d)							4/1,3,4,7-10,14,16-18,21-23,25,30(16d) 5/2,12,16,20-21,23,26,27,29(9d)								8/11(1d)																				46	2.30
	[FY2015] Satellite imagery analysis/ REL establishment 1	Sasakawa Hiroshi	Japan Forest Technology Association																																								–	–
	Satellite imagery analysis/ REL establishment 2	Furuta Tomoko	Japan Forest Technology Association	9/24,27(2d) 10/2,4,11,22,23(5d) 11/7-8(2d)					12/18,20,24-26(5d) 3/26-27(3d)							4/1-4,7,21-25,30(11d) 5/1,2,13,15,16,19-23,26(11d)																													45	2.25
	[FY2013, FY2014] Project management group_Cheif/ REDD+ project development	Hiratsuka Motoshi	Mitsubishi UFJ Research and Consulting	9/24,27(2d) 10/2,4,11,22,23(5d) 11/8,12,13,14,29(5d)					12/18,19,20(3d) 1/6,21,23,28-29(5d) 2/7,13(2d)					3/17,24,27(3d)		4/1,10,24,30(4d) 8/19,25(2d) 12/3,9-10(3d)	5/15,27,30(3d) 9/10,16,30(3d) 1/7,14,26(3d)	6/20,25(2d) 10/17(1d) 2/3,6(2d)	7/14,28,31(3d) 11/11,12,18,20,28(5d)																								56	2.80
	[FY2015] Satellite imagery analysis/ REL establishment 3	Hiratsuka Motoshi	Waseda University																									7/22,27,28,29(4d) 8/10,27,28,31(4d)								12/1,2,10(3d) 1/4,5,12,19(4d) 2/9,16,19,24(4d)			3/1-4,7,16-18, 22,24-25,28(12d)			31	1.55
	Forest biomass survey/ Emission factor development 1	Amano Masahiro	Waseda University				11/29(1d) 12/1(1d) 1/28-29(2d)					3/27(1d)				4/1(1d)					7/28(1d) 8/12(1d)			12/26(1d)				7/28(1d) 8/10(1d)								1/19(1d) 2/1,2,3,16,17(5d)			3/14-16,22,25(5d)			22	1.10
	Forest biomass survey/ Emission factor development 2	Niitsuma Kouhei	Japan Forest Technology Association				11/6,7,21,29(4d) 12/2,3,10,12,18,20(6d)					3/24-27,31(5d)				4/1-4,7(5d)															9/1,2,3,4,12,13,16,18,28,29 (10d)								12/20-24(5d)			3/4,7-11(6d)			41	2.05
	Socio-Economic survey	Chikaraishi Haruko	Mitsubishi UFJ Research and Consulting				10/2,4,11,24(4d) 11/8,12,29(3d) 12/18,20(2d)					1/22-24(3d) 2/25(1d) 3/17,24(2d)				4/1,30(2d) 5/21,22(2d) 6/10,20,25(3d)					7/9-11(3d) 8/11-12(2d) 9/8(1d)			10/17(1d) 2/10(1d)				4/1,2,14(3d) 6/11,18,19(3d) 7/17,23,24,27,30(5d)						8/10,11,14,17,18,19,31(7d) 9/7,10,11,17,18(5d) 12/8,11(2d)			1/19(1d) 2/15,18,22,23(4d) 3/14,15,17,28,29(5d)		4/4-8(5d)	70	3.50
	[FY2013, FY2014] Carbon monitoring design/forest GIS/database 1	Oonishi Seido	Asia Air Survey													5/12-15(4d) 6/2-6,9-10,23-25(10d)																											14	0.70
	[FY2015] Carbon monitoring design/forest GIS/database 1	Kuno Hiromitsu	Japan Forest Technology Association																													7/28,29,30,31(4d) 8/3,4,5,6,7,10,11(7d) 9/14,15,16,17,18,24,25 (7d)									11/26(1d) 1/31(1d)						20	1.00
	Short term expert	Hirose Kazuyo	J-space systems																																								–	–
																																								Total (Japan)			432	21.60
																																								Total				43.56

Legend ■ : Assigned Period

Reporting						△ IC/R			△ PG/R					△ IT/R										△ PG/R2										△ DtR		△ F/R	

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Appendix 4

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Record of Training

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

Record of Training

Year	Date	Training/ OJT	Purpose	No. of participants (Approx.)	Venue
2014	February 19-20	On the Job Training of Ground truth	To collect information for training data for supervised labeling and verify results RS analysis	2	Kayong Utara, Ketapang
2014	February 24-28	Pre-training for basic skills of GIS	To obtain basic skills of GIS operation and field survey for forest and peatland monitoring	11	Pontianak
2014	February 24-27	On the Job Training of Ground truth	To collect information for training data for supervised labeling	2	Pontianak
2014	May 13-15	Training for national park staffs and surveyor of socio-economic survey for households	To share and understand objectives of socio-economic survey and keep consistency of the survey process	30	Sukadana
2014	May 20-22	Pre-training for basic skills of GIS	To obtain basic skills of GIS operation and field survey for forest monitoring	9	Pontianak
2014	June 11-20	Training course in Japan for development ability of satellite imagery analysis	To promote understanding of the relationship between REDD+ and related activities for monitoring, and practical techniques of satellite imagery analysis and forest monitoring	9	Japan
2014	April 12-16	On the Job Training of forest survey	To verify forest degradation and develop an emission factor	9	Kayong Utara
2014	September 16-19	Training for peatland mapping	To improve the skills of peatland mapping	4	Pontianak Mempawah
2014	October 8-17	On the Job Training of Ground truth	To add information for accuracy assessment and verifying	9	Pontianak, Mempawah
2014	September 11-17	On the Job Training of forest survey	To verify forest degradation and develop an emission factor	6	Kayong Utara

Year	Date	Training/ OJT	Purpose	No. of participants (Approx.)	Venue
2014	September 9/25-27	On the Job Training of forest survey	To verify forest degradation and develop an emission factor	6	Kayong Utara
2015	January 1/20-21	Training of CO2 emission measurement	To measure CO2 emission from the peatland	5	Pontianak
2015	June 1-5	Pre-training for basic skills of GIS	To obtain basic skills of GIS operation and field survey for forest and peatland monitoring	15	Pontianak
2015	June 8-12	Pre-training for basic skills of GIS	To obtain basic skills of GIS operation and field survey for forest and peatland monitoring	11	Palangka Raya
2015	September 7-18	Training course in Japan for development ability of forest monitoring system	To promote understanding of the relationship between REDD+ and related activities for monitoring, and practical techniques of satellite imagery analysis and forest monitoring	8	Japan
2015	October 26-27	In-house Training on Improvement of Base Maps on Land cover	To try to do enhancement of base maps (current status: 2013) by confirming the existing ground reference data obtained	8	Pontianak
2015	October 28-29	Preparatory Workshop for Organizing Land and Forest Monitoring Team in West Kalimantan	To obtain basic knowledge and share the experience to utilize the skills of GIS and forest survey into monitoring GHG emission in land sector	30 (all ex GIS trainees)	Pontianak
2015	October 21-22	Meeting of Drafting Team from the Ex GIS Trainees	To try to do drafting road maps to build MRV/ monitoring mechanism	6	Pontianak
2016	March 7	Meeting for sharing data process methodologies of Socio-economic survey	To share the data process methodologies of Socio-economic survey with National Park officials.	5	Ketapang

1) All trainings and on the job trainings on GIS and forest surveys also mean as the training to enhance the basic capacity to be needed for MRV/ monitoring implementation.
2) The implementation of further trainings needed based on the results of meeting on 21-22 Dec, 2015. has been started by Provincial REDD+ Working Group through Provincial Local Environmental Agency since Feb. 2016 by provincial own budget.

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Appendix 5

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Procurement List

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

List of Procurements

No.	Date of Procured	Item	Detail Description	QTY
1	February 5th, 2014	Original SPOT 6 Image	1. Original raw data of SPOT satellite image 2. DVD	1
2	February 13th, 2014	GEOSPATIAL (ERDAS IMAGIN for Installation)	1. ERDAS IMAGIN is software for processing satellite image 2. To copy the software by potential users 3. 1 box containing 2 CD ■ No.2(a): CD (for 32bit P/C) ■ No.2(b): CD (for 64 bit P/C)	1 box (2CD)
		ERDAS IMAGINE Professional	1. To operate software ERDAS IMAGIN by only one user 2. CD	1
		ERDAS IMGINE Professional Dongle Key	1. To operate software ERDAS IMAGIN by only one user 2. USB	1

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Appendix 6

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Meeting List

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

List of Meetings

Year	Date	Meeting	Venue
2013	October 29	First Coordination Meeting	Pontianak
2014	June 5	1st Technical Committee	Pontianak
2014	July 22	1st Joint Coordination Committee	Bogor
2015	January 29	2nd Technical Committee	Pontianak
2016	March 11	Closing Meeting	Bogor

Notification: All meetings were organized by long term expert

Appendix 7-1 Final Report

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Report of REDD+ planning and its Review

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

Planning Study
of
Landscape Forest Conservation in West Kalimantan Province, Indonesia

January 2016 (Version 2.0)

Responsible Organization XX

with supports from
the Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (IJ-REDD+) funded by Japan International Cooperation Agency (JICA)

Jurisdictional REDD+ Program Title	*Landscape Forest Conservation in West Kalimantan Province, Indonesia*
Version	*2.0 (January 22, 2016)*
Date of Issue	*31-6-2016 (scheduled under the IJ-REDD+)*
Prepared By	*Responsible Organization XX*
Contact	*Physical address,*

Notification

- This planning study use specific word of "**Project Description (PD)**" as the name of REDD+ Planning Document as the Case Study
- Edited sentences (red collar) in this document means revised points through review process.

1. Jurisdictional REDD+ Program details

1.1. Summary Description of the Jurisdictional REDD+ Program

In Indonesia, 94.4 million ha out of 190.5 million ha of total land (approximately 50.0%) is classified as forest, which is the third biggest tropical forest (approximately 10% of world tropical forest) behind Brazil and Democratic Republic of the Congo (DRC). Therefore, forest management in Indonesia is not a domestic agenda but the particularly important to mitigate global warming on global basis. However, as a result of exploitation of forest development and timber products since the early 1970s, over 20 million m^3 of logs had been produced per year till 1990s and this significant deforestation became a concern world widely. In addition, illegal logging, forest fire, and conversion of lands to agriculture enhance forest degradation.

Typical land conversion from forest to other land categories in West Kalimantan Province

Forests in West Kalimantan Province where this REDD+ program locates, that covers a total area of 14,732 thousand ha, has a great potential to contribute reduction of greenhouse gas (GHG) emissions and enhance carbon stocks. In light of this, West Kalimantan Province is committed to contributing up to 7.8% of the national target in 2020. Then the Government of West Kalimantan Province has established a team to draft a provincial REDD+ strategy and action plan document for West Kalimantan Province based on the decision of the Governor of West Kalimantan No. 437/BLHD/2013. Also decision of the Governor of West Kalimantan No 115/BLHD/2012 was enforced to establish the REDD+ Working Group in the West Kalimantan Province.

Jurisdictional REDD+ program in this Project Description (PD) are based on such national and provincial forest conservation/REDD+ strategies and targeted adequate scale of jurisdictional level of sub-districts based REDD+ program, which are focusing Sukadana and Simpang Hilir Sub-Districts in Kayoug Utara District located in southern West Kalimantan Provinces (*see* location in following Figure 5). Also all of activities under the REDD+ program of “Landscape Forest Conservation in West Kalimantan Province, Indonesia” are focusing reducing deforestation and forest degradation through forest conservation concept of the Society of Friends of GPNP.

Forest area and its dynamics in Sukadana and Simpang Hilir Sub-districts are similar as overall West Kalimantan Province, which showed severe deforestation (land conversion from forest to other land categories) caused by human activities of expansion of plantation of oilpalm, rubber and other cash crops and mining (*see* pictures below). From results of fundamental survey for identifying land use change dynamics conducted by West Kalimantan Province, drivers of deforestation and forest degradation in target area are identified as mentioned below (Table 1).

Table 1 Identified drivers and categorized types of deforestation and forest degradation[1]

GHG Emission Sources	Drivers	
Deforestation	Planned	1. Expansion of local administrative/governance regions for infrastructure and other uses 2. Approved legal forest conversion (based on spatial plans/RTRW) 3. Forest conversion on lands reserved for other purposes (APL) 4. Forest conversion for mining concessions (e.g., coal, copper, gold, silver, nickel, tin) 5. Forest conversion for estate crop plantations (e.g., oil palm, rice, rubber, coffee, cocoa)
	Unplanned	1. Unplanned forest conversion for estate crop plantations (e.g., oil palm, rice, rubber, coffee, cocoa) 2. Encroachment for timber, fuel wood, agriculture and small-scale mining 3. Uncontrolled forest fires 4. Land claims leading to conversion of forest areas
Forest Degradation	Planned	1. Approval of timber utilization permits (concessions) in natural forests 2. Approval of industrial plantations in natural forests
	Unplanned	1. Timber harvesting outside the annual allowable cut 2. Illegal logging 3. Forest fires due to natural factors 4. Small human-induced forest fires for land clearing

By considering such severe situation of deforestation and forest degradation, this program was started by the Responsible Organization XX, who was established to implement collaborative management in the area, to reduce pressures on forest resources in targets area by implementing counter measures/activities and aimed to reduce deforestation and forest degradation, and also to enhance carbon stock in the forests of

[1] Hardiansyah G. et al. 2014. REDD+ Strategy and action plan of West Kalimantan Province. REDD+ KALBAR.

target area.

To monitor results of implemented countermeasures by the Responsible Organization XX, which are GHG emission reductions and removals from the atmosphere after undertaking activities (Project Activities, *see* details in "3.3. REDD+ Activities and Drivers of Deforestation and/or Degradation"), the REDD+ program analyzed satellite images (LANDSAT TM and SPOT 5) from 2000 to 2013 to identify forest dynamics (changes in land and forest areas) in the target site. Additionally, the REDD+ program analyzed the dynamics of each forest type and revised them on the basis of a ground truth (field survey and application of high resolution satellite imagery of SPOT 5). The REDD+ program classified each forest type based on the Indonesian National Forest Inventory. The REDD+ program then quantified the amount of carbon stock per unit area of each forest type based on country-specific emission/removal factors provided in Indonesian national forest reference emission level (FREL) which was submitted into UNFCCC in 2015. Finally, since the change in the amount of carbon stock in project area and its surrounded area was closely related to human activity, the REDD+ program developed a new activities for the area under reference scenario and quantified its dynamics. From above monitoring and calculation process, as an ex-ante estimate, the REDD+ program is expected to reduce GHG by 7,823,620 tCO_2e within 10 years (i.e. 782,362 tCO_2e/year) of the REDD+ program start date.

1.2. Jurisdictional Proponent

The REDD+ program is conducted by the Responsible Organization XX and implementing structure is shown in Figure 1. This REDD+ program requires participation of various stakeholders to identify solutions to problems related to deforestation and forest degradation, a practice arising from unplanned land and forestry resource use and a major cause of deforestation and forest degradation in the area. The following structure for implementing the REDD+ program was developed as part of preliminary work (including discussions with stakeholders).

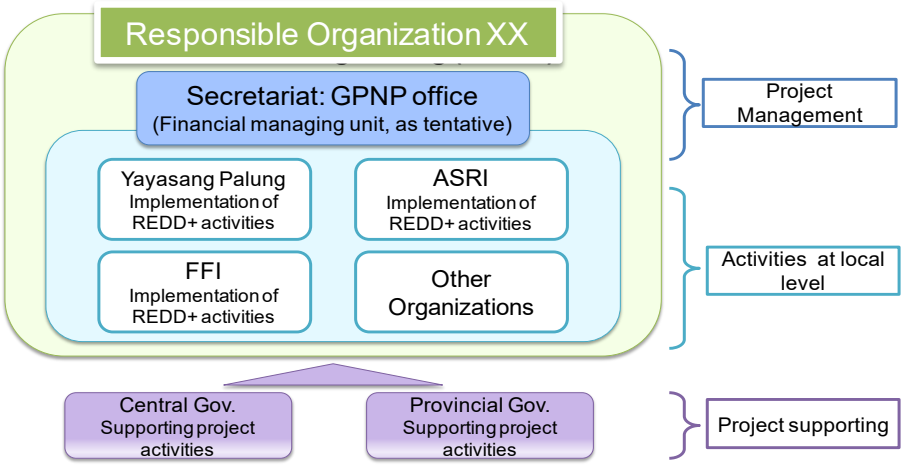


Figure 1 REDD+ program implementation structure

The forum is consist of 20 (Total number of organizations will be finalized before submitting PD) organizations from central and local Governments, NGOs and private sectors, and has been established as a

new organization those who have mission to 1) strengthen the communication of the parties in the landscape GPNP, 2) develop collaboration in the area of landscape management GPNP, 3) create synergy among the parties in the region and preserve the public welfare in the landscape of GPNP and 4) support and actively participate in the efforts of adaptation and mitigation of climate change in the landscape of GPNP to implement REDD+ program in the area, which is according to Ministerial Degree No.45 (Amendment 2002). Also some related organizations who have specific technical advantages, for example, habitat management of Orangutan, carbon monitoring, participatory approach, introduction of alternative livelihood and so on, are joined to the forum as follows;

Organization name	Responsible Organization XX
Contact person	*Responsible person: under discussion (should be added)*
Title	The forum has been established according to Ministerial Degree No. 45, and consists of 20 organizations from Governments, NGO and private sectors. Roles: 1. Strengthening the communication of the parties in the landscape GPNP 2. Develop collaboration in the area of landscape management GPNP 3. Creating synergy among the parties in the region and preserve the public welfare in the landscape GPNP 4. Support and actively participate in the efforts of adaptation and mitigation of climate change in the landscape GPNP
Address	Address: Jl. KH Wahid Hasyim 41-A, Ketapang, Kalimantan Barat, Indonesia
Telephone	Tel number: +62-(534) 33539
Email	E-mail (should be added)

Organization name	Gunung Palung National Park Office (GPNP)
Contact person	*Responsible person: under discussion (should be added)*
Title	Roles/ responsibilities: The GPNP office is responsible organization of the REDD+ program and secretariat of the Forum. The GPNP manages the task of forest conservation, forest monitoring. Also the GPNP has gathered opinions from all of stakeholders to help make profits as an incentive to sustain REDD+ over the mid- term and long-term.

1.3. Other Entities Involved in the Jurisdictional REDD+ Program

This REDD+ program has involved some organizations that have implemented REDD+ and their related activities. Each organization has many experiences to address to forest conservation activities in West Kalimantan Provinces and their knowledge is very specific to implement REDD+ activities in the area. Following organizations are core members and intensively implement REDD+ program.

Organization	Yayasang Palung
Activity Start Year	From 2009 they have conducted "Gunung Palung Orangutan Conservation Program
Target village/area	Padu Banjar, Pulau Kumbang, Pemangkat, Nopah Kuning and Rantu Panjang villages in total 6,000 ha in SH. VV has planned to have concession of Hutan Desa (2,000 ha)
Activity Type	Hutan Desa (Village forest) in Simpan Hilir sub-district Habitat conservation: They have conducted "Gunung Palung Orangutan Conservation Program" which including scientific research, conservation and education activities.
Concession type	Hutan Desa (2,000 ha, under preparing)

Organization	Alam Sehat Lestari (ASRI)
Activity Start Year	2007- Human health care services and forest care (against illegal logging) 2012- Environmental Education 2011- Forest Conservation (Forest guardians)
Target village/area	Total 24 villages, deeply 2 villages (Sudahan Jaya and) Reforestation 20 ha and restore 6 ha as key corridor for orangutan
Activity Type	Human healthcare service (against illegal logging): evaluating impact on illegal logging in village base in Sukadana sub-district Environmental Education: targeting children Forest Conservation: Forest Guardians monitor logging in their communities and conduct outreach for seeking alternative livelihood to loggers.
Concession type	-

Organization	Fauna & Flora International (FFI)
Activity Start Year	2007- Protecting carbon-rich peat forests in West Kalimantan (landscape-based HCVF assessment) 2011-2014 Asia-Pacific Community Carbon Pools and REDD+ Program
Target village/area	- Asia-Pacific Community Carbon Pools and REDD+ Program :Total 6 villages in Ketapang district (Including Laman Satong village) - Landscape-based HCVF assessment: Kapuas Hulu and Ketapang districts (working with oil palm plantation company, PT. PAS)
Activity Type	- Asia-Pacific Community Carbon Pools and REDD+ Program: conducting project pilot site included six villages, covering 14,325 ha of hutan desa (village

Organization	Fauna & Flora International (FFI)
	forest) in Ketapang district. - High Conservation Value Forest (HCVF): protecting key orangutan habitat from conversion to palm oil plantations. FFI has been conducted HCVF at landscape level in community swamp forest.
Concession type	HCVF

Organization	Cipta Usaha Sejati Ltd (PT. CUS)
Activity Start Year	In 2008, a license was issued with letter No.280 by the forestry service.
Target village/area	Simpang Hilir sub-district The area including two village; Perawas and Sungai Rembawan,
Activity Type	- Under preparation for registering VCS VM0004, it aims to 1) Prevent conversion of the site to oil palm plantation Restore the vegetation to its original condition, 2) Improve the well-being of the local communities surrounding the project area by empowering their capacity, 3) Quantify avoided emissions associated with the conservation of this peat swamp forest and 4) Sell Verified Emission Reductions (VERs) generated by the project. - PT. CUS is a member of Roundtable on Sustainable Palm Oil (RSPO) operating two oil palm estate in Kayong Utara under PT.CUS (26,206 ha) and PT. Jalin Vaneo (18,909ha).
Concession type	The area is categorized as Other Land Use Areas (APL= Area untuk Penggunaan Lain), through Surat Keputusan Menteri Kehutanan No. SK.265/Menhut-II/2008 on 1 August 2008, for an area of 18,042.49 ha. PT CUS/JV has a clearing license for the area within the project site, and an Exploitation Rights (HGU = Hak Guna Usaha).

Organization	Forestry department of Kayong Utara District
Activity Start Year	In 2007, district was formed under Law No.6 of 2007 from Ketapang district.
Target village/area	24 in total and one ranger
Activity Type	Kayong Utara District
Concession type	- The department has 3 section; Protection forest, Rehabilitation forest and Plantation - Managing forest area (HL,HP,(HTI)) - Conducting Hutan Desa activities in Karimata island

1.4. Program Start Date

The start date of the proposed REDD+ program activity crediting period is June 1, 2016. The real activities of the REDD+ program began on June 1, 2016, with the first orientation meeting in Sukadana

Sub-district, Kayong Utara District.

1.5. Program Crediting Period

The crediting period is 20 years: from June 1, 2016 to May 31, 2035 (program period is 40 years: from June 1, 2016 to May 31, 2055).

1.6. Estimated GHG Emission Reductions and/or Removals

Ex-ante estimates to determine program scale were provided only for the first 10-year baseline period through to May 31, 2025. As the anticipated emission reductions are less than 1,000,000 tCO_2e per year, the program falls short of the definition of mega project. Then, if program scale is according to Verified Carbon Standard (VCS) guidance on REDD projects (VCS AFOLU v3 3.1.9), this REDD+ program was not identified as large project as follows;

Project	Less than or equal to 1,000,000 tCO_2e per year
Large project	No

The estimated mean annual GHG emission reductions by the program (i.e. after accounting for leakage and prior to buffer withholding) are provided below (Table 2). Since the first baseline period is only 10 years, total GHG benefits are 7,823,620 tCO_2e.

Table 2 Estimated GHG emission reductions (tCO_2e) in the REDD+ program

Years	Estimated GHG emission reductions or removals (tCO_2e)
2016	782,362
2017	782,362
2018	782,362
2019	782,362
2020	782,362
2021	782,362
2022	782,362
2023	782,362
2024	782,362
2025	782,362
Total estimated ERs	7,823,620
Total number of crediting years	10
Average annual ERs	782,362

1.7. Jurisdiction Location and Geographic Boundaries

(1) Location and geographical boundaries

West Kalimantan Province is located in the western part of the island of Kalimantan (formerly known as Borneo) or between 2°08" North Latitude and 3°05' South Latitude and between 108°0' East Longitude and 114°10' East Longitude on the map of the earth. Based on that geographical location, West Kalimantan Province is traversed by the Equator (0° latitude) precisely on the city of Pontianak. West Kalimantan Province is also one of the tropical areas whose temperatures and humidity are quite high. Another characteristic of West Kalimantan Province is that it one of the provinces in Indonesia that is directly adjacent to a foreign country, that is, the State of Sarawak, East Malaysia.

Most of West Kalimantan Province is low-lying land with an area of 146,807 km^2 or 7.53% of the total area of Indonesia or 1.13 times the island of Java. The region stretches straight more than 600 km from north to south and about 850 km from west to east. In terms of size, West Kalimantan Province is the fourth largest province in Indonesia (204,534 km^2). West Kalimantan Province is a sub-national Government administration with 14 districts/cities, including REDD+ program site of Kayong Utara District (Figure 2).

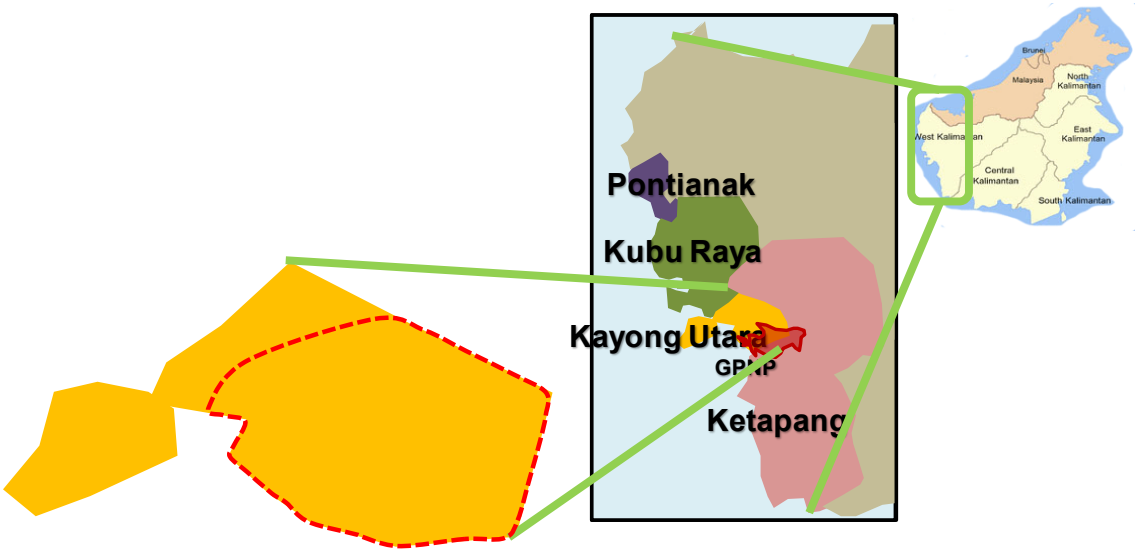


Figure 2 REDD+ program Location

The target site in this REDD+ program is Sukadana (1,027.1 km^2 in total) and Simpang Hilir Sub-districts (1,421.8km^2 in total) in Kayong Utara District (Figure 3). According to administrative boundary, there are 22 villages, which are 10 in Sukadana sub-district and 12 in Simpang Hilir sub-District. General information on each village is shown in Table 3

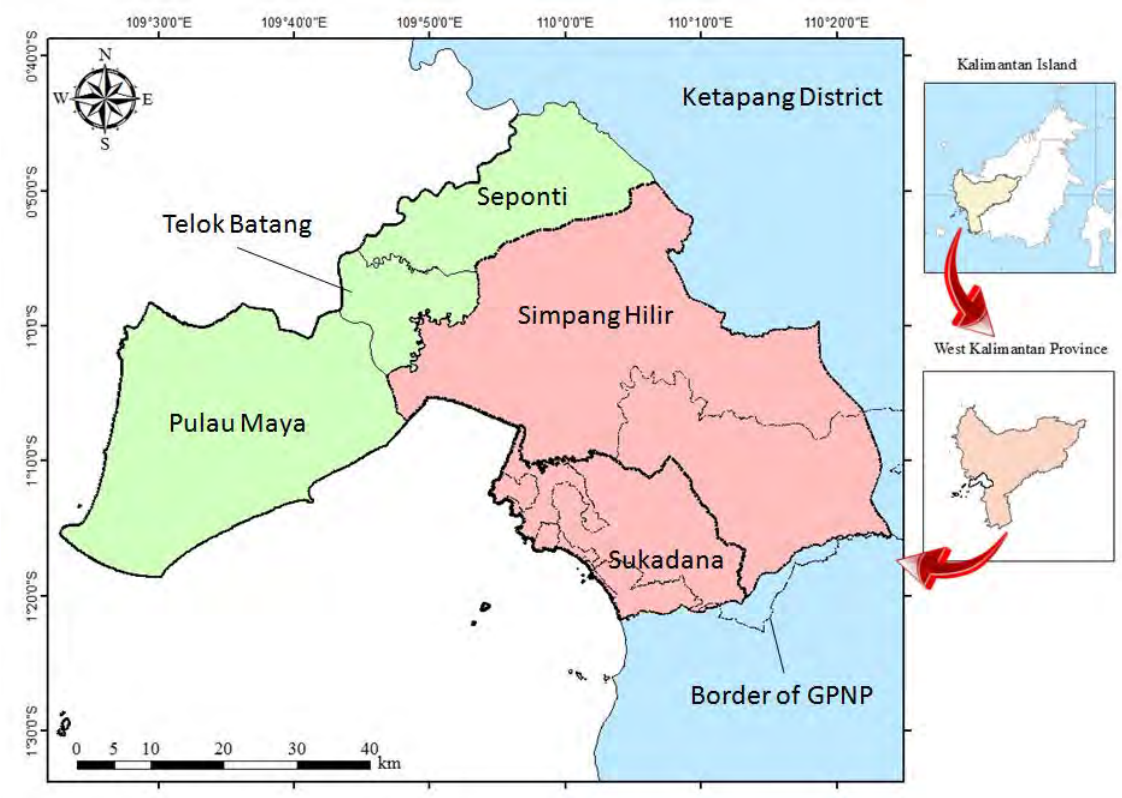


Figure 3 Location of both of Sukadana and Simpang Hilir sub-Districts

Table 3 General information on villages inside target area

Village name		Establishment of the Village	Registration of the Village	Number of sub-village in 2011	Number of households in 2011	Population	Major ethnic group	Land area (km^2)	Distance from District Center (km)
Sukadana	Simpang Tiga			3	466	1,730	Malay	75.0	21.0
	Sejahtera	N/A	1980	3	526	1,858	Malay, Bugis	126.7	5.0
	Pangkalan Buton	1978	1978	4	711	3,289	Malay	70.2	2.0
	Sutera			5	1074	4,733	Malay, Madura	63.3	0.0
	Benawai Agung	N/A	1985	3	588	2,084	Malay, Madura	144.4	6.0
	Harapan Mulia			3	702	2,492	Malay	192.0	12.0
	Sedahan Jaya	2005	2006	4	508	2,053	Malay, Jawa, Bali	41.3	7.5
	Gunung Sembilan	2005	2006	3	296	967	Malay	27.0	1.5
	Pampang Harapan	N/A	2007	3	269	1,136	Malay	64.3	21.5
	Riam Berasap Jaya			3	423	1,699	Malay	75.0	20.5
Simpang Hilir	Padu Banjar	1913	N/A	6	1028	3268	Malay	105.8	23.2
	Pulau Kumbang			4	572	2284	Malay	5.3	17.1
	Pemangkat			3	459	1597	Malay, Jawa	27.0	9.2
	Nipah Kuning			5	712	2536	Malay	27.0	4.8
	Rantau Panjang	1942	N/A	8	1012	3935	Malay, Jawa, China	49.3	5.0
	Penjalaan	1987	1992	3	647	2509	Malay	96.3	4.0
	Telok Melano			3	748	2822	Malay, China	7.4	0.6
	Sungai Mata Mata	1931	1958	4	887	3109	Malay	323.2	3.8
	Batu Barat	1942	1981	4	483	1903	Malay	183.2	16.0
	Matan Jaya			4	564	2475	Malay	312.1	87.0
	Lubuk Batu			2	234	890	Malay	276.5	60.0
	Medan Jaya	2005	2005	3	503	2010	Malay, Bugis	8.7	0.3

(2) Climatic conditions

The climate in West Kalimantan Province, including the project area of Sukadana and Simpang Hilir Sub-districts, is classified as "Tropical Rainforest Climate" under the Köppen climate classification. In Ketapang District facing on Kayong Utara District, the mean monthly high temperature ranges from 30.66°C in January to 32.36°C in May. The mean monthly low ranges from 23.34°C in July to 24.64°C in January (Figure 3). Annual rainfall is 3,134 mm (with monthly low of 125.1 mm in September and monthly high of 455.2 mm in November) (Figure 4).

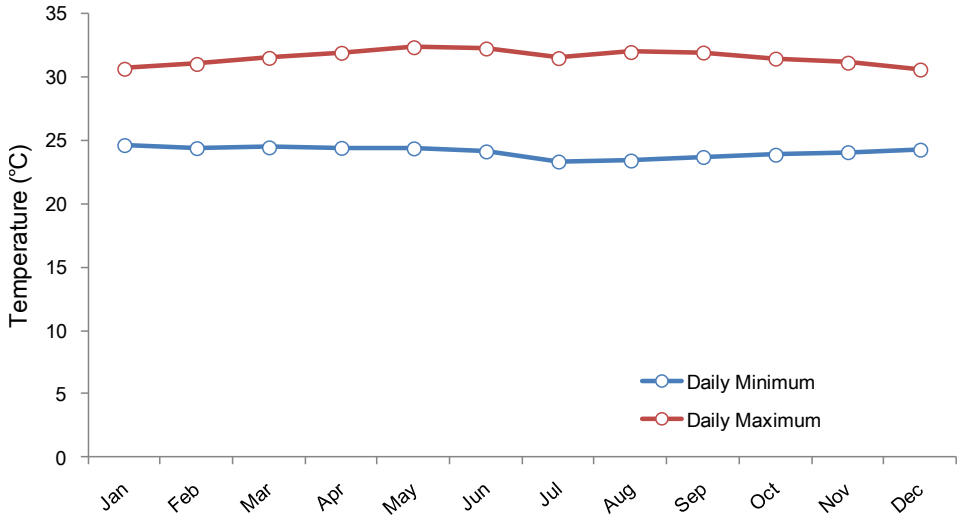


Figure 3 Temperature at the target site in West Kalimantan Province (Based on monthly averages for the 50-year period 1951-2000)

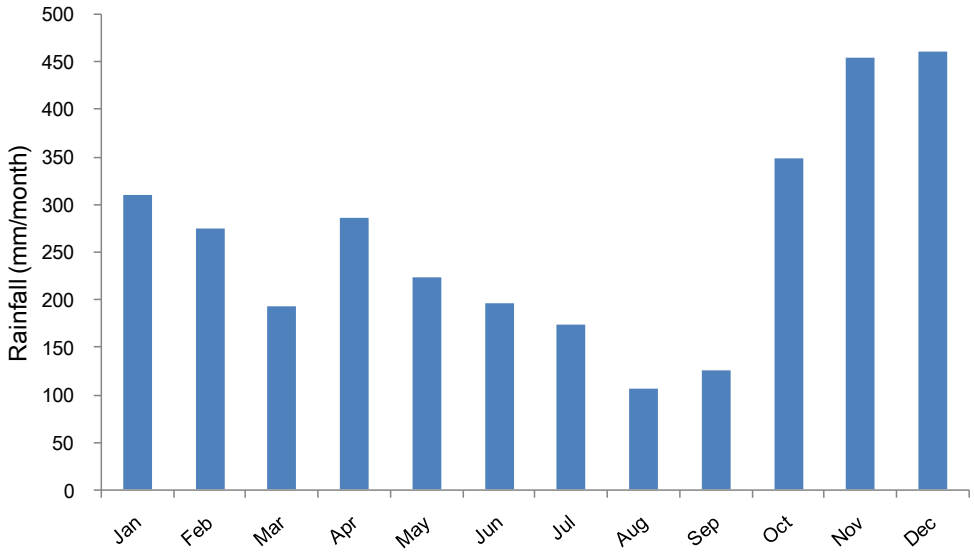


Figure 4 Rainfall at the target site in West Kalimantan Province (monthly averages for the 5-year period 2008-2012)

(3) Ecosystem conditions

The reference region of Kayong Utara District is located in southern West Kalimantan Province. The altitude of the main settlement in the REDD+ program site is under 100 m. The native vegetation is the typical forest.

(4) Land use condition

Current land use is significantly affected by human activities. Rich forests have been converted to degraded forests. The results of land use analysis based on satellite imagery in Kayong Utara District or reference region show “Secondary Swamp Forest” was decreased 71,235 ha (approximately 61% compared with 2000). Land use in the project area is very similar to the typical pattern in Kayong Utara District in West Kalimantan Province.

(5) Endangered species

The reference region is including the habitat area of Orangutan. The some organizations have had activities/works to protect endangered wild Orangutans especially around the GPNP. This REDD+ program also makes consideration for endangered species.

All target area (i.e. project area) is under control by the REDD+ program. Spatial boundaries consist of reference region, project area, leakage belt and forest (Figure 5). In this REDD+ program, the program set spatial boundaries based on following concepts.

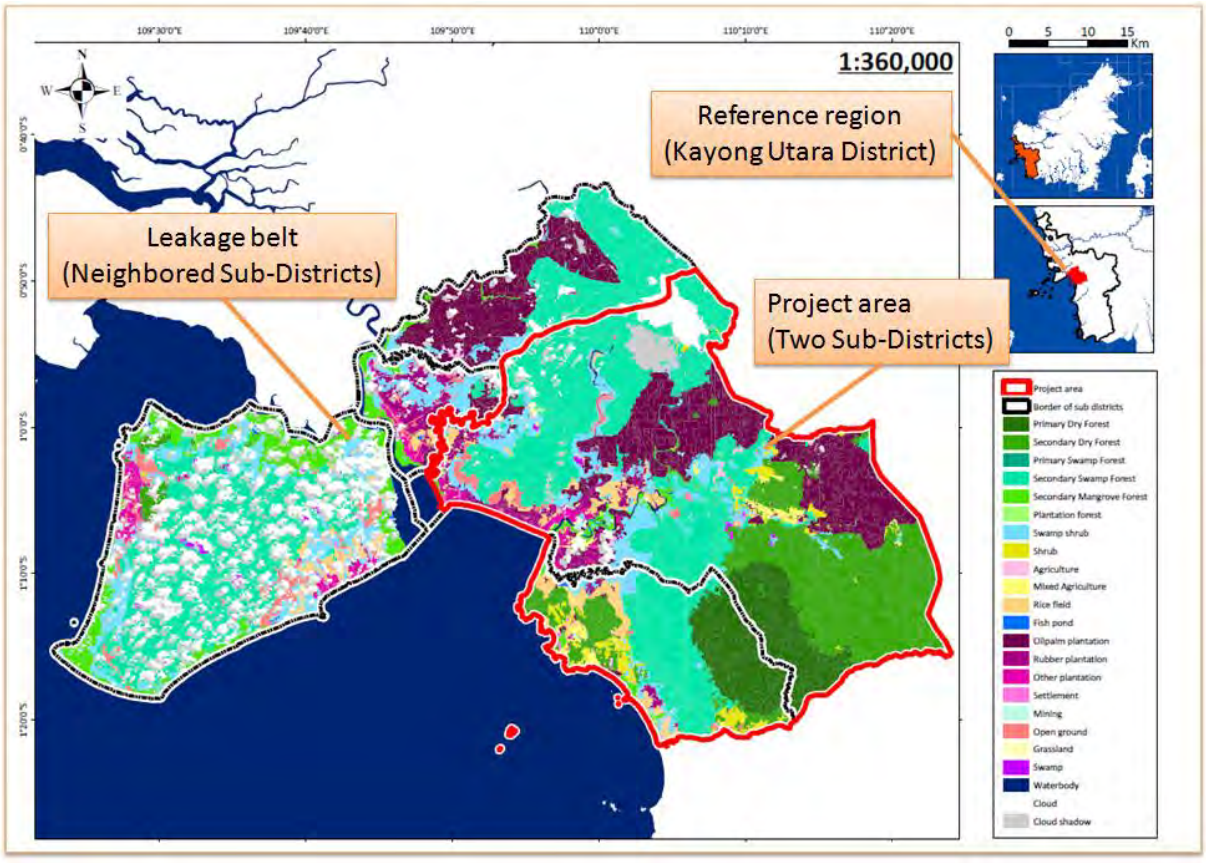


Figure 5 Spatial boundaries of reference region, project area and leakage belt

(6) Reference region

As shown in Figure 5, reference region in this PD are overall area in Kayong Utara District, West Kalimantan Province and it was because West Kalimantan Province and/or Kayong Utara District had not been developed sub-national baselines. Therefore, reference region was identified as overall Kayong Utara District including the project area of Sukadana and Simpang Hilir Sub-districts. It was because there is a typical forest ecosystem which is similar to the project area. Therefore, it is appropriate to set overall Kayong Utara District as the reference region for the project area. In the overall Kayong Utara District, the area under severe deforestation and forest degradation is expanding due to some drivers, which makes it even more appropriate to identify the overall district as the reference region for the project area.

The reference region has an area of 413,208 ha (consist of 220,793 ha of forest area and 192,415 ha of non-forest area) – approximately 2 times bigger than the project area. The criteria used to define the reference region were based on drivers (agent, agent group and related drivers), forest/vegetation classes and socio-economic conditions. The reference region meets the following conditions;

a. Drivers

i) Agents and drivers of deforestation

To analyze the agents and drivers of deforestation in the project area of Sukadana and Simpang Hilir Sub-districts, the REDD+ program proponents used participatory methods. A detailed description of the agents and drivers of deforestation in the project area are explained in “3.3. REDD+ Activities and Drivers of Deforestation and/or Degradation”. Interviews to Officials of Kayong Utara District Government, proponents were conducted to identify that there are similar condition of agents and drivers of deforestation between Kayong Utara District (reference region) and the Sukadana and Simpang Hilir Sub-districts (project area). The first main deforestation drivers in both areas are exploitation of the forest area for oil palm plantation and second one is the land conversion from forest area to substantial small scale crops land.

ii) Agents groups

The agents of deforestation both within Kayong Utara District (reference region) and the project area of Sukadana and Simpang Hilir Sub-districts are almost all of small farm holders using conventional techniques to convert natural forests and secondary forests into croplands.

iii) Infrastructure drivers

In both reference region and project area, there is no new improved infrastructures related

deforestation and forest degradation.

iv) Other spatial drivers expected to influence the project area

From interviews to Officials of Kayong Utara District Government, no other major drivers were identified in both reference region and the project area, therefore, no additional drivers are expected to emerge near or inside the project area.

b. Landscape configuration and ecological conditions

Ecological condition in reference region is as follows; regarding forest/vegetation classes, in both reference region and project area, forest classifications are certainly same. Over 60% of project area has forest classes that exist in at least 53% of the rest of reference region.

c. Socio-economic conditions

According to the information from the officials in Kayong Utara Government, legal status of the land, land tenure, enforced policies/regulations and socio-economic conditions in both reference region and the project area are similar, therefore, it is appropriate to set overall Kayong Utara District as the reference region for the project area.

(7) Project area

As shown in Figure 6, project area, which is project area in this PD are Sukadana and Simpang Hilir Sub-districts in Kayon Utara District, West Kalimantan Province. The location of the project area, including each village, main road and other related information are shown in Figure 6.

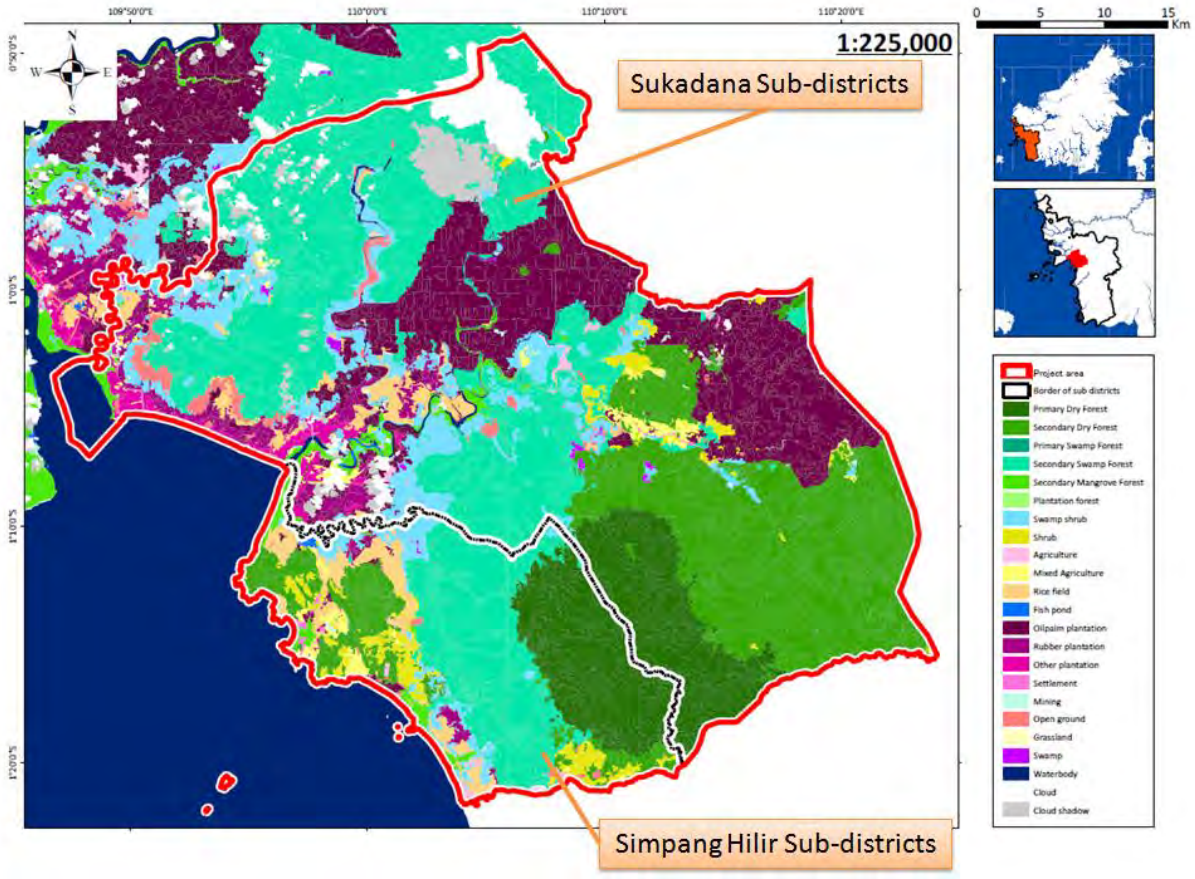


Figure 6 Project area of Sukadana and Simpang Hilir Sub-districts

The project area includes all forests area observed according to Indonesian National Forest Inventory within the boundaries of the project area and reference region, as illustrated in Figure 6.

The total project area is 222,324 ha (project area is 133,615 ha including 88,709 ha of non-forest area) and location in each village is mentioned in Figure 6.

(8) Leakage belt

As shown in Figure 6, leakage belt in this project are same as reference region (overall area in Kayong Utara District, West Kalimantan Province). From results of preliminary survey before the commencement of the REDD+ program and mobility analysis by expert opinion and participant rural appraisal (PRA) of the REDD+ program, leakage belt was identified as neighbor regions in Kayong Utara District where is same as reference levels. Opinions from Officials of Kayong Utara District Government had been supported such concept of leakage belt.

(9) Forest

According to the definition of Indonesian National Forest Inventory, the specific definition of forests in this REDD+ program is identified and applied to the REDD+ program as follows;

Minimum area of land	0.25 ha
Average tree height	5 m
Minimum tree crown cover	30% and above

Primary Dry Forest around GPNP

Oil palm (categorized as cropland) around GPNP

Also, forest classification such as primary dryland forest, Secondary dryland forest, Primary swamp forest and so on are adopted by Indonesian National Forest Inventory according to Minister Degree of SNI 8033, 2014. The baseline scenario is based on a multi-temporal historical analysis of deforestation. The analysis yielded a digital map of forest cover, deforestation that was filtered to a minimum-mapping unit (MMU) of 1.0 ha; the forest class has an overall accuracy of 80%. The forest benchmark was generated from the multi-temporal historical analysis. Also some area covered by clouds and shadows were analyzed according specific methodology.

This forest class is according to Indonesian National Forest Inventory (Table 4).

Table 4 Applied forest class in this REDD+ program[2]

Forest class	Definition	Land clarification according to IPCC
Primary dryland forest	Natural tropical forests grow on non-wet habitat including lowland, upland, and montane forests with no signs of logging activities. The forest includes pygmies and heath forest and forest on ultramafic and lime-stone, as well as coniferous, deciduous and mist or cloud forest.	Forest
Secondary dryland forest	Natural tropical forest grows on non-wet habitat including lowland, upland, and montane forests that exhibit signs of logging activities indicated by patterns and	Forest

[2] Directorate General of Climate Change 2015. National Forest Reference Emission Level for Deforestation and Forest Degradation in the Context of the Activities Referred to in Decision 1/CP.16, Paragraph 70 UNFCCC

	spotting of logging. The forest is including pygmies and heath forest and forest on ultramafic and lime-stone, as well as coniferous, deciduous and mist or cloud forest.	
Primary swamp forest	Natural tropical forest grows on wet habitat including brackish swamp, sago and peat swamp, with no signs of logging activities	Forest
Secondary swamp forest	Natural tropical forest grows on wet habitat including brackish swamp, sago and peat swamp that exhibit signs of logging activities indicated by patterns and spotting of logging	Forest
Primary mangrove forest	Inundated forest with access to sea/brackish water and dominated by species of mangrove and Nipa (Nipa frutescens) that has no signs of logging activities	Forest
Secondary mangrove forest	Inundated forest with access to sea/brackish water and dominated by species of mangrove and Nipa (Nipa frutescens) that exhibit signs of logging activities indicated by patterns and spotting of logging	Forest
Plantation forest	Planted forest including areas of reforestation, industrial plantation forest and community plantation forest	Forest
Dry shrub	Highly degraded log over areas on non-wet habitat that are ongoing process of succession but not yet reach stable forest ecosystem, having natural scattered trees or shrubs	Grassland
Wet shrub	Highly degraded log over areas on wet habitat that are ongoing process of succession but not yet reach stable forest ecosystem, having natural scattered trees or shrubs	Grassland
Savanna and Grasses	Areas with grasses and scattered natural trees and shrubs. This is typical of natural ecosystem and appearance on Sulawesi Tenggara, Nusa Tenggara Timur, and south part of Papua island. This type of cover could be on wet or non-wet habitat	Grassland
Pure dry agriculture	All land covers associated to agriculture activities on dry/non-wet land, such as tegalan (moor), mixed garden and ladang (agriculture fields)	Cropland

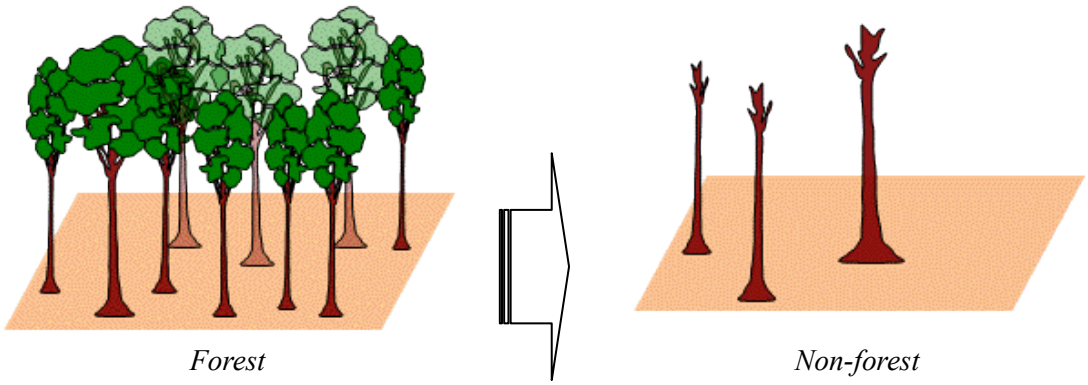
Table 4 *continued*

Forest class	Definition	Land clarification according to IPCC
Mixed dry agriculture	All land covers associated to agriculture activities on dry/non-wet land that mixed with shrubs, thickets, and log over forest. This cover type often results of shifting cultivation and its rotation, including on karts	Cropland
Estate crop	Estate areas that has been planted, mostly with perennials crops or other agriculture trees commodities	Cropland
Paddy field	Agriculture areas on wet habitat, especially for paddy, that typically exhibit dyke patterns (pola pematang). This cover type includes rain-fed, seasonal paddy field, and irrigated paddy fields	Cropland

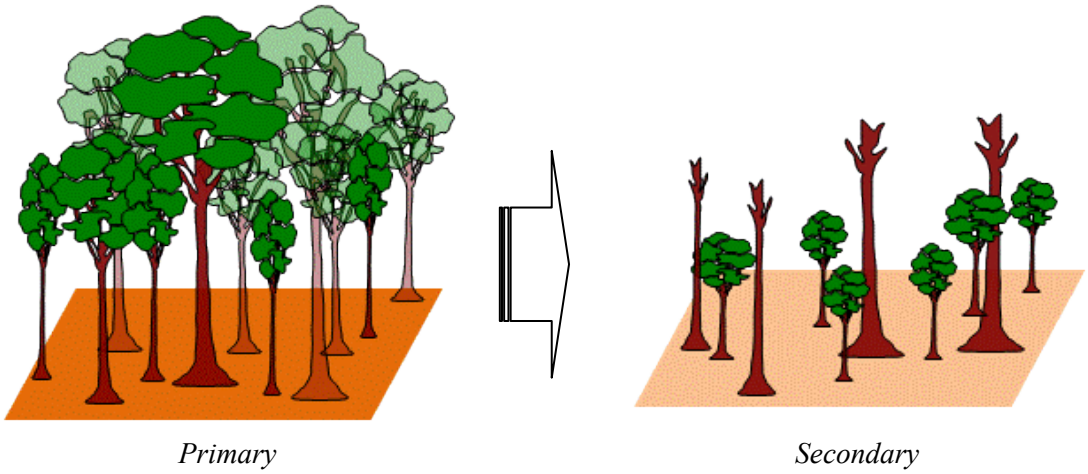
Transmigration areas	Kind of unique settlement areas that exhibit association of houses and agroforestry and/or garden at surrounding	Settlement
Fish pond/aquaculture	Areas exhibit aquaculture activities including fish ponds, shrimp ponds or salt Ponds	Wetland
Bare ground	Bare grounds and areas with no vegetation cover yet, including open exposure areas, craters, sandbanks, sediments, and areas post fire that has not yet exhibit regrowth	Other land
Mining areas	Mining areas exhibit open mining activities such as open-pit mining including tailing ground	Other land
Settlement areas	Settlement areas including rural, urban, industrial and other settlements with typical appearance	Settlement
Port and harbor	Sighting of port and harbor that big enough to independently delineated as independent object	Other land
Open water	Sighting of open water including ocean, rivers, lakes, and ponds	Wetland
Open swamps	Sighting of open swamp with few vegetation	Wetland
Clouds and no-data	Sighting of clouds and clouds shadow with size more than 4 cm2 at 100.000 scales display	No data

In this PD, REDD+ activities consist of; 1) reducing deforestation; 2) reducing forest degradation; and 3) enhancing forest carbon stocks (not include afforestation and reforestation). Definition of each carbon stock changes is illustrated in Figure 7.

Deforestation: land conversion from forest land to other land (e.g., cropland, grazing land and settlements)



Forest Degradation: change of forest types (e.g., primary forest to secondary forest)



Carbon Enhancement: change of forest types (e.g., plantation forest to primary forest)

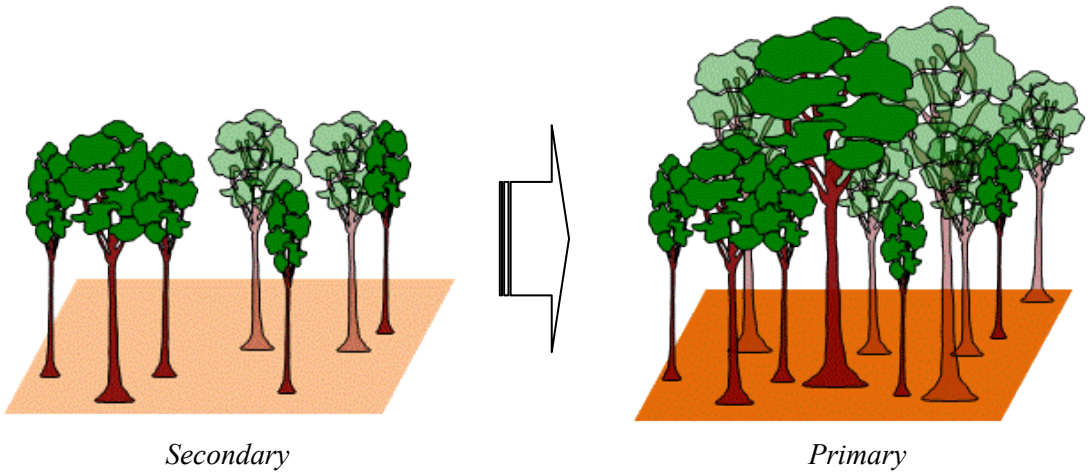


Figure 7 Concept of deforestation, forest degradation and carbon enhancement in the forest in this PD

1.8. Conditions Prior to Program Initiation

Since the UNFCCC COP 13 meeting in Bali in 2007, Indonesia has prioritized climate change planning and action. In 2009, the President announced a commitment to reduce GHG emissions nationwide by at least 26% below business as usual levels by 2020. National strategies and action plans recognize that

land-use change and forestry activities are the main sources of Indonesia's emissions, accounting for 84% of Indonesia's total emissions.

(Left: Well managed forest in GPNP Right: Regenerated vegetation after fires)
Landscape in Kayong Utara District facing on GPNP

The largest forest fires that took place in 1997/1998 during dry seasons were associated with the El Nino phenomenon. After the El Nino-induced forest fires of 1997, forest and peat fires always occur every year and significantly affected GHG emissions. Fires directly change carbon stocks into GHG. During dry seasons, the burning of land could go uncontrolled and threaten oilpalm plantation estates and industrial plantation forests because this may lead to wild fires that would burn plantation areas and production forest also. Land cover change from 2000 to 2013 which shows land conversion from forest to cropland (i.e. oil palm plantation) are visually quantified by satellite imagery analysis by JICA IJ-REDD+ (please see details in below).

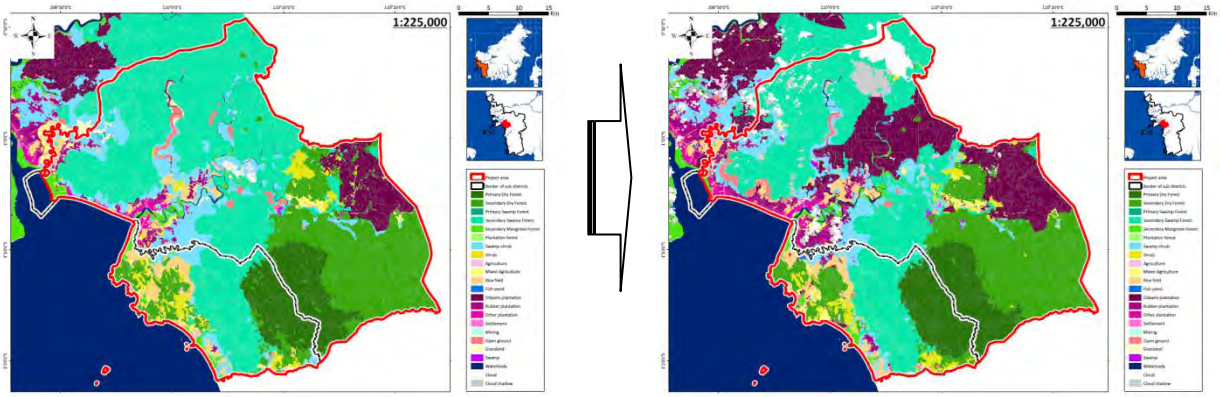
In certain cases, fire is used as a weapon to resolve conflicts over land ownership. It should be noted that peat and forest fires also occurred in areas for other uses, and in both production and conservation forest areas[3]. The extent of such forest and peat fires are presented in the following Table 5 and land-cover change between 2000 and 2015 are shown in Figure 8.

Table 5 Past burned area caused by forest and peat fires around target area in West Kalimantan Province[4]

[3] Dinas Kehutanan Provinsi Kalimantan Barat 2012. Provincial Statistics.
[4] Dinas Kehutanan Provinsi Kalimantan Barat 2012. Provincial Statistics.

District	Burned Area (ha)				
	2007	2008	2009	2010	Average
Kubu Raya	69	447	428	105	262
Ketapang	5	10	642	0	164

Before this REDD+ program, forest area of Sukadana and Simpang Hilir Sub-districts are categorized in both of Hutan Lindung (protected forest), Hutan Produksi (Production Forest) and Areal Penggu-naan Lain (APL) (Non-forest Zone). Also forest distribution area had been changed since 2000 (Figure 2008).



Left: land cover in 2000 Right: land cover in 2013

Figure 8 Land use change before REDD+ program start

1.9. Approvals

All of responsibility for implementing REDD+ program, which include leakage management and issues to be solved are held by the Responsible Organization XX (Total number of participated organizations will be finalized before submitting PD). Also some tasks of institutional arrangement regarding jurisdictional approach are owned by the Responsible Organization XX.

(1) Nested Subnational Jurisdictions

This REDD+ program does not allow additional or new lower-level activities.

(2) Nested Projects

This REDD+ program does not allow additional or new lower-level activities.

1.10. Compliance with Laws, Statutes and Other Regulatory Frameworks

The REDD+ program aims to be in compliance with Indonesia's laws and regulations, as well as those governing international trade. Specifically, the most relevant local laws and regulations related to the REDD+ program activities include:

- Law No. 5 of 1990 on Natural Resources Conservation and Biological Ecosystem
- Law No. 41 of 1999 on Forestry
- Law No. 32 of 2004 on Regional Government

- Law No. 26 of 2007 on regarding Spatial Planning
- Law No. 32 of 2009 on Environmental Protection and Management
- Presidential Regulation No. 61/2011 regarding National Action Plan on GHG Emission Reduction
- Presidential Decree No. 62/2013 regarding managing agency for the reduction of emission from deforestation and degradation of forest and peatlands
- Government Regulation No. 44 of 2004 on Forestry Planning
- Government Regulation No. 45 of 2004 on Forest Protection
- Government Regulation No. 6 of 2007 on Forest Management and Formulation of Forest Management and Forest Utilization Plan
- Government Regulation No. 38 of 2007 on the Division of Governmental Affairs Between the Government, Provincial Government and Regency/Municipal Government
- Government Regulation No. 10 of 2010 on the procedure of altering the appropriation and function of forest areas
- Government Regulation No. 24 of 2010 on the Use of Forest Areas
- Government Regulation No. 60 of 2012 on the amendment of No. 10/2010 on Procedures for altering the appropriation and function of forest areas
- Minister of Forestry Regulation No P.68/Menhut-II/2008 on the Implementation of Demonstration Activities on Reduction of Emission from Deforestation and Degradation
- Minister of Forestry Regulation No. P.61/Menhut-II/2008 regarding Provisions and Procedures for the Granting of Business Permits for the Utilization of Products of Wood Forest Ecosystem Restoration in Natural Production Forests thru Application.
- Minister of Forestry Regulation No.P.30/Menhut-II/2009 Reduction of Emissions from Deforestation and Forest Degradation Procedure
- Minister of Forestry Regulation No. P.4/Menhut-II/2011 - Forest Reclamation Guidelines
- Minister of Forestry Regulation P. 20/Menhut-II/2012 on Implementation of Forest Carbon
- Minister of Forestry Decree No. 259/Kpts-II/2000 regarding harmonization of Central and Provincial Spatial Plans
- Minister of Forestry Decree No. SK.455/Menhut-ii/2008 on Working Group on Climate Change in the Department of Forestry
- Ministry of Forestry Decree No.P.36/Menhut-II/2009 regarding Procedures for Licensing of Commercial Utilization of Carbon Sequestration and/or Storage in Production and Protected Forests.
- Minister of Forestry Decree No. SK 13/Menhut-II/2009 on Climate Change Working Group in the Ministry of Forestry
- Minister of Forestry Decree No SK.199/Menhut-II/2012 on Creation of The Preparatory Unit for The Macro Plan for Forestry Tenure

1.11. Ownership and Other GHG Programs

(1) Right of Use

Legally the reference and the project areas are classified as National Park, Forest area (HP, HL, HTI) and other land use (APL) based on SK.733/ Menhut-II/2014. In accordance with those classifications, the proponents have secured provisional right of use. The carbon right is secured in accordance with Regulation No. P. 20/Menhut-II/2012. Therefore the REDD+ program proponents have control of the project area by virtue of above rights of use. The authorization process will be taken as the activities in Forum (i.e. forum activities mentioned in "3.3. REDD+ Activities and Drivers of Deforestation and/or Degradation")

(2) Participation under Other GHG Programs

This REDD+ program has not and will not seek to generate credits in any other form. Any reductions in GHG emissions achieved through this REDD+ program will not be used to meet compliance requirements, whether regional or national. Neither Indonesia nor the regional or local governments have established a national target, a compliance program, or a cap-and-trade system.

1.12. Benefit Sharing Mechanism

Benefit sharing mechanism and/or benefit distribution system among all stakeholders are essential to keep motivation to participate into the REDD+ program. In Indonesia, regulation for REDD+ mechanism is still under development, then discussions on benefit sharing mechanism in this REDD+ program have not reach to the agreement points. The mechanism should be in line with the Decree 36/2009[5] and also distribution rate and other regulation should be finalized after some times of stakeholder's meeting.

1.13. Program Sensitive Information

No sensitive information.

2. Safeguards

2.1. Stakeholders Consultation

The jurisdictional REDD+ program has been developed and this document has been documented with a multi-stakeholders process in a transparent manner. The process included some internal meetings and workshops. Relevant stakeholders (described section of "Chapter 1 Output 1 Activity 1-1 1.2. Consulted and its process and outcomes are summarized below;

Stakeholders	Ministry of Environment and Forestry in Indonesia
Manner of consulting	- Sharing the draft PD and gathering the comments - Carrying out 3 times of meeting and discussion to develop final draft - Having the workshop as a co-chair in order to consult with relevant stakeholders

[5] Ministry of Forestry 2009. Ministry of Forestry Decree No. P.36/Menhut-II/2009 regarding Procedures for Licensing Of Commercial Utilisation Of Carbon Sequestration and/or Storage In Production and Protected Forests

Stakeholders	Forum Members
Manner of consulting	- [*Need to be shared with forum*] - Carrying out X time of meeting and discussion to develop final draft - Having the workshop as a co-cheer in order to consult with relevant stakeholders

Stakeholders	The villages in Sukadana Sub-district
Manner of consulting	- Having the consultation workshop to share the result of socio-economic survey and exchanged opinions Sedahan Jaya Village: on 14-15th October, 2014 with 29 participants - Riam Berasap Village: on 19th May, 2015 with 16 participants - -Sejahtera Village: on 9th August, 2015 with 41 participants - Taking collaborative management process in 4 villages - Conducting FPIC process

Stakeholders	The villages in Simpang Hilir Sub-district
Manner of consulting	- Having the consultation workshop to share the result of socio-economic survey and exchanged opinions - Batu Barat Village: on 10th February, 2015 with 18 participants - Matan Jaya Village: on 27th March, 2015 with 21 participants

Stakeholders	FPIC Training Work shop
Manner of consulting	- Having the workshop for FPIC training - Held on 11th-13th January, 2016

2.2. Relevant institutions and/or standards

Relevant rules, standards, procedural descriptions, guidelines that are used as guidance to meet sub-national social and environmental safeguard requirements which have also addressed and respected safeguards requirements and all of the safeguards contained Decision 1/CP.16 of the UNFCCC Cancun Agreements, are listed in Table 6.

Table 6 Relevant institutions and/or standards in Indonesia

Institutions and standards in Indonesia	Description
Pengelolaan Hutan Produksi Lestari (PHPL) as policies and regulations	Pengelolaan Hutan Produksi Lestari, a sustainability management system for all production forest concessions in Indonesia.
Sistem Verifikasi Legalitas	Sistem Verifikasi Legalitas Kayu, timber legality verification system

Kayu (SVLK)	which is part of PHPL.
SFM Certification	Sustainable Forest Management, refers to voluntary certification standards for SFM used in the context of timber production. The Forest Stewardship Council (FSC) and Lembaga Ekolabel Indonesia (LEI) are the two most well known systems used in Indonesia.
Kajian Lingkungan Hidup Strategis (KLHS)	Kajian Lingkungan Hidup Strategis, strategic environmental assessment (SEA) is a mandatory control mechanism for development policies, plans and programs at the National, Provincial and Kabupaten level (UU 32/2009)
Analisis Mengenai Dampak Lingkungan (AMDAL)	Analisis Mengenai Dampak Lingkungan, environmental impact assessment.
Free, Prior, and Informed Consent (FPIC)	Free, Prior, and Informed Consent (or Consultation, per Government of USA and WB), a process that provides opportunity for indigenous and/or local communities to reject or approve activities in forests to which they have rights.

2.3. Handling and resolving grievances and disputes

Mechanisms for handling and resolving grievances and dispute have not been developed. The REDD+ program will consider who and how should identify and resolve grievances and disputes relating to the design, implementation and evaluation of the REDD+ program. The Responsible Organization XX has continuously held workshops and meetings in order to review the process on security framework for REDD+ in and around GPNP.

3. Jurisdictional Baseline Details

3.1. Jurisdictional Baseline Start Date and Frequency of Update

The historical reference period is from 2000 to 2013, totaling 14 years. The start and end date of the REDD+ program crediting period, 20 years in total, are June 1, 2015 and May 31, 2034, respectively. The REDD+ program crediting period is subject to renewals. The fixed baseline period covers a 10 years period from 2016 to 2025. The minimum duration of a monitoring period will be one year and will not exceed the fixed reference period. It is expected that monitoring reports will be issued every 3-5 years, depending on REDD+ program circumstances. This REDD+ program will seek registration only under the VCS. The REDD+ program will not seek to register credits with any other program.

3.2. Previously Established Jurisdictional Baseline and/or Reduction Commitments

In West Kalimantan Province, and each District in the Province have not established baseline (i.e. forest reference level according to UNFCCC decision) even in January 2016. Therefore, the PD dose not considered relationship between previously established jurisdictional baseline and/or reduction commitments.

3.3. REDD+ Activities and Drivers of Deforestation and/or Degradation

The agents, drivers, and underlying causes of deforestation and forest degradation in the project area were identified through the socio-economic survey, such as interviews with local stakeholders (officials from the GPNP, NGOs and community leaders) a review of socio-economic study conducted by the IJ-REDD+, participatory workshops in community, and experts opinions.

The process of identifying drivers and agents and selecting REDD+ activities for reducing GHG emissions are shown in Figure 9.

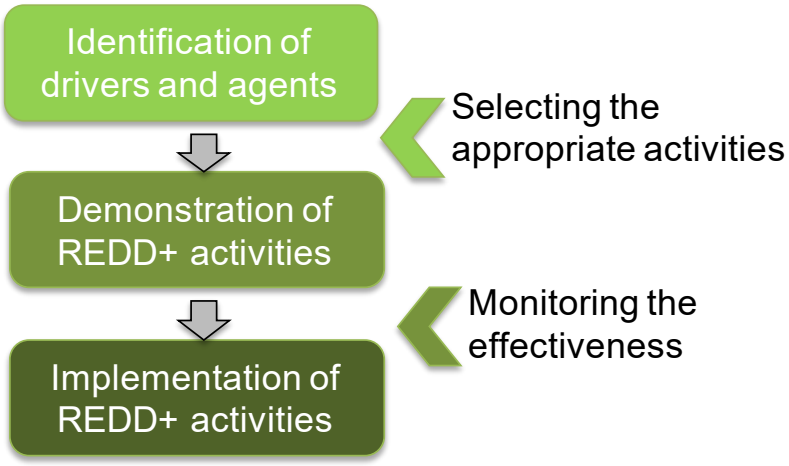


Figure 9 Process of identifying drivers and agents and selecting REDD+ activities

(1) Identification of agents and drivers of deforestation and forest degradation

Based on the sources described above, 1 agent group was identified in planned deforestation and 3 agents group were indentified in unplanned deforestation and forest degradation. Oil palm plantation settler is the main agents responsible for deforestation since around the year of 2007. Other agents, small scale subsistence farmers who converted forest area to crops land and forest resource user, also present in the project area.

a. Planned deforestation

This REDD+ program defines one main agent and drivers of deforestation and forest degradation-converting the forest area to oil palm plantation. These are the dominant agents of deforestation and forest degradation in the region and are expected to be in the coming decades.

Agent 1	Oil palm plantation settler
Driver	In accordance with the satellite imagery analysis, XX area of plantations has been increasing since 2006.

b. Unplanned deforestation and forest degradation

There are other potential agents of deforestation and degradation in the project area however

according to expert opinion these do not cause significant deforestation in comparison to agent 1. In order to secure the safeguard aspects the REDD+ program also need to consider following agent;

Agent 2	Subsistence small scale farmer without irrigation system (rice production in dry paddy)
Driver	- Land use conversion for crops land The community who are engaging in upland rice and/or shifting cultivation. Their main income generation is labor salary in oil palm plantation. Instable employment condition has community returned to substantial foaming like shifting cultivation and there is a possibility that the number of land conversion to crops land will be increasing by population growth of the target area.

Agent 3	Forest resource user in particular non timber forest products (NTFPs)
Driver	- Growing forest resource utilization pressure The fuel wood is the main source of cooking while propane gas is widely introduced in project area. Approximately 76% (minimum30%- maximum97%) of target households collecting fuel woods in forest area and 19% (minimum3.3%- maximum71.5%) of target households are deriving their income from NTFPs selling. The customary way of natural resource use is sustainable. However there is the possibility that the forest utilization pressure will be increasing by population growth of the target area.

Agent 4	Small scale loggers
Driver	- Logging In mainly 1990's, the impact on deforestation caused by illegal logging had been decreasing since the main income source around project area has been shifted to employment of oil palm plantation and logging for self consumption as building materials are continuing on a small scale. However there is the possibility that the timber utilization will be increasing by population growth of the target area.

These agents do not present independently, one agent activities shall be plurality of drives shown in Table 7.

Table 7 Community group and their characteristics

Community group	Main income generation	Dependence of substantial farming	NTFP usage	Underlying problem	General problem
Group A	Harvesting Dry land paddy / NTFP selling/ small scale logger	High	Yes	● Insufficient yield amount ● Lack of agricultural techniques ● Insufficient income	Population growth (immigration). Unrecognized boundary between community area and conservation forest area (NP, HL). Lack of land use and natural resource management policies/ rules and their enforcements Low coordination for forest management among local stakeholders (community, government and NGOs)
Group B	Harvesting rubber plantation	High-Middle	Yes	● Influenced by market price of rubber ● New migrants cannot gain enough land	
Group C	Labor salary in oil palm plantation	Middle	Yes	● Lost own farming area ● Income disparities	
Group D	Harvesting Wetland paddy	Low	Yes	● Conflict over the resource allocation	
Group A	Harvesting Dry land paddy / NTFP selling / small scale logger	High	Yes	● Insufficient yield amount ● Lack of agricultural technique ● Insufficient income	
Group B	Harvesting rubber plantation	High-Middle	Yes	● Influenced by market price of rubber ● New migrants cannot gain enough land	

(2) Identification of underlying causes of deforestation

The underlying causes make the unsustainable exploitation of forest in the project area are summarized below;

- Market price of palm oil
- Market price of rubber
- Lack of land use and natural resource management policies/ rules and their enforcements in community level
- Lack of coordination for forest governance among local government
- Lack of coordination for forest management among local stakeholders (community, government and NGOs)
- Lack of agricultural techniques
- Lack of economic opportunities other than working in oil palm plantation
- Population Growth

(3) REDD+ Activities

As mentioned above, the landscape level has multi agents and drivers, and multi underlying causes for deforestation and forest degradation. Thus the REDD+ activities are implemented through the two scales to avoid the baseline deforestation and forest degradation. One is small scale activity which carried out by the NGOs in order to approach multi agents and drivers in each village level. The other is wide scale to handle with the underlying causes. This approach ensures that the communities are undertaking activities or benefiting from the inputs that are well suited to their circumstances and needs, and are more likely to succeed since the forest governance condition will be put into place (Figure 10).

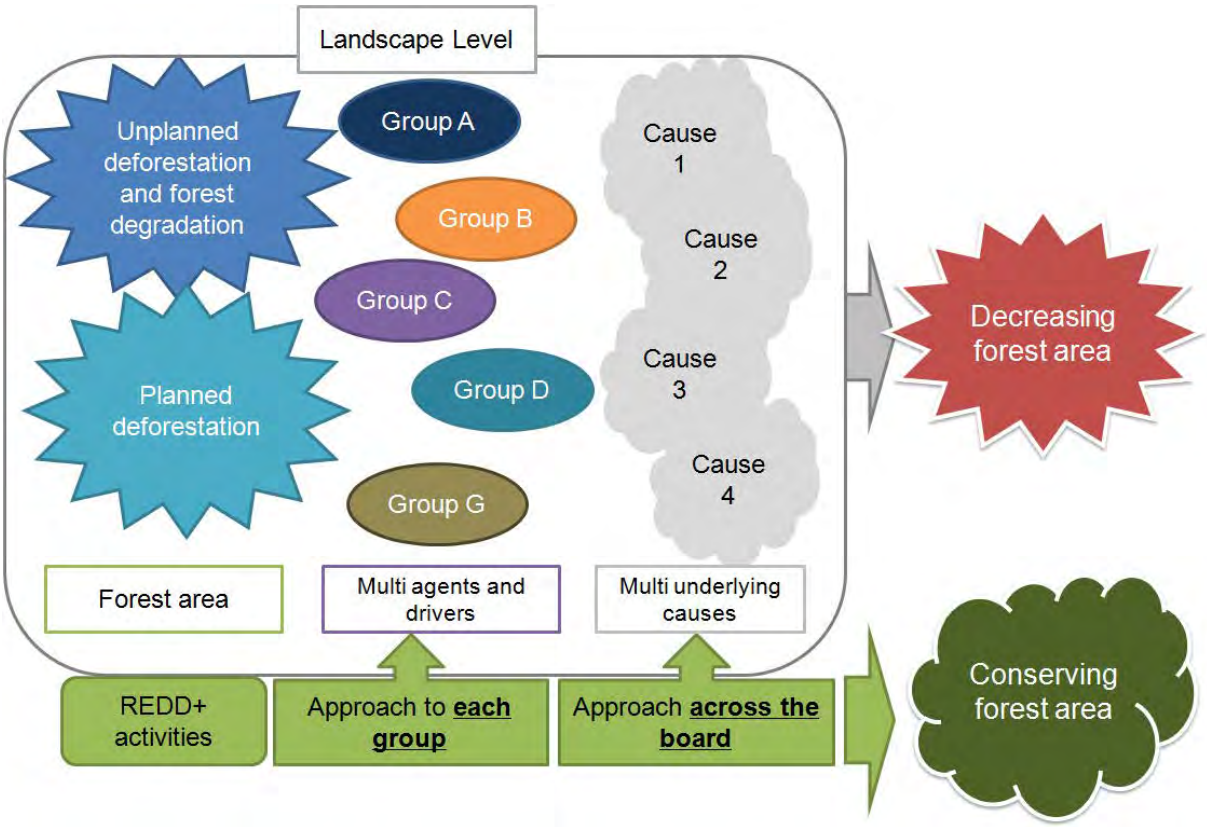


Figure 10 REDD+ approach to landscape level

a. REDD+ activities: Approach to each group

REDD+ activities	Improving agriculture techniques
How it will achieve net GHG emission reductions	Land conversion to crops area is negatively related to rice yields especially in dry land paddy (rain-fed paddy/ without irrigation system). Training communities in conservation farming techniques that allow them to improve the productivities on small areas of land then reducing their needs to clear new areas of forest to expand fields. Installing organic farming also introduce the system with low cost input that is enable them to secure sustainable manner.
REDD+ activities	Introducing alternative livelihood – eco tourism-
How it will achieve net GHG emission reductions	The local economy will not be diversified away from agriculture and forest exploitation on a broad enough scale to decrease the loss of forest by providing alternative livelihood. Introducing oil palm plantation gave labor opportunities to community. However, this provided a direct opportunity for a part of community. The involvement of community in eco tourism activities is designed aim to provide local communities as alternative income, to help them to perceive and receive benefits from their forest environment and organizing community group.

REDD+ activities	Introducing community forest monitoring system for illegal logging
How it will achieve net GHG emission reductions	Forest monitoring system for illegal logging by involving the community is introduced. To emphasize the forest area protection with a variety of incentives; such as providing health care services are introduced.

REDD+ activities	Awareness rising for natural resource management
How it will achieve net GHG emission reductions	The REDD+ program has carried out an environmental education for community. It has enhanced the effectiveness of above mentioned activities since the community understanding for biodiversity and natural resource conservation has been improving.

b. REDD+ activities: Approach to across the board of project area

REDD+ activities	Building forest management structure in communities through collaborative management
How it will achieve net GHG emission reductions	The REDD+ program is focusing on enforcing community abilities for management of forests and natural resources management by their own through the activities of collaborative management and/or community forestry (Hutan Desa). The land zoning and making rules for natural resource utilization lead the better management of forest area. To take this process also secures the community rights to access to these natural resources.

REDD+ activities	Enforcing forest governance through forum activities and facilitation process
How it will achieve net GHG emission reductions	The relationship had not been well developed between communities and local government. Also, the community might not be recognized the boundary between community area and conservation forest area. Thus forest encroachment and land conversion has gradually occurred in and around the project area. To strengthen the forest management governance at the landscape level, the collaborative management system has been constructed among relevant stakeholders through the activity by the forum

3.4. Program Boundary

In line with 2006 IPCC Guidelines for National Greenhouse Gas Inventories “Volume 4 Agriculture, Forestry and Other Land Use”, carbon pools, which are target of GHG emissions and removals, are defined as following Table 8.

Table 8 Selected Carbon Pools

Carbon pools	Included/excluded	Justification/Explanation of choice
Aboveground	Included	The baseline land use in the project area is conversion of forests to other land use, and degradation of natural and secondary forests by pioneer shifting cultivation. Therefore the carbon stock in this pool is likely to be relatively large compared to the REDD+ program scenario.
Belowground	Included	Recommended by the methodology as it usually represents between 15% and 30% of the above-ground biomass.
Dead wood	Excluded	Conservatively excluded (the carbon stock in this pool is not expected to be higher than the baseline compared to the REDD+ program scenario).
Harvest wood products	Excluded	Under the baseline scenario, illegal or selective logging occurs at very small scale. Such results were supported by results of preliminary survey. Therefore, harvested wood products have been considered insignificant.
Litter	Excluded	Not to be measured
Soil organic carbon	Included	To be measured

Also GHG types which are target of GHG emissions and removals are defined as following Table 9.

Table 9 Identified source of GHG types

	Gas	Included?	Justification/Explanation
Biomass burning	CO_2	Excluded	Counted as carbon stock change
	CH_4	Excluded	Considered insignificant
	N_2O	Excluded	Considered insignificant
Livestock emissions	CO_2	Excluded	Not counted as carbon stock change
	CH_4	Excluded	Not a significant source.
	N_2O	Excluded	Not a significant source.
Paddy field	CO_2	Excluded	Not counted as carbon stock change
	CH_4	Excluded	Not a significant source.
	N_2O	Excluded	Not to be measured

3.5. Description of Jurisdictional Baseline Method

(1) Accounting Method

Accounting of GHG emission reductions are according to land-based system. In this REDD+ program, land clarification based on Indonesian National Forest Inventory was applied and estimation of GHG emission reductions are based on land-based analysis (satellite imagery analysis). Land-based system are consistent with national forest management system in Indonesia, therefore there are no information gap and some kind gaps of over or under estimation and accounting in this REDD+ program.

(2) Most Plausible Jurisdictional Baseline Scenario

The baseline scenario (i.e. reference scenario according to the JCM word) is continuous deforestation and forest degradation in the target site, such area into some types of secondary forest and non-forest area (e.g., plantations). The scenario has been identified through preliminary survey (see section of "(3) Baseline Scenario Selection Method" below).

(3) Baseline Scenario Selection Method

The identification and selection of alternative land use scenarios for baseline determination and additionality assessment were carried out in accordance with the VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, Version 3.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Sub-step 1a. Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity: The following alternative land use scenarios were identified for the REDD+ program (Table 10):

Table 10 Alternative land use scenarios in REDD+ target site

Alternative directions	Details
Alternative 1	Continuation of deforestation activities taking place prior to the activities in the target site
Alternative 2	Creation of large industrial/agricultural projects as alternative livelihood to shifting cultivation
Alternative 3	Management and protection of the area as Protection Forest by the Central Government or Provincial Government
Alternative 4	Project activities taking place without registration of this project

As discussed above, Government of the West Kalimantan Province lacks the funds to manage and protect the target site and has no corresponding plans. Therefore, Alternative 3 is considered implausible. The remaining three alternatives are considered below.

Sub-step 1b. Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations: Alternative 1 entails deforestation due to land conversion. Either activity is considered legal or acceptable by the Government. Presumably, the activities would have been allowed to continue in the region. This alternative remains plausible. Alternative 4 includes all REDD+ program activities not currently registered as VCS projects. As outlined in "1.10 Compliance with Laws, Statutes and

Other Regulatory Frameworks", all activities comply with all applicable laws and regulations. Alternative 2 includes the granting of agricultural concessions or the development of large-scale agricultural initiatives in the area. Since the REDD+ program site is recognized as land managed by the Forum, it would be illegal to grant concessions in most parts of the REDD+ program site. For this reason, Alternative 2 is eliminated from further consideration. Then Alternatives 1 and 4 remain as plausible alternatives.

Sub-step 1c. Selection of the baseline scenario: The investment analysis in following additionality demonstrates that Alternative 4 is significantly less financially attractive than Alternative 1, prompting the conclusion that Alternative 1 is the most likely baseline scenario.

Sub-step 2a. Determine appropriate analysis method: In Option 1, a simple cost analysis, is the appropriate analysis method. This analysis focuses solely on revenues generated by the REDD+ program that can be used for REDD+ program activities.

Sub-step 2b. – Option I. Apply simple cost analysis: The annual management costs associated with the REDD+ program are roughly 1 million USD. Based on 2011 data, an estimated 30% of these costs are for introduction of alternative livelihood. Approximately 50% of the costs are for information gathering and data analysis (including GIS), program development, coordination, and monitoring. The remaining 20% is used for financial and office administration. With successful REDD+ program validation and verification, annual costs are expected to increase 10% to an estimated average of 1.1 million USD annually. The additional costs are necessary to expand land use and extension activities to a larger number of communities; to undertake carbon monitoring and verification of carbon credits; to expand REDD+ program communication with stakeholders; to undertake outreach and capacity building among other REDD+ proponents; and to account for inflation for costs such as salaries, transportation, and equipment. A financial statement highlighting projected expenses and revenues for the period 2016–-2035 will be provided to the validator. Moving forward, revenues from the sale of carbon credits will be used directly to cover the costs of introduction of alternative livelihood, additional activities related to the REDD+ program, and the establishment of an endowment to ensure long-term financing for REDD+ program activities. This will allow all proponents to continue REDD+ program activities that ensure reduced emissions from deforestation. Any remaining revenues will be shared with the Government. The Government has reviewed and agreed to a specific revenue-sharing agreement. The REDD+ program has no other revenue sources. There is no established government funding for the management of the REDD+ or the protection of the intact forest. The REDD+ program site will not be used for any revenue-generating purpose. The organizations that have financed the REDD+ program to date will not provide additional funds once verified carbon credits have been generated. Since the proposed REDD+ program activity generates no financial benefits other than VCS-related income, the REDD+ program proceed to the common practice assessment below.

Step 4: Common Practice (Common Practice Assessment)

The REDD+ program has management contracts with the Government to oversee REDD+ program activities. REDD+ program activities are managed by the REDD+ program. However, the management

contracts differ markedly. The REDD+ program has a 20-year, full-management contract for all activities. In REDD+ program activities, the REDD+ program budget indicates 1 million USD was spent on the site. The financial plan includes mention of partnerships with the REDD+ program and other organizations to assist in financing the protection services. The REDD+ program, whose purpose is land and forest management and engagement of neighboring communities to ensure the long-term success of the conservation efforts, spends roughly 1 million USD annually. In sites managed by national and regional governments, extensive activities beyond land use planning or environmental education tend to be limited. The overall funding available for protected areas is clearly limited. Due to the proponent's unique management plan and significantly more extensive activities, this REDD+ program does not reflect common practice, a key distinction between it and other sites and conservation REDD+ programs. Thus, Alternative 1 is the most likely baseline scenario.

(4) Land Cover Maps

An analysis of land-use and land-cover change in the reference region was conducted in around 3 to 6 years intervals for the reference period (2000-2013) using medium resolution satellite imagery, and then it was validated using a combination of high-resolution satellite imageries. All data sources used in these analyses are listed in Table 11.

Table 11 Data sources of satellite imagery analysis

2000		2006		2009		2011		2013	
File name	Source	File name	Source	File name	Source	File name	Source	File name	Source
LE71200602001 134SGS00	USGS	LT51200602006 268BKT00	USGS	MOSAIK_2009_ NUTM49_N01	INCAS	MOSAIK_2011_ NUTM49_N01	INCAS	LC81200602013 175LGN00	USGS
LE71200612001 134SGS00	USGS	LT51200612006 268BKT00	USGS	MOSAIK_2009_ NUTM49_S01	INCAS	MOSAIK_2011_ NUTM49_S01	INCAS	LC81200612013 175LGN00	USGS
LE71200622001 134SGS00	USGS	LT51200622006 268BKT00	USGS	MOSAIK_2009_ NUTM49_S02	INCAS	MOSAIK_2011_ NUTM49_S02	INCAS	LC81200622013 175LGN00	USGS
LE71210602001 173SGS00	USGS	LT51210602005 224BKT00	USGS	MOSAIK_2009_ NUTM49_S05	INCAS	MOSAIK_2011_ NUTM49_S05	INCAS	LC81210602013 166LGN00	USGS
LE71210612001 173SGS00	USGS	LT51210612005 224BKT00	USGS					LC81210612013 166LGN00	USGS
LE71210622001 173SGS00	USGS	LT51210622005 224BKT00	USGS					LC81210622013 150LGN00	USGS

Following definition of classes of land-use was applied in this REDD+ program (Table 12).

Table 12 List of all land use and land cover classes existing at the REDD+ program start date within the reference region

Class identifier		Trend in carbon stock	Presence in[1]	Baseline activity[2]			Description (including criteria for unambiguous boundary definition) according to Indonesian National Forest Inventory
ID	Name			LG	FW	CP	
1	Primary dryland forest	Constant	PA, RA, LK	N	N	N	Please see Table 4
2	Secondary dryland forest	Decreasing	PA, RA, LK	N	Y	N	Same as above
3	Primary swamp forest	Constant	PA, RA, LK	N	Y	N	Same as above
4	Secondary swamp forest	Decreasing	PA, RA, LK	N	Y	N	Same as above
5	Primary mangrove forest	Constant	PA, RA, LK	N	Y	N	Same as above
6	Secondary mangrove forest	Decreasing	PA, RA, LK	N	Y	N	Same as above
7	Plantation forest	Increasing	PA, RA, LK	Y	Y	N	Same as above

1: PA = Project area, RR = Reference region, LK = Leakage belt

2: LG = Logging, FW = Fuel-wood collection; CP = Charcoal Production (Y/N)

The REDD+ program defined 23 land-cover classes, and many possible combinations of land-cover change categories.

The best practice in the remote sensing field emphasizes the use of medium resolution imagery as a very cost-effective method for classifying and monitoring forest cover and loss, and the type of spectral analysis using such imagery is sufficient to accurately distinguish closed-canopy forest from many vegetation formations. LANDSAT imagery, one such type of medium resolution imagery, was used in this REDD+ program to map the forest cover and loss. Following pictures shows areas of typical fallow in the REDD+ program site.

Landscape in Kayong Utara District facing GPNP

Land-cover change data for the reference region were mapped by JICA IJ-REDD+, via time-series analysis using satellite imagery of optical sensor data: LANDSAT-Thematic Mapper (TM) LANDSAT-Enhanced Thematic Mapper Plus (ETM+), for the reference period of 2000 to 2013. As a result, 23 classes were mapped, including forest cover and loss, non-forest, cloud, and water. In order to assure a high quality analysis, IJ-REDD+ special pre-processing, IJ-REDD+ interpretation and classification, and IJ-REDD+ post-processing steps was applied, and land-cover maps were developed (Figure 11 to Figure 15).

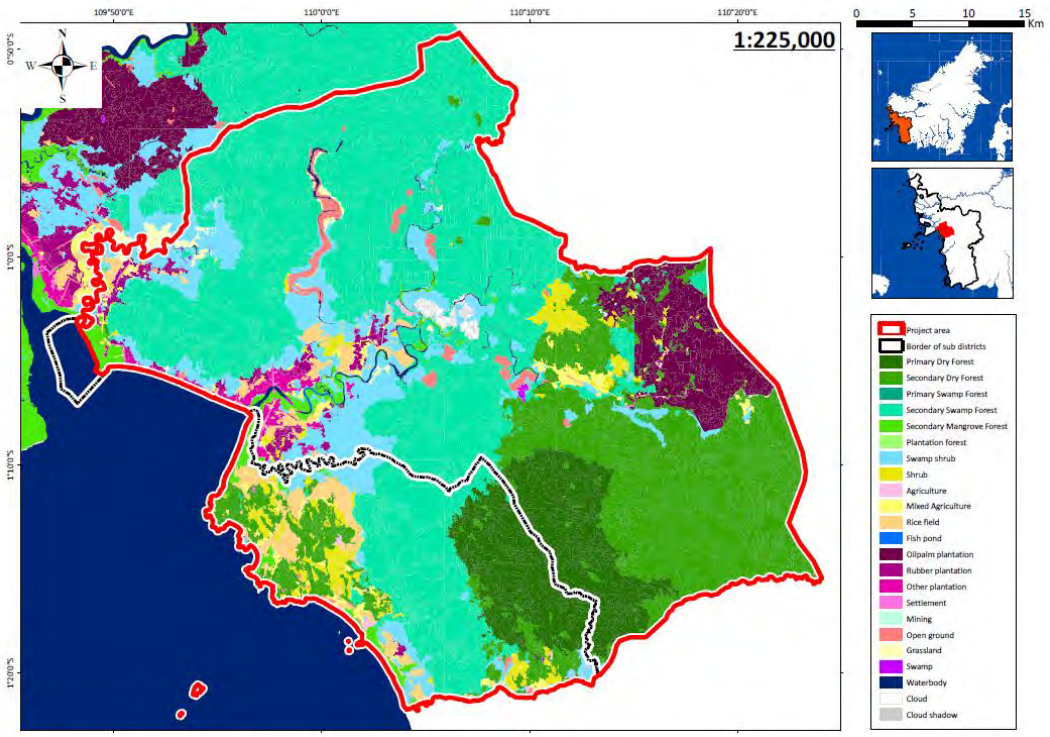


Figure 11 Land cover in reference period from 2000

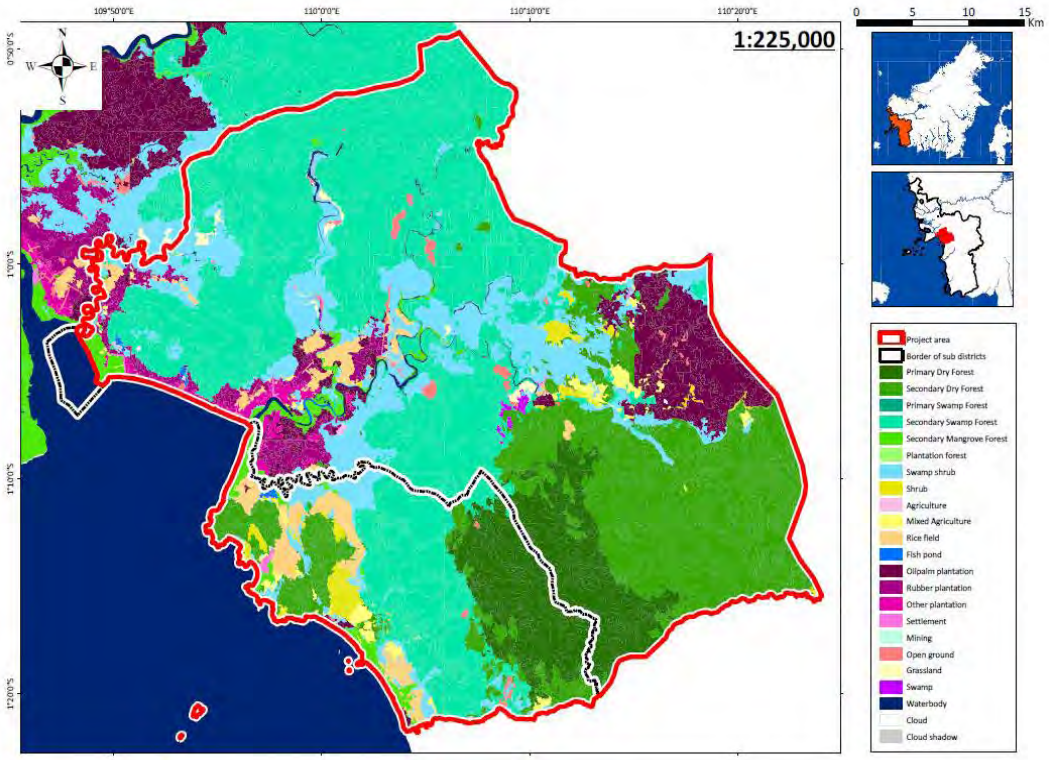


Figure 12 Land cover in reference period from 2006

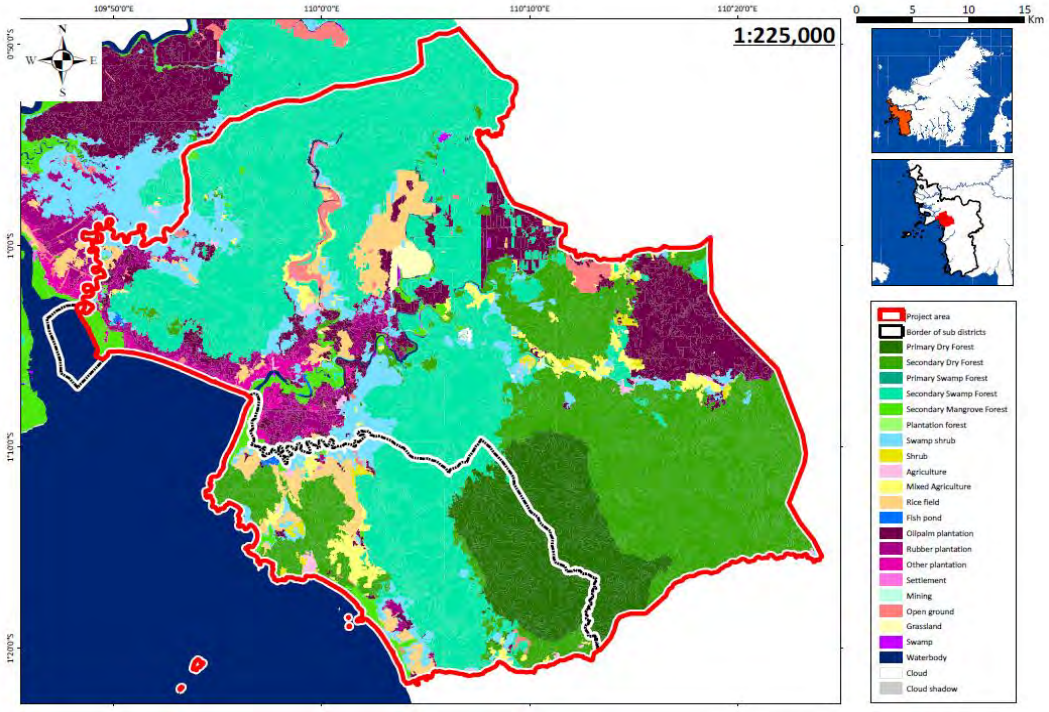


Figure 13 Land cover in reference period from 2009

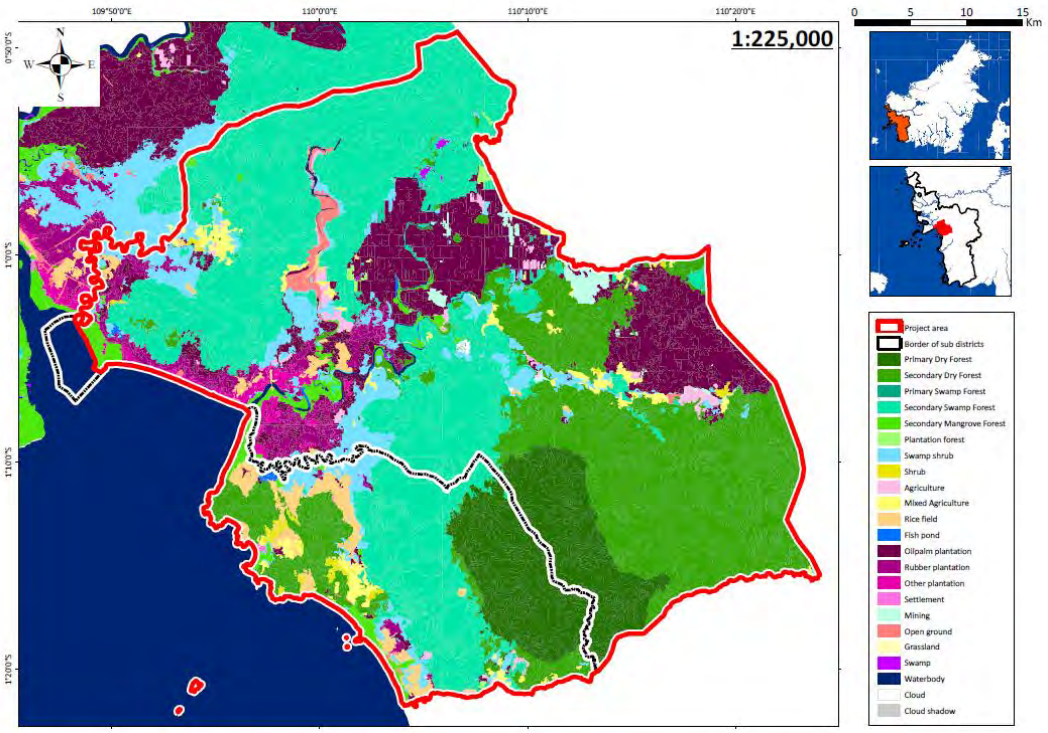


Figure 14 Land cover in reference period from 2011

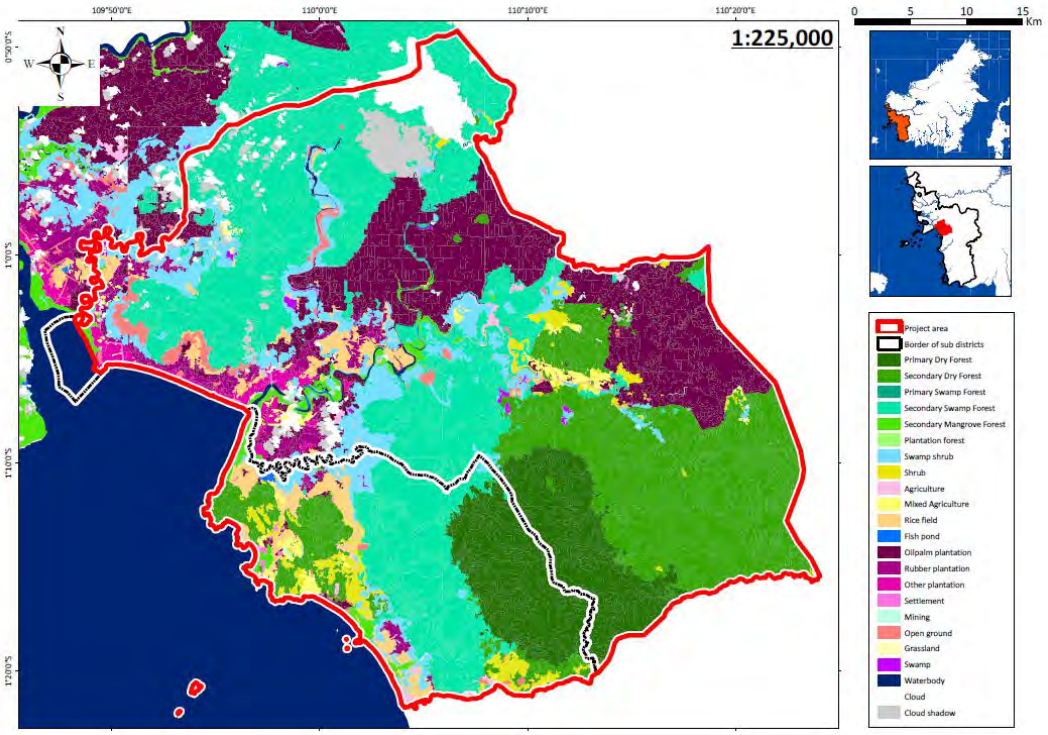


Figure 15 Land cover in reference period from 2013

From analysis by using land cover map in Figure 11 to Figure 15, land dynamics in each category of reference region, project area and leakage belt are shown in Figure 16 to Figure 18 .

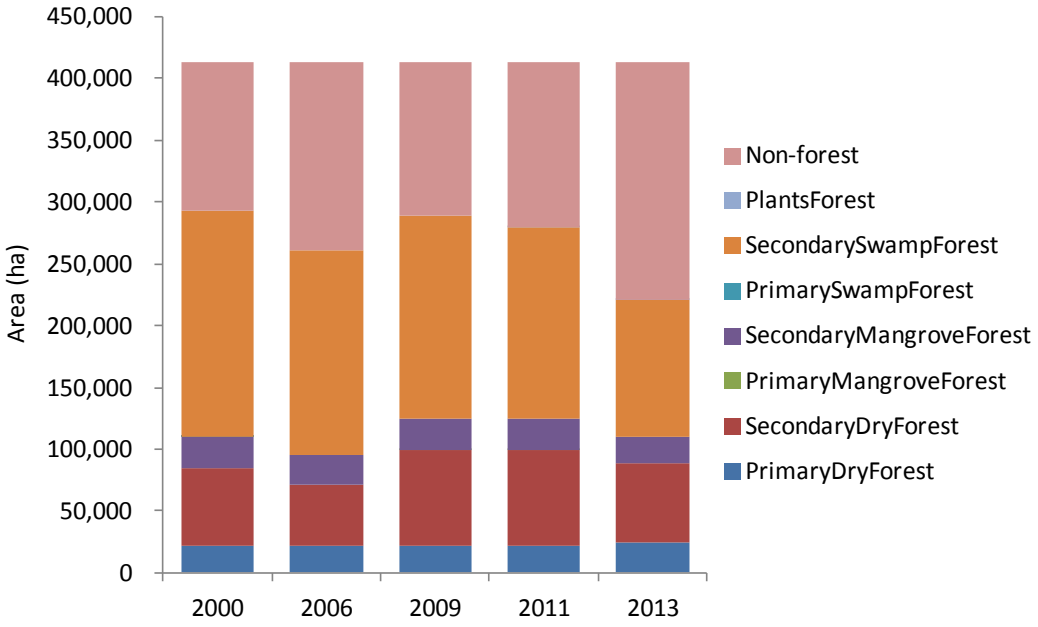


Figure 16 Dynamics of each type of forest area in reference region

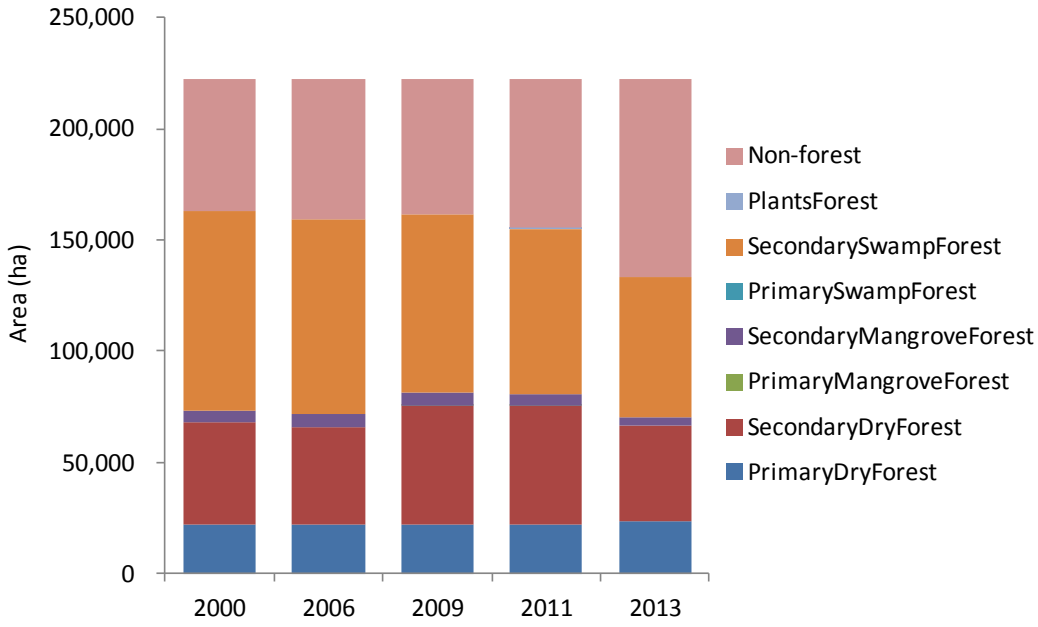


Figure 17 Dynamics of each type of forest area in project area

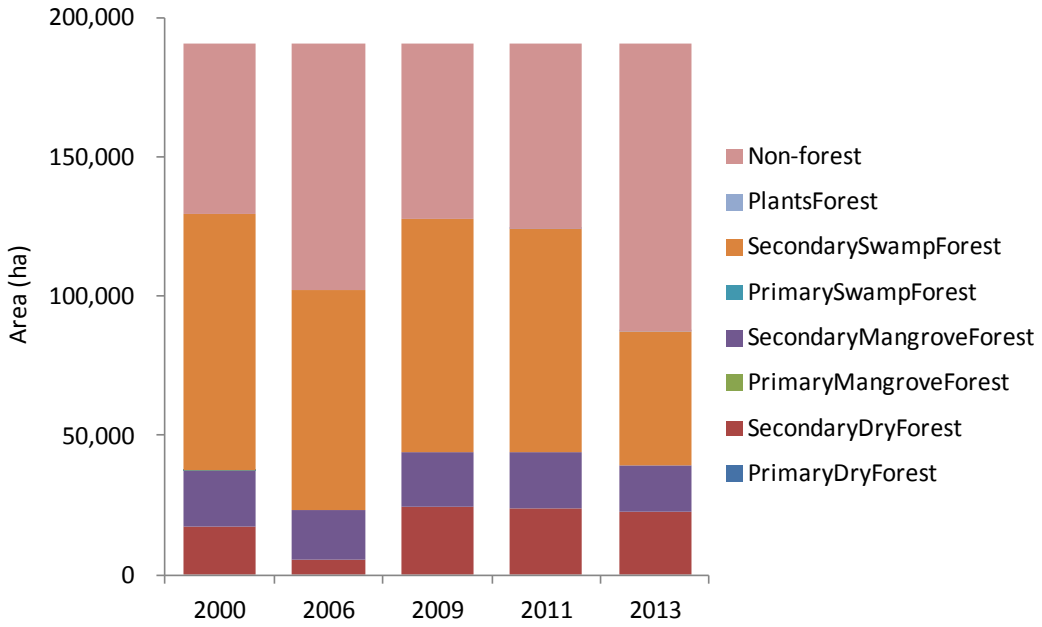


Figure 18 Dynamics of each type of forest area in leakage belt

The 2013 land cover classification developed by the methodology of this REDD+ program was validated by ground truth data of 1,143 points within West Kalimantan Province, which was acquired by IJ-REDD+. All plots were located within forested areas in project area, reference region and some plots are located in outside of reference region (but from same forest type and vegetation) (Figure 19).

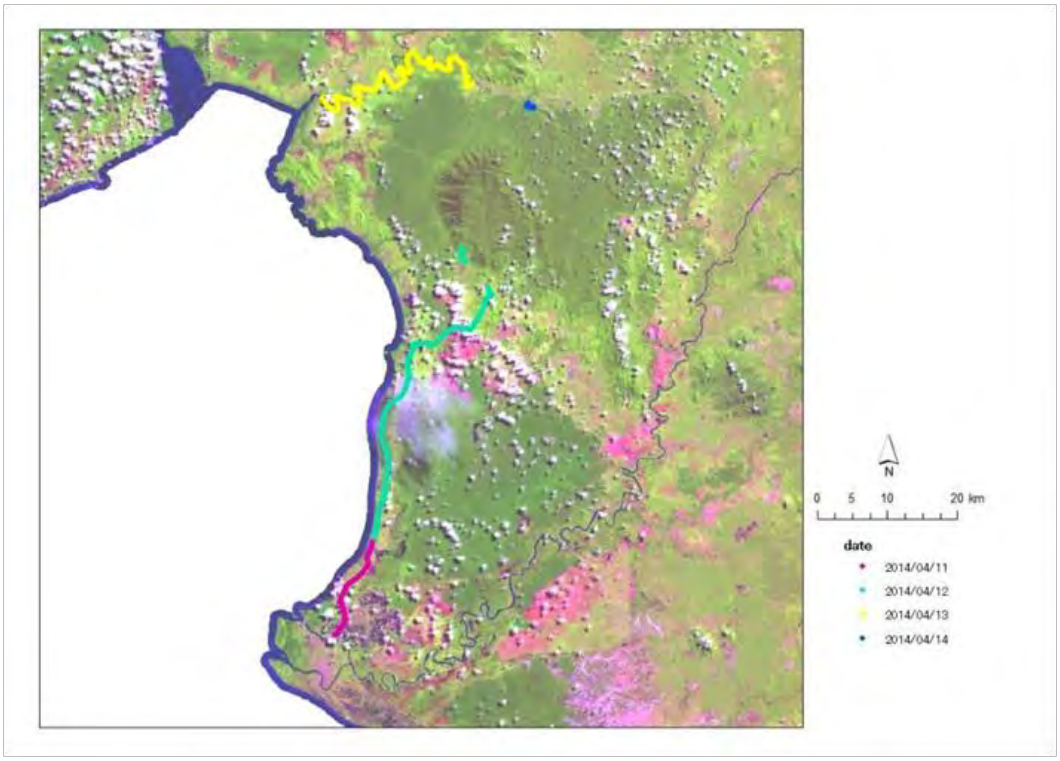


Figure 19 Location of ground truth survey in Kayong Utara District

The resulting confusion matrix for forest and non-forest is presented in Table 13 and Table 14. The overall accuracy was 82.1%.

Table 13 Result of accuracy assessment for forest and non-forest (2010 land cover classification by this REDD+ program's methodology)

	V4_13	Verf																								
		2001_PrimaryDryForest	2002_SecondaryDryForest	2004_PrimaryMangroveForest	20041_SecondaryMangroveForest	2005_PrimarySwampForest	20051_SecondarySwampForest	2006_PlantsForest	2007_Shrub	20071_SwampShrub	20091_Agriculture	20092_MixedAgriculture	20093_RiceField	20094_FishPond	2010_Plantation_oilpalm	2010_Plantation_others	2010_Plantation_rubber	2012_Settlement	2014_OpenGround	20141_Mining	3000_GrassLand	5001_WaterBody	50011_Swamp	SubTotal	Matched data	Class accuracy
Classification	2001_PrimaryDryForest	40																						40	40	100.0
	2002_SecondaryDryForest		86						2			4												92	86	93.5
	2004_PrimaryMangroveForest																									
	20041_SecondaryMangroveForest				73		2			3												3		81	73	90.1
	2005_PrimarySwampForest					29	1																	30	29	96.7
	20051_SecondarySwampForest		1		2	1	84			8						1			1					98	84	85.7
	2006_PlantsForest						1	36											2					39	36	92.3
	2007_Shrub		4						48	13	1	6			1				2					75	48	64.0
	20071_SwampShrub			1	1		3		6	81	1	2	1		1	3	1		1					102	81	79.4
	20091_Agriculture								1	6	38					3	1	1						50	38	76.0
	20092_MixedAgriculture		5						10	2		45	2				3	1	3		1			72	45	62.5
	20093_RiceField								1	8	4		63			5			5					86	63	73.3
	20094_FishPond									1			2	36								2	1	42	36	85.7
	2010_Plantation_oilpalm						2		1	4	2				71	1		1	5					87	71	81.6
	2010_Plantation_others								1	2	2	1	3			66	2	1						78	66	84.6
	2010_Plantation_rubber									6	2		3				66						1	78	66	84.6
	2012_Settlement									2	2							53	12				2	71	53	74.6
	2014_OpenGround								1	5		1	2		3	1			75					88	75	85.2
	20141_Mining									1		1	2			1			9	31		2		47	31	66.0
	3000_GrassLand																				9			9	9	100.0
	5001_WaterBody						1															78	1	80	78	97.5
	50011_Swamp						4			5									4				35	48	35	72.9
	SubTotal	40	96	1	76	30	98	36	71	147	52	60	78	36	76	81	73	57	119	31	10	85	40	1393	1143	82.1

Table 14 Result of accuracy assessment for forest types (2010 land cover classification by this REDD+ program's methodology)

EF Group	Class	Accuracy (%)
A		86.3
EF 30	2007_Shrub	64.0
	20071_SwampShrub	79.4
	20092_MixedAgriculture	62.5
B		86.4
EF 2-10		
B1		77.2
	20091_Agriculture	76.0
	20093_RiceField	73.3
B2		88.1
	2012_Settlement	74.6
	2014_OpenGround	85.2
C		85.7
EF 0	20094_FishPond	85.7
	20141_Mining	66.0
	5001_WaterBody	97.5
	50011_Swamp	72.9

To estimate carbon stock change in above-ground and below-ground biomass, we used analyzed land cover maps and emission factors. On the other hand, as specific situation in West Kalimantan Province, GHG emissions from peat soil were also important when we estimate landscape level's GHG emission with high accuracy. Then, in this PD, peat soil distribution was improved by field survey (see pictures below), which was based on internationally used peat soil distribution map prepared by the Wetland International[6].

Survey of peat soil distribution

6 Wetlands International 2004. Maps of peatland distribution and carbon content in Kalimantan, 2000-2002. 51.

For improving peat soil distribution in 4 districts facing on ocean in West Kalimantan Province, 324 points are surveyed and soil type and peat depth are monitored and recorded (Figure 20). From such survey, peat soil distribution applied in this PD was improved (Figure 21).

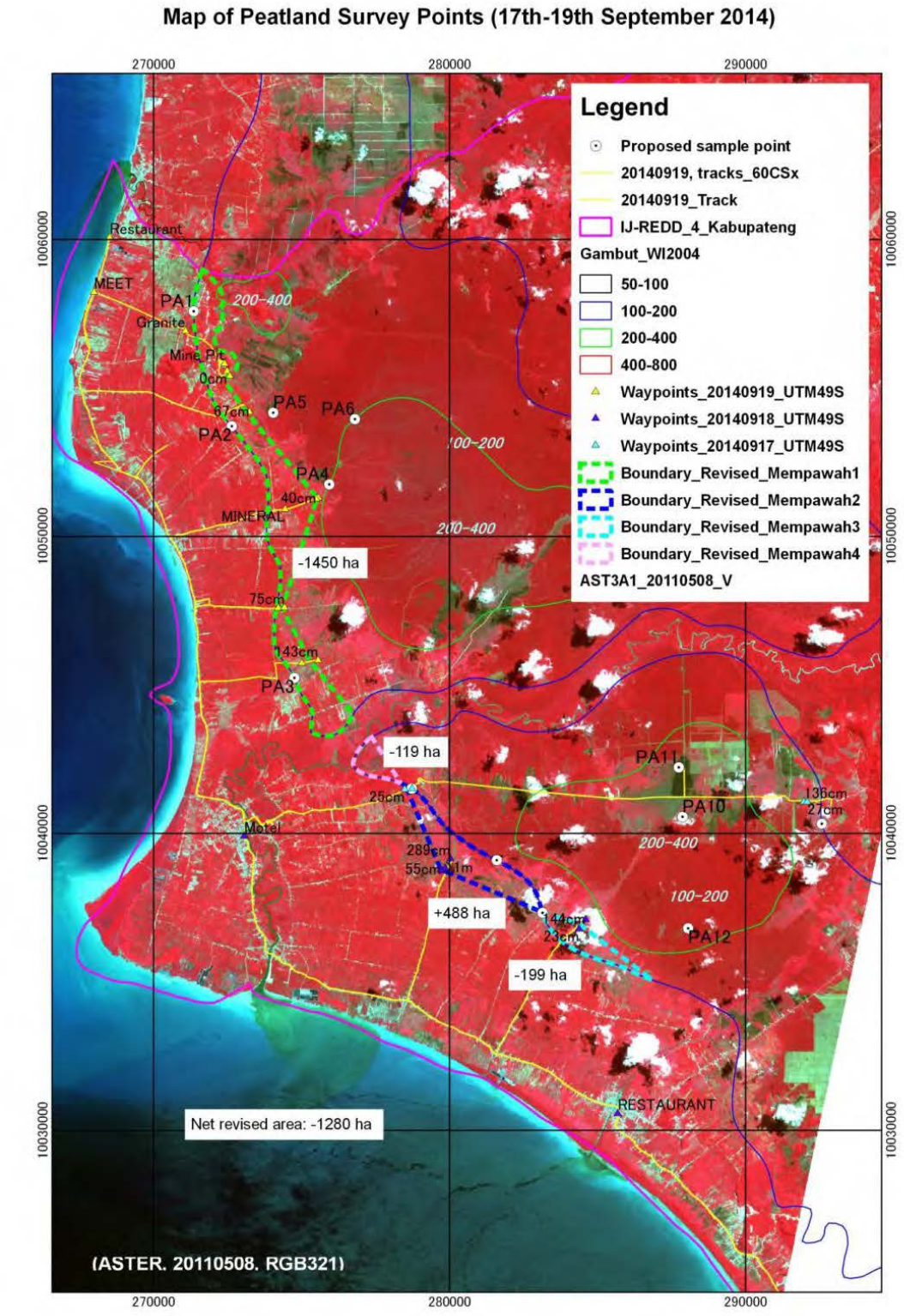
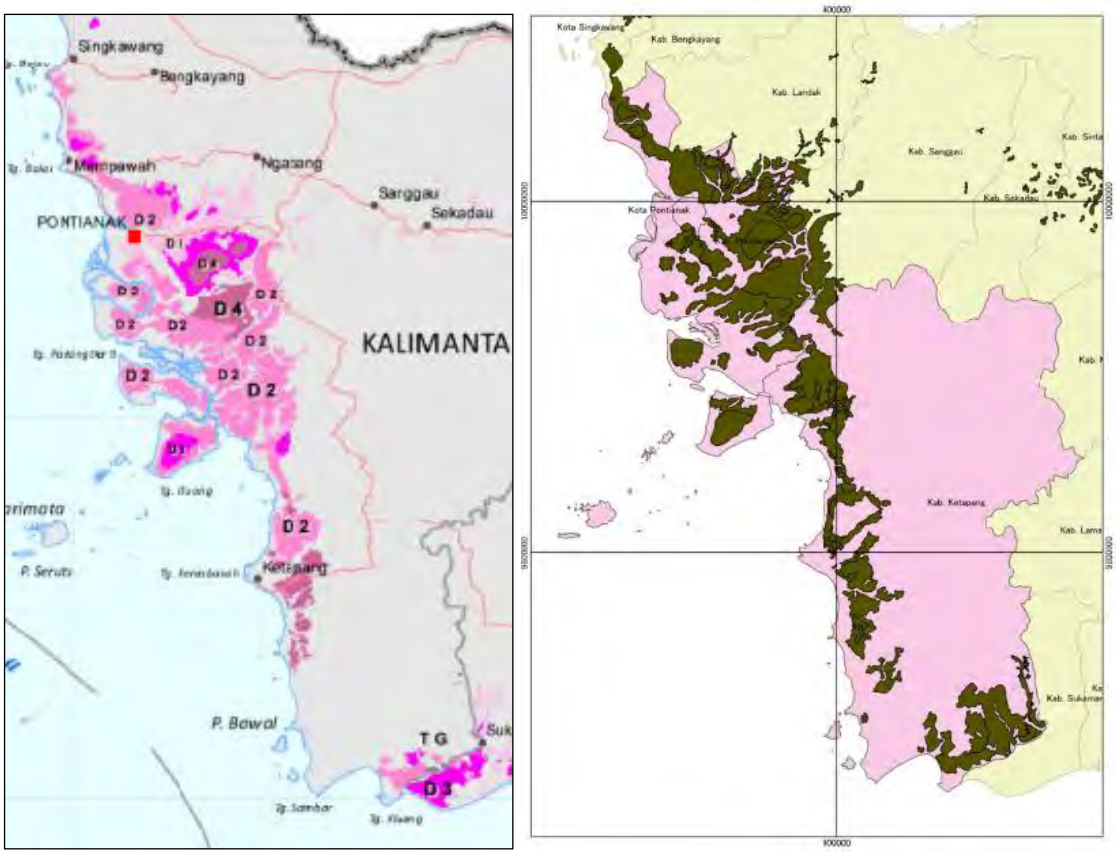


Figure 20 Survey points of peat soil distribution



Left: map prepared by Ritung et al (2011) Right: map prepared by Wetlands International (2004)

Figure 21 Image of peat soil distribution compared with the map prepared by the Wetland International

As results of improvement of peat soil distribution, total area of peat soil are estimated as mentioned in Table 15.

Table 15 Improved peat soil area in 4 districts

	Wetland International 2004	Ritung 2011	IJ-REDD+
Kayong Utara	163,303	214,054	193,930
Ketapang	337,552	255,873	259,283
Kubu Raya	410,241	519,885	503,990
Pontianak	70,889	74,755	74,441
Kab Pontianak	398	2,280	2,801
Total	982,383	1,066,847	1,034,445

(5) Excluded Forest Loss in Historical Reference Period

Identify any instances of forest loss (e.g., large infrastructure projects, geological or weather-related impacts) in the historical reference period that are excluded from the calculation and projection of the

rate of deforestation and associated GHG emissions in the baseline, including clearly identifying the associated geographic area and month and year of occurrence. Demonstrate and justify that forest loss exceeds 1,000 hectares and is not likely to reoccur during the baseline period.

(6) Large Unavoidable Infrastructure Projects

Considering current situation to manage forest resources by landscape approach in project area, there is no plan to allow large-scale infrastructure projects and/or unplanned such disturbances in Kayong Utara District as reference region of this REDD+ program.

(7) Large-Scale Commercial Deforestation

There had been conducted some types of land conversion (e.g. converted from rich forest to oilpalm plantation) in Kayong Utara District where is reference region in this REDD+ program. But all of such land conversions have not exceeded 10% of historical deforestation in each. Considering current situation to manage forest resources by landscape approach in project area, there is no plan to allow new commercial logging and or land conversion in project area and its surrounding area in the future.

(8) Carbon Loss

Indicate the method(s) used to reliably establish the pattern of carbon loss over time. The method(s) should be scientifically sound, based on empirical evidence and not likely to overestimate early carbon losses.

4. Quantification of GHG Emission Reductions and/or Removals

4.1. Baseline Emissions

To estimate carbon stock in each forest type, i.e. GHG emissions, it is required to apply stratification methods according to forest and land types in target site. Therefore this REDD+ program applied following stratifying the reference region according to the results from the analysis of agents and drivers of deforestation (Table 16).

Table 16 Stratification of the reference region

Stratum ID		Description	Area at year (ha)			
ID	Name		2000	2006	2009	2011
1	Primary dryland forest	*See* Table 4	21,616	21,612	22,243	22,243
2	Secondary dryland forest		63,051	49,876	77,234	76,822
3	Primary swamp forest		0	0	239	224
4	Secondary swamp forest		25,608	23,244	25,431	25,206
5	Primary mangrove forest		101	0	0	0
6	Secondary mangrove forest		182,610	166,454	163,762	154,783
7	Plantation forest		0	0	0	528
8	Non-forest	Land use except for forests (*See* Table 4)	120,222	152,022	124,298	133,402

(1) Quantitative projection of future deforestation

To project the annual areas of baseline deforestation in the reference region, the target area of REDD+ is continuously being impacted by land conversion within and around its boundaries that rely heavily on forest conversion to cropland to sustain their income generation activities. Such activities are identified by following methods a to d;

a. Image selection

LANDSAT Thematic Mapper (TM) images of different dates were compiled from the United States Geographical Survey (USGS). The dates of historic imagery were then plotted over a timeline to demonstrate that on average they were distributed over the entire historical reference period, thus avoiding any bias in the image weights used to estimate the observation weights.

b. Observation points

The total number of observation points in the reference region was estimated based on the variance of small sample data. Initially 1,143 points were distributed over the reference region and classified according to the land cover observed in the satellite imagery above listed (Figure 19).

c. Land-cover classification

The estimation of baseline activity data was analyzed using method in above – where historical land cover changes are assumed to be representative of future trends in all-over reference region. Therefore reference region is based on only one zone.

The land-cover map for the historical period was generated by interpreting LANDSAT imageries. These imageries have a spatial resolution of approximately 30 m, thus each type of forest and non-forest areas can be identified accurately.

The state of forest of each point was then visually classified based on each LANDSAT covering the historical period. One of the following classes was assigned to each point; Forest, Non-Forest, Cloud/Shadow, Build-up, or no images. Consistency of the accuracy must be taking into account when carrying out forest classification using several points in time of satellite imagery. If the error of the classification at each point in time exceeds the amount of the change, the trend of the change would not be able to be delivered. Therefore, classification methodology, such as updating only changed land, is desirable while respecting the result of one time before the target time. So as to detect the monitoring target, new slush-and-burn area is required to be extracted primarily as the amount of the change between two points in time. From this aspect, the REDD+ program decided to extract only changed land from forest to non-forest through comparing two points in time while using the classification result of one time before at the land of not changed. Different method is used for the land changed from non-forest to forest, such as plantation, since remote sensing is difficult to extract them. From the above points of view, flow of the classification methodology is shown as below Figure 22.

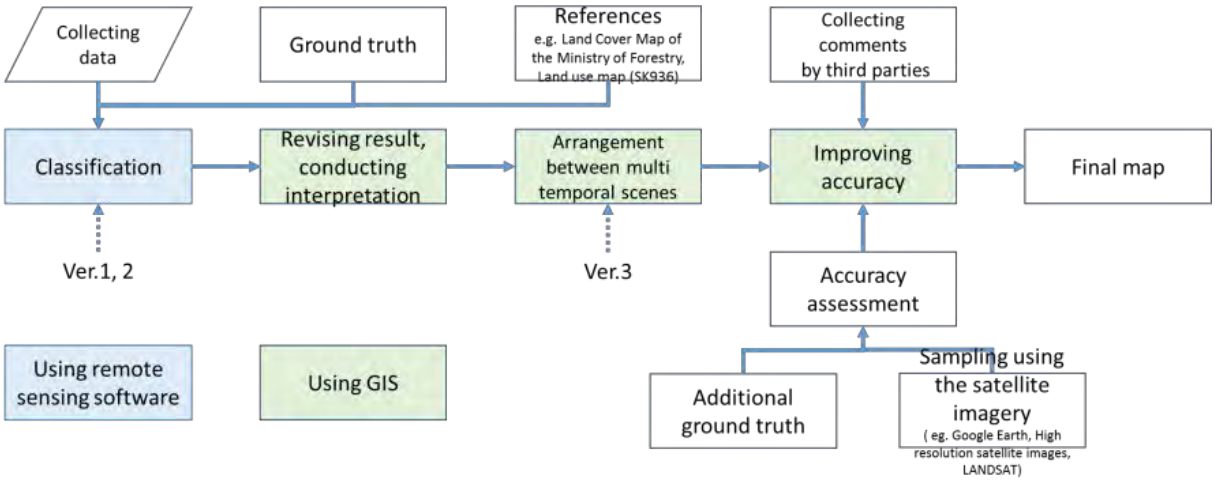


Figure 22 Classification Methodologies

d. Considering national/regional circumstances

As explained in above “3.5. Description of Jurisdictional Baseline Method”, it is appropriate to use a time function approach to estimate the rate of baseline deforestation and forest degradation in the area. However, to keep consistency with Indonesian national forest reference emission level (FREL) development methodology, we have not considered national and/or regional circumstances on process of establishing reference levels. In this PD, projected yearly deforestation are based on mean deforestation area during 2000 to 2013.

(2) Quantitative projection of future deforestation

The portion of the annual areas of baseline deforestation and forest degradation for each forest class within the reference region was determined using satellite imagery analysis. The map of forest classes was overlaid with the projected yearly deforestation maps applied mean deforestation area during 2000 to 2013. The results of preparing annual areas of baseline deforestation and forest degradation in reference region are presented in Table 17 and its land cover change matrix are in Table 18 to Table 21.

Table 17 Annual areas of baseline deforestation in reference region

Project year *t*	Stratum in the reference region (ha)							Total	
	PDF[1] $ABLRR_{i,t}$ ha	SDF[2] $ABSLRR_{i,t}$ ha	PMF[3] $ABSLRR_{i,t}$ ha	SMF[4] $ABSLRR_{i,t}$ ha	PSF[5] $ABSLRR_{i,t}$ ha	SSF[6] $ABSLRR_{i,t}$ ha	PF[7] $ABSLRR_{i,t}$ ha	Annual $ABSLRR_{i,t}$ ha	Cumulative $ABSLRR_{i,t}$ ha
2015	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	5,553.3
2016	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	11,106.6
2017	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	16,659.9
2018	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	22,213.2
2019	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	27,766.5
2020	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	33,319.8
2021	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	38,873.1
2022	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	44,426.4
2023	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	49,979.6
2024	-162.3	-162.7	0.0	391.2	7.8	5,479.6	-0.3	5,553.3	55,532.9

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 18 Area changes from 2000 to 2006 in reference region from IPCC Approach 2

		Area of each Stratum in 2006 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2000 (ha)	PDF[1]	18,917	2,455	0	0	0	226	0	18
	SDF[2]	2,449	43,549	0	13	0	607	0	16,433
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	81	0	21,114	0	266	0	4,147
	PSF[5]	0	0	0	0	0	21	0	80
	SSF[6]	32	1,416	0	443	0	160,873	0	19,846
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	214	2,375	0	1,674	0	4,461	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 19 Area changes from 2006 to 2009 in reference region from IPCC Approach 2

		Area of each Stratum in 2009 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2006 (ha)	PDF[1]	20,123	1,489	0	0	0	0	0	0
	SDF[2]	1,919	44,283	6	94	0	1,085	0	2,488
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	128	48	20,658	0	247	0	2,163
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	180	1,267	82	302	-	147,695	0	16,928
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	21	30,066	103	4,378	0	14,735	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 20 Area changes from 2009 to 2011 in reference region from IPCC Approach 2

		Area of each Stratum in 2011 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2009 (ha)	PDF[1]	22,243	0	0	0	0	0	0	0
	SDF[2]	0	76,686	0	26	0	47	0	475
	PMF[3]	0	0	224	0	0	0	0	15
	SMF[4]	0	0	0	24,819	0	2	0	611
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	0	88	0	7	0	154,084	468	9,115
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	0	48	0	354	0	650	60	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 21 Area changes from 2011 to 2013 in reference region from IPCC Approach 2

		Area of each Stratum in 2013 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2011 (ha)	PDF[1]	22,035	162	0	0	0	11	0	35
	SDF[2]	1,691	64,646	0	207	0	2,597	0	7,681
	PMF[3]	0	0	0	9	0	89	0	126
	SMF[4]	0	0	0	17,904	0	179	0	7,123
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	0	40	0	803	0	108,152	0	45,788
	PF[7]	0	0	0	0	0	12	4	512
	Non-forest	0	318	0	1,599	0	335	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

4.2. Projection of the annual areas of baseline deforestation in the project area and leakage belt

The portion of the annual areas of baseline deforestation and forest degradation for each forest class within the project area and leakage belt was also determined using satellite imagery analysis. The results of preparing annual areas of baseline deforestation and forest degradation are presented in Table 22 and Table 23. Also land cover change matrixes in project area were in Table 24 to Table 27 and leakage belt were in Table 28 to Table 31. Noted that methodology for developing baseline or forest reference emission level (FREL in UNFCCC) is

consist of Indonesian national FREL which was submitted to UNFCCC[7].

Table 22 Annual areas of baseline deforestation in the project area

Project year *t*	Stratum in the reference region (ha)							Total	
	PDF[1] $ABLPA_{i,t}$ ha	SDF[2] $ABSLPA_{i,t}$ ha	PMF[3] $ABSLPA_{i,t}$ ha	SMF[4] $ABSLPA_{i,t}$ ha	PSF[5] $ABSLPA_{i,t}$ ha	SSF[6] $ABSLPA_{i,t}$ ha	PF[7] $ABSLPA_{i,t}$ ha	Annual $ABSLPA_{i,t}$ ha	Cumulative $ABSLPA_{i,t}$ ha
2015	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	2,275.2
2016	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	4,550.4
2017	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	6,825.7
2018	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	9,100.9
2019	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	11,376.1
2020	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	13,651.3
2021	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	15,926.5
2022	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	18,201.8
2023	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	20,477.0
2024	-162.3	264.9	0.0	90.9	0.0	2,081.7	0.0	2,275.2	22,752.2

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

[7] BP-REDD+ 2015. National Forest Reference Emission Level for Deforestation and Forest Degradation in the Context of the Activities Referred to in Decision 1/CP.16, Paragraph 70 (REDD+) Under the UNFCCC: A Reference for Decision Makers, Published by BP-REDD+ Indonesia

Table 23 Annual areas of baseline deforestation in the leakage belt

Project year *t*	Stratum in the reference region (ha)							Total	
	PDF[1] $ABLLB_{i,t}$ ha	SDF[2] $ABSLLB_{i,t}$ ha	PMF[3] $ABSLLB_{i,t}$ ha	SMF[4] $ABSLLB_{i,t}$ ha	PSF[5] $ABSLLB_{i,t}$ ha	SSF[6] $ABSLLB_{i,t}$ ha	PF[7] $ABSLLB_{i,t}$ ha	Annual $ABSLLB_{i,t}$ ha	Cumulative $ABSLLB_{i,t}$ ha
2015	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	3,278.1
2016	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	6,556.1
2017	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	9,834.2
2018	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	13,112.3
2019	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	16,390.4
2020	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	19,668.4
2021	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	22,946.5
2022	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	26,224.6
2023	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	29,502.7
2024	0.0	-427.6	0.0	300.3	7.8	3,397.9	-0.3	3,278.1	32,780.7

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest, 4: SecondaryMangroveForest, 5: PrimarySwampForest, 6: SecondarySwampForest and 7: PlantsForest

Table 24 Area changes from 2000 to 2006 in project area from IPCC Approach 2

		Area of each Stratum in 2006 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2000 (ha)	PDF[1]	18,917	2,455	0	0	0	226	0	18
	SDF[2]	1,787	31,775	0	10	0	443	0	11,990
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	16	0	4,266	0	54	0	838
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	16	701	0	219	0	79,638	0	9,825
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	1,450	16,098	0	11,345	0	30,238	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 25 Area changes from 2006 to 2009 in project area from IPCC Approach 2

		Area of each Stratum in 2009 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2006 (ha)	PDF[1]	20,123	1,489	0	0	0	0	0	0
	SDF[2]	1,708	39,423	6	84	0	966	0	2,215
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	31	12	4,959	0	59	0	519
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	95	667	43	159	0	77,696	0	8,905
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	27	38,520	131	5,610	0	18,879	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest.

6: SecondarySwampForest and 7: PlantsForest

Table 26 Area changes from 2009 to 2011 in project area from IPCC Approach 2

		Area of each Stratum in 2011 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2009 (ha)	PDF[1]	22,243	0	0	0	0	0	0	0
	SDF[2]	0	52,745	0	18	0	32	0	327
	PMF[3]	0	0	224	0	0	0	0	15
	SMF[4]	0	0	0	5,378	0	0	0	132
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	0	43	0	4	0	75,414	229	4,461
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	0	2,654	0	19,428	0	35,697	3,279	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest.

6: SecondarySwampForest and 7: PlantsForest

Table 27 Area changes from 2011 to 2013 in project area from IPCC Approach 2

		Area of each Stratum in 2013 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2011 (ha)	PDF[1]	22,035	162	0	0	0	11	0	35
	SDF[2]	1,162	44,430	0	142	0	1,785	0	5,279
	PMF[3]	0	0	0	9	0	89	0	126
	SMF[4]	0	0	0	3,893	0	39	0	1,549
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	0	19	0	385	0	51,867	0	21,959
	PF[7]	0	0	0	0	0	9	3	390
	Non-forest	0	9,441	0	47,545	0	9,959	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest.

6: SecondarySwampForest and 7: PlantsForest

Table 28 Area changes from 2000 to 2006 in reference region from IPCC Approach 2

		Area of each Stratum in 2006 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2000 (ha)	PDF[1]	0	0	0	0	0	0	0	0
	SDF[2]	662	11,774	0	4	0	164	0	4,443
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	64	0	16,848	0	212	0	3,309
	PSF[5]	0	0	0	0	0	21	0	80
	SSF[6]	16	715	0	223	0	81,235	0	10,022
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	1,498	16,632	0	11,721	0	31,240	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest.

6: SecondarySwampForest and 7: PlantsForest

Table 29 Area changes from 2006 to 2009 in reference region from IPCC Approach 2

		Area of each Stratum in 2009 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2006 (ha)	PDF[1]	0	0	0	0	0	0	0	0
	SDF[2]	211	4,860	1	10	0	119	0	273
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	97	37	15,698	0	188	0	1,644
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	85	601	39	143	0	69,999	0	8,023
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	38	54,186	185	7,891	0	26,556	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest.

6: SecondarySwampForest and 7: PlantsForest

Table 30 Area changes from 2009 to 2011 in reference region from IPCC Approach 2

		Area of each Stratum in 2011 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2009 (ha)	PDF[1]	0	0	0	0	0	0	0	0
	SDF[2]	0	23,941	0	8	0	15	0	148
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	0	0	19,441	0	2	0	478
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	0	45	0	4	0	78,669	239	4,654
	PF[7]	0	0	0	0	0	0	0	0
	Non-forest	0	2,749	0	20,122	0	36,972	3,397	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest.

6: SecondarySwampForest and 7: PlantsForest

Table 31 Area changes from 2011 to 2013 in reference region from IPCC Approach 2

		Area of each Stratum in 2013 (ha)							
		PDF[1]	SDF[2]	PMF[3]	SMF[4]	PSF[5]	SSF[6]	PF[7]	Non-forest
Area of each Stratum in 2011 (ha)	PDF[1]	0	0	0	0	0	0	0	0
	SDF[2]	529	20,216	0	65	0	812	0	2,402
	PMF[3]	0	0	0	0	0	0	0	0
	SMF[4]	0	0	0	14,011	0	140	0	5,574
	PSF[5]	0	0	0	0	0	0	0	0
	SSF[6]	0	21	0	418	0	56,284	0	23,829
	PF[7]	0	0	0	0	0	3	1	122
	Non-forest	0	9,372	0	47,198	0	9,886	0	0

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

4.3. Program Emissions

The actual GHG emissions reductions generated by the REDD+ program will be determined through ex-post measurements of REDD+ program results based on its monitoring plan. Here, under the assumption of REDD+ program effectiveness and following the methodology requirements, the ex-ante carbon stock changes within the project area are estimated by multiplying the annual total baseline carbon stock change by the factor (1-EI), where (EI) is an Effectiveness Index ranging from 0 (no effectiveness) to 1 (maximum effectiveness).

The EI was estimated based on the demonstration of REDD+ program activities. We also assumed that higher effectiveness rate will be achieved. We assumed that in the effectiveness rate will be 20%.

(1) Calculation of baseline activity data per forest class

In order to estimate the area in hectares of each forest class within the project area deforested and degraded under the baseline scenario, annual deforestation rate was applied for 2015-2024. The results are shown in above Table 17, Table 22 and Table 23.

(2) Calculation of baseline activity data per post-deforestation forest class

a. Estimation of the average carbon stocks of each LU/LC class

Average carbon stocks was estimated based on IPCC emission factor database (EFDB) and Indonesian National Forest Inventory, as well as non-forest classes projected to exist in the project area under the baseline scenario. The factors used are illustrated in Table 32 and Table 33.

Table 32 Factors identified for use in the area for estimating above-ground biomass and living biomass

(above-ground and below-ground biomass)

Forest type/ species group	Value in each Portion		Source
	Above-ground (AB)	Below-ground (BG)	
Primary dryland forest	269.4	13.6% of AG	Indonesian Government (2015)[8] for AB and IPCC EFDB (2015) for BG
Secondary dryland forest	203.3	13.6% of AG	Same as above
Primary swamp forest	208.5	13.6% of AG	Same as above
Secondary swamp forest	124.7	13.6% of AG	Same as above
Primary mangrove forest	274.8	13.6% of AG	Same as above
Secondary mangrove forest	170.5	13.6% of AG	Same as above
Plantation forest	120.0	13.6% of AG	Same as above
Non-forest	28.1	13.6% of AG	Same as above

Table 33 Factors identified for use in the area for estimating GHG from peat soil

Forest type/ species group	GHG emission from peat soil	Source
Primary dryland forest	0.0	Indonesian Government (2015)[9]
Secondary dryland forest	19.0	Same as above
Primary swamp forest	0.0	Same as above
Secondary swamp forest	19.0	Same as above
Primary mangrove forest	0.0	Same as above
Secondary mangrove forest	19.0	Same as above
Plantation forest	73.0	Same as above
Non-forest	26.3	Same as above

In the baseline scenario, the carbon stocks and boundaries of the forest classes within the project area is assumed to remain constant. It is not expected that areas will lose carbon due to degradation, logging for timber, charcoal production or fuel wood collection.

A complete description of the sampling design and field measurements are provided to the validator, if necessary. The average carbon content in all LU/LC classes as well as the 90% confidence intervals are reported in Table 34 and applied factors was in Table 35.

Table 34 Carbon stocks per hectare of initial forest classes (including specific groups) existing in the

8 BP-REDD+ 2015. National Forest Reference Emission Level for Deforestation and Forest Degradation in the Context of the Activities Referred to in Decision 1/CP.16, Paragraph 70 (REDD+) Under the UNFCCC: A Reference for Decision Makers, Published by BP-REDD+ Indonesia

9 BP-REDD+ 2015. National Forest Reference Emission Level for Deforestation and Forest Degradation in the Context of the Activities Referred to in Decision 1/CP.16, Paragraph 70 (REDD+) Under the UNFCCC: A Reference for Decision Makers, Published by BP-REDD+ Indonesia

project area and leakage belt

LU/LC class		Average carbon stock per hectare + 90% CI					
		Cab_{cl}		Cbb_{cl}		$Ctot_{cl}$	
ID_{cl}	Name	average stock t CO_2e ha^{-1}	+ 90% CI t CO_2e ha^{-1}	average stock t CO_2e ha^{-1}	+ 90% CI t CO_2e ha^{-1}	average stock t CO_2e ha^{-1}	+ 90% CI t CO_2e ha^{-1}
1	Primary dryland forest	269.4	80.8	36.6	11.0	306.0	91.8
2	Secondary dryland forest	203.3	61.0	27.6	8.3	230.9	69.3
3	Primary swamp forest	208.5	62.6	28.4	8.5	236.9	71.1
4	Secondary swamp forest	124.7	37.4	17.0	5.1	141.7	42.5
5	Primary mangrove forest	274.8	82.4	37.4	11.2	312.2	93.7
6	Secondary mangrove forest	170.5	51.2	23.2	7.0	193.7	58.1
7	Plantation forest	120	36.0	16.3	4.9	136.3	40.9
8	Non-forest	28.1	8.4	3.8	1.1	31.9	9.6

Cab_{cl}: Average carbon stock per hectare in the above-ground biomass carbon pool of class cl; tCO_2-e ha^{-1}

Cbb_{cl}: Average carbon stock per hectare in the below-ground biomass carbon pool of class cl; tCO_2-e ha^{-1}

$Ctot_{cl}$ Average carbon stock per hectare n all accounted carbon pools cl; tCO_2-e ha^{-1}

Table 35 Values to be used after discounts for uncertainties

LU/LC class		Average carbon stock per hectare + 90% CI					
		Cab_{cl}		Cbb_{cl}		$Ctot_{cl}$	
ID_{cl}	Name	C stock t CO_2e ha^{-1}	C stock change t CO_2e ha^{-1}	C stock t CO_2e ha^{-1}	C stock change t CO_2e ha^{-1}	C stock t CO_2e ha^{-1}	C stock change t CO_2e ha^{-1}
1	Primary dryland forest	188.6	-	25.6	-	214.2	-
2	Secondary dryland forest	142.3	-	19.4	-	161.7	-
3	Primary swamp forest	146.0	-	19.8	-	165.8	-
4	Secondary swamp forest	87.3	-	11.9	-	99.2	-
5	Primary mangrove forest	192.4	-	26.2	-	218.5	-
6	Secondary mangrove forest	119.4	-	16.2	-	135.6	-
7	Plantation forest	84.0	-	11.4	-	95.4	-
8	Non-forest	19.7	-	2.7	-	22.3	-

Cab_{cl}: Average carbon stock per hectare in the above-ground biomass carbon pool of class cl; tCO_2-e ha^{-1}

Cbb_{cl}: Average carbon stock per hectare in the below-ground biomass carbon pool of class cl; tCO_2-e ha^{-1}

$Ctot_{cl}$ Average carbon stock per hectare n all accounted carbon pools cl; tCO_2-e ha^{-1}

Note: Average carbon stock per hectare is as same in each ID_{cl} for in all years.

Carbon stock in post-deforestation class was assumed as cropland, grazing land and settlement, which carbon stock are estimated by applying weight average value in case of current year of 2013 and was estimated as 22.3 t CO_2e ha^{-1} from conservative manner (Table 36).

Table 36 Long-term (20-years) average carbon stocks per hectare of post-deforestation LU/LC classes present in the reference region

Project year *t*	Average carbon stock per hectare + 90% CI					
	Cab		*Cbb*		*Ctot*	
	C stock t CO_2e ha^{-1}	±90% CI t CO_2e ha^{-1}	*C stock* t CO_2e ha^{-1}	±90% CI t CO_2e ha^{-1}	*C stock* t CO_2e ha^{-1}	±90% CI t CO_2e ha^{-1}
Value from conservative manner	-	-	-	-	22.3	-

Carbon stock in post-deforestation class was assumed as land conversion from forest to other lands and applied as 22.3 t CO_2e ha^{-1} from conservative manner (Table 36). As a result, as example, the net emissions per ha from LULC-change in case of from Primary Dryland Forest in Project Area is 191.9 tCO_2e/ha (i.e. 214.2 tCO_2e/ha – 22.3 tCO_2e/ha).

By applying such values, estimated baseline carbon stock change in reference region are in Table 37

to Table 39. Estimated baseline carbon stock change in project area are in Table 40 to Table 42. Estimated baseline carbon stock change in leakage belt are in Table 43 to Table 45.

Table 37 Baseline carbon stock change in the above-ground biomass in reference region

Project year *t*	Carbon stock changes in the above-ground biomass per initial forest classes														Total carbon stock change in the above-ground biomass of the initial forest classes in the reference region	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		annual	cumulative
	$ABRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABRRi_t$ tCO_2-e	$ABRRi_t$ tCO_2-e
2015	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	2,331,453
2016	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	4,662,905
2017	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	6,994,358
2018	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	9,325,811
2019	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	11,657,263
2020	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	13,988,716
2021	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	16,320,168
2022	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	18,651,621
2023	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	20,983,074
2024	-162	691	-163	522	0	535	391	320	8	705	5,480	438	-0	308	2,331,453	23,314,526

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 38 Baseline carbon stock change in the below-ground biomass in reference region

Project year *t*	Carbon stock changes in the below-ground biomass per initial forest classes														Total carbon stock change in the below-ground biomass of the initial forest classes in the reference region	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		annual	cumulative
	$BBRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBRRi_t$ tCO_2-e	$BBRRi_t$ tCO_2-e
2015	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	317,078
2016	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	634,155
2017	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	951,233
2018	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	1,268,310
2019	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	1,585,388
2020	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	1,902,465
2021	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	2,219,543
2022	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	2,536,620
2023	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	2,853,698
2024	-162	94	-163	71	0	73	391	44	8	96	5,480	60	-0	42	317,078	3,170,776

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 39 Baseline CO_2 emissions from peat soil in reference region

Project year *t*	CO2 emissions from peat soil per initial forest classes																Total carbon stock change in the below-ground biomass of the initial forest classes in the reference region	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		Deforested area (Non-forest)		annual $SCRRi_t$ tCO_2-e	cumulative $SCRRi_t$ tCO_2-e
	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCRR_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}		
2015	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	254,484
2016	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	508,967
2017	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	763,451
2018	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	1,017,935
2019	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	1,272,419
2020	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	1,526,902
2021	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	1,781,386
2022	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	2,035,870
2023	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	2,290,354
2024	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	5,553	26	254,484	2,544,837

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 40 Baseline carbon stock change in the above-ground biomass in project area

Project year *t*	Carbon stock changes in the above-ground biomass per initial forest classes														Total carbon stock change in the above-ground biomass of the initial forest classes in the project area	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		annual	cumulative
	$ABPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$ABPAi_t$ tCO_2-e	$ABPAi_t$ tCO_2-e
2015	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	966,095
2016	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	1,932,189
2017	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	2,898,284
2018	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	3,864,379
2019	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	4,830,474
2020	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	5,796,568
2021	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	6,762,663
2022	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	7,728,758
2023	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	8,694,853
2024	-162	691	265	522	0	535	91	320	0	705	2,082	438	0	308	966,095	9,660,947

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 41　Baseline carbon stock change in the below-ground biomass in project area

Project year *t*	Carbon stock changes in the below-ground biomass per initial forest classes														Total carbon stock change in the below-ground biomass of the initial forest classes in the project area	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		annual	cumulative
	$BBPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBPAi_t$ tCO_2-e	$BBPAi_t$ tCO_2-e
2015	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	131,389
2016	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	262,778
2017	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	394,167
2018	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	525,556
2019	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	656,944
2020	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	788,333
2021	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	919,722
2022	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	1,051,111
2023	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	1,182,500
2024	-162	94	265	71	0	73	91	44	0	96	2,082	60	0	42	131,389	1,313,889

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 42 Baseline CO_2 emissions from peat soil in project area

Project year *t*	CO_2 emissions from peat soil per initial forest classes																Total carbon stock change in the below-ground biomass of the initial forest classes in the reference region	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		Deforested area (Non-forest)		annual $SCPAi_t$ tCO_2-e	cumulative $SCPAi_t$ tCO_2-e
	$SCPA_{cl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCPA_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}		
2015	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	106,151
2016	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	212,302
2017	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	318,453
2018	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	424,604
2019	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	530,755
2020	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	636,906
2021	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	743,057
2022	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	849,208
2023	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	955,359
2024	-162	0	-163	19	0	0	391	19	8	0	5,480	19	-0	73	2,275	26	106,151	1,061,510

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 43 Baseline carbon stock change in the above-ground biomass in leakage belt

Project year t	Carbon stock changes in the above-ground biomass per initial forest classes														Total carbon stock change in the above-ground biomass of the initial forest classes in the leakage belt	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		annual	cumulative
	$ABLB_{icl,t}$ ha	$Ctot_{icl,t}$ $tCO_2\text{-e ha}^{-1}$	$ABLB_{icl,t}$ ha	$Ctot_{icl,t}$ $tCO_2\text{-e ha}^{-1}$	$ABLB_{icl,t}$ ha	$Ctot_{icl,t}$ $tCO_2\text{-e ha}^{-1}$	$ABLB_{icl,t}$ ha	$Ctot_{icl,t}$ $tCO_2\text{-e ha}^{-1}$	$ABLB_{icl,t}$ ha	$Ctot_{icl,t}$ $tCO_2\text{-e ha}^{-1}$	$ABLB_{icl,t}$ ha	$Ctot_{icl,t}$ $tCO_2\text{-e ha}^{-1}$	$ABLB_{icl,t}$ ha	$Ctot_{icl,t}$ $tCO_2\text{-e ha}^{-1}$	$ABLBi_t$ $tCO_2\text{-e}$	$ABLBi_t$ $tCO_2\text{-e}$
2015	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	1,365,358
2016	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	2,730,716
2017	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	4,096,074
2018	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	5,461,432
2019	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	6,826,789
2020	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	8,192,147
2021	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	9,557,505
2022	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	10,922,863
2023	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	12,288,221
2024	0	691	-428	522	0	535	300	320	8	705	3,398	438	0	308	1,365,358	13,653,579

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 44 Baseline carbon stock change in the below-ground biomass in leakage belt

Project year *t*	Carbon stock changes in the below-ground biomass per initial forest classes														Total carbon stock change in the below-ground biomass of the initial forest classes in the leakage belt	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		annual	cumulative
	$BBLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$BBLBi_t$ tCO_2-e	$BBLBi_t$ tCO_2-e
2015	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	185,689
2016	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	371,377
2017	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	557,066
2018	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	742,755
2019	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	928,443
2020	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	1,114,132
2021	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	1,299,821
2022	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	1,485,509
2023	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	1,671,198
2024	0	94	-428	71	0	73	300	44	8	96	3,398	60	0	42	185,689	1,856,887

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

Table 45 Baseline CO_2 emissions from peat soil in leakage belt

Project year *t*	CO_2 emissions from peat soil per initial forest classes																Total carbon stock change in the below-ground biomass of the initial forest classes in the reference region	
	PDF[1]		SDF[2]		PMF[3]		SMF[4]		PSF[5]		SSF[6]		PF[7]		Deforested area (Non-forest)		annual $SCLBi_t$ tCO_2-e	cumulative $SCLBi_t$ tCO_2-e
	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}	$SCLB_{icl,t}$ ha	$Ctot_{icl,t}$ tCO_2-e ha^{-1}		
2015	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	148,333
2016	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	296,666
2017	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	444,998
2018	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	593,331
2019	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	741,664
2020	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	889,997
2021	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	1,038,329
2022	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	1,186,662
2023	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	1,334,995
2024	-162	0	-163	19	0	0	391	19	8	0	5,480	19	0	73	3,278	26	148,333	1,483,328

1: PrimaryDryForest, 2: SecondaryDryForest, 3: PrimaryMangroveForest. 4: SecondaryMangroveForest, 5: PrimarySwampForest. 6: SecondarySwampForest and 7: PlantsForest

(3) Ex-ante estimation of carbon stock changes due to unavoidable unplanned deforestation within

In this REDD+ program, according to baseline scenario of the PD, GHG emission in the future (up to 2034) is estimated by applying simple method which is same as Indonesian national level's FREL. Also, for estimation of GHG emission in REDD+ program scenario, some parameters which are assumed by implementing effects of REDD+ program activities are applied EI of 20%.

a. Ex-ante estimated net actual carbon stock changes in the project area

The results of the previous step are summarized in Table 46.

Table 46 Ex-ante estimated net carbon stock change in the project area under the REDD+ program scenario

Project year *t*	Total carbon stock decrease in above-ground biomass		Total carbon stock decrease in below-ground biomass		Total carbon stock decrease in soil carbon		Total carbon stock change in the project case	
	Annual $CSDabPA_t$ t-CO_2e	Cumulative $CSDabPA$ t-CO_2e	Annual $CSDbbPA_t$ t-CO_2e	Cumulative $CSDbbPA$ t-CO_2e	Annual $CSDscPA_t$ t-CO_2e	Cumulative $CSDscPA$ t-CO_2e	Annual $CSCPA_t$ t-CO_2e	Cumulative $CSCPA$ t-CO_2e
2015	966,095	966,095	131,389	131,389	106,151	106,151	1,203,635	1,203,635
2016	966,095	1,932,189	131,389	262,778	106,151	212,302	1,203,635	2,407,269
2017	966,095	2,898,284	131,389	394,167	106,151	318,453	1,203,635	3,610,904
2018	966,095	3,864,379	131,389	525,556	106,151	424,604	1,203,635	4,814,538
2019	966,095	4,830,474	131,389	656,944	106,151	530,755	1,203,635	6,018,173
2020	966,095	5,796,568	131,389	788,333	106,151	636,906	1,203,635	7,221,808
2021	966,095	6,762,663	131,389	919,722	106,151	743,057	1,203,635	8,425,442
2022	966,095	7,728,758	131,389	1,051,111	106,151	849,208	1,203,635	9,629,077
2023	966,095	8,694,853	131,389	1,182,500	106,151	955,359	1,203,635	10,832,711
2024	966,095	9,660,947	131,389	1,313,889	106,151	1,061,510	1,203,635	12,036,346

(4) Ex-ante estimation of actual non-CO_2 emission from forest fires

GHG emissions from some activities are evaluated. However significant emissions are not identified in this project (Table 47).

Table 47 Total ex-ante estimated actual emissions of non-CO_2 gasses due to forest fires (biomass

burning) in the project area

Project year *t*	Total ex-ante estimated actual non-CO_2 emissions from forest fires in the project area	
	$NCO2PA_t$ t-CO_2e	$NCO2PA$, t-CO_2e
2015	*Not estimated*	*Not estimated*
2016	*Not estimated*	*Not estimated*
2017	*Not estimated*	*Not estimated*
2018	*Not estimated*	*Not estimated*
2019	*Not estimated*	*Not estimated*
2020	*Not estimated*	*Not estimated*
2021	*Not estimated*	*Not estimated*
2022	*Not estimated*	*Not estimated*
2023	*Not estimated*	*Not estimated*
2024	*Not estimated*	*Not estimated*

(5) Total ex-ante estimations for the project area

The total ex-ante estimation of GHG emissions for the project area is reported in Table 48.

Table 48 Total ex-ante estimated actual net carbon stock changes and emissions of non-CO_2 gasses in the project area

Project year *t*	Total *ex-ante* carbon stock decrease in above-ground biomass		Total *ex-ante* carbon stock decrease in below-ground biomass		Total *ex-ante* carbon stock decrease in soil carbon		Total *ex-ante* estimated actual non-CO_2 emissions		Total *ex-ante* estimated GHG emissions	
	Annual $CSDabPA_t$ t-CO_2e	Cumulative $CSDabPA$ t-CO_2e	Annual $CSDbbPA_t$ t-CO_2e	Cumulative $CSDbbPA$ t-CO_2e	Annual $CSDscPA_t$ t-CO_2e	Cumulative $CSDscPA$ t-CO_2e	Annual $CSCnon\text{-}co2PA_t$ t-CO_2e	Cumulative $CSCnon\text{-}co2PA$ t-CO_2e	Annual $totalPA_t$ t-CO_2e	Cumulative $totalPA$ t-CO_2e
2015	966,095	966,095	131,389	131,389	106,151	106,151	*Not estimated*	*Not estimated*	106,151	106,151
2016	966,095	1,932,189	131,389	262,778	106,151	212,302	*Not estimated*	*Not estimated*	106,151	212,302
2017	966,095	2,898,284	131,389	394,167	106,151	318,453	*Not estimated*	*Not estimated*	106,151	318,453
2018	966,095	3,864,379	131,389	525,556	106,151	424,604	*Not estimated*	*Not estimated*	106,151	424,604
2019	966,095	4,830,474	131,389	656,944	106,151	530,755	*Not estimated*	*Not estimated*	106,151	530,755
2020	966,095	5,796,568	131,389	788,333	106,151	636,906	*Not estimated*	*Not estimated*	106,151	636,906
2021	966,095	6,762,663	131,389	919,722	106,151	743,057	*Not estimated*	*Not estimated*	106,151	743,057
2022	966,095	7,728,758	131,389	1,051,111	106,151	849,208	*Not estimated*	*Not estimated*	106,151	849,208
2023	966,095	8,694,853	131,389	1,182,500	106,151	955,359	*Not estimated*	*Not estimated*	106,151	955,359
2024	966,095	9,660,947	131,389	1,313,889	106,151	1,061,510	*Not estimated*	*Not estimated*	106,151	1,061,510

4.4. Leakage

(1) Ex-ante estimation of leakage

a. Ex-ante estimation of the decrease in carbon stocks and increase in GHG emissions due to leakage prevention measures

Leakage prevention activities in these areas in the REDD+ program scenario include the introduction of alternative livelihoods. Carbon stocks in the project area in the REDD+ program scenario are thus expected to increase compared to the baseline. However, we conservatively assume that they will remain non-forest land, and the carbon stock in the project area will consequently remain unchanged throughout the REDD+ program period.

b. Ex-ante estimation of CH4 and N2O emissions from grazing animals

REDD+ program activities associated with leakage prevention do not include significant livestock management, therefore emissions as result of grazing are not considered. Also activities for expanding paddy fields do not include significant non-CO_2 emissions, therefore emissions are not considered.

c. Total ex-ante estimated carbon stock changes and increases in GHG emissions due to leakage prevention measures

The results of the previous step are summarized (Table 49).

Table 49 Ex-ante estimated total emissions above the baseline from leakage prevention activities

Project year *t*	Carbon stock decrease due to leakage prevention measures		Total *ex-ante* GHG emissions from patrol activities		Total *ex-ante* increase in GHG emissions due to leakage prevention measures	
	Annual $CSDLKPM_t$ t-CO_2e	Cumulative *CSDLKPM* t-CO_2e	Annual $GHGEIPA_t$ t-CO_2e	Cumulative *GHGEIPA* t-CO_2e	Annual $CSDLKPM_t$ t-CO_2e	Cumulative *CSDLKPM* t-CO_2e
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
2024	0	0	0	0	0	0

(2) Ex-ante estimation of the decrease in carbon stocks and increase in GHG emissions due to

In order to conservatively estimate, it was assumed that 5% of the deforestation within the project area in the baseline case will be displaced to the leakage belt in every year of the REDD+ program (Table 50). The calculation process of 5% to be displaced will be provided to the REDD+ program validator in validation process

Table 50 Ex-ante estimated leakage due to activity displacement

Project year *t*	Total *ex-ante* estimated decrease in carbon stocks due to displaced deforestation		Total *ex-ante* estimated emissions from patrol activities	
	Annual *CSDLK-dd*$_t$ t-CO_2e	Cumulative *CSDLK-dd* t-CO_2e	Annual *GHG-pa*$_t$ t-CO_2e	Cumulative *GHG-pa* t-CO_2e
2015	60,182	60,182	0	0
2016	60,182	120,363	0	0
2017	60,182	180,545	0	0
2018	60,182	240,727	0	0
2019	60,182	300,909	0	0
2020	60,182	361,090	0	0
2021	60,182	421,272	0	0
2022	60,182	481,454	0	0
2023	60,182	541,636	0	0
2024	60,182	601,817	0	0

(3) Ex-ante estimation of total leakage

The total ex-ante leakage estimation is reported in Table 51.

Table 51 Ex-ante estimated total leakage

Project year *t*	Total *ex-ante* estimated decrease in carbon stocks due to displaced deforestation		Total *ex-ante* estimated emissions from patrol activities		Carbon stock decrease or non-CO_2 emissions due to leakage prevention measures		Total *ex-ante* decrease in carbon stocks due to displaced deforestation		Total net increase in emissions due to leakage	
	Annual *CSDLK-dd*$_t$ t-CO_2e	Cumulative *CSDLK-dd* t-CO_2e	Annual *GHG-pa*$_t$ t-CO_2e	Cumulative *GHG-pa* t-CO_2e	Annual *GHGLKn-co2*$_t$ t-CO_2e	Cumulative *GHGLKn-co2* t-CO_2e	Annual *ΔCLK*$_t$ t-CO_2e	Cumulative *ΔCLK* t-CO_2e	Annual *ΔELK*$_t$ t-CO_2e	Cumulative *ΔELK* t-CO_2e
2015	60,182	60,182	0	0	0	0	60,182	60,182	60,182	60,182
2016	60,182	120,363	0	0	0	0	60,182	120,363	60,182	120,363
2017	60,182	180,545	0	0	0	0	60,182	180,545	60,182	180,545
2018	60,182	240,727	0	0	0	0	60,182	240,727	60,182	240,727
2019	60,182	300,909	0	0	0	0	60,182	300,909	60,182	300,909
2020	60,182	361,090	0	0	0	0	60,182	361,090	60,182	361,090
2021	60,182	421,272	0	0	0	0	60,182	421,272	60,182	421,272
2022	60,182	481,454	0	0	0	0	60,182	481,454	60,182	481,454
2023	60,182	541,636	0	0	0	0	60,182	541,636	60,182	541,636
2024	60,182	601,817	0	0	0	0	60,182	601,817	60,182	601,817

4.5. Total GHG Emission Reductions and/or Removals

(1) Ex-ante total net anthropogenic GHG emission reductions

a. Significance assessment

The carbon stored in the above and below ground biomass pools were considered by the REDD+ program. Root-to-shoot ratios and data to estimate the carbon stocks in the below-ground biomass pool were sourced from regional literature in accordance with IPCC (2006) guidance.

On the other hand, harvested wood products were excluded as significant timber removal is not associated with the baseline scenario. This is because that there were no legal and official logging activities in project area and reference region and there were not so much harvest wood products to be accounted.

b. Calculation of ex-ante estimation of total net GHG emissions reductions

The ex-ante estimation of total net GHG emissions reductions to be generated through the proposed REDD+ program activity are calculated.

$$\Delta REDD_t = \Delta CBSLPA_t - \Delta CPSPA_t - (\Delta CLK_t + ELK_t)$$

where;

$\Delta REDD_t$ Ex-ante estimated net anthropogenic GHG reduction attributable to the REDD+ program activity at year t; tCO_2e

$\Delta CBSLPA_t$ Sum of baseline carbon stock changes in the project area at year t; tCO_2e

$\Delta CPSPA_t$ Sum of ex post estimated actual carbon stock changes in the project area at year t; tCO_2e

ΔCLK_t Sum of ex post estimated leakage net carbon stock changes at year t; tCO_2e

ELK_t Sum of ex post estimated leakage emissions at year t; tCO_2e

t 1, 2, 3 … t, a year of the proposed crediting period; dimensionless

Ex-ante buffer credits are calculated based on a 20% risk factor estimated through expert judgment (as tentative).

c. Calculation of ex-ante Verified Carbon Units (VCUs) (VCUs are in case we applied VCS)

The calculation of ex-ante Verified Carbon Units (VCUs) to be generated through the proposed REDD+ program activity are summarized in Table 52. Ex-ante buffer credits are calculated based on a 20% risk factor.

Table 52 Ex-ante estimated net anthropogenic GHG emission reductions ($\Delta REDD_t$) and Voluntary Carbon Units (VCUt)

Project year *t*	Baseline carbon stock changes		Baseline GHG emissions		*Ex-ante* project carbon stock changes		*Ex-ante* project GHG emissions		*Ex-ante* leakage carbon stock changes		*Ex-ante* leakage GHG emissions		*Ex-ante* net anthropogenic GHG emission reductions		*Ex-ante* VCUs tradable		*Ex-ante* buffer credits	
	Ann. C_t t-CO_2e	Cum. C t-CO_2e	Ann. $BLghg_t$ t-CO_2e	Cum. $BLghg$ t-CO_2e	Ann. PCS_t t-CO_2e	Cum. PCS t-CO_2e	Ann. $Pghg_t$ t-CO_2e	Cum. $Pghg$ t-CO_2e	Ann. LKC_t t-CO_2e	Cum. LKC t-CO_2e	Ann. $LKghg_t$ t-CO_2e	Cum. $LKghg$ t-CO_2e	Ann. $REDD_t$ t-CO_2e	Cum. $REDD$ t-CO_2e	Ann. VCU_t t-CO_2e	Cum. VCU t-CO_2e	Ann. VBC_t t-CO_2e	Cum. VBC t-CO_2e
2015	1,097,484	1,097,484	106,151	106,151	768,239	768,239	74,306	74,306	54,874	54,874	5,308	5,308	782,362	782,362	625,890	625,890	156,472	156,472
2016	1,097,484	2,194,967	106,151	212,302	768,239	1,536,477	74,306	148,611	54,874	109,748	5,308	10,615	782,362	1,564,725	625,890	1,251,780	156,472	312,945
2017	1,097,484	3,292,451	106,151	318,453	768,239	2,304,716	74,306	222,917	54,874	164,623	5,308	15,923	782,362	2,347,087	625,890	1,877,670	156,472	469,417
2018	1,097,484	4,389,935	106,151	424,604	768,239	3,072,954	74,306	297,223	54,874	219,497	5,308	21,230	782,362	3,129,450	625,890	2,503,560	156,472	625,890
2019	1,097,484	5,487,418	106,151	530,755	768,239	3,841,193	74,306	371,528	54,874	274,371	5,308	26,538	782,362	3,911,812	625,890	3,129,450	156,472	782,362
2020	1,097,484	6,584,902	106,151	636,906	768,239	4,609,431	74,306	445,834	54,874	329,245	5,308	31,845	782,362	4,694,175	625,890	3,755,340	156,472	938,835
2021	1,097,484	7,682,385	106,151	743,057	768,239	5,377,670	74,306	520,140	54,874	384,119	5,308	37,153	782,362	5,476,537	625,890	4,381,230	156,472	1,095,307
2022	1,097,484	8,779,869	106,151	849,208	768,239	6,145,908	74,306	594,445	54,874	438,993	5,308	42,460	782,362	6,258,900	625,890	5,007,120	156,472	1,251,780
2023	1,097,484	9,877,353	106,151	955,359	768,239	6,914,147	74,306	668,751	54,874	493,868	5,308	47,768	782,362	7,041,262	625,890	5,633,010	156,472	1,408,252
2024	1,097,484	10,974,836	106,151	1,061,510	768,239	7,682,385	74,306	743,057	54,874	548,742	5,308	53,075	782,362	7,823,625	625,890	6,258,900	156,472	1,564,725

Note: Ex-ante buffer credits are calculated based on a 20% Risk Factor (RF) estimated through expert judgment (as tentative).

5. Monitoring

This Chapter should be described after stakeholder's meeting regarding monitoring structure in GPNP and its surrounding area. Following are example which is quoted from the PD in Luang Prabang Province, Lao PDR, prepared by JICA PAREDD Project.

5.1. Monitoring Data Reconciliation

(1) Monitoring of project implementation

Monitoring of the HK-VC project implementation is conducted through different components that together form an integrated monitoring system. Quarterly reports will be available describing the progress of the activities listed in the management plans. The project will keep a copy of all spatial and tabular data, maps, reports and any relevant documentation, securely backed-up. This information will be available to verifiers for inspection. The project will also be responsible for monitoring project activities to be implemented by local partners. See section “4.3 Description of the Monitoring Plan” of the PD for a detailed description of the HK-VC data management plan.

(2) Monitoring of land-use and land-cover change within the project area

As of the date of validation no regional, national or jurisdictional monitoring system of land-cover change was in place. Therefore, the project proponent will be responsible for developing the land-cover change component of the monitoring plan for the project area. The analysis will cover the monitoring of forest land converted to non-forest. The land cover and change maps will be produced following the technical steps described below, including quality assurance procedures.

The project proponent will complete the following technical steps:

- Acquire appropriate LANDSAT images with minimal cloud cover from multiple sources. Multiple images will be used in the verification to fill areas obscured by clouds;
- Atmospherically correct images;
- Orthorectify images to within one pixel using a single base image (generally a GeoCover image, or similar image, used to generate the forest benchmark map);
- In areas where no-data values exist in the base image (due to clouds, cloud shadows and so on), composited images will be generated using the base image and multiple gap-filling images. A cloud and cloud shadow will first be generated and gap-filling scenes identified to fill the mask of the base image. Temporal and gap extent criteria will be used to select the gap-filling scenes; scenes with similar acquisition dates will be given preference, as well as minimal cloud and cloud shadow.

a. Monitoring of carbon stock changes and non-CO_2

Monitoring of carbon stock changes emissions from forest fires within the project area: The

ex-ante estimated average carbon stocks per in Mixed forest is not expected to change during the fixed baseline period. There are no areas subject to significant carbon stock decrease due to controlled deforestation and planned harvest activities (e.g. planned logging, fuel-wood collection and charcoal production activities) in the project scenario. Similarly, no areas subject to significant unplanned carbon stock decrease e.g. due to uncontrolled forest fires or other catastrophic events were identified. Although protection of forest by the project will likely lead to an increase in carbon stocks, monitoring of increases in carbon stocks are conservatively omitted because the project does not intend to claim credits for this category. Therefore, carbon stocks will not be monitored within the project area.

Monitoring of carbon stock changes emissions from forest fires within leakage management areas (LMAs): No areas will be subject to planned and significant carbon stock decrease in the project scenario in the LMAs according to the ex-ante assessment. On the contrary, carbon stocks are expected to increase in LMAs but are conservatively omitted from project accounting. Therefore, carbon stocks will not be monitored within LMAs.

Monitoring of carbon stock changes emissions from forest fires within the leakage belt: Carbon stocks will not be monitored within the leakage belt as this is optional.

b. Monitoring of non-CO_2 emissions form forest fires

Monitoring of impacts of natural disturbances and other catastrophic events: Natural disasters that might affect the carbon stocks (i.e. hurricanes, volcanic eruptions, flooding, severe droughts, earthquakes) in the project area are uncommon and do not represent a significant risk for the project area as assessed in the Non-Permanence Risk Report. However, the project proponent will use medium-resolution satellite images to monitor catastrophic events, applying the methodology described in above.

Total ex post estimated actual net carbon stock changes and GHG emissions in the project area: Relevant tables will be updated using the new measurements of changes in carbon stocks and GHG emissions in each monitoring period. The results will be summarized: Total ex-post estimated actual net changes in carbon stocks and emissions of GHG in the project area.

c. Monitoring of leakage

Monitoring of carbon stock changes and GHG emissions associated to leakage prevention activities: The major leakage prevention activity to be implemented is the capacity building and technical assistance for alternative livelihoods. No planned deforestation or degradation is expected to occur as part of leakage prevention activities, and no changes in carbon stocks are expected to occur according to the ex-ante analysis.

Monitoring of carbon stock decrease and increases in GHG emissions due to activity displacement leakage: Deforestation in the leakage belt will be monitored. Any deforestation above the baseline in the leakage belt will be discounted from the carbon emissions avoided to due to project activities. If emissions in the leakage belt are higher than the baseline due to activities not attributed to the project,

the project proponent will collect robust evidence to justify that the deforestation is not linked to project activities.

Emissions from forest fires are included in the baseline therefore increases in GHG emissions will be monitored in the leakage belt.

Total ex post estimated leakage: The results of all ex-post estimations of leakage through monitoring will be summarized using the same table format used in the ex-ante assessment and will be reported.

d. Ex post net anthropogenic GHG emission reductions

The calculation of ex-post net anthropogenic emission reductions will be estimated similarly to the ex-ante calculation using the equation below:

$$\Delta REDD_t = \Delta CBSLPA_t - \Delta CPSPA_t - (\Delta CLK_t + ELK_t)$$

where;

$\Delta REDD_t$	Ex-post estimated net anthropogenic GHG reduction attributable to the project activity at year t; tCO_2e
$\Delta CBSLPA_t$	Sum of baseline carbon stock changes in the project area at year t; tCO_2e
$\Delta CPSPA_t$	Sum of ex post estimated actual carbon stock changes in the project area at year t; tCO_2e
ΔCLK_t	Sum of ex post estimated leakage net carbon stock changes at year t; tCO_2e
ELK_t	Sum of ex post estimated leakage emissions at year t; tCO_2e
t	1, 2, 3 … t, a year of the proposed crediting period; dimensionless

5.2. Data and Parameters Available at Validation

Complete the table below for all data and parameters that are determined or available at validation, and remain fixed throughout the program crediting period (copy the table as necessary for each data/parameter). Data and parameters monitored during the operation of the jurisdictional REDD+ program are included in Section 5.3 (Data and Parameters Monitored) below.

Data / Parameter	Forest cover benchmark in 2016

Data unit	Map
Description	Digital map showing the location of forest land within the project area at the beginning of the crediting period
Source of data	LANDSAT 7
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	LANDSAT-based land cover classification is applied. The map accuracy is ensured at least 80% for the classification of forest and non-forest in the satellite imagery analysis.
Purpose of data	Indicate one of the following: ● Determination of baseline scenario ● Calculation of baseline emissions ● Calculation of program emissions

Data / Parameter	Project area
Data unit	Map
Description	Digital map of project area boundaries
Source of data	GIS dataset (elevation, slope, forest edges, project boundaries)
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	LANDSAT-based land cover classification is applied. The map accuracy is ensured at least 80% for the classification of forest and non-forest in the satellite imagery analysis.
Purpose of data	Indicate one of the following: ● Determination of baseline scenario ● Calculation of baseline emissions ● Calculation of program emissions

Data / Parameter	Reference region

Data unit	Map
Description	Digital map of reference region boundaries
Source of data	GIS dataset (elevation, slope, forest edges, project boundaries)
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	LANDSAT-based land cover classification is applied. The map accuracy is ensured at least 80% for the classification of forest and non-forest in the satellite imagery analysis.
Purpose of data	Indicate one of the following: ● Determination of baseline scenario ● Calculation of baseline emissions ● Calculation of program emissions

Data / Parameter	Leakage belt
Data unit	Map
Description	Digital map of leakage belt boundaries
Source of data	GIS dataset (elevation, slope, forest edges, project boundaries)
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	LANDSAT-based land cover classification is applied. The map accuracy is ensured at least 80% for the classification of forest and non-forest in the satellite imagery analysis.
Purpose of data	Indicate one of the following: ● Determination of baseline scenario ● Calculation of baseline emissions ● Calculation of program emissions

5.3. Data and Parameters Monitored

Not addressed in IJ-REDD+.

5.4. Description of the Monitoring Plan

Not addressed in IJ-REDD+.

6. Safeguard Information System

In Indonesia, Ministry of Environment and Forestry have developed jurisdiction's safeguard information systems, SIS-REDD+ Indonesia (Principles, Criteria and Indicators for a System for Providing Information on REDD+ Safeguards Implementation in Indonesia) for assessing safeguards implementation to address and respect the decision Dec.1/CP16 on COP16. SIS-REDD+ is according to "SIS-REDD+ Indonesia" developed referring various existing instruments related to social and environmental assessment. The project will provide information in accordance with this SIS guidance.

6.1. Data and Parameters Available at Validation

Refer to SIS-REDD+ Indonesia

6.2. Description of the Safeguards Information System

Refer to SIS-REDD+ Indonesia

7. Further Information

In addition to stakeholder engagement specifically on the PD, the concept is based on Indonesia's REDD+ strategy documents and on related reforms that have been built on strong stakeholder engagement and outreach activities. The National REDD+ Strategy and the province-level REDD+ strategies and action plans were developed through consultation processes at the national and local levels, reaching out to communities, NGOs, universities and the government (central, provincial and district). The RAN-GRK used a consultation and communication platform to develop Province Level Strategies and Action Plans based on local needs and priorities.

A preliminary stakeholder engagement process specific to the design of the PD was begun on XX 20XX with a focus group discussion (FGD). This involved representatives from the Dinas XXX, GPNP, XXX, the private sector, and universities and research institutions. Specific topics discussed were: site selection, action plan, potential non-carbon benefits (such as NTFPs), consultation processes, REL and expected emissions reductions, MRV, readiness, and payment mechanisms. The participants of the meeting agreed that the PD will be submitted into XX.

Results of its Review

No.	Reviewer	Comments type	Comments, recommendation and question	Improved points/sentences
1	IJ-REDD+ members	CAR	There is no reference map location to Indonesia area	Yes, we added geographical map of West Kalimantan Province, Gunung Palung National Park and our REDD+ target area.
2	IJ-REDD+ members	CAR	Structure refer to management structure or particular as REDD+ proponent?	Yes, the proponent structure in the PD is just assumption according to IJ-REDD+ activities and some discussions with IJ-REDD+ stakeholders.
3	IJ-REDD+ members	CAR	Mentioned about 30 organization. Where is it refer?	Total participants/responsible organizations were improved, the total number of organizations will be finalized before submitting PD.
4	IJ-REDD+ members	CAR	Need to check on address	Contact address of each organization were blanked, and main address of the forum is just mentioned.
5	IJ-REDD+ members	CAR	Sub chapter 1.3 what the explanation of this sub chapter? Just Forum members? Or others that closed to the location?	Organizations in this part are regarding proponents who were assumued by IJ-REDD+
6	IJ-REDD+ members	CL	Ther mention "…..REDD+ related activities", what is the meaning?	REDD+ related activities are activities to reduce deforestation and forest degradation directly and/or indirectly.
7	IJ-REDD+ members	CL	Is there any footnote for reference on the data (where's data come?)	The data were results of estimation of GHG emission reductions. Estimation methodologies are mentioned.
8	IJ-REDD+ members	CL	Same picture?	We revised pictures.
9	IJ-REDD+ members	CL	There sentence, "In certain ases,……..ownership" Could you explain on this?, is there any reference for this sentence?	This sentence is quoted from SRAP prepared by West Kalimantan Province. We added reference in the document.
10	IJ-REDD+ members	CAR	Need to shorted from highest regulation to lowest	This part was improved by IJ-REDD+ members
11	IJ-REDD+ members	CAR	It needs brief explanation on GPNP including meaning of abbreviation.	In top page, explanation of the GPNP was added.

12	IJ-REDD+ members	R	Other brief explanation on forum would be needed rather than STATUTA.	Yes, the proponent structure in the PD is just assumption according to IJ-REDD+ activities and some discussions with IJ-REDD+ stakeholders.
13	IJ-REDD+ members	CAR	There are 30 organizations not 20, and community leaders are also included.	Total participants/responsible organizations were improved. Total number of organizations will be finalized before submitting PD.
14	IJ-REDD+ members	CL	What are example of “human activities”?	In REDD+ project, mainly address to deforestation and forest degradation by human activities (e.g. illegal logging, illegal land conversion), then human activities means direct and indirect activities bringing deforestation and forest degradation.
15	IJ-REDD+ members	CL	It is not clear why private company such as oil palm plantation is not included as agents of deforestation.	In this PD, we can not reach to agreement whether the PD is based on all of stakeholders or some parts of stakeholders. Therefore, we will have to decide collaboration system with oil palm plantation in near future (when we submit this document).
16	IJ-REDD+ members	CL	Why not add explanation on oil palm development?	Such explanation will not be required in this PD because we can not reach to agreement wit oil palm company.
17	IJ-REDD+ members	CAR	Need explanation on Year	Yes, we added explanation on the year to Figure 8.
18	IJ-REDD+ members	CAR	It may need more clear explanation for forum members (esp. NGO)	Total participants/responsible organizations were improved. Total number of organizations will be finalized before submitting PD.
19	IJ-REDD+ members	CL	It would need confirmation that it is not overlapped with RAD-GRK target especially on KPH program.	Target are in this PD do not been implemented by KPH-base, therefore the PD do not consider some kind of overlap issues with other programs.
20	IJ-REDD+ members	CL	How about explanation on internal distribution internal forum and how to allocate for community?	Indicated point is under discussion with the forum. When this PD submitted, such a point will be discussed.
21	IJ-REDD+ members	R	It would be better to clarify that this consultation is not yet been done. So, MoF or Forum need to conduct.	Yes, after review process by IJ-REDD+ members, national experts kindly review this PD according to their experiences and Indonesian national forest related laws and concepts.

22	IJ-REDD+ members	R	It would better to add and remind that the current situation on lack of understanding on boundary and zoning will be risk for REDD+ in the future.	This PD focuses on only two sub-districts in Kayong Utara District. Therefore the boundary is not eligible in line with VCS requirements. But this PD was prepared to clarify points to be solved when someone will implement REDD+ project in the area. Also we prepare the cover letter to explain situation of the PD.
23	IJ-REDD+ members	CAR	It is not sure the who will be agent 1-4 (ethnic group or which village?)	Agent(s) should be identified by not only specific group(s), but also some kind of general/common group(s). In this PD, all of agents are explained by general group whose activities sometime become drivers of deforestation and/or forest degradation.
24	IJ-REDD+ members	CL	1) Targets (agent groups) for each activity are not clear. 2) benefit of eco-tourism will be very limited. So, it would better to add other alternative livelihood. 3) use of term “monitoring system for illegal logging” will be difficult to accept by forum members. 4) Awareness raising not rising; 5) it would be more appropriate to use “environmental education and community facilitation” as a set.	Yes, in order to show evidences that each activities have potential to reduce deforestation are not prepared, because demonstration activities in the area are on process now. Also mentioned activities just include some idea-based, therefore we recognize that it is required to have consultation process with all of proponents to finalizing activities by using this materials.
25	IJ-REDD+ members	CAR	It is not clear which is map by WI	We added explanation for indentifying map developer.
26	IJ-REDD+ members	R	Add requirement of proponent for future recommendation.	From process of PD preparation, we were not able to discuss about proponent(s) and other entities. We prepare the cover letter to explain situation of the PD.
27	IJ-REDD+ members	CL	In all section, need to clarify what need to be clarified/fulfilled for finalizing PDD.	Yes, we prepare the cover letter to explain situation of the PD.
28	IJ-REDD+ members	R	Provide several options of Baseline and REL/RL; 1) whole 2 sub-districts, 2) in case PT PAS area is excluded, 3) in case HP area is excluded.	Yes, we prepare the cover letter to explain situation of the PD.

29	IJ-REDD+ members	R	Describe all necessary measures on social and environmental safeguard as recommendation for REDD+ implementation.	Yes, after finalizing demonstration activities, we would add specific measures on safeguards.
30	IJ-REDD+ members	R	Describe all REDD+-related activities implemented/planed by forum members.	Yes, after finalizing demonstration activities, we would add concept of REDD+ activities.
31	IJ-REDD+ members	R	Provide several activity options which are effective for REDD+ in the landscape. Based on each activity, estimated GHG reduction amount and basis/way of calculation need to be explained for PDD revision in the future.	Yes, after finalizing demonstration activities, we would add effectiveness of each REDD+ activity.
32	IJ-REDD+ members	R	As supplemental guide, difference of requirement/format/information among VCS, JCM and GCF need to be clarified. As optional value addition for carbon credit, requirement for CCBA need to be explained.	Yes, we prepare the cover letter to explain situation of the PD.
33	IJ-REDD+ members	R	Add information on zoning system and use rights of national park. Based on the current situation on NTFP use, the REDD+ project needs to take care for not to seize local people’s rights and access.	We recognize the comments are very important. On suitable opportunity, we would like to discuss with National Park and other stakeholders.
34	IJ-REDD+ members	CAR	Information on Hutan Desa by Yayasan Palung and monitoring activities by ASRI need to be included.	Yes, activities by Hutan Desa and its related activities are added.
35	Ari	CAR	NPD clearly stated his expectation that the project should produce emission reduction target through Eligible Activities according to available mechanism or standards	The word of "NPD" is not clear. Regarding activities for reducing deforestation and forest degradation are mentioned in chapter ""

36	Ari	CL	Referring to JNR Requirement in 3.5.6 The lowest eligible jurisdictional level is the second administrative level below the national level. For example, in Brazil this would be a municipality (i.e., one administrative unit below the state) or, in Indonesia, a regency (i.e., one administrative level below the province), therefore Sub-district is not eligible for Jurisdictional REDD	This PD focuses on only two sub-districts in Kayong Utara District. Therefore the boundary is not eligible in line with VCS requirements. But this PD was prepared to clarify points to be solved when someone will implement REDD+ project in the area. Also we prepare the cover letter to explain situation of the PD.
37	Ari	CL	Under new law No. 23/2014, on local government, the authority of forestry sector is under central and province government, therefore implementation of REDD+ should be under jurisdiction of Province Government and even Central Government if involving National Park.	As same as comments of No. 36
38	Ari	CL	Project Proponents : Project Proponents must be clear and must able to show control over the project area and ownership of carbon rights for the project area. Current proposed jurisdictional proponents of Responsible Organization XX should proof their right and ability to control of the project area.	As same as comments of No. 36
39	Ari	CL	This project applied jurisdictional approach for two Sub Districts (Kecamatan). In this case, the Head of administrative region or Camat has no control of some forest areas as project area (including GPNP).	As same as comments of No. 36
40	Ari	CL	All land areas registered under any other voluntary or regulatory carbon trading scheme must be transparently reported and excluded from the project area (e.g. PT CUS).	Yes, before finalizing and submitting the PD, we have to identify other projects in our target area. Also we recognize to avoid double submitting, counting and insurance of credits.

41	Ari	R	A need to consider eligible project activities (ARR, IFM and REDD under VCS),	Yes, this PD assumed jurisdictional or sub-national REDD+, then our activities are consist of all of forest management practices except for A/R. it was because A/R activities sometime overlap with A/R CDM under the UNFCCC crediting mechanism
42	Ari	CL	A need to define landscape condition in proposed project area, based on its status and condition such as forestry land (production forest, national park, protection forest) and non forestry land with forest (forested APL).	Yes, we would explain condition prior to program initiation which include area of APL.
43	Ari	CL	An individual eligible project of REDD may be developed based on available eligible land, clear proponent and boundaries. This project may be refer to VCS, JCM, Plan Vivo or others.	As same as comments of No. 41
44	Ari	CL	When preparing reference level or baseline for a REDD project, a need to refer to Indonesian FREL with Historical land cover change analysis from 1990-2012.	Yes, methodologies for developing reference level keep consistency with national FREL. We add some explanation in page 51.
45	Ari	CAR	Make sure the decision to continue the preparation of PDD that refer to VCS JNR. Considering the eligibility of jurisdictional approach for sub district level.	As same as comments of No. 36
46	Ari	CL	Make sure to apply the right template for PDD or PD (Project Description) under VCS	The project description (PD) is correct. We revised it.
47	Ari	R	In the Title, Landscape Forest Conservation in West Kalimantan Province should have clear meaning of landscape, conservation and jurisdiction area in sub district.	Yes, we add some explanation.

48	Ari	R	Table of content depend on selected PD template.	In this PD, we used VCS JNR template, so all of tables are according to the template.
49	Ari	CL	Table 1. If possible to indicate total area and forest status/function of each driver as input for each stand alone project	Yes, we added such data and information.
50	Ari	CL	1.2. Jurisdictional proponent: eligibility of Responsible Organization XX as proponent (are they eligible? Right to Control over forest)	As same as comments of No. 36
51	Ari	CL	1.3. Other Entities Involved in the Jurisdictional REDD+ Program: should consider entity as eligible project proponent, to support the possibility of stand alone project	As same as comments of No. 36
52	Ari	CL	Boundaries : project area, reference area and leakage belt should clear	Yes, we added detailed map including reference area, leakage belt and project area
53	Ari	CL	Table 4, land cover to include area and forest function and management authority	According to VCS requirements, Table 4 just explains definition of forest types.
54	Ari	CL	Figure 7 Concept of deforestation, forest degradation and carbon enhancement in the forest in this PDD should be improved (e.g. enhancement of C stock from plantation to primary forest is not correct.	REDD+ project will be verified by "results base" and it will be results from carbon emission reduction and enhancement. Therefore Figure 7 just explain forest type changes which bring carbon stock changes.
55	Ari	CL	1.8. Conditions Prior to Program Initiation should be proven with historical land cover change analysis including fire history in project area	Yes, we added land and forest management history including fire fighting team activities.
56	Ari	CL	1.9 Approval: proof of Responsible Organization XX as eligible entity.	As same as comments of No. 36
57	Ari	CL	Nested Project: Consider of nested project as an eligible activity	As same as comments of No. 36

58	Ari	CL	1.10. Compliance with Laws, Statutes and Other Regulatory Frameworks : UU No 23/2014, forestry authority in province and central government level	the part of laws you indicated was improved by IJ-REDD+ national experts.
59	Ari	CL	3.5. Description of Jurisdictional Baseline Method -> should be prepared using historical land cover change and data of degradation over jurisdiction area, the future projection of baseline is based on historical trend and/or forward looking with document of evidence	Yes, baseline is based on historical data and its methodologies are consist with national FREL.
60	Ari	CAR	Quantification of GHG Emission Reductions and/or Removals; Should refer to IPCC Gl 2006: emission = activity data (area of land cover change) x emission factors (local or default values)	Yes, all of estimation process are in line with IPCC guidelines.
61	Ari	CAR	Table 32 Factors identified for use in the area for estimating GHG from peat soil -> consider peat decomposition??	Yes, soil decompositions are considered.
62	Ari	CL	JNR requires eligible jurisdiction : district or even province, therefore sub districts are not eligible for JNR under VCS	As same as comments of No. 36
63	Ari	CL	To consider eligible proponent for REDD+ activity who has right/authority over project area. Current society of Responsible Organization XX may not eligible	As same as comments of No. 36
64	Ari	CL	To consider Scenario 1 according to VCS JNR requirements with stand alone projects but with jurisdictional baseline	This PD will be categorized in scenario 2 according to VCS JNR, because West Kalimantan Province already developed sub-national REDD+ strategy and the are targeted by this PD is just part of it.

65	Ari	CL	From PDD : basic concept of REDD+, estimation of emission and others require more common understanding	In figure 7, we explained concept of emission reductions and carbon enhancement.
66	Ari	CL	A need to consider REDD project according to available standard with eligible activity, proponent and available approved methodology	As same as comments of No. 36
67	Ari	CL	Put all information /data in a Comprehensive Technical Report	The PD was prepared by using VCS formats. As supplemental explanations, IJ-REDD+ is now preparing manuals. These manuals will be useful to share detailed methodologies.
68	Arif	CL	I am wondering the role (objective) of this document. Should this document prepared for submit to comply with VCS crediting mechanism or a recommendation draft to be fulfilled by the candidate of project proponent?	The PD was prepared by using VCS formats. As supplemental explanations, IJ-REDD+ is now preparing manuals. These manuals will be useful to share detailed methodologies.
69	Arif	CL	Please check the correct term ! Is it Project Design Document (PDD) OR Project Description or Program Description (PD)?	This PD was prepared by according to VCS guidelines. We replaced from PDD to PD.
70	Arif	CL	The Title of this program is somehow too specific on conservation. I am thinking if the standard title such as "Jurisdiction REDD+ Program in ...." will be more understandable to the reader.	IJ-REDD+ had been focused on landscape level's activities. We think that current title is not specific and can include all of conservation activities in the area.
71	Arif	CL	Is this the Project Proponent? What is their role to the overall Jurisdiction Area? Do they have adequate power (authority) to reduce or control/oversight deforestation?	This PD focuses on only two sub-districts in Kayong Utara District. Therefore the boundary is not eligible in line with VCS requirements. But this PD was prepared to clarify points to be solved when someone will implement REDD+ project in the area. Also we prepare the cover letter to explain situation of the PD.

72	Arif	CL	Should this expressions appear on the Project Description Document? Please clarify !	As same as comments of No. 69
73	Arif	CL	Please clarify their role in this Project Description more clearly.	As same as comments of No. 71
74	Arif	CL	Please refer to the previous comment !	As same as comments of No. 71
75	Arif	CL	Please see previous comment !	This PD was prepared by according to VCS guidelines. We replaced from PDD to PD.
76	Arif	CL	Not 1.36 million but 136 million ha	We replaced 1.36 to 94.4 according to national data in 2010.
77	Arif	CL	Not 1.92 million but 192 million ha	We replaced 1.92 to 190.5 according to national data in 2010
78	Arif	R	Classified or designated? From the data that showed, it refers to a "forest area (forestland)". Some of the forest area (forestland) are not covered by forest.	Yes, we applied Indonesian definition.
79	Arif	R	Maybe you can add : "By increasing global awareness on climate change mitigation action from land use change and forestry; therefore,....	A great thanks for your kind suggestion. We added sentence.
80	Arif	R	Please indicate the reference for this statement !	This part was quoted from un-published document prepared by JICA IJ-REDD+. We eliminated the sentence.
81	Arif	CL	Delete "forest exploitation for timber products"	A great thanks for your kind suggestion. We eliminated sentence.
82	Arif	CL	Timber production is using selective cutting system, so they are the driver of forest degradation, not deforestation !!!	A great thanks for your kind suggestion. We mentioned both deforestation and forest degradation.
83	Arif	R	Forest conversion to agriculture is the main driver of deforestation, not forest degradation !!!	A great thanks for your kind suggestion. We mentioned both deforestation and forest degradation.
84	Arif	R	If you use this expression, this means a process of conversion, which is actually not. So please change the wording, for example : Typical converted forest to	A great thanks for your kind suggestion. We replace into your suggested explanation.

85	Arif	CL	Does it refer to the total area of forested area, forest land or Province area? Please make it clear !!!	Total area means total land area in West Kalimantan Province. Yes, we added explanation.
86	Arif	CL	This expression is confusing, please rephrase !!!	We replace "to reduce " into "reduction of".
87	Arif	R	Use a consistent decimal number !	In this PD, total area with some decimal number will be not necessary. We would explain a little bit rough area information.
88	Arif	CL	Confusing statement...Please rephrase !!!	We added explanation that forest conservation is in line with Provincial strategy (SRAP).
89	Arif	CL	Please refer to the previous comment !	As same as comments of No. 69
90	Arif	CL	Confusing statement...Please rephrase !!!	As same as comments of No. 71
91	Arif	CL	Forest area and dynamic is similar? Confusing statement ...Please rephrase !!!	The word of "dynamics" is used as forest area increase and/or decrease. Anyway we replace the word.
92	Arif	CL	How can they manage the activity to reduce deforestation when they don't have enough authority on the area management.	As same as comments of No. 71
93	Arif	CL	The structure of who's doing what is somehow confusing	As same as comments of No. 71
94	Arif	CL	Who is the REDD+ Program?	As same as comments of No. 71
95	Arif	CL	What/who is the REDD+ Program?	REDD+ program means all of activities by the forum. We added some explanation in XX.
96	Arif	CL	What is the Indonesian forest inventory?	Indonesian Forest Inventory means National Forest Monitoring System in Indonesia. We replace "Indonesian Forest Inventory" into "Indonesian National Forest Inventory" accordingly.
97	Arif	CL	What/who is the REDD+ Program?	REDD+ program means all of activities by the forum. We added some explanation.
98	Arif	CL	"Site specific" emission will not be found in the IPCC EF database	Yes, we revised the sentence

99	Arif	CL	What is a new model? This statement is unclear.	Yes, we revised the sentence
100	Arif	CL	Please refer to the previous comments !	As same as comments of No. 2
101	Arif	CL	Can the Responsible Organization XX do this work?	As same as comments of No. 2
102	Arif	CL	Does this structure suitable enough to counter deforestation and forest degradation?	As same as comments of No. 2
103	Arif	CL	Who is the proponent who responsible for tackling deforestation and forest degradation in West Kalimantan (or GPNP)? What Ministerial Decree? Forestry? Environment? Mining? Energy?	As same as comments of No. 2
104	Arif	CL	What is the relation between this organization and GPNP? It is quite unclear !	As same as comments of No. 2
105	Arif	CL	Please refer to the previous comment !	As same as comments of No. 2
106	Arif	CL	What is the role and institutional arrangement of these institutions?	As same as comments of No. 2
107	Arif	CL	Already started?	Not yet. The program is assumed to start on 1th June 2016. We revised Table 2.
108	Arif	CL	Maximum?	Blue line is minimum and red line is maximum. We revised them.
109	Arif	CL	What is the different between seasonal tropical forest and tropical rain/humid forest?	We improved the word to "tropical forest".
110	Arif	CL	Land use or Land cover?	In this PD, we applied land-cover approach according to Indonesia's national FREL methodology.
111	Arif	CL	Land cover analysis is using satellite imagery. Land use analysis is using...?	In this PD, we applied land-cover approach according to Indonesia's national FREL methodology.
112	Arif	CL	There are : (1) Project area; (2) target area; (3) Jurisdictional Area. This un-consistent is confusing !	Yes, we improved specific words; project area (farmer target area) and we eliminate jurisdictional area in this PD.

113	Arif	CL	Confusing...see previous comment !	Yes, we improved specific words; project area (farmer target area) and we eliminate jurisdictional area in this PD.
114	Arif	CL	Please refer to the Provincial/District Land Use Planning to make an analysis for infrastructure driver !	We checked current situation, but we did not identify specific infrastructure projects.
115	Arif	CL	Both reference region? Which is...?	In this PD, we set reference region in allover Kayoung Utra District. Therefore, we used "both". But for clear understanding, we use "sub-districts of XX and CC"
116	Arif	CL	What about coal mining? Forest and peat fire?	In the project area, there are not mining activities.
117	Arif	CL	Both reference region? Which is...?	As same as comments of No. 115
118	Arif	CL	Both reference region? Which is...?	As same as comments of No. 115
119	Arif	CL	Both reference region? Which is...?	As same as comments of No. 115
120	Arif	CL	What is Indonesian forest inventory?	Indonesian Forest Inventory means National Forest Monitoring System in Indonesia. We replace "Indonesian Forest Inventory" into "Indonesian National Forest Inventory" accordingly.
121	Arif	CL	What is mobility analysis?	The mobility analysis in this PD was resulted from discussions with all of stakeholder in and around GPNP, and means both easy and difficult for moving from village to village as results of working style and others.
122	Arif	CL	This statement is difficult to understand	We set leakage belts as neighbor sub-districts of Sukadana and Simpang Hilir sub-districts. We added some explanation.
123	Arif	CL	This statement is difficult to understand	As same as comments of No. 122
124	Arif	CL	Based on which reference?	As same as comments of No. 120
125	Arif	CL	This definition seems like in-line with the National FREL	Yes, all of methodologies are in line with the national FREL of Indonesia.
126	Arif	CL	Did you mean Indonesia's National Forest Inventory System?	As same as comments of No. 120

127	Arif	CAR	What is the "specific methodology"? Do you attach any information regarding the methodology?	All of processing methodologies are compiled by another product (document) which will be prepared until end of March. When we have third-party variation in the future, we will be able to explain by the product (document).
128	Arif	CL	Is it possible? For this definition, IJ-REDD+ project can proposed a definition based on the results of the project	In order to replace from secondary forest to primary forest takes very long time. But such succession is not impossible and REDD+ project is expected such effects.
129	Arif	CL	What kind of national strategies and action plans?	This means Indonesian National target according to UNFCCC COP15
130	Arif	CAR	This sentence is abruptly appear in this paragraph	Yes, we eliminate this sentence.
131	Arif	CAR	Figure number?	The pictures do not have figure number.
132	Arif	R	So..?? What is the relation between fire and conditions Prior to Program Initiation? I cannot follow the argument correctly.	This REDD+ program will start from June 2016. therefore fire condition until 2015 will be included in prior information.
133	Arif	CL	Can they do this? Do they have enough authority?	As same as comments of No. 2
134	Arif	CL	The project need to define jurisdiction REDD+ program, since the definition (where refer to) is still mixed up.	As same as comments of No. 36
135	Arif	CL	Co-Cheer?	Yes, this is spell-missed. We revised into "co-chairs".
136	Arif	CL	I cannot follow the argument.	Yes, indicated sentence is unclear. We eliminated it.
137	Arif	CL	Will logging activity deforest the area? Didn't they select the bigger tree? Not all trees were cutted down.	Yes, we added explanation that deforestation driver is illegal or unplanned logging activities.
138	Arif	CL	Are these REDD+ activities differ with Chapter 1.7?	REDD+ activities mentioned in this part is same as Chapter
139	Arif	CL	REDD+ activities are Reduction of D, D and +.	REDD+ activities mean direct and indirect activities for reducing deforestation, forest degradation and enhancing carbon stock. Therefore activity mentioned in this page is suitable as REDD+ activities.
140	Arif	CL	REDD+ activities are Reduction of D, D and +.	As same as comments of No. 139

141	Arif	CL	REDD+ activities are Reduction of D, D and +.	As same as comments of No. 139
142	Arif	CL	REDD+ activities are Reduction of D, D and +.	As same as comments of No. 139
143	Arif	CL	REDD+ activities are Reduction of D, D and +.	As same as comments of No. 139
144	Arif	CL	REDD+ activities are Reduction of D, D and +.	As same as comments of No. 139
145	Arif	CAR	Program Bo?	Yes, this is spell-missed. We revised into "boundary".
146	Arif	CL	What is the relation of this Carbon pool with the activities measured?	All of activities effect on carbon stock directly or indirectly. This table is according to VCS format.
147	Arif	CL	baseline land use?	Baseline land use is not specific word. In this part, the word is used as baseline scenario.
148	Arif	CL	What is pioneer shifting cultivation?	This chapter will be improved.
149	Arif	CL	What is REDD+ program scenario?	Program scenario means land use dynamics (forest conservation scenario) during activities introduced by the REDD+ project.
150	Arif	CL	Difficult to understand the meaning. Consistent with national forest management system?	Yes, this PD is consist with national forest management system. Because this PD applied land-use system (not apply land-based system)
151	Arif	CL	Means? I cannot follow the argument.	As above, this PD has no information gap with national system.
152	Arif	CL	What is JCM? Did you state any reference to the JCM?	If we applied VCS format, we should use the word of baseline scenario. To reduce confusion, we just added explanation by using JCM concept.
153	Arif	CL	If I am not mistaken, the VCS methodology for REDD+ has been established	The VCS allows to use CDM methodological tool, then we used it.
154	Arif	CL	?????	The word of "y" was mistake by us. We eliminated it.
155	Arif	CAR	Difficult to understand	This part is related in Additionality and indicated sentence is one of the assumptions which is according to baseline scenario. We added explanation.
156	Arif	CAR	Difficult to understand	This part is related in Additionality and indicated sentence is one of the assumptions which is according to baseline scenario. We added explanation.
157	Arif	CL	Three or Four alternatives?	Yes, three is correct. We revised from four to three in this sentence.

158	Arif	CL	Why did you say illegal because of Forum? Illegal is based on Law…	If the REDD+ program is implemented by specific concession, other land use activities including large agriculture project will be excluded by the concession. Therefore we mentioned as illegal.
159	Arif	CL	Difficult to understand. It is better to rephrase the sentence	Yes, we eliminated the sentence.
160	Arif	CL	Too expensive..	Yes, this was rough estimation by IJ-REDD+. This chapter mentioned REDD+ needs big budget and baseline scenario can not supply such budget.
161	Arif	CL	Overhead Costs (Transaction Costs) are too high...This is not the way REDD+ project should be !!! For the community it is better to invest other business such as palm oil which is more economically feasible than to support this project !!!	Yes, this was rough estimation by IJ-REDD+. This chapter mentioned REDD+ needs big budget and baseline scenario can not supply such budget.
162	Arif	CL	Too costly and no other REDD+ revenue???	Estimated cost is just assumption, but total cost will be very high and over district's annual budget. Details estimation will be included in final report of the IJ-REDD+ consultation team.
163	Arif	CL	This part need to be elaborated more clearly to the government and the project proponent.	Yes, after finalizing proponent, this part will be revised again. We added some explanation in this part.
164	Arif	CL	Is it possible? Please refer to the other best practice in foreign country or in Indonesia	As same as comments of No. 2
165	Arif	CAR	Difficult to understand. Please rephrase …	Yes, we eliminated the sentence.
166	Arif	CAR	Was spent?	Estimated cost is just assumption, but total cost will be very high and over district's annual budget. Details estimation will be included in final report of the IJ-REDD+ consultation team.
167	Arif	CL	Who is the proponent? Getting more confuse with institutional arrangement and consistency of terminology on writing this document	As same as comments of No. 71
168	Arif	CL	What is "this REDD+ program" refer to?	As same as comments of No. 2

169	Arif	CAR	Figure number?	In the part of pictures, it will be not necessary to mentioned Figure No.
170	Arif	CL	What is this all special thing? Do you attach the methodology on processing the image? Or is it the data that purchased from the MoEF?	All of processing methodologies are compiled by another product (document) which will be prepared until end of March. When we have third-party variation in the future, we will be able to explain by the product (document).
171	Arif	CL	Too small....!!!	We revised the table.
172	Arif	CAR	???	This part was described according to VCS guidelines, and our sentences were to be assumed as general.
173	Arif	CL	Please refer to the Provincial/District Land Use Planning !	We checked current situation, but we did not identify specific infrastructure projects.
174	Arif	CAR	???	This part was described according to VCS guidelines, and our sentences were to be assumed as general.
175	Arif	CL	Please state the purpose of this observation points !	Our observation points were according to VCS guidelines, especially methodology 0015.
176	Arif	CL	The sequential processes of the overall methodology is not written in a process-based. Please ask related expert to write this part !!!	Overall methodology was reviewed by Prof. Amano who has much experiences in the field of IPCC and/or UNFCCC.

Appendix 7-2 Final Report

Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (REDD+ Planning Study)

Report of REDD+ Options from Planning Study

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting

Japan Forest Technology Association

Landscape Forest Conservation in West Kalimantan Province, Indonesia

- Contents -

Structure of This Document

- By using all of outcomes of the IJ-REDD+, future REDD+ implementation with some options are compiled in this document.
- Even in end of March 2016, international and/or national (Indonesian) REDD+ status had not been finalized and guidelines, modality and procedure for REDD+ also had not been developed under the UNFCCC and the Joint Crediting Mechanism (JCM). Therefore, based on some criteria (GHG emission reductions, proponent's status and so on), this document analyzed and showed following 4 directions (Project level with 2 scales, Landscape level and Sub-national level) of REDD+ in Southern West Kalimantan Province (Figure 1).

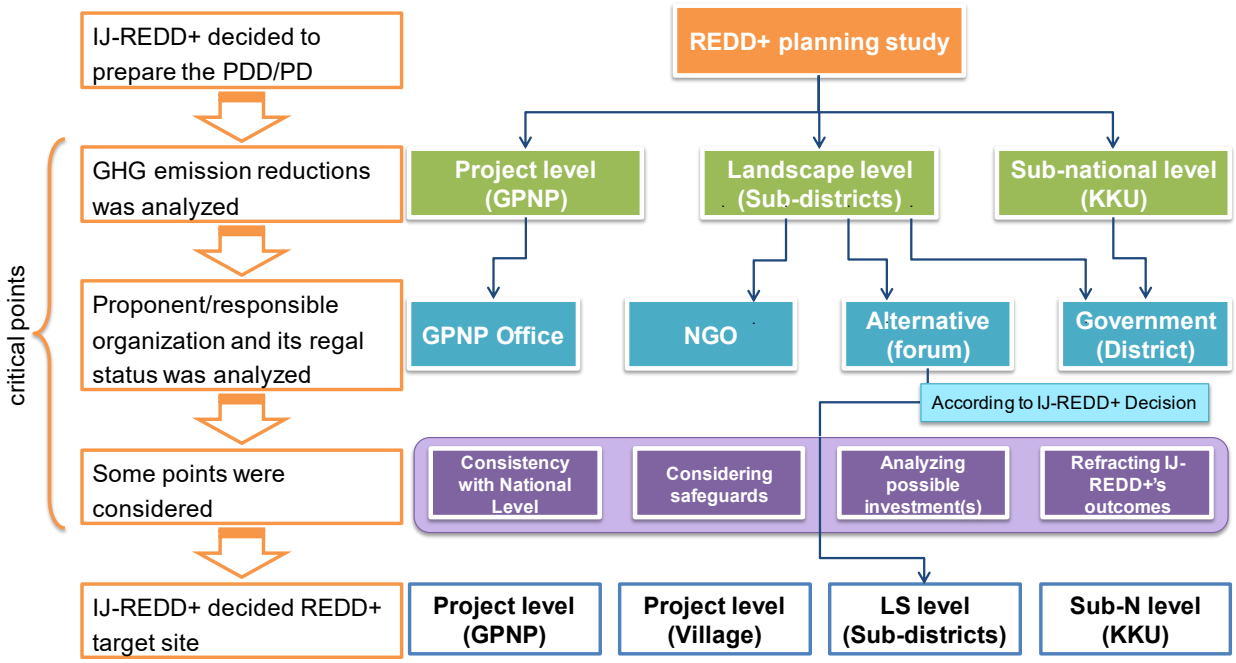


Figure 1 Some consultation points for deciding direction of REDD+ activities

- All of directions of REDD+ in Figure 1 will have potential to be implemented in the future, and this document addressed all of 4 options respectively. While mainly targeted landscape (LS) based REDD+ because most outcomes of the IJ-REDD+ overlapped with LS based REDD+ and LS based REDD+ was expected to get many GHG emission reductions by analyzed and identified counter-measure/activities (REDD+ activities) which was main outcome of the IJ-REDD+.

Note: some options and assumptions in each part are based on outcomes of the IJ-REDD+, but not according to actual results/demonstration/implementation, is actually options and assumptions.

Executive Summary

Executive Summary of the REDD+ plan (i.e., Project Design Document, PDD) is compiled by contents of each REDD+ planning (direction) respectively. Following is an example of landscape REDD+ planning targeting Sukadana and Simpang Hilir Sub-Districts in Kayoug Utara District located in southern West Kalimantan Provinces. In cases of other directions; GPNP; village; and district (sub-national) based REDD+, their Executive Summary will be very similar with follows.

REDD+ plan targeting landscape is based on national and provincial forest conservation/REDD+ strategies and targeted adequate scale, which are focusing on Sukadana and Simpang Hilir Sub-Districts in Kayoug Utara District located in southern West Kalimantan Provinces. Also all of activities under the REDD+ program are focusing on reducing deforestation and forest degradation through forest conservation concept of the proponent named as “Society of Friends of GPNP”. Forest area and its dynamics in Sukadana and Simpang Hilir Sub-districts are similar as overall West Kalimantan Province, which showed severe deforestation (land conversion from forest to other land categories) caused by human activities of expansion of plantation of oilpalm, rubber and other cash crops and mining. From results of fundamental survey for identifying land use change dynamics conducted by West Kalimantan Province, drivers of deforestation and forest degradation in target area are identified as mentioned below (Table 1).

Table 1 Identified drivers and categorized types of deforestation and forest degradation[1]

GHG Sources	Drivers	
Deforestation	Planned	1) Expansion of local administrative/governance regions for infrastructure and other uses; 2) Approved legal forest conversion (based on spatial plans/RTRW); 3) Forest conversion on lands reserved for other purposes (APL); 4) Forest conversion for mining concessions (e.g., coal, copper, gold, silver, nickel, tin): 5) Forest conversion for estate crop plantations (e.g., oil palm, rice, rubber, coffee, cocoa)
	Unplanned	1) Unplanned forest conversion for estate crop plantations (e.g., oil palm, rice, rubber, coffee, cocoa); 2) Encroachment for timber, fuel wood, agriculture and small-scale mining; 3) Uncontrolled forest fires; 4) Land claims leading to conversion of forest areas
Forest Degradation	Planned	1) Approval of timber utilization permits (concessions) in natural forests; 2) Approval of industrial plantations in natural forests
	Unplanned	1) Timber harvesting over annual allowance; 2) Illegal logging; 3) Forest fires; 4)Human-induced forest fires for land clearing

[1] Hardiansyah G. et al. 2014. REDD+ Strategy and action plan of West Kalimantan Province. REDD+ KALBAR.

By considering such severe situation of deforestation and forest degradation, this plan was started by the "Society of Friends of GPNP", who was established to implement collaborative management in the area, to reduce pressures on forest resources in targets area by implementing counter measures/activities (REDD+ activities) and aimed to reduce deforestation and forest degradation, and also to enhance carbon stock in the forests of target area.

To monitor results of implemented counter-measures by "Society of Friends of GPNP", which are GHG emission reductions and removals from the atmosphere after undertaking activities, the REDD+ plan analyzed satellite images (LANDSAT TM and SPOT 5) from 2000 to 2013 to identify forest dynamics (changes in land and forest areas) in the target site. Additionally, the REDD+ plan analyzed the dynamics of each forest type and revised them on the basis of a ground truth (field survey and application of high resolution satellite imagery of SPOT 5). The REDD+ plan classified each forest type based on the Indonesian National Forest Inventory. The REDD+ plan then quantified the amount of carbon stock per unit area of each forest type based on country-specific emission/removal factors provided in Indonesian national forest reference emission level (FREL) which was submitted into UNFCCC in 2015. Finally, since the change in the amount of carbon stock in project area and its surrounded area was closely related to human activity, the REDD+ plan developed a new activities for the area under reference scenario and quantified its dynamics. From above monitoring and calculation process, as an ex-ante estimate, the REDD+ plan is expected to reduce GHG by 7,823,620 tCO_2e within 10 years (i.e., 782,362 tCO_2e/year) of the REDD+ plan start date.

1. Land and Forest Condition in Kayong Utara District of West Kalimantan Province

This part is general description for explaining land and forest condition of REDD+ target site. Following will be applied in all of cases of REDD+ plan (GPNP, village and district) in Kayong Utara District with no revision, and in case of other directions; GPNP; village; and district (sub-national) based REDD+, additional and detail information will be required if necessary.

In Indonesia, 94.4 million ha out of 190.5 million ha of total land (approximately 50.0%) is classified as forest, which is the third biggest tropical forest (approximately 10% of world tropical forest) behind Brazil and Democratic Republic of the Congo (DRC). Therefore, forest management in Indonesia is not a domestic agenda but the particularly important to mitigate global warming on global basis. However, as a result of exploitation of forest development and timber products since the early 1970s, over 20 million m^3 of logs had been produced per year till 1990s and this significant deforestation became a concern world widely. In addition, illegal logging, forest fire, and conversion of lands to agriculture enhance forest degradation.


Typical land conversion from forest to other land categories in West Kalimantan Province

Forests in West Kalimantan Province where this REDD+ program locates, that covers a total area of 14,732 thousand ha, has a great potential to contribute reduction of greenhouse gas (GHG) emissions and enhance carbon stocks. In light of this, West Kalimantan Province is committed to contributing up to 7.8% of the national target in 2020. Then the Government of West Kalimantan Province has established a team to draft a provincial REDD+ strategy and action plan document for West Kalimantan Province based on the decision of the Governor of West Kalimantan No. 437/BLHD/2013. Also decision of the Governor of West Kalimantan No 115/BLHD/2012 was enforced to establish the REDD+ Working Group in the West Kalimantan Province.

2. Proponent to be Expected

This part has 4 options;
Following is case 1 which is targeting "landscape" REDD+ in project in Sukadana and Simpang Hilir Sub-Districts in Kayoug Utara District and is managed by the specific forum among some organizations.

[Case 1: Landscape based REDD+]

The REDD+ plan is conducted by "Society of Friends of GPNP" and implementing structure is shown in Figure 2. This REDD+ plan requires participation of various stakeholders to identify solutions to problems related to deforestation and forest degradation, a practice arising from unplanned land and forestry resource use and a major cause of deforestation and forest degradation in the area. The following structure for implementing the REDD+ plan was developed as part of preliminary work (including discussions with stakeholders).

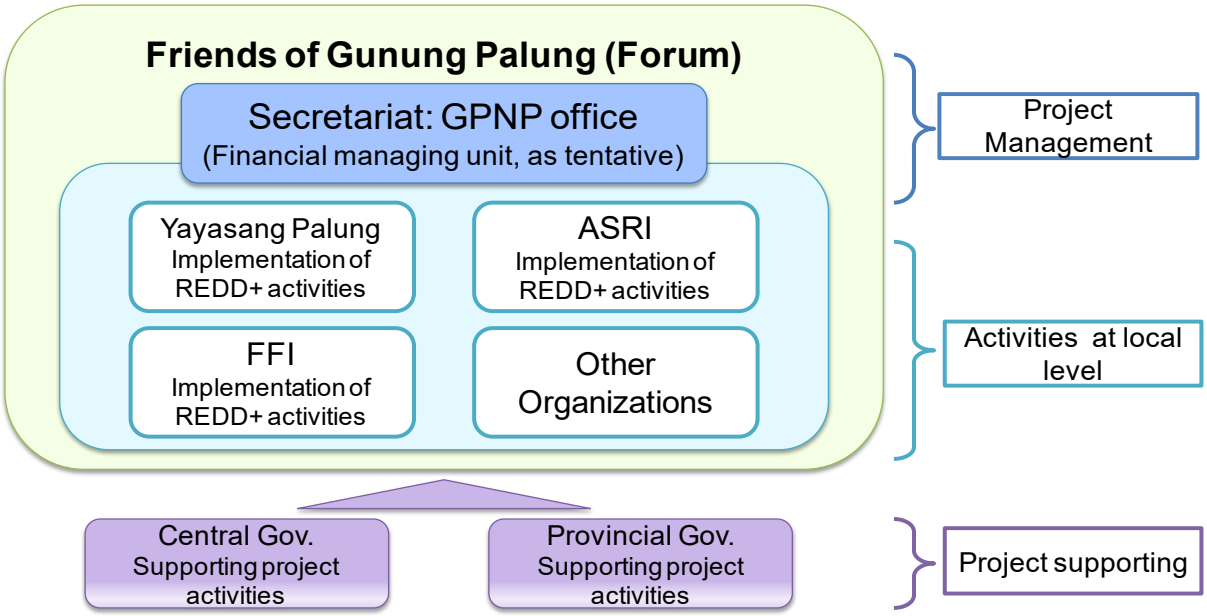


Figure 2 REDD+ plan implementation structure

The forum is consist of XX (Total number of organizations will be finalized later) organizations from central and local Governments, NGOs and private sectors, and has been established as a new organization those who have missions to 1) strengthen the communication of the parties in the landscape GPNP, 2) develop collaboration in the area of landscape management GPNP, 3) create synergy among the parties in the region and preserve the public welfare in the landscape of GPNP and 4) support and actively participate in the efforts of adaptation and mitigation of climate change in the landscape of GPNP to implement REDD+ plan in the area, which is according to Ministerial Degree No.45 (Amendment 2002). Also some related organizations who have specific technical advantages, for example, habitat management of Orangutan, carbon monitoring, participatory approach, introduction of alternative livelihood and so on, are joined to the forum as follows;

Organization name	Society of Friends of Gunung Palung (Forum)
Contact person	*Responsible person: under discussion (should be added)*
Title	The forum has been established according to Ministerial Degree No. 45, and consists of XX organizations from Governments, NGO and private sectors. Roles: 1. Strengthening the communication of the parties in the landscape GPNP 2. Develop collaboration in the area of landscape management GPNP 3. Creating synergy among the parties in the region and preserve the public welfare in the landscape GPNP 4. Support and actively participate in the efforts of adaptation and mitigation of climate change in the landscape GPNP
Address	Address: Jl. KH Wahid Hasyim 41-A, Ketapang, Kalimantan Barat, Indonesia
Telephone	Tel number: +62-(534) 33539
Email	E-mail (should be added)

Organization name	Gunung Palung National Park Office (GPNP)
Contact person	*Responsible person: under discussion (should be added)*
Title	Roles/ responsibilities: The GPNP office is responsible organization of the REDD+ program and secretariat of the Forum. The GPNP manages the task of forest conservation, forest monitoring. Also the GPNP has gathered opinions from all of stakeholders to help make profits as an incentive to sustain REDD+ over the mid- term and long-term.

This part has 4 options;
Following is case 2 and 3 which are "project" level which are targeting Gunung Palung National Park (GPNP) with management of GPNP Office and Village level with management of suitable body (e.g., NGO).

[Case 2 and 3: Project based REDD+ (GPNP or Village)]

The REDD+ plan is conducted by the GPNP (Figure 3). This REDD+ plan requires participation of various stakeholders to identify solutions to problems related to deforestation and forest degradation, a practice arising from unplanned land and forestry resource use and a major cause of deforestation and forest degradation in the area. The GPNP Office consulates all of stakeholder; NGO, local people and international/national donor organizations and manage all of REDD+ related activities. The following structure for implementing the REDD+ plan was developed as part of preliminary work.

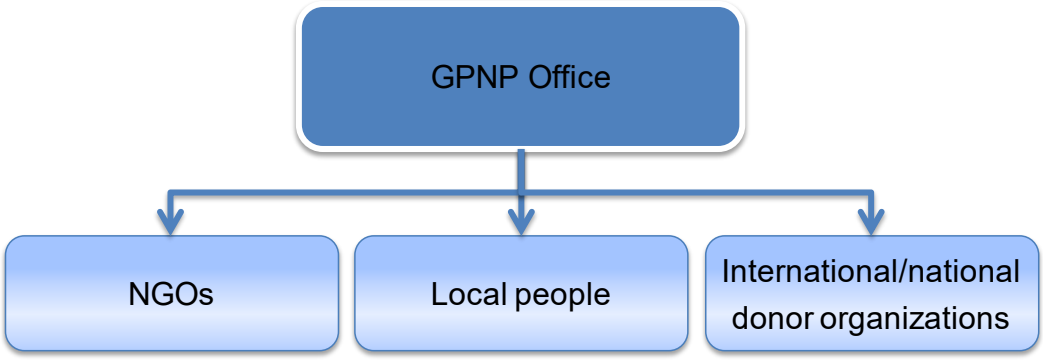


Figure 3 REDD+ plan implementation structure

Except for GPNP Office, some related organizations (e.g., NGO) who have specific technical advantages, for example, habitat management of Orangutan, carbon monitoring, participatory approach, introduction of alternative livelihood and so on, are joined to the REDD+ implementation team. Also in case of village level REDD+, similar implementation structure is to be developed, and suitable body/organization should be selected instead of GPNP Office,

This part has 4 options;
Following is case 4 which is targeting Kayong Utara (KKU) District and managed by KKU Government.

[Case 4: Sub-national based REDD+ (KKU)]

The REDD+ plan is conducted by KKU Government (Figure 4). This REDD+ plan requires participation of various stakeholders to identify solutions to problems related to deforestation and forest degradation, a practice arising from unplanned land and forestry resource use and a major cause of deforestation and forest degradation in the area. The KKU Government consulates all of stakeholder; NGO, local people and international/national donor organizations and manage all of REDD+ related activities. The following structure for implementing the REDD+ plan was developed as part of preliminary work.

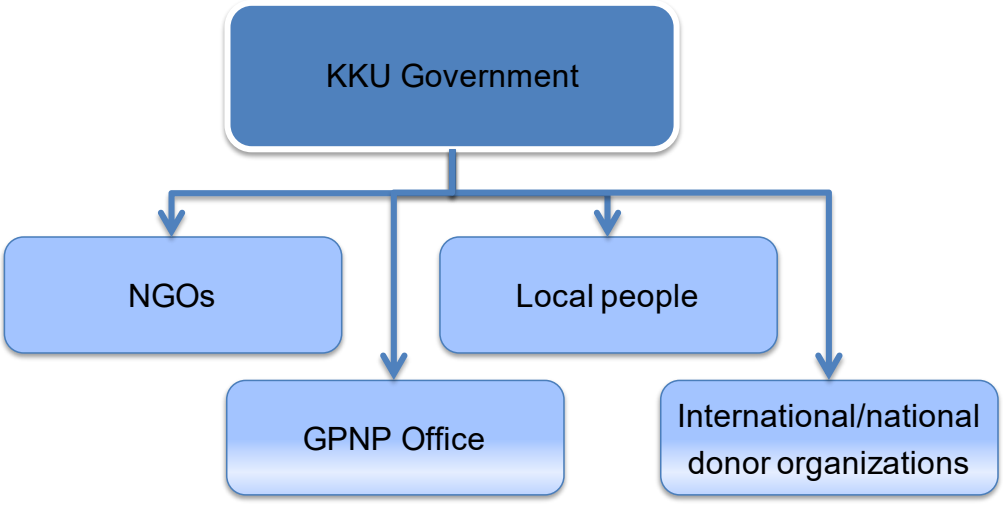


Figure 4 REDD+ plan implementation structure

Except for KKU Government, some related organizations (e.g., NGO) who have specific technical advantages, for example, habitat management of Orangutan, carbon monitoring, participatory approach, introduction of alternative livelihood and so on, are joined to the REDD+ implementation team.

3. Other Entities Involved in the REDD+ Program

This part has 4 options;
Following is case 1 which is targeting landscape REDD+ in project in Sukadana and Simpang Hilir Sub-Districts in Kayoug Utara District and is managed by the specific forum among some organizations.

[Case 1: Landscape based REDD+]

This REDD+ plan has involved some organizations that have implemented REDD+ and their related activities. Each organization has many experiences to address to forest conservation activities in West Kalimantan Provinces and their knowledge is very specific to implement REDD+ activities in the area. Following organizations are core members and intensively implement REDD+ plan.

Organization	Yayasang Palung
Activity Start Year	From 2009 they have conducted "Gunung Palung Orangutan Conservation Program
Target village/area	Padu Banjar, Pulau Kumbang, Pemangkat, Nopah Kuning and Rantu Panjang villages in total 6,000 ha in SH. VV has planned to have concession of Hutan Desa (2,000 ha)
Activity Type	Hutan Desa (Village forest) in Simpan Hilir sub-district Habitat conservation: They have conducted "Gunung Palung Orangutan Conservation Program" which including scientific research, conservation and education activities. See details in Appendix 3
Concession type	Hutan Desa (2,000 ha, under preparing)

Organization	Alam Sehat Lestari (ASRI)
Activity Start Year	2007- Human health care services and forest care (against illegal logging) 2012- Environmental Education 2011- Forest Conservation (Forest guardians)
Target village/area	Total 24 villages, deeply 2 villages (Sudahan Jaya and) Reforestation 20 ha and restore 6 ha as key corridor for orangutan
Activity Type	Human healthcare service (against illegal logging): evaluating impact on illegal logging in village base in Sukadana sub-district Environmental Education: targeting children Forest Conservation: Forest Guardians monitor logging in their communities and conduct outreach for seeking alternative livelihood to loggers.
Concession type	-

Organization	Fauna & Flora International (FFI)
Activity Start Year	2007- Protecting carbon-rich peat forests in West Kalimantan (landscape-based HCVF assessment) 2011-2014 Asia-Pacific Community Carbon Pools and REDD+ Program
Target village/area	- Asia-Pacific Community Carbon Pools and REDD+ Program :Total 6 villages in Ketapang district (Including Laman Satong village) - Landscape-based HCVF assessment: Kapuas Hulu and Ketapang districts (working with oil palm plantation company, PT. PAS)
Activity Type	- Asia-Pacific Community Carbon Pools and REDD+ Program: conducting project pilot site included six villages, covering 14,325 ha of hutan desa (village forest) in Ketapang district. - High Conservation Value Forest (HCVF): protecting key orangutan habitat from conversion to palm oil plantations. FFI has been conducted HCVF at landscape level in community swamp forest.
Concession type	HCVF

Organization	Cipta Usaha Sejati Ltd (PT. CUS)
Activity Start Year	In 2008, a license was issued with letter No.280 by the forestry service.
Target village/area	Simpang Hilir sub-district The area including two village; Perawas and Sungai Rembawan,
Activity Type	- Under preparation for registering VCS VM0004, it aims to 1) Prevent conversion of the site to oil palm plantation Restore the vegetation to its original condition, 2) Improve the well-being of the local communities surrounding the project area by empowering their capacity, 3) Quantify avoided emissions associated with the conservation of this peat swamp forest and 4) Sell Verified Emission Reductions (VERs) generated by the project. - PT. CUS is a member of Roundtable on Sustainable Palm Oil (RSPO) operating two oil palm estate in Kayong Utara under PT.CUS (26,206 ha) and PT. Jalin Vaneo (18,909ha).
Concession type	The area is categorized as Other Land Use Areas (APL= Area untuk Penggunaan Lain), through Surat Keputusan Menteri Kehutanan No. SK.265/Menhut-II/2008 on 1 August 2008, for an area of 18,042.49 ha. PT CUS/JV has a clearing license for the area within the project site, and an Exploitation Rights (HGU = Hak Guna Usaha).

Organization	Forestry department of Kayong Utara District
Activity Start Year	In 2007, district was formed under Law No.6 of 2007 from Ketapang district.
Target village/area	24 in total and one ranger
Activity Type	Kayong Utara District
Concession type	- The department has 3 section; Protection forest, Rehabilitation forest and Plantation - Managing forest area (HL,HP,(HTI)) - Conducting Hutan Desa activities in Karimata island

This part has 4 options;
In case of case 2, 3 and 4, only GPNP Office or Village authority are proponent of the REDD+, and other entities involved in the REDD+ are depend on selection of REDD+ implementing scheme (whether collaborate with NGO or not). Therefore assuming each option's structure of the REDD+ is quite difficult by considering unclear REDD+ institutional arrangement in Indonesia.

[Case 2 and 3: Project based REDD+ (GPNP or Village)]

It is difficult to assume future implementing structure or collaboration system including other entities of NGO, local people and others.

This part has 4 options;
Following is case 4 which is targeting Kayong Utara (KKU) District and managed by KKU Government.

[Case 4: Sub-national based REDD+ (KKU)]

It is difficult to assume future implementing structure or collaboration system including other entities of NGO, local people and others.

4. REDD+ Start Date

This part is general description for explaining project start date. Following will be applied in various cases of REDD+ project in Kayong Utara District with no revision.

The start date of the proposed REDD+ plan's activities is June 1, 2016. The real activities of the REDD+ plan began on June 1, 2016, with the first orientation meeting in Sukadana Sub-district, Kayong Utara District.

5. REDD+ Crediting Period

This part is general description for explaining crediting period. Following will be applied in various cases of REDD+ project in Kayong Utara District with no revision.

The crediting period is 20 years: from June 1, 2016 to May 31, 2035 (the plan period is 40 years: from June 1, 2016 to May 31, 2055).

6. Estimated GHG Emission Reductions and/or Removals

This part is general description for explaining amount of GHG emission reduction or removals. Following will be applied in various cases of REDD+ project in Kayong Utara District with only revising and filling estimated values of its case.

Ex-ante estimates to determine plan scale were provided only for the first 10-year baseline period through to May 31, 2025.

The estimated mean annual GHG emission reductions by the plan (i.e., after accounting for leakage and prior to buffer withholding) are provided below (Table 2). Since the first baseline period is only 10 years, total GHG benefits are 7,823,620 tCO_2e.

Table 2 Estimated GHG emission reductions (tCO_2e) in the REDD+ program

Years	Estimated GHG emission reductions or removals (tCO_2e)
2016	782,362
2017	782,362
2018	782,362
2019	782,362
2020	782,362
2021	782,362
2022	782,362
2023	782,362
2024	782,362
2025	782,362
Total estimated ERs	7,823,620
Total number of crediting years	10
Average annual ERs	782,362

7. Location and Geographic Boundaries

This part is general description for explaining location and geographical boundaries. Following will be applied in various cases of REDD+ planroject in Kayong Utara District with only changing map and its related information.

West Kalimantan Province is located in the western part of the island of Kalimantan (formerly known as Borneo) or between 2°08” North Latitude and 3°05’ South Latitude and between 108°0’ East Longitude and 114°10’ East Longitude on the map of the earth. Based on that geographical location, West Kalimantan Province is traversed by the Equator (0° latitude) precisely on the city of Pontianak. West Kalimantan Province is also one of the tropical areas whose temperatures and humidity are quite high. Another characteristic of West Kalimantan Province is that it one of the provinces in Indonesia that is directly adjacent to a foreign country, that is, the State of Sarawak, East Malaysia.

Most of West Kalimantan Province is low-lying land with an area of 146,807 km^2 or 7.53% of the total area of Indonesia or 1.13 times the island of Java. The region stretches straight more than 600 km from north to south and about 850 km from west to east. In terms of size, West Kalimantan Province is the fourth largest province in Indonesia (204,534 km^2). West Kalimantan Province is a sub-national Government administration with 14 districts/cities, including REDD+ plan site of Kayong Utara District (Figure 5).

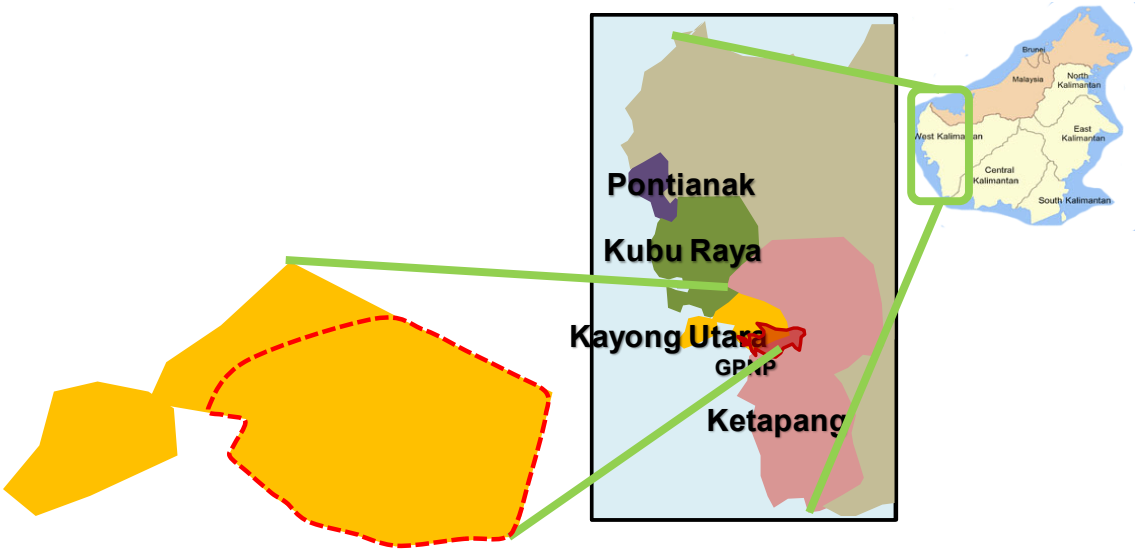


Figure 5 REDD+ program Location

The target site in this REDD+ program is Sukadana (1,027.1 km^2 in total) and Simpang Hilir Sub-districts (1,421.8km^2 in total) in Kayong Utara District (Figure 6). According to administrative boundary, there are 22 villages, which are 10 in Sukadana sub-district and 12 in Simpang Hilir sub-District. General information on each village is shown in Table 3.

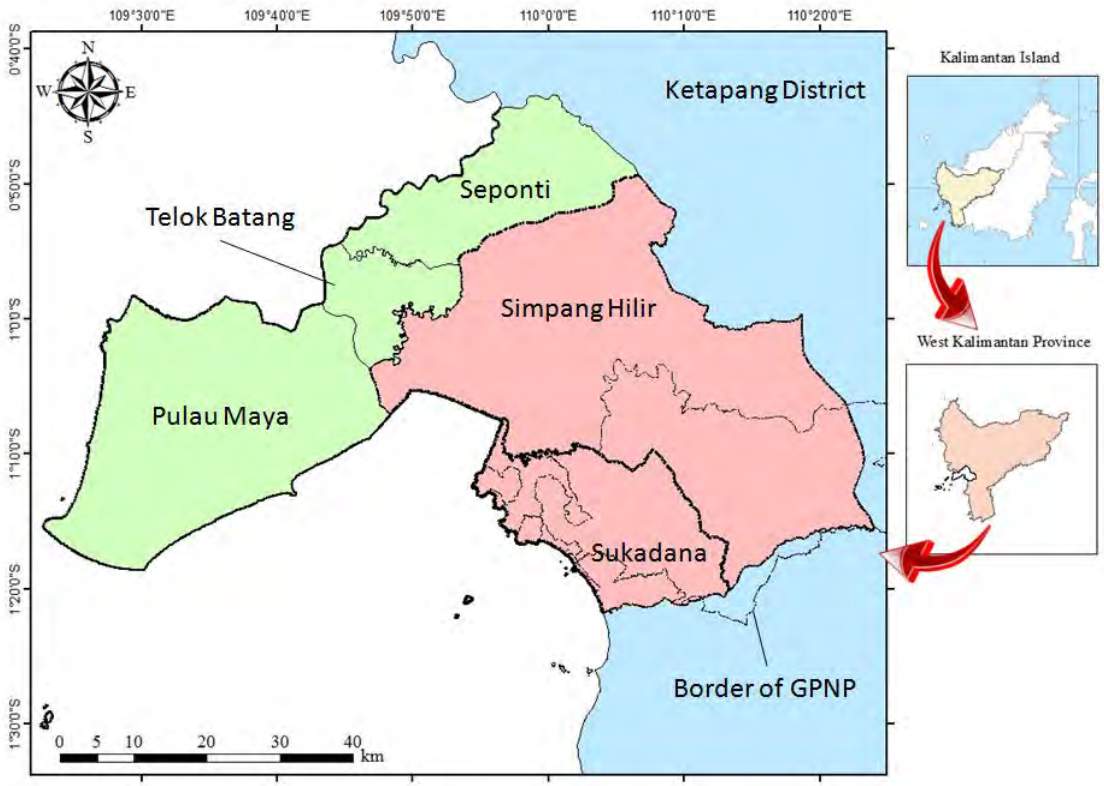


Figure 3 Location of both of Sukadana and Simpang Hilir sub-Districts

Table 3 General information on villages inside target area

Village name		Establishment of the Village	Registration of the Village	Number of sub-village in 2011	Number of households in 2011	Population	Major ethnic group	Land area (km^2)	Distance from District Center (km)
Sukadana	Simpang Tiga			3	466	1,730	Malay	75.0	21.0
	Sejahtera	N/A	1980	3	526	1,858	Malay, Bugis	126.7	5.0
	Pangkalan Buton	1978	1978	4	711	3,289	Malay	70.2	2.0
	Sutera			5	1074	4,733	Malay, Madura	63.3	0.0
	Benawai Agung	N/A	1985	3	588	2,084	Malay, Madura	144.4	6.0
	Harapan Mulia			3	702	2,492	Malay	192.0	12.0
	Sedahan Jaya	2005	2006	4	508	2,053	Malay, Jawa, Bali	41.3	7.5
	Gunung Sembilan	2005	2006	3	296	967	Malay	27.0	1.5
	Pampang Harapan	N/A	2007	3	269	1,136	Malay	64.3	21.5
	Riam Berasap Jaya			3	423	1,699	Malay	75.0	20.5
Simpang Hilir	Padu Banjar	1913	N/A	6	1028	3268	Malay	105.8	23.2
	Pulau Kumbang			4	572	2284	Malay	5.3	17.1
	Pemangkat			3	459	1597	Malay, Jawa	27.0	9.2
	Nipah Kuning			5	712	2536	Malay	27.0	4.8
	Rantau Panjang	1942	N/A	8	1012	3935	Malay, Jawa, China	49.3	5.0
	Penjalaan	1987	1992	3	647	2509	Malay	96.3	4.0
	Telok Melano			3	748	2822	Malay, China	7.4	0.6
	Sungai Mata Mata	1931	1958	4	887	3109	Malay	323.2	3.8
	Batu Barat	1942	1981	4	483	1903	Malay	183.2	16.0
	Matan Jaya			4	564	2475	Malay	312.1	87.0
	Lubuk Batu			2	234	890	Malay	276.5	60.0
	Medan Jaya	2005	2005	3	503	2010	Malay, Bugis	8.7	0.3

(1) Climatic conditions

The climate in West Kalimantan Province, including the project area of Sukadana and Simpang Hilir Sub-districts, is classified as "Tropical Rainforest Climate" under the Köppen climate classification. In Ketapang District facing on Kayong Utara District, the mean monthly high temperature ranges from 30.66°C in January to 32.36°C in May. The mean monthly low ranges from 23.34°C in July to 24.64°C in January (Figure 6). Annual rainfall is 3,134 mm (with monthly low of 125.1 mm in September and monthly high of 455.2 mm in November) (Figure 7).

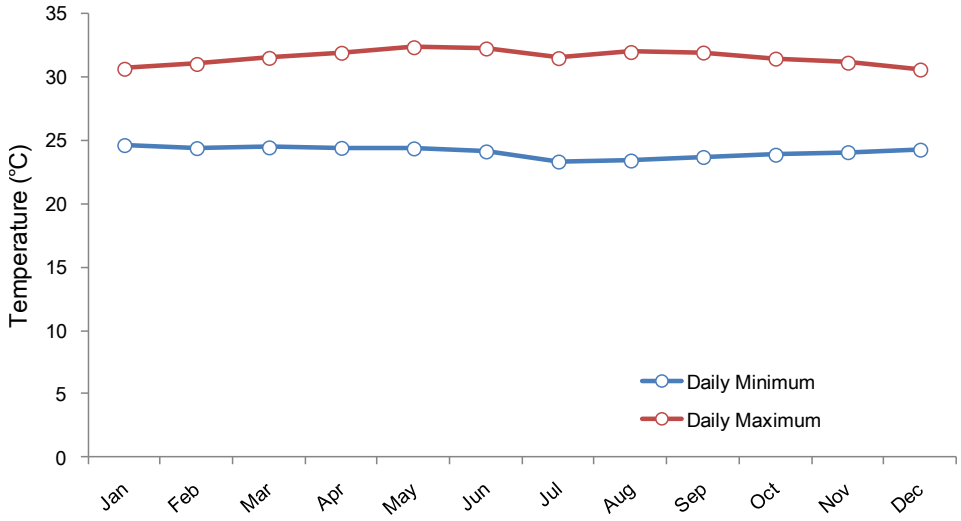


Figure 6 Temperature at the target site in West Kalimantan Province (Based on monthly averages for the 50-year period 1951-2000)

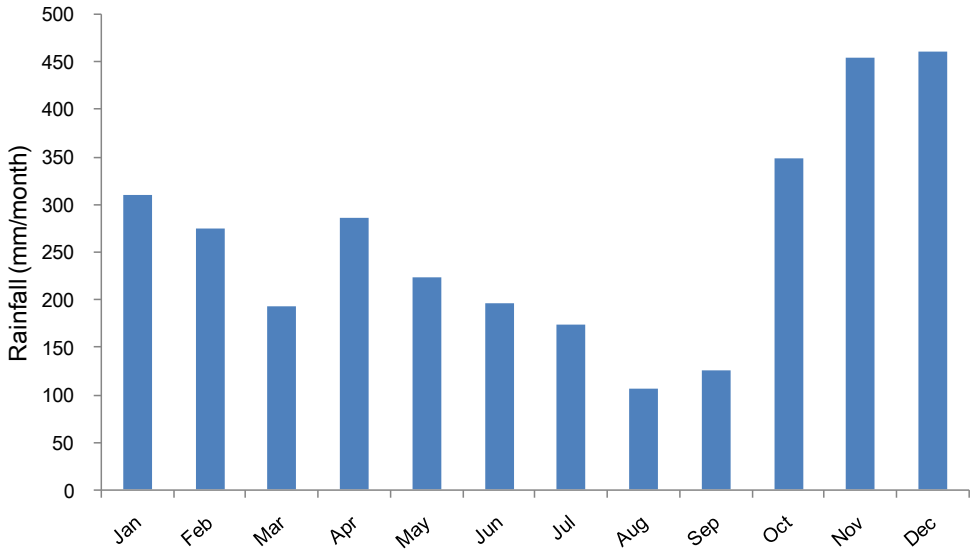


Figure 7 Rainfall at the target site in West Kalimantan Province (monthly averages for the 5-year period 2008-2012)

(2) Ecosystem conditions

The reference region of Kayong Utara District is located in southern West Kalimantan Province. The altitude of the main settlement in the REDD+ plan site is under 100 m. The native vegetation is the typical forest.

(3) Land use condition

Current land use is significantly affected by human activities. Rich forests have been converted to degraded forests. The results of land use analysis based on satellite imagery in Kayong Utara District or reference region show “Secondary Swamp Forest” was decreased 71,235 ha (approximately 61% compared with 2000). Land use in the project area is very similar to the typical pattern in Kayong Utara District in West Kalimantan Province.

(4) Endangered species

The reference region is including the habitat area of Orangutan. The some organizations have had activities/works to protect endangered wild Orangutans especially around the GPNP. This REDD+ program also makes consideration for endangered species.

All target area (i.e. project area) is under control by the REDD+ plan. Spatial boundaries consist of reference region, project area, leakage belt and forest (Figure 5). In this REDD+ plan, the plan set spatial boundaries based on following concepts.

8. Reference region

The concept of reference region should be different with each REDD+ plan (direction), but in all of directions of REDD+ target site are almost inside KKU. Therefore following will be applied in various cases of REDD+ project in Kayong Utara District with no revision.

As shown in Figure 8, reference region in this plan (landscape base) are overall area in Kayong Utara District, West Kalimantan Province and it was because West Kalimantan Province and/or Kayong Utara District had not been developed sub-national baselines. Therefore, reference region was identified as overall Kayong Utara District including the project area of Sukadana and Simpang Hilir Sub-districts. It was because there is a typical forest ecosystem which is similar to the project area. Therefore, it is appropriate to set overall Kayong Utara District as the reference region for the project area. In the overall Kayong Utara District, the area under severe deforestation and forest degradation is expanding due to some drivers, which makes it even more appropriate to identify the overall district as the reference region for the project area. The reference region has an area of 413,208 ha (consist of 220,793 ha of forest area and 192,415 ha of non-forest area) – approximately 2 times bigger than the project area.

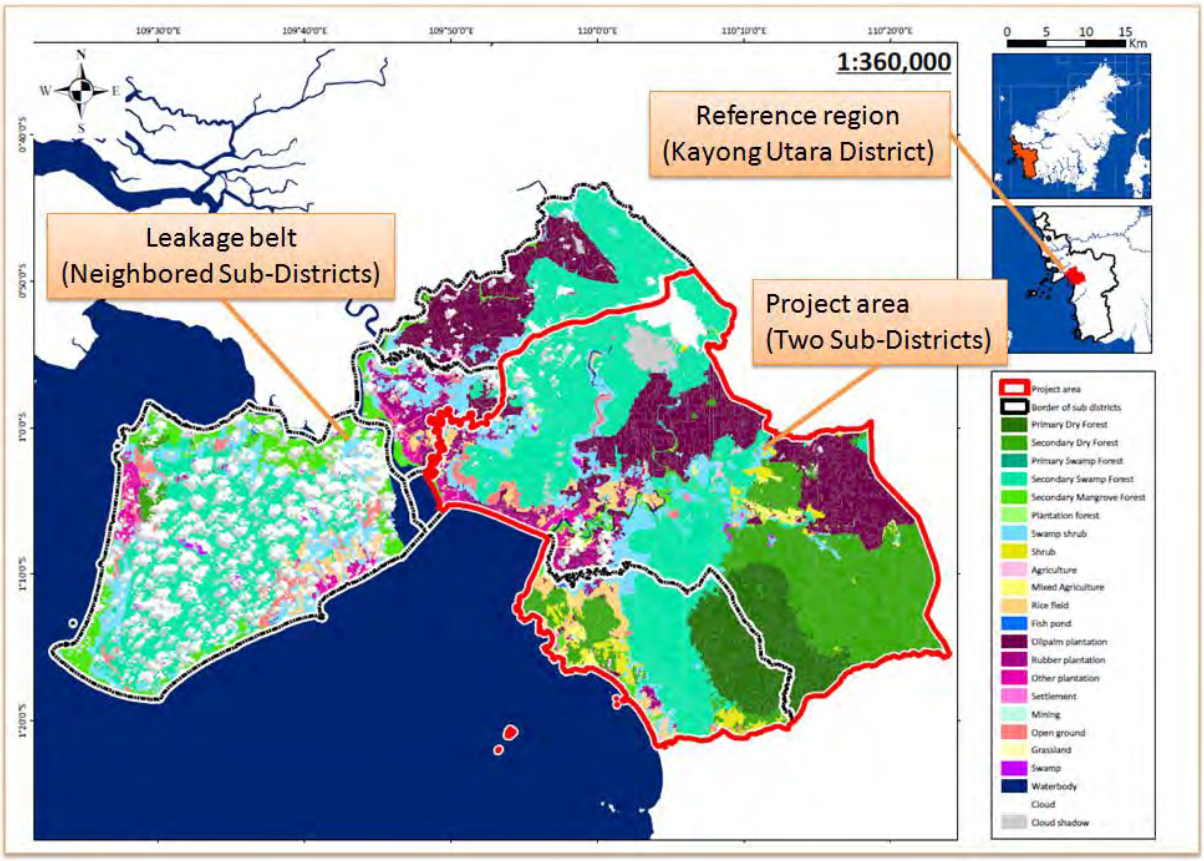


Figure 8 Spatial boundaries of reference region, project area and leakage belt

9. Project area

This part is general description for explaining project area. Following will be applied in various cases of REDD+ project in Kayong Utara District with revision of map and its explanation.

As shown in Figure 6, project area, which is project area in this PD are Sukadana and Simpang Hilir Sub-districts in Kayon Utara District, West Kalimantan Province. The location of the project area, including each village, main road and other related information are shown in Figure 9.

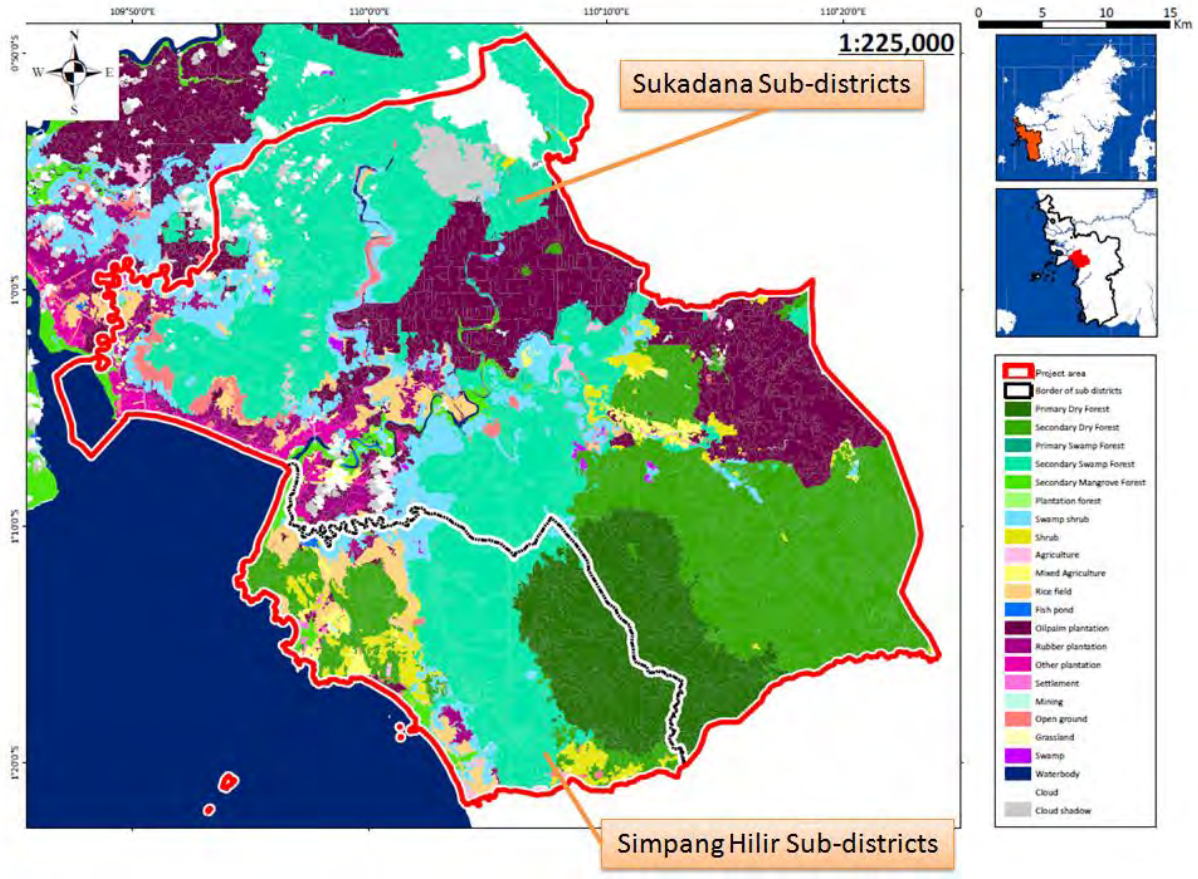


Figure 9 Project area of Sukadana and Simpang Hilir Sub-districts

The project area includes all forests area observed according to Indonesian National Forest Inventory within the boundaries of the project area and reference region, as illustrated in Figure 8. The total project area is 222,324 ha (project area is 133,615 ha including 88,709 ha of non-forest area) and location in each village is mentioned in Figure 9.

10. Leakage belt

This part is general description for explaining leakage belt. Following will be applied in various cases of REDD+ project in Kayong Utara District with revision of map and its explanation.

As shown in Figure 8, leakage belt in this project are same as reference region (overall area in Kayong Utara District, West Kalimantan Province). From results of preliminary survey before the commencement of the REDD+ program and mobility analysis by expert opinion and participant rural appraisal (PRA) of the REDD+ program, leakage belt was identified as neighbor regions in Kayong Utara District where is same as reference levels. Opinions from Officials of Kayong Utara District Government had been supported such concept of leakage belt.

11. Definition of Forest

This part is general description for explaining definition of forest. Following should be applied in all of cases of REDD+ plan in Indonesia.

According to the definition of Indonesian National Forest Inventory, the specific definition of forests in this REDD+ program is identified and applied to the REDD+ program as follows;

Minimum area of land	0.25 ha
Average tree height	5 m
Minimum tree crown cover	30% and above

Primary Dry Forest around GPNP

Oil palm (categorized as cropland) around GPNP

Also, forest classification such as primary dryland forest, Secondary dryland forest, Primary swamp forest and so on are adopted by Indonesian National Forest Inventory according to Minister Degree of SNI 8033, 2014. The baseline scenario is based on a multi-temporal historical analysis of deforestation. The analysis yielded a digital map of forest cover, deforestation that was filtered to a minimum-mapping unit (MMU) of 1.0 ha; the forest class has an overall accuracy of 80%. The forest benchmark was generated from the multi-temporal historical analysis. Also some area covered by clouds and shadows were analyzed according specific methodology. This forest class is according to Indonesian National Forest Inventory (Table 4).

Table 4 Applied forest class in this REDD+ program[2]

Forest class	Definition	Land clarification according to IPCC
Primary dryland forest	Natural tropical forests grow on non-wet habitat including lowland, upland, and montane forests with no signs of logging activities. The forest includes pygmies and heath forest and forest on ultramafic and lime-stone, as well as coniferous, deciduous and mist or cloud forest.	Forest
Secondary dryland forest	Natural tropical forest grows on non-wet habitat including lowland, upland, and montane forests that exhibit signs of logging activities indicated by patterns and spotting of logging. The forest is including pygmies and heath forest and forest on ultramafic and lime-stone, as well as coniferous, deciduous and mist or cloud forest.	Forest
Primary swamp forest	Natural tropical forest grows on wet habitat including brackish swamp, sago and peat swamp, with no signs of logging activities	Forest
Secondary swamp forest	Natural tropical forest grows on wet habitat including brackish swamp, sago and peat swamp that exhibit signs of logging activities indicated by patterns and spotting of logging	Forest
Primary mangrove forest	Inundated forest with access to sea/brackish water and dominated by species of mangrove and Nipa (Nipa frutescens) that has no signs of logging activities	Forest
Secondary mangrove Forest	Inundated forest with access to sea/brackish water and dominated by species of mangrove and Nipa (Nipa frutescens) that exhibit signs of logging activities indicated by patterns and spotting of logging	Forest
Plantation forest	Planted forest including areas of reforestation, industrial plantation forest and community plantation forest	Forest
Dry shrub	Highly degraded log over areas on non-wet habitat that are ongoing process of succession but not yet reach stable forest ecosystem, having natural scattered trees or shrubs	Grassland
Wet shrub	Highly degraded log over areas on wet habitat that are ongoing process of succession but not yet reach stable forest ecosystem, having natural scattered trees or shrubs	Grassland
Savanna and Grasses	Areas with grasses and scattered natural trees and shrubs. This is typical of natural ecosystem and appearance on Sulawesi Tenggara, Nusa Tenggara Timur, and south part of Papua island. This type of cover could be on wet or non-wet habitat	Grassland
Pure dry agriculture	All land covers associated to agriculture activities on dry/non-wet land, such as tegalan (moor), mixed garden and ladang (agriculture fields)	Cropland

[2] Directorate General of Climate Change 2015. National Forest Reference Emission Level for Deforestation and Forest Degradation in the Context of the Activities Referred to in Decision 1/CP.16, Paragraph 70 UNFCCC

Table 4 *continued*

Forest class	Definition	Land clarification according to IPCC
Mixed dry agriculture	All land covers associated to agriculture activities on dry/non-wet land that mixed with shrubs, thickets, and log over forest. This cover type often results of shifting cultivation and its rotation, including on karts	Cropland
Estate crop	Estate areas that has been planted, mostly with perennials crops or other agriculture trees commodities	Cropland
Paddy field	Agriculture areas on wet habitat, especially for paddy, that typically exhibit dyke patterns (pola pematang). This cover type includes rain-fed, seasonal paddy field, and irrigated paddy fields	Cropland
Transmigration areas	Kind of unique settlement areas that exhibit association of houses and agroforestry and/or garden at surrounding	Settlement
Fish pond/aquaculture	Areas exhibit aquaculture activities including fish ponds, shrimp ponds or salt Ponds	Wetland
Bare ground	Bare grounds and areas with no vegetation cover yet, including open exposure areas, craters, sandbanks, sediments, and areas post fire that has not yet exhibit regrowth	Other land
Mining areas	Mining areas exhibit open mining activities such as open-pit mining including tailing ground	Other land
Settlement areas	Settlement areas including rural, urban, industrial and other settlements with typical appearance	Settlement
Port and harbor	Sighting of port and harbor that big enough to independently delineated as independent object	Other land
Open water	Sighting of open water including ocean, rivers, lakes, and ponds	Wetland
Open swamps	Sighting of open swamp with few vegetation	Wetland
Clouds and no-data	Sighting of clouds and clouds shadow with size more than 4 cm2 at 100.000 scales display	No data

12. Program Boundary

This part is general description for explaining definition of forest. Following should be applied in all of cases of REDD+ plan in Indonesia.

In line with 2006 IPCC Guidelines for National Greenhouse Gas Inventories “Volume 4 Agriculture, Forestry and Other Land Use”, carbon pools, which are target of GHG emissions and removals, are defined as following Table 5.

Table 5 Selected Carbon Pools

Carbon pools	Included/excluded	Justification/Explanation of choice
Aboveground	Included	The baseline land use in the project area is conversion of forests to other land use, and degradation of natural and secondary forests by pioneer shifting cultivation. Therefore the carbon stock in this pool is likely to be relatively large compared to the REDD+ program scenario.
Belowground	Included	Recommended by the methodology as it usually represents between 15% and 30% of the above-ground biomass.
Dead wood	Excluded	Conservatively excluded (the carbon stock in this pool is not expected to be higher than the baseline compared to the REDD+ program scenario).
Harvest wood products	Excluded	Under the baseline scenario, illegal or selective logging occurs at very small scale. Such results were supported by results of preliminary survey. Therefore, harvested wood products have been considered insignificant.
Litter	Excluded	Not to be measured
Soil organic carbon	Included	To be measured

Also GHG types which are target of GHG emissions and removals are defined as following Table 6.

Table 6 Identified source of GHG types

	Gas	Included?	Justification/Explanation
Biomass burning	CO_2	Excluded	Counted as carbon stock change
	CH_4	Excluded	Considered insignificant
	N_2O	Excluded	Considered insignificant
Livestock emissions	CO_2	Excluded	Not counted as carbon stock change
	CH_4	Excluded	Not a significant source.
	N_2O	Excluded	Not a significant source.
Paddy field	CO_2	Excluded	Not counted as carbon stock change
	CH_4	Excluded	Not a significant source.
	N_2O	Excluded	Not to be measured

13. Land and Forest Dynamics

This part is general description for estimation process of land and forest area dynamics according to the methods of Indonesian national forest reference emission levels. Following should be applied in various cases of REDD+ project in Kayong Utara District with revision of target site. But land cover map in each year and estimated land and forest area dynamics as follows should be revised according to selected REDD+ site (directions).

The REDD+ program defined 23 land-cover classes, and many possible combinations of land-cover change categories.

The best practice in the remote sensing field emphasizes the use of medium resolution imagery as a very cost-effective method for classifying and monitoring forest cover and loss, and the type of spectral analysis using such imagery is sufficient to accurately distinguish closed-canopy forest from many vegetation formations. LANDSAT imagery, one such type of medium resolution imagery, was used in this REDD+ program to map the forest cover and loss. Following pictures shows areas of typical fallow in the REDD+ program site.

Landscape in Kayong Utara District facing GPNP

Land-cover change data for the reference region were mapped by JICA IJ-REDD+, via time-series analysis using satellite imagery of optical sensor data: LANDSAT-Thematic Mapper (TM) LANDSAT-Enhanced Thematic Mapper Plus (ETM+), for the reference period of 2000 to 2013. As a result, 23 classes were mapped, including forest cover and loss, non-forest, cloud, and water. In order to assure a high quality analysis, IJ-REDD+ special pre-processing, IJ-REDD+ interpretation and classification, and IJ-REDD+ post-processing steps was applied, and land-cover maps were developed (

Figure 10 to Figure 14).

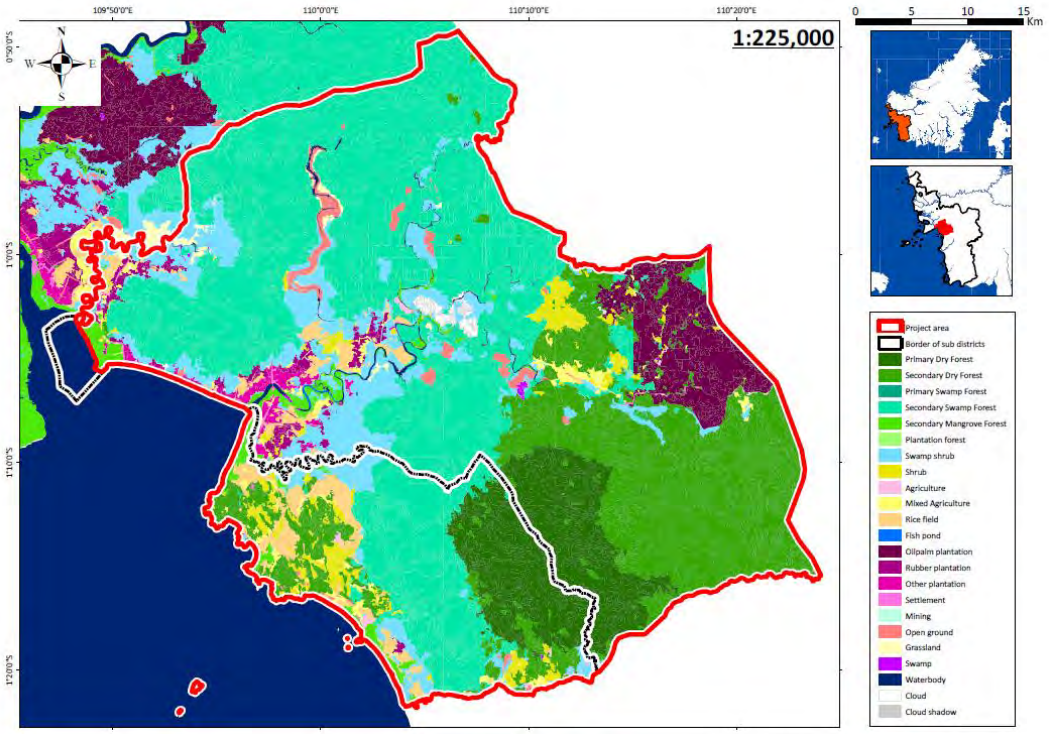


Figure 10 Land cover in reference period from 2000

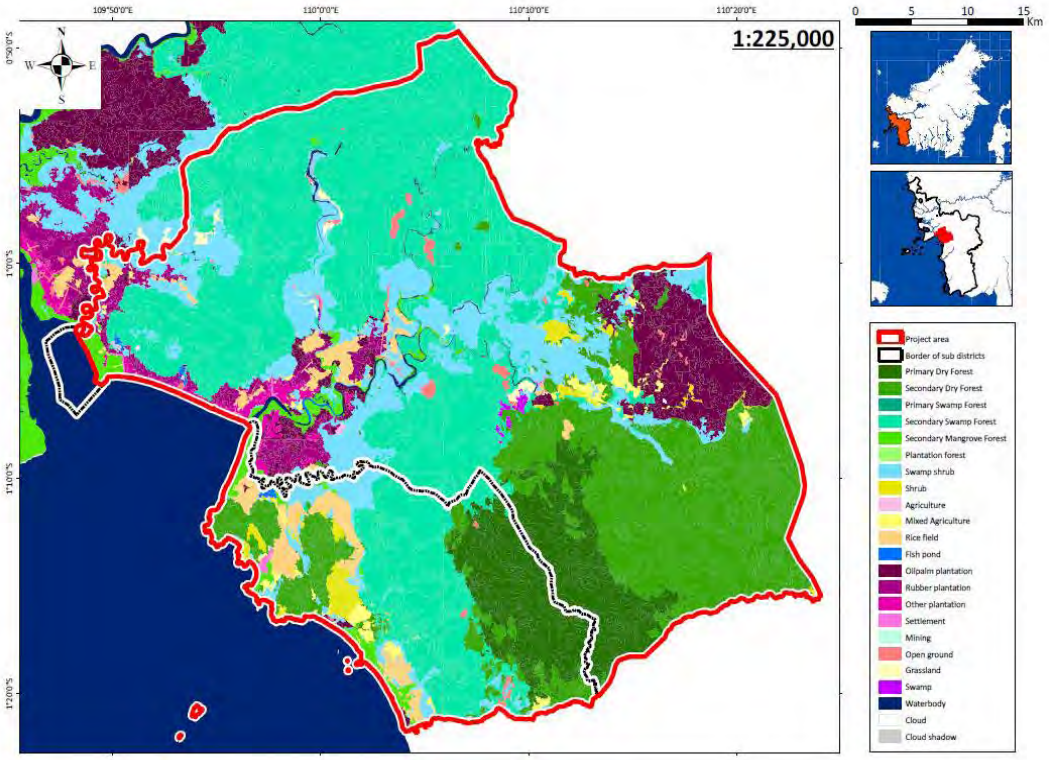


Figure 11 Land cover in reference period from 2006

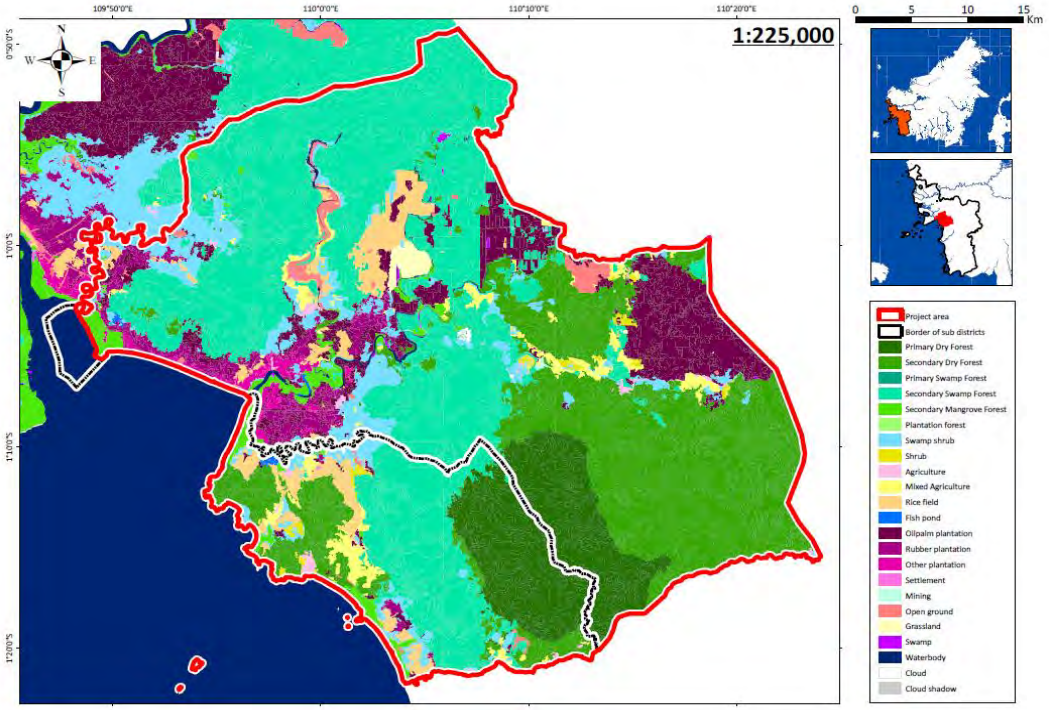


Figure 12 Land cover in reference period from 2009

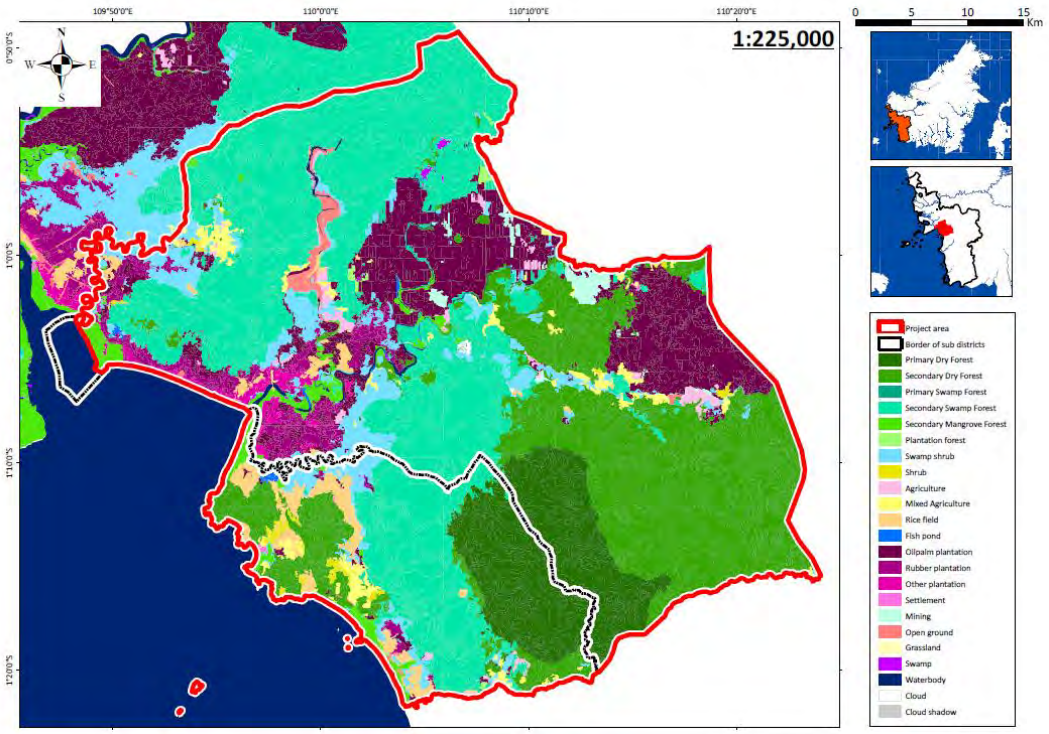


Figure 13 Land cover in reference period from 2011

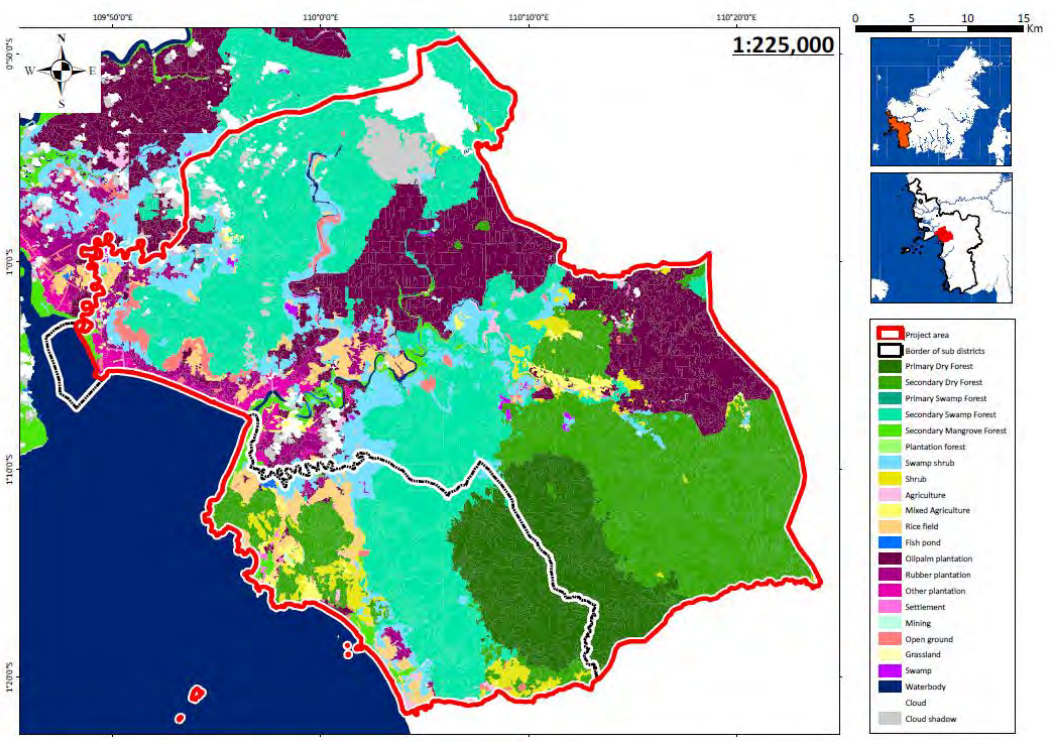


Figure 14 Land cover in reference period from 2013

From analysis by using land cover map in

Figure 10 to Figure 14, land dynamics in each category of reference region, project area and leakage belt are shown in

Figure 15 to

Figure 17 .

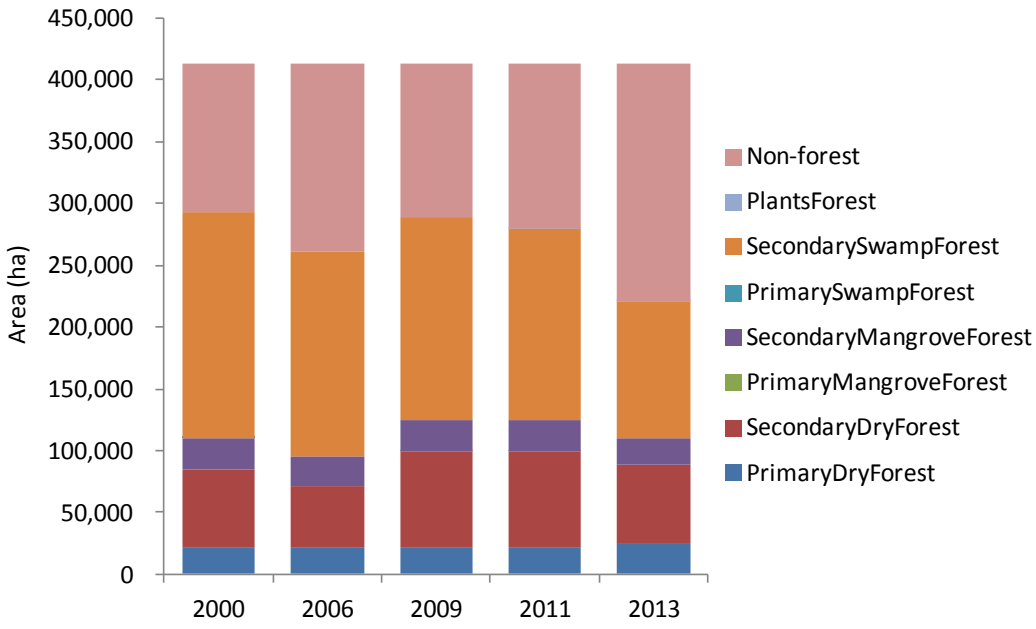


Figure 15 Dynamics of each type of forest area in reference region

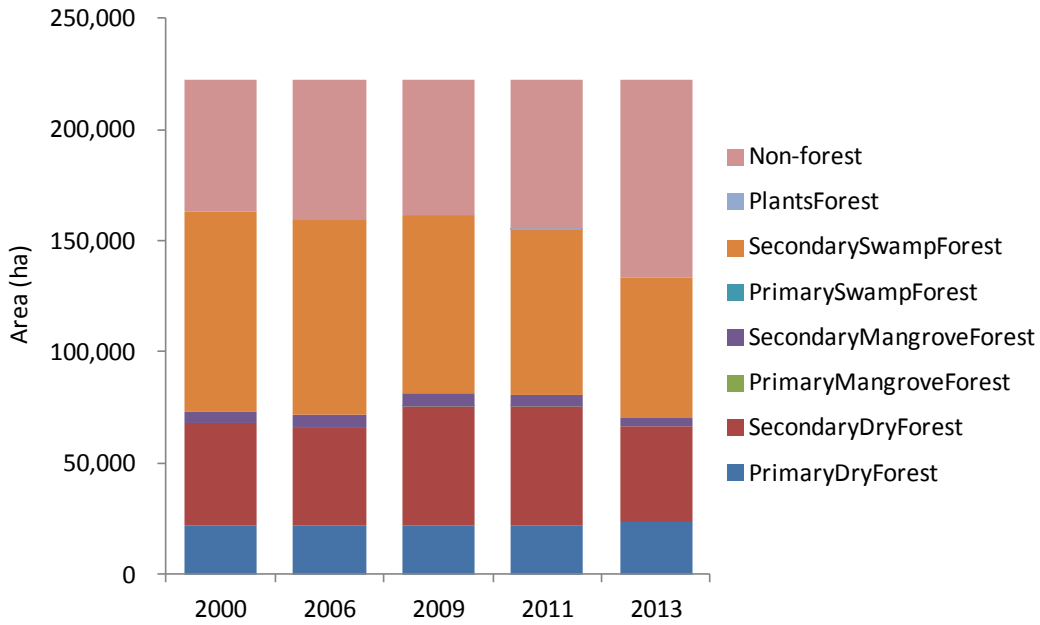


Figure 16 Dynamics of each type of forest area in project area

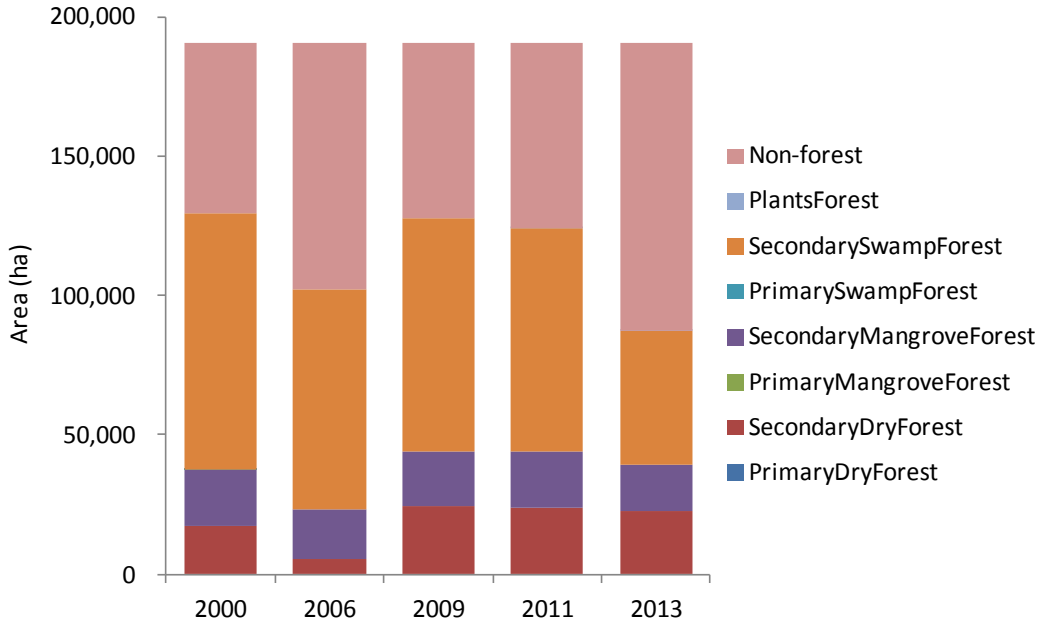


Figure 17 Dynamics of each type of forest area in leakage belt

The 2013 land cover classification developed by the methodology of this REDD+ program was validated by ground truth data of 1,143 points within West Kalimantan Province, which was acquired by IJ-REDD+. All plots were located within forested areas in project area, reference region and some plots are located in outside of reference region (but from same forest type and vegetation). The resulting confusion matrix for

forest and non-forest is presented in Table 7. The overall accuracy was 82.1%.

Table 7 Result of accuracy assessment for forest and non-forest (2010 land cover classification by this REDD+ program's methodology)

		Verf																								
V4_13		2001_PrimaryDryForest	2002_SecondaryDryForest	2004_PrimaryMangroveForest	20041_SecondaryMangroveForest	2005_PrimarySwampForest	20051_SecondarySwampForest	2006_PlantsForest	2007_Shrub	20071_SwampShrub	20091_Agriculture	20092_MixedAgriculture	20093_RiceField	20094_FishPond	2010_Plantation_oilpalm	2010_Plantation_others	2010_Plantation_rubber	2012_Settlement	2014_OpenGround	20141_Mining	3000_GrassLand	5001_WaterBody	50011_Swamp	SubTotal	Matched data	Class accuracy
Classification	2001_PrimaryDryForest	40																						40	40	100.0
	2002_SecondaryDryForest		86						2			4												92	86	93.5
	2004_PrimaryMangroveForest																									
	20041_SecondaryMangroveForest				73		2			3												3		81	73	90.1
	2005_PrimarySwampForest					29	1																	30	29	96.7
	20051_SecondarySwampForest		1		2	1	84			8						1			1					98	84	85.7
	2006_PlantsForest						1	36											2					39	36	92.3
	2007_Shrub		4						48	13	1	6			1				2					75	48	64.0
	20071_SwampShrub			1	1		3		6	81	1	2	1		1	3	1		1					102	81	79.4
	20091_Agriculture								1	6	38					3	1	1						50	38	76.0
	20092_MixedAgriculture		5						10	2		45	2				3	1	3		1			72	45	62.5
	20093_RiceField								1	8	4		63			5			5					86	63	73.3
	20094_FishPond									1			2	36								2	1	42	36	85.7
	2010_Plantation_oilpalm						2		1	4	2				71	1		1	5					87	71	81.6
	2010_Plantation_others								1	2	2	1	3			66	2	1						78	66	84.6
	2010_Plantation_rubber									6	2		3				66						1	78	66	84.6
	2012_Settlement									2	2							53	12				2	71	53	74.6
	2014_OpenGround								1	5		1	2		3	1			75					88	75	85.2
	20141_Mining									1		1	2			1			9	31		2		47	31	66.0
	3000_GrassLand																				9			9	9	100.0
	5001_WaterBody						1															78	1	80	78	97.5
	50011_Swamp						4			5									4				35	48	35	72.9
	SubTotal	40	96	1	76	30	98	36	71	147	52	60	78	36	76	81	73	57	119	31	10	85	40	1393	1143	82.1

14. Peat Soil Distribution

This part is general description for identifying peat soil distribution. In case of IJ-REDD+ activities in West Kalimantan Province, new peat distribution map was prepared and applied it in REDD+ plan of landscape level as follows. However national adopted methodologies to identify peat distribution map is still unclear even in March 2016. Therefore it is very difficult to select suitable methodologies r select official peat distribution map.

To estimate carbon stock change in above-ground and below-ground biomass, we used analyzed land cover maps and emission factors. On the other hand, as specific situation in West Kalimantan Province, GHG emissions from peat soil were also important when we estimate landscape level's GHG emission with high accuracy. Then, in this PD, peat soil distribution was improved by field survey (*see* pictures below), which was based on internationally used peat soil distribution map prepared by the Wetland International[3].


Survey of peat soil distribution

For improving peat soil distribution in 4 districts facing on ocean in West Kalimantan Province, 324 points are surveyed and soil type and peat depth are monitored and recorded (

Figure 18). From such survey, peat soil distribution applied in this PD was improved (Figure 19).

[3] Wetlands International 2004. Maps of peatland distribution and carbon content in Kalimantan, 2000-2002. 51.

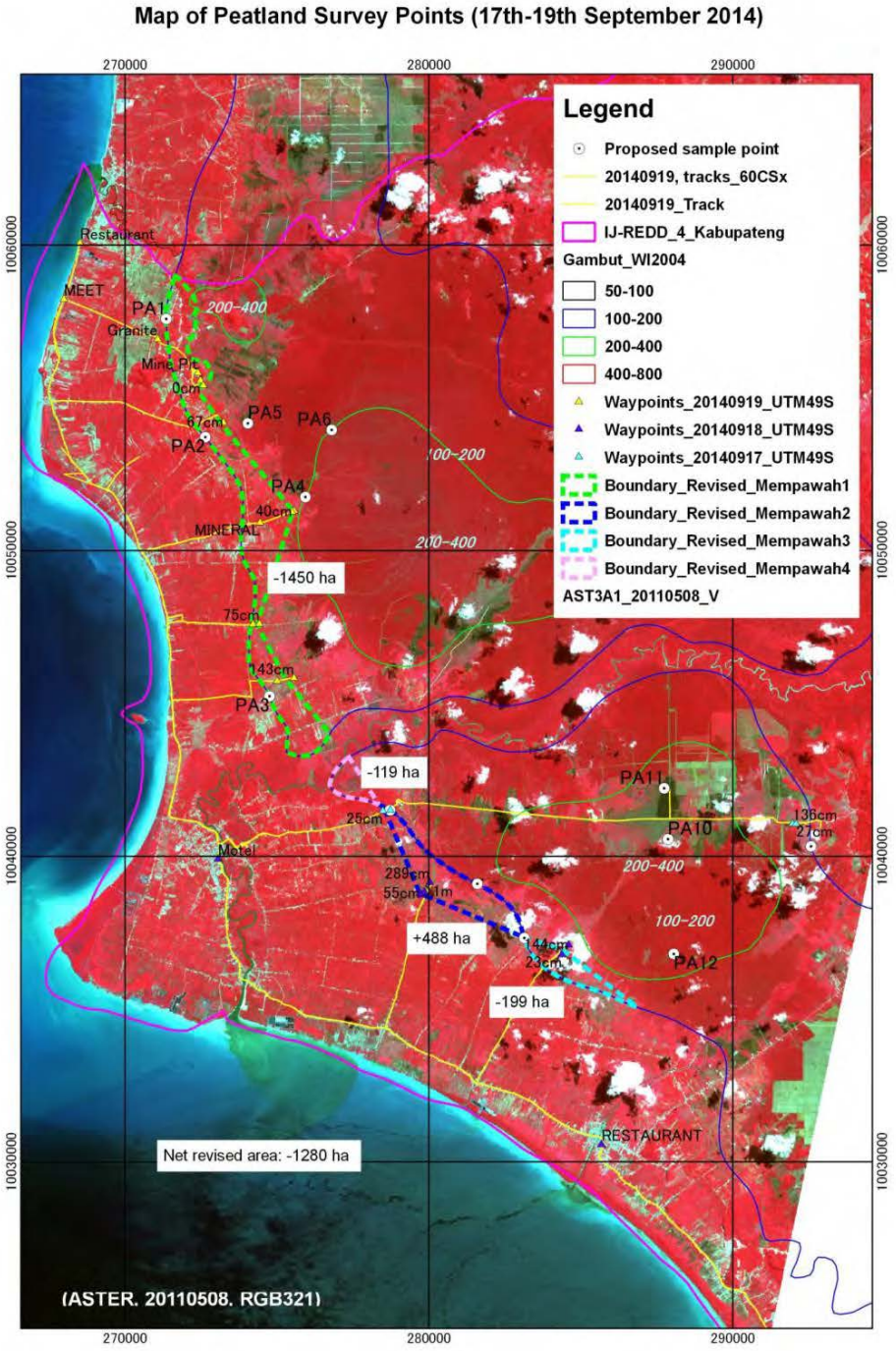
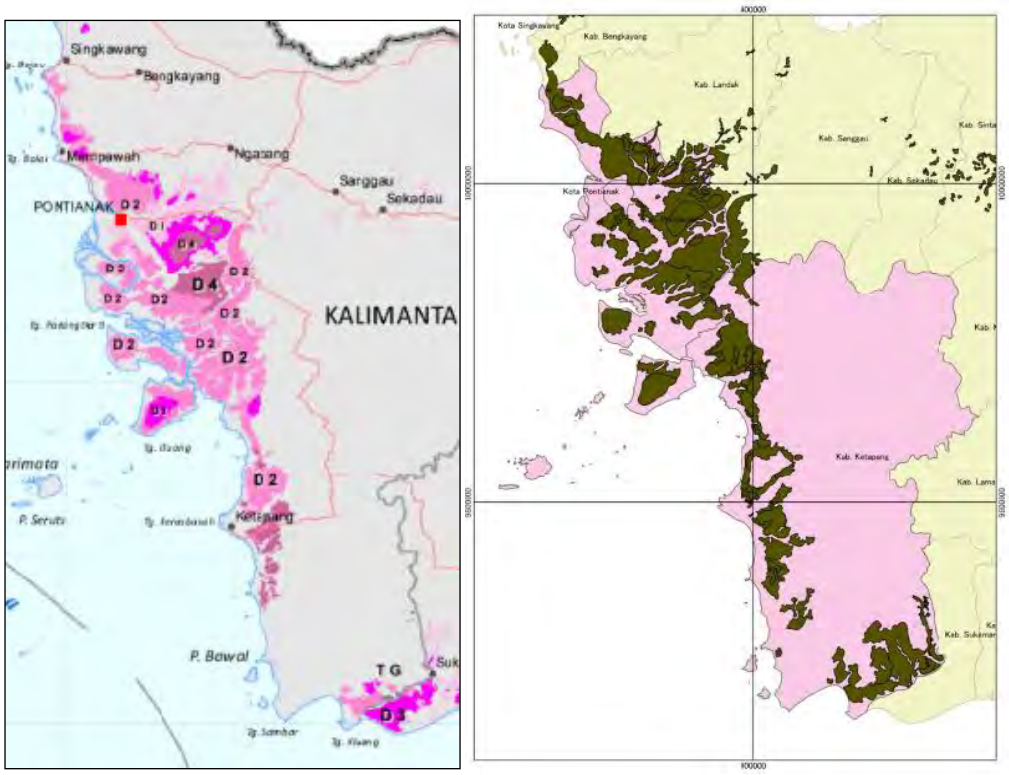


Figure 18 Survey points of peat soil distribution



Left: map prepared by Ritung et al (2011) Right: map prepared by Wetlands International (2004)

Figure 19 Image of peat soil distribution compared with the map prepared by the Wetland International

As results of improvement of peat soil distribution, total area of peat soil are estimated as mentioned in Table 8.

Table 8 Improved peat soil area in 4 districts

	Wetland International 2004	Ritung 2011	IJ-REDD+
Kayong Utara	163,303	214,054	193,930
Ketapang	337,552	255,873	259,283
Kubu Raya	410,241	519,885	503,990
Pontianak	70,889	74,755	74,441
Kab Pontianak	398	2,280	2,801
Total	982,383	1,066,847	1,034,445

15. Compliance with Laws, Statutes and Other Regulatory Frameworks

This part is general description for explaining project start date. Following will be applied in various cases of REDD+ project in Kayong Utara District with no revision.

The REDD+ program aims to be in compliance with Indonesia's laws and regulations, as well as those

governing international trade. Specifically, the most relevant local laws and regulations related to the REDD+ program activities include:

- Law No. 5 of 1990 on Natural Resources Conservation and Biological Ecosystem
- Law No. 41 of 1999 on Forestry
- Law No. 32 of 2004 on Regional Government
- Law No. 26 of 2007 on regarding Spatial Planning
- Law No. 32 of 2009 on Environmental Protection and Management
- Presidential Regulation No. 61/2011 regarding National Action Plan on GHG Emission Reduction
- Presidential Decree No. 62/2013 regarding managing agency for the reduction of emission from deforestation and degradation of forest and peatlands
- Government Regulation No. 44 of 2004 on Forestry Planning
- Government Regulation No. 45 of 2004 on Forest Protection
- Government Regulation No. 6 of 2007 on Forest Management and Formulation of Forest Management and Forest Utilization Plan
- Government Regulation No. 38 of 2007 on the Division of Governmental Affairs Between the Government, Provincial Government and Regency/Municipal Government
- Government Regulation No. 10 of 2010 on the procedure of altering the appropriation and function of forest areas
- Government Regulation No. 24 of 2010 on the Use of Forest Areas
- Government Regulation No. 60 of 2012 on the amendment of No. 10/2010 on Procedures for altering the appropriation and function of forest areas
- Minister of Forestry Regulation No P.68/Menhut-II/2008 on the Implementation of Demonstration Activities on Reduction of Emission from Deforestation and Degradation
- Minister of Forestry Regulation No. P.61/Menhut-II/2008 regarding Provisions and Procedures for the Granting of Business Permits for the Utilization of Products of Wood Forest Ecosystem Restoration in Natural Production Forests thru Application.
- Minister of Forestry Regulation No.P.30/Menhut-II/2009 Reduction of Emissions from Deforestation and Forest Degradation Procedure
- Minister of Forestry Regulation No. P.4/Menhut-II/2011 - Forest Reclamation Guidelines
- Minister of Forestry Regulation P. 20/Menhut-II/2012 on Implementation of Forest Carbon
- Minister of Forestry Decree No. 259/Kpts-II/2000 regarding harmonization of Central and Provincial Spatial Plans
- Minister of Forestry Decree No. SK.455/Menhut-ii/2008 on Working Group on Climate Change in the Department of Forestry
- Ministry of Forestry Decree No.P.36/Menhut-II/2009 regarding Procedures for Licensing of Commercial Utilization of Carbon Sequestration and/or Storage in Production and Protected Forests.
- Minister of Forestry Decree No. SK 13/Menhut-II/2009 on Climate Change Working Group in the Ministry of Forestry

- Minister of Forestry Decree No SK.199/Menhut-II/2012 on Creation of The Preparatory Unit for The Macro Plan for Forestry Tenure

16. Baseline Details

This part is general description for explaining project start date. Following will be applied in various cases of REDD+ project in Kayong Utara District with no revision.

The historical reference period is from 2000 to 2013, totaling 14 years. The start and end date of the REDD+ program crediting period, 20 years in total, are June 1, 2015 and May 31, 2034, respectively. The REDD+ program crediting period is subject to renewals. The fixed baseline period covers a 10 years period from 2016 to 2025. The minimum duration of a monitoring period will be one year and will not exceed the fixed reference period. It is expected that monitoring reports will be issued every 3-5 years, depending on REDD+ program circumstances.

17. Drivers of Deforestation and Forest Degradation

This part is general description for explaining project start date. Following will be applied in various cases of REDD+ project in Kayong Utara District with revision of specific name and location.

17.1. Agents and drivers of deforestation

To analyze the agents and drivers of deforestation in the project area of Sukadana and Simpang Hilir Sub-districts, the REDD+ program proponents used participatory methods. Interviews to Officials of Kayong Utara District Government, proponents were conducted to identify that there are similar condition of agents and drivers of deforestation between Kayong Utara District (reference region) and the Sukadana and Simpang Hilir Sub-districts (project area). The first main deforestation drivers in both areas are exploitation of the forest area for oil palm plantation and second one is the land conversion from forest area to substantial small scale crops land.

17.2. Agents groups

The agents of deforestation both within Kayong Utara District (reference region) and the project area of Sukadana and Simpang Hilir Sub-districts are almost all of small farm holders using conventional techniques to convert natural forests and secondary forests into croplands.

17.3. Infrastructure drivers

In both reference region and project area, there is no new improved infrastructures related deforestation and forest degradation.

17.4. Other spatial drivers expected to influence the project area

From interviews to Officials of Kayong Utara District Government, no other major drivers were identified in both reference region and the project area, therefore, no additional drivers are expected to emerge near or inside the project area.

17.5. Socio-economic conditions

According to the information from the officials in Kayong Utara Government, legal status of the land, land tenure, enforced policies/regulations and socio-economic conditions in both reference region and the project area are similar, therefore, it is appropriate to set overall Kayong Utara District as the reference region for the project area.

18. REDD+ Activities

This part is general description for explaining project start date. Following will be applied in various cases of REDD+ project in Kayong Utara District with revision of specific name and location.

The agents, drivers, and underlying causes of deforestation and forest degradation in the project area were identified through the socio-economic survey, such as interviews with local stakeholders (officials from the GPNP, NGOs and community leaders) a review of socio-economic study conducted by the IJ-REDD+, participatory workshops in community, and experts opinions. The process of identifying drivers and agents and selecting REDD+ activities for reducing GHG emissions are shown in Figure 20.

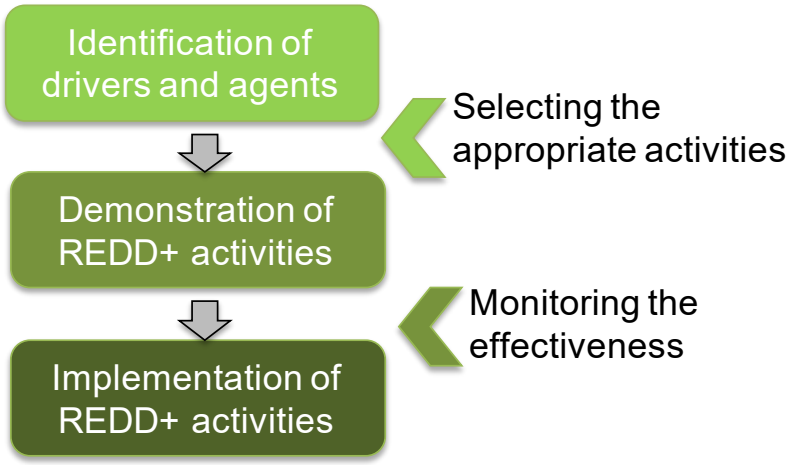


Figure 20 Process of identifying drivers and agents and selecting REDD+ activities

18.1. Identification of agents and drivers of deforestation and forest degradation

Based on the sources described above, 1 agent group was identified in planned deforestation and 3 agents group were indentified in unplanned deforestation and forest degradation. Oil palm plantation settler is the main agents responsible for deforestation since around the year of 2007. Other agents, small scale subsistence farmers who converted forest area to crops land and forest resource user, also present in the

project area.

18.2. Identification of underlying causes of deforestation

The underlying causes make the unsustainable exploitation of forest in the project area are summarized below;

- Market price of palm oil
- Market price of rubber
- Lack of land use and natural resource management policies/ rules and their enforcements in community level
- Lack of coordination for forest governance among local government
- Lack of coordination for forest management among local stakeholders (community, government and NGOs)
- Lack of agricultural techniques
- Lack of economic opportunities other than working in oil palm plantation
- Population Growth

18.3. REDD+ Activities (Counter-measure/activities for Deforestation and Forest Degradation)

As mentioned above, the landscape level has multi agents and drivers, and multi underlying causes for deforestation and forest degradation. Thus the REDD+ activities are implemented through the two scales to avoid the baseline deforestation and forest degradation. One is small scale activity which carried out by the NGOs in order to approach multi agents and drivers in each village level. The other is wide scale to handle with the underlying causes. This approach ensures that the communities are undertaking activities or benefiting from the inputs that are well suited to their circumstances and needs, and are more likely to succeed since the forest governance condition will be put into place (Figure 21).

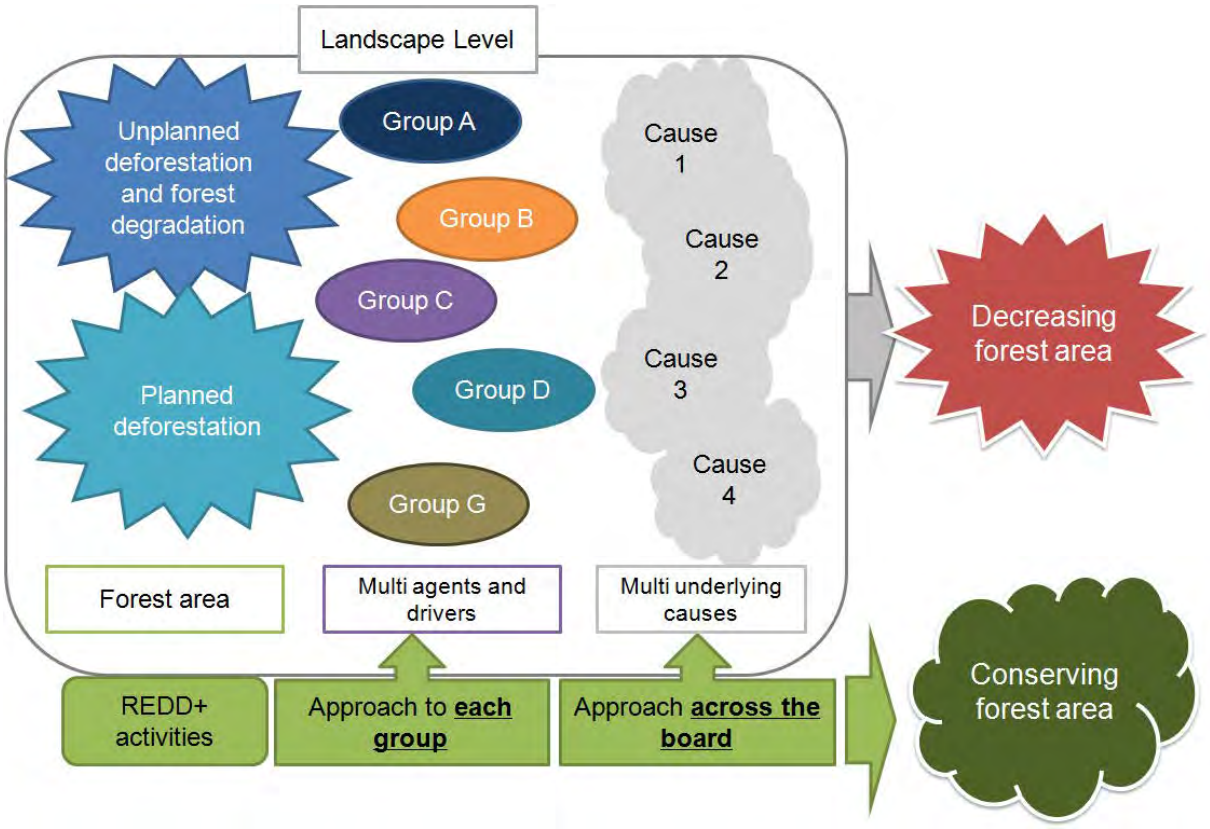


Figure 21 REDD+ approach to landscape level

19. Quantification of GHG Emission Reductions and/or Removals

This part is general description for explaining project start date. Following will be applied in various cases of REDD+ project in Kayong Utara District with revision of specific name and location.

19.1. Baseline Emissions

To estimate carbon stock in each forest type, i.e. GHG emissions, it is required to apply stratification methods according to forest and land types in target site. Therefore this REDD+ program applied following stratifying the reference region according to the results from the analysis of agents and drivers of deforestation (Table 9).

Table 9 Stratification of the reference region

Stratum ID		Description	Area at year (ha)			
ID	Name		2000	2006	2009	2011
1	Primary dryland forest	*See* Table 4	21,616	21,612	22,243	22,243
2	Secondary dryland forest		63,051	49,876	77,234	76,822
3	Primary swamp forest		0	0	239	224
4	Secondary swamp forest		25,608	23,244	25,431	25,206
5	Primary mangrove forest		101	0	0	0
6	Secondary mangrove forest		182,610	166,454	163,762	154,783
7	Plantation forest		0	0	0	528
8	Non-forest	Land use except for forests (*See* Table 4)	120,222	152,022	124,298	133,402

19.2. Program Emissions

The actual GHG emissions reductions generated by the REDD+ program will be determined through ex-post measurements of REDD+ program results based on its monitoring plan. Here, under the assumption of REDD+ program effectiveness and following the methodology requirements, the ex-ante carbon stock changes within the project area are estimated by multiplying the annual total baseline carbon stock change by the factor (1-EI), where (EI) is an Effectiveness Index ranging from 0 (no effectiveness) to 1 (maximum effectiveness).

The EI was estimated based on the demonstration of REDD+ program activities. We also assumed that higher effectiveness rate will be achieved. We assumed that in the effectiveness rate will be 20%.

19.3. Leakage

a. Ex-ante estimation of the decrease in carbon stocks and increase in GHG emissions due to leakage prevention measures

Leakage prevention activities in these areas in the REDD+ program scenario include the introduction of alternative livelihoods. Carbon stocks in the project area in the REDD+ program scenario are thus expected to increase compared to the baseline. However, we conservatively assume that they will remain non-forest land, and the carbon stock in the project area will consequently remain unchanged throughout the REDD+ program period.

b. Ex-ante estimation of CH4 and N2O emissions from grazing animals

REDD+ program activities associated with leakage prevention do not include significant livestock management, therefore emissions as result of grazing are not considered. Also activities for expanding paddy fields do not include significant non-CO_2 emissions, therefore emissions are not considered.

c. Total ex-ante estimated carbon stock changes and increases in GHG emissions due to leakage

prevention measures

The results of the previous step are summarized (Table 10).

Table 10 Ex-ante estimated total emissions above the baseline from leakage prevention activities

Project year *t*	Carbon stock decrease due to leakage prevention measures		Total *ex-ante* GHG emissions from patrol activities		Total *ex-ante* increase in GHG emissions due to leakage prevention measures	
	Annual $CSDLKPM_t$ t-CO_2e	Cumulative *CSDLKPM* t-CO_2e	Annual $GHGEIPA_t$ t-CO_2e	Cumulative *GHGEIPA* t-CO_2e	Annual $CSDLKPM_t$ t-CO_2e	Cumulative *CSDLKPM* t-CO_2e
2015	0	0	0	0	0	0
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
2024	0	0	0	0	0	0

19.4. Total GHG Emission Reductions and/or Removals

a. Significance assessment

The carbon stored in the above and below ground biomass pools were considered by the REDD+ program. Root-to-shoot ratios and data to estimate the carbon stocks in the below-ground biomass pool were sourced from regional literature in accordance with IPCC (2006) guidance.

On the other hand, harvested wood products were excluded as significant timber removal is not associated with the baseline scenario. This is because that there were no legal and official logging activities in project area and reference region and there were not so much harvest wood products to be accounted.

b. Calculation of ex-ante estimation of total net GHG emissions reductions

The ex-ante estimation of total net GHG emissions reductions to be generated through the proposed REDD+ program activity are calculated.

$$\Delta REDD_t = \Delta CBSLPA_t - \Delta CPSPA_t - (\Delta CLK_t + ELK_t)$$

where;

$\Delta REDD_t$ Ex-ante estimated net anthropogenic GHG reduction attributable to the REDD+ program activity at year t; tCO_2e

$\Delta CBSLPA_t$ Sum of baseline carbon stock changes in the project area at year *t*; tCO_2e

$\Delta CPSPA_t$ Sum of ex post estimated actual carbon stock changes in the project area at year *t*; tCO_2e

ΔCLK_t Sum of ex post estimated leakage net carbon stock changes at year *t*; tCO_2e

ELK_t Sum of ex post estimated leakage emissions at year *t*; tCO_2e

t 1, 2, 3 … *t*, a year of the proposed crediting period; dimensionless

Ex-ante buffer credits are calculated based on a 20% risk factor estimated through expert judgment (as tentative).

c. Calculation of ex-ante Verified Carbon Units (VCUs) (VCUs are in case we applied VCS)

The calculation of ex-ante Verified Carbon Units (VCUs) to be generated through the proposed REDD+ program activity are summarized in Table 11. Ex-ante buffer credits are calculated based on a 20% risk factor.

Table 11 Ex-ante estimated net anthropogenic GHG emission reductions ($\Delta REDD_t$) and Voluntary Carbon Units (VCUt)

Project year *t*	Baseline carbon stock changes		Baseline GHG emissions		*Ex-ante* project carbon stock changes		*Ex-ante* project GHG emissions		*Ex-ante* leakage carbon stock changes		*Ex-ante* leakage GHG emissions		*Ex-ante* net anthropogenic GHG emission reductions		*Ex-ante* VCUs tradable		*Ex-ante* buffer credits	
	Ann. C_t t-CO_2e	Cum. C t-CO_2e	Ann. $BLghg_t$ t-CO_2e	Cum. $BLghg$ t-CO_2e	Ann. PCS_t t-CO_2e	Cum. PCS t-CO_2e	Ann. $Pghg_t$ t-CO_2e	Cum. $Pghg$ t-CO_2e	Ann. LKC_t t-CO_2e	Cum. LKC t-CO_2e	Ann. $LKghg_t$ t-CO_2e	Cum. $LKghg$ t-CO_2e	Ann. $REDD_t$ t-CO_2e	Cum. $REDD$ t-CO_2e	Ann. VCU_t t-CO_2e	Cum. VCU t-CO_2e	Ann. VBC_t t-CO_2e	Cum. VBC t-CO_2e
2015	1,097,484	1,097,484	106,151	106,151	768,239	768,239	74,306	74,306	54,874	54,874	5,308	5,308	782,362	782,362	625,890	625,890	156,472	156,472
2016	1,097,484	2,194,967	106,151	212,302	768,239	1,536,477	74,306	148,611	54,874	109,748	5,308	10,615	782,362	1,564,725	625,890	1,251,780	156,472	312,945
2017	1,097,484	3,292,451	106,151	318,453	768,239	2,304,716	74,306	222,917	54,874	164,623	5,308	15,923	782,362	2,347,087	625,890	1,877,670	156,472	469,417
2018	1,097,484	4,389,935	106,151	424,604	768,239	3,072,954	74,306	297,223	54,874	219,497	5,308	21,230	782,362	3,129,450	625,890	2,503,560	156,472	625,890
2019	1,097,484	5,487,418	106,151	530,755	768,239	3,841,193	74,306	371,528	54,874	274,371	5,308	26,538	782,362	3,911,812	625,890	3,129,450	156,472	782,362
2020	1,097,484	6,584,902	106,151	636,906	768,239	4,609,431	74,306	445,834	54,874	329,245	5,308	31,845	782,362	4,694,175	625,890	3,755,340	156,472	938,835
2021	1,097,484	7,682,385	106,151	743,057	768,239	5,377,670	74,306	520,140	54,874	384,119	5,308	37,153	782,362	5,476,537	625,890	4,381,230	156,472	1,095,307
2022	1,097,484	8,779,869	106,151	849,208	768,239	6,145,908	74,306	594,445	54,874	438,993	5,308	42,460	782,362	6,258,900	625,890	5,007,120	156,472	1,251,780
2023	1,097,484	9,877,353	106,151	955,359	768,239	6,914,147	74,306	668,751	54,874	493,868	5,308	47,768	782,362	7,041,262	625,890	5,633,010	156,472	1,408,252
2024	1,097,484	10,974,836	106,151	1,061,510	768,239	7,682,385	74,306	743,057	54,874	548,742	5,308	53,075	782,362	7,823,625	625,890	6,258,900	156,472	1,564,725

Note: Ex-ante buffer credits are calculated based on a 20% Risk Factor (RF) estimated through expert judgment (as tentative).

20. Safeguard Information System

This part is general description for explaining safeguard information system (SIS) in Indonesia. Following should be applied in all of cases of REDD+ plan in Indonesia.

In Indonesia, Ministry of Environment and Forestry have developed jurisdiction's safeguard information systems, SIS-REDD+ Indonesia (Principles, Criteria and Indicators for a System for Providing Information on REDD+ Safeguards Implementation in Indonesia) for assessing safeguards implementation to address and respect the decision Dec.1/CP16 on COP16. SIS-REDD+ is developed referring various existing instruments related to social and environmental assessment. The project will provide information in accordance with this SIS guidance.