「REDD+ in Tropical Lowland Forest」

## （implemented by Conservation International Japan）

FS Partners	- Conservation International Foundation (CI-HQ and CI Cambodia Program) - Jenny Henman (Individual Consultant) - Forestry Administration of Cambodia (Partner for plot survey)
Location of Project/Activity	Prey Long Area, Cambodia
Category of Project/Activity	REDD+
Description of Project/Activity	Targeting the REDD+ project in the Prey Long Area, located in the north-east part of Cambodia, the project continued to resolve pending issues based on the last year's result. The final boundary of Protected Forest has been finalized about 400,000ha. In the Prey Long area, deforestation is continuing due to small-scale, unplanned logging by local communities for their livelihood, and due to large-scale logging by companies obtaining concessions for developing agricultural land. The results of a current analysis have found rate of deforestation in the Prey Long Area is much higher than the average rate per year for Cambodia, which has been reported to be 0.8%, and supports the urgency of conservation in this area, as well as the potential for the REDD+ project. Within this year's project, two sets of consultation meeting both with Government of Japan and with Royal Government of Cambodia had been held so that the study could receive the inputs from both governments. The project researched the technical and institutional aspect in order to realize the JCM/BOCM in Cambodia.
Eligibility Criteria	(a) The activities in the reference scenario are to lead to unplanned deforestation. (b) Target areas has been forest for at least 10 years. (c) Target areas not to include peat lands
Reference Scenario and Project/Activity Boundary	The deforestation continues based on the reference scenario. Spatial Boundary: Project area is Prey Long Protected Forest, which has been at the finalization stage. The reference area is four provinces where Prey Long Protected Forest are to located. Time Boundary: The target of analysis was from 2001 to 2011
Calculation Method Options	Calculation method 1: Adopt the reference emission amount at the sub-national level Calculation method 2-1: Calculate targeting large scale deforestation Calculation method 2-2: Calculate targeting small scale deforestation
Default Values set in Methodology	Carbon stocks in above-ground and below-ground biomass pools and deadwood pool were measured in the target area.
Monitoring Method	Forest change: Monitor every few years by using the remote sensing images. Consider more frequent monitoring for better forest management. Forest carbon stock: The value applied with this feasibility study should be

	valid for ten years. It would be ideal that plot survey to be conducted within the National Forestry Inventory.
GHG Emissions and its Reductions	4.5 million tonCO$_2$ / 10 -year
Method of Verification	It is desirable to have a system for external reviews in order to ensure transparency and reliability, which is currently discussed as in UNFCCC.
Environmental Impacts	The project plans to adopt CCB standards in order to ensure environmental integrity. On the environmental aspect, positive effects will be achieved in stopping forest degradation within the target area, where biodiversity is at the risk. Effect will be checked by monitoring selected species as an index of the health of biodiversity. In order to achieve forest conservation and to minimize the impact of doing so on outside the of the target area, a comprehensive societal approach will be adopted, considering aspects such as compensating for land ownership rights, and the provision and creation of livelihoods. In order to further understanding local residents, and to further increase the effects of the project, training will be needed using training manuals in the future. Legal compliance will be ensured through close collaboration with the FA in Cambodia.
Financial Plan	Initially, activity expenses for 20 years, based on the hypothesis that inflation rate to be 5% per year, were estimated. Costs specific to the carbon project, such as carbon monitoring, are not included in the plan. It was estimated that the cost will be approximately US$36 million over 20 years. When a consultation meeting was held with the Cambodian government in October, REDD+ roadmap for the Prey Long area was drafted, and short-term, mid-term, and long-term activities were summarized. Based on the results, the budget plan for several items which were given as the initial investment expenses were summarized. JICA Cambodia is currently summarizing a draft proposal for support, and the total amount of it will be $87,200 for FY2013.
Promotion of Japanese Technology	Effective types of support provided by the Japanese government in the area of forestry include the establishment of facilities, such as ranger stations for commencing forestry conservation activities, capacity building related to technologies required in the REDD+ project, such as satellite image analysis and highly accurate biomass surveys, and providing sustainable agricultural technologies; as well as improving irrigation facilities. Morever, transfering the ownership of projects to local organizations based on continuing capacity building support, after structure has been set in place. It is believed that, in transferring the ownership of projects to local organizations, it is worth considering exploring linkages with the private sector, such as with financial institutions, in order to fulfill the gap of existing support, of JICA.
Sustainable Development in Host Country	The forest in the Prey Long Area is an important watershed for sustaining fishery and agricultural activities in Cambodia and Vietnam, and is also a source of non-timber forest products such as resin, which the economy in local communities depends on. Also, the Cambodian government has positioned REDD as one of the strategic issues for prioritization in the National Forest Program (2010-2029). The Cambodian government aims to maintain forest cover in the country at 60% until 2015 by enhancing forest law enforcement and as well as by strengthening the governance structure. In conclusion, the implementation of the REDD+ project in the Prey Long area will contribute to achieving prioritized policies in the host country.

FS Title: JCM/BOCM Feasibility Study
"REDD+ in Tropical Lowland Forest"

FS Entity: Conservation International Japan

FS Implementation Scheme
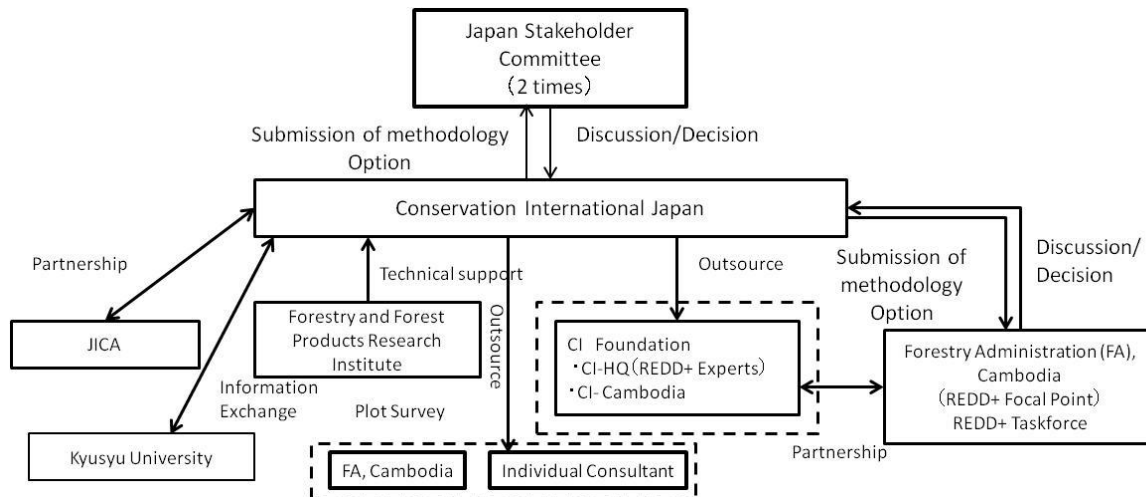
2. Overview of Project/Activity

(1) Description of Project/Activity Contents:

The target of the this feasibility study is the REDD+ project in the Prey Long Area, located in the north-east part of Cambodia. The REDD+ project in Cambodia is led on a national level by the Forestry Administration (FA) of the Royal Government of Cambodia , based on support from the REDD+ task force, established with the support of UN-REDD.

Along with this study, FA is finalizing the boundary to establish Protected Forest in the area, and the final boundary resulted to be around 400,000 ha.

In the Prey Long area, deforestation is continuing due to small-scale, unplanned logging by local communities for their livelihood, and due to large-scale logging by companies obtaining concessions for developing agricultural land. The results of a current analysis have found that evergreen forest is being deforested at a rate of 1.81% per year, and deciduous forest is being deforested at a rate of 1.39% per year. As a whole, this rate of deforestation is much higher than the average rate per year for Cambodia, which has been reported to be 0.8%, and supports the urgency of conservation in this area, as well as the potential for the REDD+ project.

Since 2002, CI has been implementing forest conservation activities in the Central Cardamom Protected Forest, located in the southwest of Cambodia, through Conservation Agreement with local communities by strengthening FA's forest management activities. The FA asked CI to explore the opportunity to implement the same scheme for the Prey Long Area, and CI and FA started the research for the feasibility of REDD+ project.

In this feasibility study, we researched the application of the forest conservation project, for which lessons has been already learnt in Cambodia, designed and created a long-term financial plan, and looked into the feasibility of a REDD+ project. In other words, the feasibility study has a framework of reducing emissions from deforestation in the Prey Long area by implementing, over the long-term, forestry conservation at the community-level by applying Conservation Agreements, and by implementing forestry management with FAs in each province.

(2) Situations of Host Country:

Cambodia has one of the highest levels of forest cover in Southeast Asia, with approximately 60% of its land covered by forest. Although the Cambodian Millennium Development Goals aim to retain

60% forest cover until 2015, deforestation is still continuing at this moment. Forests fall under the regulatory and management jurisdiction of the Ministry of the Environment (MOE) and the Ministry of Agriculture, Forestry and Fisheries (MAFF). Protected Areas fall under the jurisdiction of the MOE, while Permanent Forest Reserves, flooded forests and mangrove areas fall under the jurisdiction of MAFF, and FA and FFA assume direct managements. Protected Forests have been established in the area of Permanent Forest Reserves and their legal effect in terms of forest protection is believed to be stronger than that of Protected Areas.

   Following a high deforestation rate and failure of the commercial logging concessions after the Pol Pot Government, the Cambodian Government issued a declaration to halt the granting of logging concessions throughout the country in 2002 in order to reform the forestry sector and with the aim of introducing sustainable forestry management. However, 3.4 million hectares of existing concessions remain non-managed areas, and wide tracts of forests are facing the potential threat of logging activities with no legal framework.

   One of the biggest drivers of deforestation is Economic Land Concessions (ELCs). An ELC is a type of concession issued for using land for agricultural or forestry activities, and has been identified as the cause of large-scale deforestation. Some ELCs are issued to foreign companies, and this has been criticized since it threatens local communities who depend on the forest for their livelihood. ELCs, and other concessions such as for mining, are also being issued within the boundaries of Protected Areas under the jurisdiction of the MOE (IGES, 2011).

   Meanwhile, the REDD+ Taskforce, which encompasses various ministries and agencies, was established in 2010, and the REDD+ Roadmap was created. Cambodia was included in the UN-REDD Program for the purpose of creating and implementing the national REDD+ strategy, and its activities officially started in November 2011.
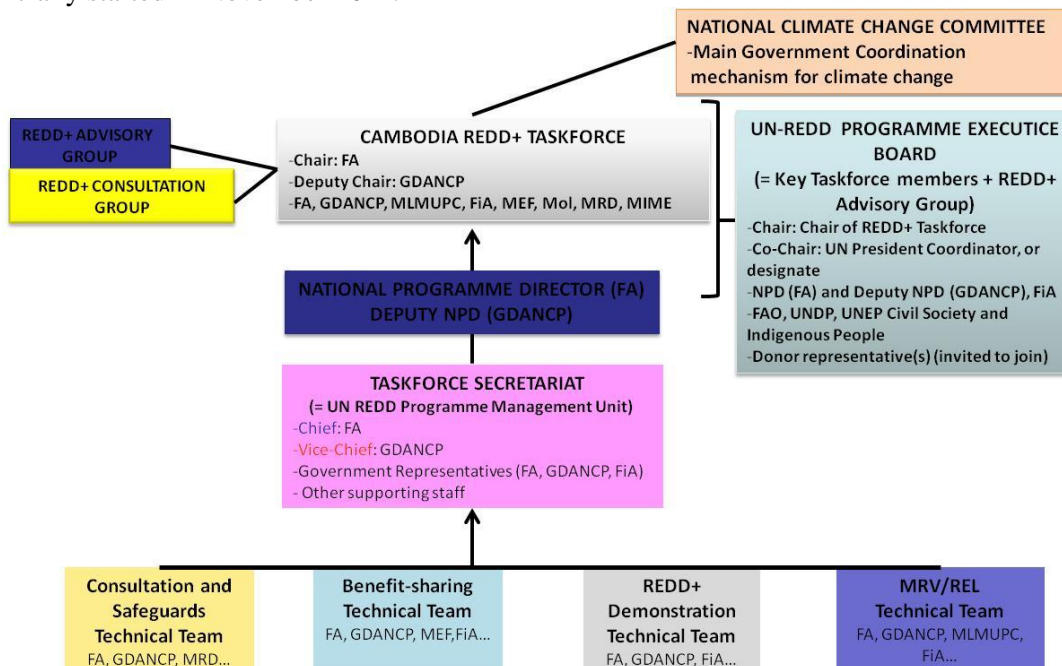

Chart 1: The relationship of REDD+ Taskforce and National Climate Change Committee

(3) Complementarity of the CDM:

   In the Clean Development Mechanism (CDM) under the Kyoto protocol, only afforestation and reforestation CDM (A/R-CDM) was approved as forestry related CDM, and a proposal to incentivize forest conservation was not accepted. Therefore, it is impossible to implement the relevant project with the CDM under the UNFCCC.

   However, A/R-CM, the only forest-related CDM, was applied to the rule that forestry related CERs lacks to fulfill the permanence issue. As a result, Japan, which participated in the first commitment period of Kyoto Protocol, was obliged to compensate for credits once they expired. Due to a decrease in investment incentives, and the extreme complexity for its rules, A/R-CDM projects that have been registered by UNFCCC as of December 2012 remain at less than 1% of the

total.

The original purposes of Article 12 of the Kyoto protocol were: 1. to provide support for sustainable development in developing countries (non-Annex I Parties), and 2. to provide support in achieving emission reduction targets in developed countries (Annex I Parties). However, since, in implementing the CDM, unless there is a certain degree of developed industry, it is not possible to implement activities with which emission reduction can be expected. Thus, the CDM ended up focusing on emerging countries such as Brazil, China, and India. Many of the least developed countries in the world with large tracts of forest, particularly those in Africa, received such a little benefit from the CDM. Considering the fact that approximately 20% of global greenhouse gas emissions is due to land use, and land change and forestry including deforestation. the CDM did not at all resolve the issue of emission reduction from forests around the world.

Given this background, the UNFCCC started to formally discuss REDD+ as an agenda. However, at the COP18, which was held at the end of 2012, there was no effective progress made on the REDD+ negotiations the first time in five years. This was not because of decreased expectations from various countries for REDD+, but due to the effect of other political issues such as finance. Further, in technical negotiations at the SBSTA, it is planned to discuss from 2013, issues directly related to the benefits and costs to each country, such as discussions on reference levels which will form the criteria for calculating emission reduction volumes. Therefore, the possibility for further delays in the REDD+ negotiations at the UNFCCC.

Meanwhile, the developing country has requested that work programs to be implemented to investigate matters such as 'result based payment for REDD+'. By utilizing the JCM/BOCM, there are a large number of opportunities for establishing robust and rapid model cases for such issues in order toprovide input to the UNFCCC, including sub-missions from various countries going forwards. Under the JCM/BOCM, it is important to consider the packaged support for REDD+, including its supporting mechanism and   guidance on methodology to developing countries. It is also important to provide input during UNFCCC negotiations based on   the experience fromJCM/BOCM, which Japan has been looking into, to lead t he negotiations of REDD+ agenda.

3. Study Contents
(1) Issues to be Addressed in FS:
− Identification of the drivers of deforestation and developing REDD+ strategies
− Collecting detailed information necessary in setting reference scenarios
  ➢ The handling of Economic Land Concessions (ELCs) remained a major issue. Consultation with the person responsible from the Cambodian government in consultations was needed.
  ➢ Determining carbon pools for the project
− Determining boundaries
  ➢ Finalizing boundaries
− Manuals for helping local communities deepen their understanding
  ➢ Adopting them at training manuals investigation process in Cambodia led by UN-REDD
− A nested approach
  ➢ Preliminary discussion with the assumption of alignment with the nested approach in Cambodia
  ➢ Briefings and Q&A sessions on VCS's Jurisdictional and Nested Initiative, and developing discussions towards application in Cambodia
− Methodology
  ➢ In order to develop JCM/BOCM methodology, carry out a comparative investigation into VCS's methodology, and investigated next step by holding workshops
− MRV
  ➢ Follow up the status of consideration of the REDD+ roadmap task force
  ➢ Follow up on the understanding of forest inventory and guidelines, such as those of Winlock International and FAO
  ➢ Follow up discussions at UNFCCC
  ➢ Follow up the status of discussions on inventory alignment on a national level and on sub-national level

- Plot surveys
    - ➢ Carry out Plot surveys within target areas   from late January to mid-February
- Arrangements for making progress technological and policy discussions at bilateral level
    - ➢ Hold national investigation committee meetings in Japan and consultation meetings in Cambodia
- PDD development
    - ➢ In response to a request from the Cambodian government, carry out PDD draft development for VCS/CCBS, in addition to the methodology forJCM/BOCM

(2) Process to Solve the Issues in FS:

  Up to January 2012, the following local surveys were carried out, and each survey issue was addressed. Also, two stakeholder committee meetings were held in Japan as an opportunity for preliminary discussions prior to consultations with the Cambodian Government.

The first on-site survey: July 23 - 27

The feasibility study results of the prior year was re-reported.   A discussion was held with the FA on the details, the orientation, the implementation system, and the schedule of the present feasibility study for the current fiscal year, and an agreement was reached.

- ➢ Discussed the timing of holding for workshops, and the implementation scheme and the schedule for plot surveys in the Prey Long area. An agreement was made on plot surveys to be carried out by the FAand local communities, based on the results of discussions with the FA.
- ➢ Since the current international standard is VCS,   the FA again ordered an investigation into the present feasibility study including VCS. An agreement that CI Japan will review multiple VCS methodologies and provide an explanation at the next consultation was made.
- ➢ Investigation in relation to the sub-national level: This is currently being investigated by the Cambodia REDD+ taskforce (hereinafter referred to as "taskforce"), and the idea that FA would like to commence the REDD+ in the Prey Long area, with an assumption of the sub-national level, was shared by the FA.
- ➢ Implementation structure: The necessity of a roadmap related to REDD+ implementation in the Prey Long area, and a structure with a view towards implementing it, as well as the understanding that the FA will be responsible, were shared.

The second on-site survey: October 22 - 27

A government consultation meeting was held in the morning of October 24 and 25. On the first day, CI Japan reported the current situation of JCM/BOCM based on documents distributed by the Japanese government at a seminar on August 24 and the results of the first Japan stakeholder committee, held in Japan, Thereafter, CI Japan provided detailed explanations of the technical aspects of the REDD+ project.

On the second day, Naomi Swickard, the person responsible for VCS's AFOLU, provided explanations of the Jurisdictional Nested REDD Initiative of VCS, and thereafter, attendees participated in two different subcommittees, one on technical aspects, and the other on the REDD+ roadmap in the Prey Long area, and held discussions.

The third on-site survey: November 18 - December 9

Training sessions were held from November 20 to 22 for plot surveys, including two days indoors and one day outdoors. Participants were FA staffs (outsourced entity).   Also, professionals from JICA who provide support in developing a national forest registry for Cambodia participated in the indoor training sessions.

The fourth on-site survey: January 13 - February 21

- ➢ Preparation for and implementation of re-measurement surveys for the quality assurance and quality control process for plot surveys
- ➢ Held a meeting with outsourced entity,(CI Foundation) in relation to the MRV methodology and for estimating the volume of emission reductions

A discussion was held with the FA on the results of the second Japan stakeholder committee meeting,

and the MRV methodology and orientation for estimating the volume of emission reductions was held.

The following are the main achievements for each survey issue given in 3(1).
− Identifying deforestation drivers and the REDD+ strategy
   ➢ A government consultation was held and a specific roadmap for implementing REDD+ was discussed
− Collecting detailed information necessary for setting up reference scenarios
   ➢ It was determined that a policy would be adopted to handle deforestation due to Economic Land Concessions (ELCs) as unplanned deforestation (in fact, there is no future plan), and since it is not possible to forecast the locations of ELCs, unlike other small-scale planned deforestation, a change will be made so that the spatial model required in the VCS methodology will not be applied only for ELC-derived deforestation.
   ➢ It was determined to include above-ground, below-ground and dead wood pools as a scope, and it was also determined to continue to investigate issues related to handling the validity and the uncertainty around data on soils from the Forestry and the Forest Products Research Institute, as well as issues related to the conservativeness of excluding harvested wood products.
− Determining boundaries
   ➢ It is highly likely that the boundary will encompass approximately 400,000 ha. across four provinces.
− Manuals for helping understanding by the local community
   ➢ The manual created in the prior year was disctributed as a model within the process of investigating training manuals in Cambodia, led by UN-REDD.
− Nested approach
   ➢ It was confirmed that, in relation to the nested approach in Cambodia, it is assumed that emission reduction from the project will not be excluded, but is to be handled as part of that on a sub-national level when the sub-national level is prepared (treatment based on grand-parenting period). By linking to this, an agreement that the taskforce should investigate on which types of reference areas should the project use was reached.
   ➢ VCS's AFOLU managers were invited, and a Jurisdictional and Nested Initiative briefing and Q&A session, as well as a discussion with a view towards implementation in Cambodia, were held.
− Methodology
   ➢ A workshop was held in October to 2012 in order to establish JCM/BOCM methodology. Acomparative investigation of VCS methodologies was carried out, as one of the process.
− MRV
   ➢ The progress of the REDD+ roadmap by task force was investigated.
   ➢ The understanding of Winlock International, the FAO, and other forestry inventory guidelines was looked into.
   ➢ A trip w to the COP18 in order to understand of the discussions at the UNFCCC. (This is outside of the scope of the FS).
   ➢ The status of investigation into the consistency of inventories on national and sub-national levels was investigated.
− Plot surveys
   ➢ Plot surveys were carried out in the target areas, with a schedule of implementation from late November to mid-February, and a quality assurance survey (QAQC) was implemented from mid-January.
− Arrangements were made with a view to making progress on bilateral technical and policy discussions.
   ➢ Japan stakeholder committee   was held within Japan, and a consulting meeting was held in Cambodia.
− PDD development
   ➢ In response to a request from the Cambodian government, VCS/CCBS PDD draft development was carried out, in addition to the methodology for the JCM/BOCM for

comparison.

4. Results of JCM/BOCM FS
(1) GHG Emission Reduction Effects by the Implementation of Project/Activity:

Deforestation has been continuing in the Prey Long area. It is possible to reduce greenhouse gas emissions through the implementation of projects and activities which have an effect on the factors of deforestation, and which can be prevented. The workshop 'Agents, Drivers and Underlying Causes of Deforestation in the Prey Long Region

', conducted within the period of the study in the last fiscal year, found the most prominent drivers of deforestation in the area to be: 1) conversion of forest to agricultural land on a small scale by local communities for their livelihood, and 2) large-scale plantation development by companies. In response to the first driver, we will identify areas where there is a high pressure for deforestation, and we will prevent deforestation through awareness-raising activities, strengthening patrol activities, and through the development of alternative livelihoods through Conservation Agreements. In response to the second driver, there is a plan to legally protect the forest in the Prey Long area from large-scale development by making it into a Protected Forest. By implementing the REDD+ project, the forest will be made into a Protected Forest, and incentives will be increased for preventing large-scale development.

After conservation areas are established, the FAs in Kampong Thom, Kratie, Stung Treng, and Preah Vihear Provinces, which include the Prey Long area, will take the lead in stopping illegal activities. In this scheme, local communities and FAs will protect the forest in the Protected Forest, and the success was already proven by CI applying the same scheme in the Cardamom Protected Forest. The long-term funding due to the support for the implementation of the REDD+ project will enable the continuous implementation of these activities.

In developing methodologies, opinions were heard from the domestic investigation committee and the host country's government, the trends in discussions at the UNFCCC were researched and looked into, and revisions that were determined to be appropriate were made. To develop robust methodology with transparency, literature review of methods, which have been peer-reviewed or validated by a third party were conducted. Verified Carbon Standards (VCS) methodologies were identified for a methodology to be referred for developing the MRV methodology. All steps in the MRV methodology were tested with the data and information collected to examine existence of necessary data and information, time required to carry out analysis and achievable quality of outcomes. The result of exercise was reflected into the MRV methodology.

(2) Eligibility Criteria for MRV Methodology Application:

Targeted activities are large-scale plantation development and small-scale agricultural land conversion, which were specified as the major drivers of deforestation. If development accompanying deforestation is in-line with the government's plan, the assumption of areas to be deforested in the future should be based on such a plan, and in this case, the method of estimating reference emission amount will be completely different. Additionally, if peat lands are included in the project area, it is necessary to have a method of assuming greenhouse gas emissions from peat lands. These were excluded from the scope for methodologies after confirming that there is no government plan in relation to large-scale plantation development in areas in scope, and that there are no peat lands in target areas. Instead,   swamp forests was identified and excluded from the scope.

In order to apply the MRV methodology developed under this study, it is necessary to satisfy the following eligibility requirements.
(a)   The activities in the reference scenario are to lead to unplanned deforestation.
(b)   Target areas   has been forest for at least 10 years.
(c)   Target areas   are to not include peat lands.

In Cambodia, in addition to natural forests, planted trees such as rubber, oil palms, teak, acacia, and eucalyptus are also defined as forest (Cambodian NFP, 2010-2030). On large-scale plantation developments, cassava and others are sometimes planted in the initial stage. However, in most cases,

rubber and other types of trees will be eventually planted. These changes are classified as land cover changes from forest to non-forest and this is defined as forest degradation in VCS. However, from the point of view of the methodology of estimating the volume of emission reduction, this is the same process as deforestation in the sense that the forest is converted to land for other purposes after it is changed to non-forest land, and the calculation process for emission reduction amounts is exactly the same. In the MRV methodology developed in the present report document and the present feasibility study, both land usage and land-coverage changes due to large-scale plantation development are referred   as deforestation.

(3) Calculation Method Options:

At the driver workshop held last year, the two main deforestation drivers were identified, namely llarge-scale plantation and small-scale farming land conversion. Those activities were decided as the target reference activities in the MRV methodology
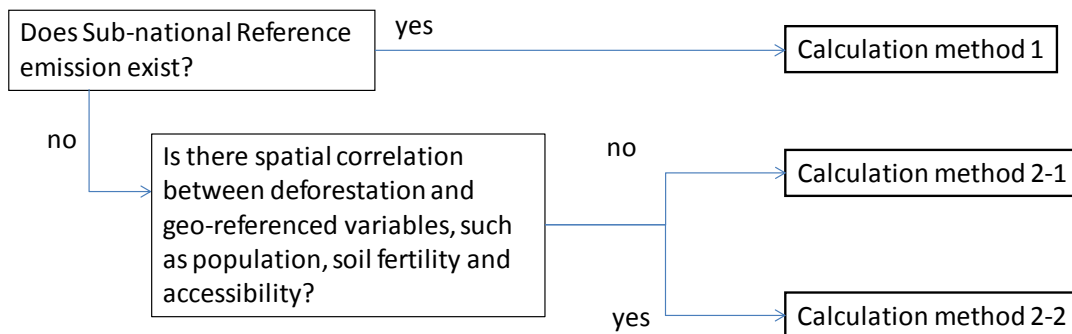
At present, Cambodia is considering setting reference levels at sub-national level, and after they are set, it is anticipated that these reference levels will be adopted in the project. This is shown as Calculation Method 1 in the diagram.

  At present, there are no reference levels of sub-national level, and the project requires reference levels to be established. The small-scale conversion to agricultural is significantly affected by location-based conditions such as the distance from areas with high population density, the potential use as agricultural land, and the distance from roads (accessibility). It is necessary to evaluate deforestation risk based on the spatial model of these factors tied to deforestation drivers, and assumptions on when and where will deforestation occur within the reference areas are necessary for estimating highly reliable reference emission level. However, since large-scale plantation developments also accompany the development of infrastructure and the mobility of workers, it is understood that the spatial dependency on roads and population is currently low, and that it is not possible to carry out spatial measurements of areas where deforestation occurs. In the MRV methodology, spatial estimates are obtained of deforestation by using spatial models, according to whether or not deforestation depends on the spatial arrangement of existing infrastructure, the population distribution, and other factors. The procedure applied to large-scale plantation development was that in Calculation Method 2-1, which does not obtain a spatial model, while that applied to small-scale agricultural land conversion was that in Calculation Method 2-2, which obtains a spatial model.

(4) Necessary Data for Calculation:

(5) Default Value(s) Set in MRV Methodology:

   Allometry equations for estimating carbon stocks of above-ground and below-ground biomass pools and wood density for estimating carbon stocks of dead wood pools were set as default values which could be applied to the area, based on literature and data accumulated for near the target area. Also, a plot survey was carried out for the overall Prey Long area, and the value of forest carbon stocks for the Prey Long area, which is specific to the project, was established.

The above-ground and below-ground biomass carbon stocks were generally calculated by

applyingdiameters of trees at the breast height measured in the plot survey to allometry equations. There are also allometry equations for obtaining tree heights, however, since measuring the height of tall trees at a high degree of precision in a dense forest requires a lot of time, this was removed from the scope of consideration. Existing allometry equations were obtained from the literature, and biomass data collected (at 12 clustes) in Mondulkiri province in West Cambodia, close to the area in scope, by the FA and the Wildlife Conservation Society (WCS), an international NGO, were used in these equations. Conservative and well-fitting allometry equations were specified. Chave (2005) and Kiyono (2010) were compared, and Kiyono (2010), with an error rate of 2%, was selected.

The amount of dead wood pool carbon stocks was estimated based on the thickness and length (measurement items differed depending on the situation) of dead wood measured in the plot survey. Wood density is a parameter which is difficult to obtain for estimating dead wood pools. As a result of literature survey of existing information, the default value for the AR-CDM tool ("Estimation of carbon stocks and changes in carbon stocks in dead wood and litter in A/R CDM project activities") was almost the only data available. Adeadwood density survey was also carried out in Mondulkiri province mentioned above,, and after comparing the values obtained with those from the AR-CDM tool, it was found that those from the tool were smaller and conservative. Therefore, the values from the tool were used for the default values in this methodology.

The above-ground and below-ground biomass stocks within the project boundary and the leakage belt were set. In the Prey Long area and its surroundings, plot surveys were also carried out in the past, and there are multiple pieces of data on above-ground biomass stocks for forest types existing within the project boundary. Although differences between the data for evergreen forests are small, the differences for deciduous forests are large, and it was difficult to select appropriate data. It is considered that one of the reasons for the large differences is that all of the surveys did not have the entire Prey Long area, but only a part of it. The amount of above-ground biomass stocks is an important value with a large impact on estimates of the emission reduction ammount. Thus, this feasibility study carried out a plot survey in order to find representative values for the overall project area. The survey was carried out by randomly establishing 100 clusters consisting of three nested plots with a maximum radius of 20 m. As a result of the calculation using allometry equations set with default values anddeadwood density, the total carbon stock was 469 tonCO2/ha for evergreen forest, and 239 tonCO2/ha for deciduous forest.

(6) Setting of Reference Scenario and Project/Activity Boundary:

  Deforestation involves various stakeholders, and occurs as a result of a combination of complex socio-economic, political, physical, and ecological factors. In order to set reference scenarios, and to thereafter set reference levels, it is necessary to understand the relationships between drivers of the deforestation and its underlining causes Also, there is a process required in order to prevent deforestation so that leakage is minimized and so there are no negative social and economic impacts. In order to understand the drivers of deforestation in the forest in the Prey Long area, and in order to set reference scenarios, a participation-type "Forest driver workshop" was held within last year's feasibility study. Participants from the FA, local governments, and NGOs held discussions. Six major causes of deforestation were identified, namely large-scale plantation development, small-scale farming, emigration, infrastructure development, illegal logging, and mining development; and particularly significant causes were found to be large-scale plantation development and small-scale farming. Each drivers were ingestigated for its social background, underlying causes, and past and future spatial distribution and the future scale of impacts; and participants reached a consensus that deforestation will continue unless some measures are taken.

The project area is where project activities are carried out, and in the case of this feasibility study, it is where the FA is making progress with legal procedures to designate it as a Protected Forest. Proposals for the boundary of the protected forest area changed multiple times due to arrangements with related organizations, and in the final version in November 2012, it was decided that it will cover approximately 400,000 ha (393,876 ha), and encompass Kratie, Kampong Thom, Preah Vihear, and

Stung Treng provinces. The reference area was the whole of these four provinces. Also, the leakage belt within these four provinces is the area legally protected (such as protected forests) and the entire forest excluding areas for which concessions have already been given.

(7) Monitoring Methods:

Cambodia is planning to adopt tier three of IPCC approaches within the REDD+ roadmap. Within the REDD+ projects in the Prey Long area, it is planned to extract forest changes spatially-displayed using satellite images (activity data), and also planned to calculate emission amount changes in carbon stocks per area   before and after logging (emission coefficient).

Extraction of forest changes
In order to extract forest changes in this feasibility study, CI applied procedures using Landsat, which is applied in over 18 countries. The method extracts the area in which land coverage has changed using supervised classification, by overlaying two years of observation images and looking at changes in reflection between them. Since the Prey Long area is relatively non-cloudy, and as it is possible to combine multiple images to create one without clouds, observation is possible through optical sensor images. Landsat is provided for free, and it is easy to analyze it by comparing with radar and other data, and the possibility of implementing this in the host country is high. By overlaying the changes extracted through this process with a land-cover classification map, it is possible to know the   forest type which have been deforested. The present feasibility study used a map created by the Cambodian government as a land-cover classification map.
The main processing methods of supervised classification are the maximum-likelihood method and the decision tree classifier, and CI uses the decision tree classifier, which has superior classification accuracy and easier and faster for processing. The software used for processing is ERDAS, See5 and CART. High resolution images are used to create training data. At present, high resolution images can be viewed in some areas using Google Earth. High resolution SPOT (2.5 m) and GeoEye (1 m) data are provided for the Prey Long area and reference areas, but there is a difficulty in that the years in which the data was acquired vary. It is considered that it is necessary for there to be a means within the JCM/BOCM going forward in which high resolution images are effectively utilized in carrying out the REDD+ project. In this feasibility study, a large number of polygons of training data were created for each land-cover classification on Google Earth, with reference to the Cambodian government's land usage maps and aboveground data obtained in the on-the-groundsurveys. As mentioned above, the purpose of this processing is to detect deforestation.Using a total of six bands of Landsat images for the two target periods, data was categorized into the classifications in Table 3. In order to remove extremely fine spatial scale changes, a 3x3 majority filter was used, and the minimum spatial unit on the final classification map was set as one hectare. See Section 4.11 for the results.

Table 1. Classification of forest changes

	Classification	Land coverage in Period 1	Land coverage in Period 2
No change	1) Evergreen forest →Evergreen forest	Evergreen forest	Evergreen forest
	2) Seasonal forest →Seasonal forest	Seasonal forest	Seasonal forest
	3) Seasonal forest →Non-forest	Non-forest	Non-forest
Deforestation	4) Evergreen forest →Non-forest	Evergreen forest	Non-forest
	5) Seasonal forest →Non-forest	Seasonal forest	Non-forest

Forest carbon stocks

The plot survey was implemented this year, and carbon stocks were obtained by forest type. At present, it is unclear how the plots established this time will be incorporated in the NFI, which is currently being designed. However, the National Forest Plan 2010-2029 states that it aims to implement a forest inventory survey every five years, and it is expected that measurements of the Prey Long area will be repeated within the forest inventory survey.

After discussion, monitoring intervals was set as 10 years. In this feasibility study, experience obtained from the plot survey will be shared with people involved in developing the National Forestry Inventory, and it will be effective to implement future plot surveys within the National Forest Inventory.

(8) Quantification of GHG Emissions and its Reductions:

The reference emission amount are estimated using the following simple summarized methods.

   1) Estimating the future rate of deforestation within the reference area (average, trend, and model)

   2) Calculating the deforestation area each year within the reference area

   3) Estimating where deforestation calculated in item 2) will occur in the reference area

       3.1) Analysing past deforestation risks from past deforestation and spatial patterns of its drivers

       3.2) Calculating spatial deforestation risks within the reference area from the spatial distribution of drivers and the results of item 3.1)

       3.3) Distributing deforestation calculated in 2), starting from places with high risk. Repeating this for each time step.

       3.4) Projecting future deforestation area within the project boundary

   4) Calculating emission coefficients

    4.1) Estimating changes in carbon stocks by forest type

    4.2) Estimating changes in carbon stocks following changes to non-forest land

   5) Calculating reference emission amount

However, deforestation derived from large-scale plantation development was estimated without a spatial model analysis, and the deforestation rate within the reference area was followed, and the forest within the project boundary was assumed.

The analysis resulted as emission reduction effect of 4.5 million tons of CO_2 in 10 years. This is not discounted based on the project activity efficiency or leakage emission suppression efficiency, but is the maximum emission reduction volume.

(9) Verification of GHG Emission Reductions:

 It is desirable to have a system for external reviews in order to ensure transparency and reliability, which is currently discussed as in UNFCCC. One candidate for the verification method is to compare the results of analysis of other projects in relation to forest changes. For biomass, a candidate is a literature review and a comparison of domestic and other REDD+ projects. Since many REDD+ projects worldwide at present use VCS, it is considered important to aim for a level of robustness equivalent to that of VCS in terms of meeting international standards. However, it is important that the selection criteria and implementation methods of the designated organization implementing the verification, the time required for registration and procedure should be simpler than the CDM in terms of procedures.

(10) Ensuring Environmental Integrity:

   The project plans to adopt CCB standards in order to ensure environmental integrity. On the environmental aspect, positive effects will be achieved in stopping forest degradation within the target area, where biodiversity is at the risk. Effects will be checked by monitoring selected species as an index of the health of biodiversity. In order to achieve forest conservation and to minimize the impact of doing so on outside the of the target area, a comprehensive societal approach will be adopted, considering aspects such as compensating for land ownership rights, and the provision and creation of

livelihoods. In order to further understanding local residents, and to further increase the effects of the project, training will be needed using training manuals in the future. Legal compliance will be ensured through close collaboration with the FA in Cambodia.

(11) Comments from Local Stakeholders:

There is a diverse range of stakeholders on the REDD+ project. Also, particularly at the local level, there is insufficient understanding of REDD+ as well as of forest conservation, and it is necessary to collect comments after increasing understanding through training. At the end of November 2011, a workshop was held for people related to the central and provincial governments, as well as for NGOs. In October 2012, a workshop was held for staffs from the central and provincial FA offices, and the Prey Long REDD+ roadmap process was set up. Please refer to Section 3.3 of the detailed report.

(12) Structure to Implement Project/Activity:

In the survey, there were further discussions on the implementation system from last year, and a discussion was held specifically on the system of implementing REDD+ demonstration activities in the Prey Long area, together with the consideration of JCM/BOCM. In order to realize the JCM/BOCM, it is essential to set up technical guidelines and a methodology, and carry out systematic consideration including a registry. At the second Japan stakeholder committee , the current status of the JCM/BOCM and the current support system were summarized based on interviews from the two countries. Moreover, in consultation meetings with the Cambodian government, which were held in February, there was strong interest in the JCM/BOCM, with the request of the initial investment that are specific to REDD+ implementation.

(13) Financial Plan to Implement Project/Activity:

The assumed details of activity expenses for the REDD+ project in the Prey Long area are shown in the plan. Initially, activity expenses for 20 years, based on the hypothesis that inflation rate to be 5% per year, were estimated. Costs specific to the carbon project, such as carbon monitoring, are not included in the plan. It was estimated that the cost will be approximately US$36 million over 20 years.

In order for REDD+ to be successful, it is important that there will be support in the preparation stage for Phase 1, and that there will be support provided to organizations implementing preparation in Phase 2. Japan has been providing Cambodia with various types of ODA and research support. In addition to the Ministry of Foreign Affairs 900 million yen of aid in 2010 under the 'forest conservation program', JICA has also been providing various types of support, and a preliminary survey is currently being implemented for the new JCM/BOCM. Additionally, it is Japan's responsibility to facilitate mutual collaboration so that it can contribute to the JCM/BOCM by putting together all types of such support, including monitoring support from the Forestry and Forest Products Research Institute, and uplifting Japan's contribution to Cambodia.

Moreover, JICA can now provide funding and aid, such as climate change program loans, in addition to their existing technical support, as a result of the integration of JBIC and JICA. What Cambodia is in need at present is to receive the integrated support from Japan and set up a new joint system in order for REDD+ to be successful on a national level. Cambodia also needs to investigate developing a new funding mechanism, such as the establishment of a fund focused on achieving sustainability of REDD+.

When a consultation meeting was held with the Cambodian government in October, REDD+ roadmap for the Prey Long area was drafted, and short-term, mid-term, and long-term activities were summarized. Based on the results, the budget plan for several items which were given as the initial investment expenses were summarized. Currently, it is assumed that the introduction of the REDD+ project in the Prey Long area in relation to these items will be adopted in the REDD+ roadmap.

JICA Cambodia is currently summarizing a draft proposal for support, and the total amount of it will be $87,200 for FY2013. The finalized amount of the support is scheduled to be determined going forwards, and it is a significant fact that Japanese aid organizations have been investigating support based on requests from the Cambodian government in order to meet local needs urgently.

(14) How to Promote the Introduction of Japanese Technologies:

Japan has been providing continuous ODA support, including in the area of forestry, and such support is significant in Cambodia. Effective types of support provided by the Japanese government in the area of forestry include the establishment of facilities, such as ranger stations for commencing forestry conservation activities, capacity building related to technologies required in the REDD+ project, such as satellite image analysis and highly accurate biomass surveys, and providing sustainable agricultural technologies; as well as improving irrigation facilities. Morever, transfering the ownership of projects to local organizations based on continuing capacity building support, after structure has been set in place.

It is believed that, in transferring the ownership of projects to local organizations, it is worth considering exploring linkages with the private sector, such as with financial institutions, in order to fulfill the gap of existing support, of JICA. The Cambodian government has been preparing REDD+ in-line with the REDD+ roadmap. It is necessary to follow policies of the host countries in carrying out the support related to REDD+.

(15) Prospects and Challenges Onward:
The present feasibility study will be completed upon the submission of the report in March, however, it is important to commence bilateral negotiations with the Cambodian government going forward, with the aim of implementing the REDD+ project in the Prey Long area, and to hold discussions with the aim of making substantial progress. On the REDD+ project, there has already been progress made with various types of bilateral work, within which support from Japan to Cambodia has been important and significant. Since it has been determined that there will be support provided by USAID, it would be advantageous to start working on bilateral discussions as soon as possible. In this regard, the REDD+ roadmap in the area given in Section 3.3 of the detailed report shows specific needs from the Cambodian government can be effectively utilized with a view towards holding discussions on support as a next step.

5. Contribution to Sustainable Development in Host Country
The forest in the Prey Long Area is an important watershed for sustaining fishery and agricultural activities in Cambodia and Vietnam, and is also a source of non-timber forest products such as resin, which the economy in local communities depends on. Also, the Cambodian government has positioned REDD as one of the strategic issues for prioritization in the National Forest Program (2010-2029). The Cambodian government aims to maintain forest cover in the country at 60% until 2015 by enhancing forest law enforcement and as well as by strengthening the governance structure. In conclusion, the implementation of the REDD+ project in the Prey Long area will contribute to achieving prioritized policies in the host country.