TERMS OF REFERENCE
Professional Service

1. Project Information

Assignment Title:	Supporting Monitoring & Measuring, Reviewing and Verification (MRV) development for the REDD+ implementation.
UNDP Practice Area:	Environment and Climate Change
Cluster/Project:	FCPF II
Assignment Location:	Home based and Phnom Penh, Cambodia
Assignment Duration:	**First Phase** 130 days from XX February 2018 to 20 December, 2018

2. Background and Project Description

The Royal Government of Cambodia (RGC) is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and is a REDD+ partner country. Since 2009, RGC is willing to implement REDD+ policies and measures to effectively reduce emissions from deforestation and forest degradation, and promote the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.

As part of those initiatives, the Forest Carbon Partnership Facility (FCPF) is supporting the RGC to be ready for the implementation of REDD+ under the UNFCCC, among others to enable the country to access results-based payments through the Green Climate Fund (GCF) in the near future.

The GCF is expected to launch a pilot programme for REDD+ results-based payments following UNFCCC decisions. Countries need to submit their REDD+ results in a technical annex to their Biennial Update Report (BUR), integrating the information of the National Forest Monitoring System (NFMS) and MRV, the Forest Reference Level (FRL) and the Safeguards Information System (SIS).

With the launch of the GCF pilot on results-based payments Cambodia now want to estimate the emissions reductions and enhancement from the Agriculture, Forest and Other Land Use (AFOLU) sector (GHG) to complete and submit a Biannual Updated Report (BUR) and a technical annex with REDD+ results before the end of 2018.

In 2017, the RGC has significantly progressed was made in the implementation of MRV activities and the development of NFMS and FREL through the support of UN-REDD, Japan International Cooperation Agency (JICA), United State Forest Service, etc. A national forest definition and land use classification was established along with activity data and a National Forest Inventory (NFI) methodology was designed along with a field manual. Historical forest inventory data, though not of high accuracy, was collected and analysed to develop country-specific emission factors for some carbon pools, in preparation of the initial FRL submission

Despite strong efforts and existing national capacities for the development of MRV activities, the RGC has identify key activities remaining in order for Cambodia to operationalize its NFMS and to be in a position to revise and upgrade its FREL using more accurate data and information.

A number of components of the NFMS require further development, including ensuring linkages to the broader national MRV system (i.e. non-land use sectors), further refinement of the monitoring functions of the NFMS, and the establishment of linkages between the NFMS and the SIS.

3. Objective of the Assignment

The main scope of this assignment is to provide technical support to the MRV team on the development of a functional Satellite Land Monitoring System (SLMS) for the Monitoring of REDD+ results, based on free available satellite imagery, aerial photography and technical and human resources from the Ministry of Environment (MOE) and the Ministry of Agriculture Forestry and Fisheries (MAFF).

The enhancement of the SLMS must include the development of a methodology of the monitoring function and integrate an early warning system of biomass loss.

4. Scope of Work

A service provider will provide the specific key sets of technical support and deliverables set forth below. Under the leadership and guidance of the MRV and REDD+ specialists and the FRL/MRV Coordinator, the service provider will provide technical support for the following specific activities that form crucial bases for the finalization of the SLMS of REDD+ in Cambodia.

The project is defined in two phases as follow:

Phase I (2018). Production of the 2018 Land forest Change map and Integration of the monitoring function to the NFMS.

a) *Support the production of the national 2018 LULUC map and 2016-2018 change map.*

- Based on the existing forest cover change methodology endorsed by the RGC, support the MRV team to process the satellite images of the 2017-2018 period (approx. Dec-17 to Mar-18) to create two maps: (1) the 2018 land use/and cover national map and (2) the correspondent 2016-2018 national land forest change map of Cambodia, including the corresponding stratified area estimation according to the methodology establish by (Olofson et al, 2013). This work entails:
    - Update and improve the existing methodology used for a technical report of the LULUC change in consultation with the FCPF MRV specialist and MRV team, described in the annex 3 of the FRL report submitted to the UNFCCC[1], improving the time of pre-processing of images, classification and final edition the map, and integrating the use unmanned aerial vehicle (UAV) images.
    - As part of the production of the LULUCF maps, conduct four (4) missions to one or two provinces in Cambodia. The area will be specified by the MOE according to the selection of the REDD+ pilot sites. The main goal of the missions is to identify drivers of deforestation and forest degradation, obtain biophysical and social information, useful for the ground truth validation and stratified area estimation.
    - It is intended to effectuate some UAV flights by mission[2]

b) *Development of the monitoring function*

- Develop a rational remote sensing methodology to spatially surveillance the progress, results and impacts of REDD+ activities in the pilot areas selected under FCPF. In order to support the monitoring of SIS and PES, the methodology should be designed to be scalable and flexible, combining remote sensing data and ground-

[1] http://bit.ly/2iEOidA

[2] The UAV and the software to process the data is provided by the project.

based social data that can help to understand the local land-use change dynamics[3].

- The methodology must include a basis to monitoring the deforestation and forest degradation associated to subsistence agriculture at small scale, using drones and free satellite images.
- This activity includes the training on the use and integration of UAV images as a complement for the monitoring forest land use and forest land cover change.

- The places and dates of the field missions are the same of the activity a) "Support the production of the national 2018 LULUC map and 2016-2018 change map" and must include at least one UAV flight on each pilot area selected (two zones will be identified by FCPF and GDANCP)
- The results of this activity must be presented in a workshop or technical meeting prepared by the MOE.

c) *Boundaries Assessment of Protected Areas and production forests, and mangrove and flooded forests in the pilot areas*

The main objective of the boundaries assessment is to develop a methodology to update the boundaries of protected areas, biodiversity conservation corridors and forests reserved for production considering a recent jurisdictional reform in the natural resources management. This information is integral to the sustainability of Cambodian forests and protected areas and for the national REDD+ strategy. This activity includes the following activities:

- Conduct a legal framework assessment based on documents, decrees and other sort of policies, maps and spatial information from the MOE, MAFF, MLMUPC or any other administrative entity involved in the land management.
- Analyze existing and proposed development plans in the areas.
- Include a spatial assessment with the support of updated satellite imagery and UAV aerial photographers on the pilot sites selected by the MOE.
- Elaborate a final technical assessment based on the legal framework and the ongoing jurisdictional changes, including the description of the methodology, results, recommendations and lessons learned.

The results of this activity must be presented in a workshop or technical meeting prepared by the MOE.

Phase II. (2019) Enhancing the methodology of forest monitoring including the deforestation early warning system and supporting the production of the 2019 LULUC map

a) *Enhancing the production of the LULUC methodology, the 2018-2019 LULUC and the monitoring function.*

- Based on the existing forest cover change methodology endorsed by the RGC, support the MRV team to process the satellite images for the period 2018 to 2019 (approx. Dec-18 to Mar-19) to create two maps: (1) the 2018 land use/and cover national map and (2) the correspondent 2018-2019 national land forest change map of Cambodia, including the corresponding stratified area estimation according to the methodology establish by (Olofson et al, 2013). This work entails:
  - Base on the methodology used in the phase one and in consultation with the FCPF MRV specialist and MRV team, incorporate algorithms (scripts) to improve pre-processing time of images, classification and final edition the map and integrate the use of active sensors free data (Synthetic Aperture Radar (SAR) i.e. PALSAR and Sentinel 1) and unmanned aerial vehicle (UAV) images.

[3] The socioeconomic analysis is based on information that would be provided by the FCPF project and/or the Ministry of Environment.

- Provide technical support to the MRV team for developing a methodology to separate forest degradation from deforestation, combining SAR data with optical data. Optative, the service provider can test the forest disturbance methodology developed by the Joint Research Center of the European Union[4].
- As part of the production of the LULUCF maps, conduct two (2) missions to one or two provinces in Cambodia. The area will be specified by the MOE according to the selection of the REDD+ pilot sites. The main goal of the missions is to identify drivers of deforestation and forest degradation, obtain biophysical and social information, useful for the ground truth validation and stratified area estimation.
- It is intended to effectuate at least one UAV flight by mission to correlate with satellite images and filed data[5]

- At least three trainings of 3 days in the use and implementation of SAR and UAV as part of the monitoring system:
  - Basic notions of SAR
  - Processing SAR images
  - Integration of SAR with Landsat and Sentinel images to improve the land forest change.

b) *Development of an Early Warning System methodology for forest disturbance and fires at national scale.*

- Integrate a rational remote sensing methodology to detect deviations from the usual pattern of vegetation change as a monitoring system for *possible anthropogenic* impacts on natural ecosystems. It can be sbased on the near real-time monitoring called Terra-I (already tested in Cambodia) and the integration of a simple fire detection using MODIS data.
- The method must include an automatic or semiautomatic verification process using Landsat and Sentinel available data.
- As result, the methodology must provide a bi-monthly analysis of warnings and a semi-automated system to validate each warning compiled.

5. Expected Outputs and Deliverables

Phase I

a) *Support the production of the 2016-2018 land forest map.*

- Creation of two maps (1) National LULUC map of 2018, using the existing national land classification system used for the 2016 map and (2) the national LULUC change map for the period 2016-2018.
  - Data Preparation and pre-processing of images: The final mosaic for the period October 2017 to February 2018 (the period can variate according to images available) is produce.
    This work can be done off line (using images downloaded) or online (Sepal or Google Earth Engine)
  - Image Classification: the images are classified using a semi-automatic classification and the collected data from the filed missions
  - Report of mapping quality control and statistics of forest cover change per province and other areas of interest. The report must include the stratified area estimation using the methodology described in Olofson et al, 2013 at national scale.
- An updated technical report of the LULUC change methodology.

[4] http://forobs.jrc.ec.europa.eu/products/software/
[5] The UAV and the software to process the data is provided by the project.

- Results are present in a workshop or technical meeting. The workshop is organized by the MOE

b) *Development of the Monitoring function.*

- Individual LULUC map of the REDD+ pilot area.
- A technical report of the monitoring methodology with the results and conclusions achieved, including:
  - UAV data collection and data processing
  - Data analysis and results, recommendations and lessons learned.
  - Technical evaluation on the integration of satellite images with UAV aerial photos and ground biophysical and social data for REDD+ monitoring purposes.
  - Technical report for each mission effectuated, describing results achieved, data collected and analysis.
  - Link with the National Forest Monitoring system and the Safeguards Information System.
- Standard Operation Procedures (SOP) for:
  - Data Collection and data processing
  - Data centralization and data sharing
  - Data management in the office
  - Any other SOP needed to improve the management and usability of data and information.
- Train the MRV team in the use of UAV images and information for monitoring forest[6]
  - Use of high-resolution images and cloud-points of UAV sensors with satellite images.
  - LULUCF classification using high-resolution images.
- The methodology and the first results are present in a workshop or technical meeting prepared by the MOE.

c) *Boundaries Assessment of protected areas, production forests and mangrove and flooded forests in the pilot areas*

- Document of methodology and results (can be combined with the monitoring function), describing the PA boundaries assessment for the REDD+ pilot projects, based on the legal framework and the most updated spatial extension,
  - Documentation review for the legal framework assessment.
  - Spatial assessments for each pilot site
  - Final maps with the boundaries updated
  - A report to summarize results, recommendations and lessons learned.

Phase II

a) *Enhancing the production of the 2019 LULUC map and 2018-2019 change map and the monitoring function.*

- Creation of two maps (1) National LULUC map of 2019, using the existing national land classification system used for the 2016 map and (2) the national LULUC change map for the period 2018-2019.
  - Data Preparation and pre-processing of images: The final mosaic for the period October 2018 to February 2019 (the period can variate according to images available) is produce.
    This work can be done off line (using images downloaded) or online (Sepal or Google Earth Engine)
  - Image Classification: the images are classified using a semi-automatic classification and the collected data from the filed missions
  - Report of mapping quality control and statistics of forest cover change per province and other areas of interest. The report must include the stratified area estimation using the methodology described

[6] A basic training on the use of UAV and prepossessing of images is covered by FCPF.

in Olofson et al, 2013 at national scale.

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  - Include a proposed method to integrate free data of active sensors (i.e. PALSAR and Sentinel 1) with optic images in order to facilitate the classification.
  - The report must include the stratified area estimation using the methodology described in Olofson et al, 2013 at national scale.
- Results are present in a workshop or technical meeting organized by the MOE
- At least three trainings of 3 days in the use and implementation of SAR:
  - Basic notions of SAR
  - Processing SAR images
  - Integration of SAR with Landsat and Sentinel images to improve the land forest change.

b) *Development of an Early Warning System methodology (EWS) for forest disturbances and fires alarm.*

- Document of the EWS methodology describing the use of satellite images to produce a near real-time monitoring of alerts for forest disturbance and fires produce at national scale, including:
  - Accessing and processing MODIS data.
  - Verification process using Landsat and Sentinel on bi-monthly cycles.
  - The use of cloud systems solutions like SEPAL (FAO)[7] or Google Earth Engine to accelerate the analysis is expected.
  - A technical report to summarize results, recommendations and lessons learned and conclusions.
- The methodology and the first results are present in a workshop or technical meeting

General remarks:

- *All results must be delivered to the UNDP focal point in the specific formats:*
  - *Secondary information (articles, documents, presentations): PDF, DOC, XLS, PPT*
  - *Final documentation: DOC, XLS or PPT. PDF are not accepted*
  - *Photos: JPG or raw format.*
  - *Raster information: TIF or IMG*
  - *Vector information: SHP*
  - *GPS data: GPX format*
  - *Physique documents (field forms): Original data in paper and copy in PDF*
- *Maps and methodologies can be submitted to UNDP as a preview version before the validation by the ministry of environment (MOE).*
- *The filed missions can be combined between them to use the UAV for multiple services.*
- *The working language for this assignment is English.*
- *It is expected that the study will be a combination of literature review, re-processing of existing data and data collection (i.e. satellite imagery and field data).*

Phase I

[7] https://github.com/openforis/sepal

N	Deliverables/Outputs	Estimated Working days to Complete	Target Due Dates
a)	**Support the production of the 2016-2018 land forest map.**	**65**	
1	Two maps (1) National Lnaduse/Landcover map of 2018, using the existing national land classification system used for the 2016 map and (2) the national LULUC change map for the period 2016-2018.	55	December 2018
1.1	The final mosaic for the Dec-17 to Mar-18 (the period can variate according to images available).	*5*	March 2018
1.2	Semi-automatic classification (include two field missions for data acquisition and guidance on manual edition).	*30*	July 2018 1st mission: March 2018 2nd mission: May 2018
1.3	Report of the mapping quality control (includes one field mission) and the statistics of Forest change at national scale, province and other areas of interest (PA)	*15*	October 2018 1st mission: Sept 2018
2	An updated technical report of the LULUC change methodology.	5	December 2018
3	Report of Workshop or technical meeting	5	December 2018
b)	**Development of the Monitoring function.**	**45**	
4	Individual LULUCF map of the REDD+ pilot projects at the scale of the project	15	Draft version: August 2018 Final Version: December 2018.
5	A report to documented the monitoring methodology and results achieved	5	November 2018
6	SOP documents validated by GDANCP	10	December 2018.
7	Presentation of a methodology and first results in a workshop or technical meeting.	5	January 2019 Update of results September 2019
8	At least two trainings of 3 days in the use and implementation of UAV as part of the monitoring system - Use of high-resolution images and cloud-points of UAV sensors with satellite images. - LULUCF classification using high-resolution images.	10	November 2018
c)	**Boundaries Assessment of protected area (PA) in the pilot areas.**	**20**	
9	A report to document methodology and results, describing boundaries assessment for the REDD+ pilot project, based on the legal framework and the analysis of spatial extension.	15	Draft version: June 2018 Second version: August 2018 Final version: November 2018
10	Presentation of a methodology and the first results are present in a workshop or technical meeting.	5	December 2018
	Total Working Days	**130**	

Phase II

N	Deliverables/Outputs	Estimated Working days to Complete	Target Due Dates
a)	**Support the production of the 2018-2019 land forest map.**	**80**	
1	Two maps (1) National Lnaduse/Landcover map of 2019 and (2) the national LULUC change map for the period 2018-2019.	55	December 2019
1.1	The final mosaic for the Dec-18 to Mar-19 period (the period can	*5*	March 2019

	variate according to images available).		
1.2	Semi-automatic classification (include two field missions for data acquisition and guidance on manual edition).	*30*	July 2019 1st mission: March 2019 2nd mission: May 2019
1.3	Report of the mapping quality control (includes one field mission) and the statistics of Forest change at national scale, province and other areas of interest (PA)	*15*	October 2019 1st mission: Sept 2019
2	- At least three trainings on the use and implementation of SAR: ▪ Basic notions of SAR ▪ Processing SAR images ▪ Integration of SAR with Landsat and Sentinel images to improve the land forest change.	15	July 2019
3	An updated technical report of the LULUC change methodology, including a method to integrate SAR images with optic images.	5	August 2019
4	Report of Workshop or technical meeting	5	December 2019
b) Development of an Early Warning System methodology (EWS).		**50**	
11	The EWS system is installed and the methodology describing the use of satellite images to produce a near real-time monitoring of alerts for forest disturbance and fires produce at national scale is produce.	30	Draft version: April 2019 Second version: September 2019 Final version: November 2019
12	Analysis and validation of alerts	15	Every two months on a year.
13	Presentation of a methodology and the first results in a workshop or technical meeting	5	December 2019
	Total Working Days	**130**	

6. Institutional Arrangement

Roles of the contractor

- The service provider shall work with the MRV team of the General Directorate of Administration for Nature Conservation and Protection (GDANCP) and have regular monthly meetings with the MRV Team leader of GDANCP and with the UNDP colleagues assigned to work on the FCPF/UNDP (i.e. FCPF National Project Advisor, MRV and REDD+ Technical Specialists, Programme Analyst, Policy Specialist)
- The service provider shall report on/submit the above deliverables to the FCPF MRV technical specialist as well as to the REDD+ technical advisor of UNDP Cambodia.
- The service provider needs to maintain daily communication with the MRV team of GDANCP and UNDP Country Office as and when problems emerge during the consultancy period, especially if they affect the scope of the job.

Role of GDANCP, Ministry of the Environment

- The General Department of Administration for Nature Conservation and Protection (GDANCP) will support the service contractor in completing the assignment, provide a physical space, hardware and software needed as well as the primary and secondary information on emission factors, activity data and GHG, including methodologies, reports and geodata.

Roles of the MRV and the REDD+ Technical Specialists

- They will provide technical direction and support, working close to the service provider. The deliverables will be reviewed by the MRV and the REDD+ specialists of the Task force before any payment release.

Roles of the REDD+ Secretariat

- The REDD+ Taskforce Secretariat will support for meetings, missions and other logistic support.

Roles of the UNDP Country

- The County Offices will review the deliverables for payment release.

7. Duration of the Work

Phase I: The duration of the assignment will be from February 15 to December 20 of 2018. The total amount of person working days for this project is 130

Phase 2: The duration of the assignment will be from February 15 to December 20 of 2019. The total amount of person working days for this project is 130

The estimated lead time for FCPF to review outputs, give comments and to approval is of 10 working days.

8. Duty Station

For the international staff specialists, the duty station is a combination of home-based and in-country missions (see details in section 5 in deliverable schedule). While is not in Cambodia, the should ensure to be regularly in touch with the MRV team to perform duties through email, telephone or Skype.

9. Minimum Qualifications of the Successful Contractor at Various Levels

UNDP is seeking to procure a services provider who can propose personnel with the required skill sets and experiences for this consultancy. Both the qualifications of the Services Provider and its proposed team members will be assessed.

The service provider must meet this minimum experience:

- At least five (3) years of experience in REDD+ projects and at least three (3) projects related to Monitoring & Measuring, Reporting and Verification (M&MRV) and Forest Reference Level (FRL) using methodologies applied under the UNFCCC. Any kind of partnership is allowed (of 2 service providers), in which both service providers must meet with the minimum experiences required.
- At least one (1) year of experience in the use of UAV and Radar, experience in Forest cover monitoring is desirable.
- At least one (1) year of experience in REDD+ projects in South-east Asia. REDD+ and MRV/FRL experience in Cambodia is an advantage.

Qualification of Key Team Member:

The service provider should prepare a proposal that includes the following set of members: 1) one international team leader with experience in environment, 2) one international MRV expert, 3) one international specialist in UAV and Radar.

a) Minimum Qualifications of 1 international Project Team Leader

In charge of overseeing the consultancy and responsible for the delivery. focal point from the project and will be in contact with UNDP in any aspects related to the delivery

Education:	At minimum, a university's degree in environment science, natural resources management, geography or related field and a Geo-information science master's level or equivalent.
Experience:	• A minimum of ten (10) years of experience in the field of natural resource management and environment, of which at least three (3) years in forestry; • At least 2 years prior work experience leading a team in remote sensing and GIS projects in the field of REDD+ and carbon assessment. Prior experience in working with the government of Cambodia in environment is a plus.
Competencies:	• Excellent technical understanding of remote sensing and GIS applicability for the forest monitoring • Proven written and analytical skills in producing high quality technical documents
Language	English.

b) Minimum Qualifications of 1 international MRV expert:

One International Expert in NFMS, MRV and REL, who provide technical guidance on remote sensing based methodologies for activity data generation and estimation of uncertainties and ensure alignment with international process requirements for data measurement. The expert will be in regular contact with the MRV specialist of UNDP and the MRV team of GDANCP.

Education:	At minimum, a university's degree in environment science, natural resources management, geography or related field and a Geo-information science master's level or equivalent.
Experience:	• A minimum of five (5) years of experience in remote sensing and GIS projects, and at least two (2) years in Forest land cover change; • At least two (2) years' work experience in the field of REDD+ and carbon assessment. Prior experience in working with the government of Cambodia in environment is a plus.
Competencies:	• Good technical understanding of remote sensing and GIS applicability for the land forest monitoring
Language	English.

c) Minimum Qualifications of 1 international UAV and SAR expert:

One International Expert application of UAV and Radar, who provide technical guidance on remote sensing based methodologies based on new technologies using SAR and UVA aerial photos for activity data generation for degradation of forest, uncertainties and ensure alignment with international process requirements for data measurement. The expert will be in frequent contact with the MRV specialist of UNDP and the MRV team of GDANCP.

Education:	At minimum, a university's degree in environment science, natural resources management, geography or related field and a Geo-information science master's level or equivalent.
Experience:	• A minimum of five (5) years of experience in remote sensing and GIS projects, and at least two (2) years in Forest land cover change; • At least two (2) years in SAR and UAV applications for environmental monitoring. Prior experience in working with the government of Cambodia in environment is a plus.
Competencies:	• Good technical understanding of Active sensors, UAV and GIS applicability for the land forest monitoring.
Language	English.

10. Scope of Bid Price and Schedule of Payments

- A service provide should prepare both activity and financial proposals that cover the whole assignment from Phase I to Phase II, and the evaluation will be done as a lump sum for all phases. However, an initial contract will be made for the Phase I only. Depending on the availability of the fund and the performance of the service provider, the contract may be extended up to one year to undertake the activities under Phase II. In the case of contract extension, the UNDP Country Office will discuss with the service provider about necessary changes regarding the number of working days and scopes of activities before an agreement is made.
- The contract price is a combined of **"fixed price"**
  - Fixed Price applies all costs include professional fee, airfare, transportation, DSA of expert team, and meeting venue package in Phnom Penh interpreters and among other related costs.

- The key outputs or milestone activities for which payments will be made, with the corresponding percentage of the contract price.

Phase I

N	Deliverables/Outputs	Payment Schedule	Payment Amount percentage
a)	**Support the production of the 2016-2018 land forest map.**	**65**	**45%**
1	Two maps (1) National Lnaduse/Landcover map of 2018, using the existing national land classification system used for the 2016 map and (2) the national LULUC change map for the period 2016-2018.	December 2018	30%
1.1	The final mosaic for the Dec-17 to Mar-18 (the period can variate according to images available).	March 2018	10%
1.2	Semi-automatic classification (include two field missions for data acquisition and guidance on manual edition).	July 2018	10%
1.3	Report of the mapping quality control (includes one field mission) and the statistics of Forest change at national scale, province and other areas of interest (PA)	October 2018	10%
2	An updated technical report of the LULUC change methodology.	December 2018	10%

3	Report of Workshop or technical meeting	December 2018	5%
b) Development of the Monitoring function.			**40%**
4	Individual LULUCF map of the REDD+ pilot projects at the scale of the project	Draft version: August 2018 Final Version: December 2018.	10%
5	A report of the monitoring methodology and results achieved	November 2018	10%
6	SOP documents validated by GDANCP	December 2018.	5%
7	Presentation of a methodology and first results in a workshop or technical meeting.	January 2019 Update of results September 2019	5%
8	At least two trainings of 3 days in the use and implementation of UAV as part of the monitoring system - Use of high-resolution images and cloud-points of UAV sensors with satellite images. - LULUCF classification using high-resolution images.	November 2018	10%
c) Boundaries Assessment of protected area (PA) in the pilot areas.			**15%**
9	A report of the methodology and results, describing boundaries assessment for the REDD+ pilot project, based on the legal framework and the analysis of spatial extension.	Draft version: June 2018 Second version: August 2018 Final version: November 2018	10%
10	Presentation of a methodology and the first results are present in a workshop or technical meeting.	December 2018	5%

Phase II:

N	Deliverables/Outputs	Payment Schedule	Payment Amount percentage
a) Support the production of the 2018-2019 land forest map.			**60%**
1	Two maps (1) National Lnaduse/Landcover map of 2019 and (2) the national LULUC change map for the period 2018-2019.	December 2019	30%
1.1	The final mosaic for the Dec-18 to Mar-19 period (the period can variate according to images available).	March 2019	10%
1.2	Semi-automatic classification (include two field missions for data acquisition and guidance on manual edition).	July 2019	15%
1.3	Report of the mapping quality control (includes one field mission) and the statistics of Forest change at national scale, province and other areas of interest (PA)	October 2019	15%
2	- At least three trainings on the use and implementation of SAR: ▪ Basic notions of SAR ▪ Processing SAR images ▪ Integration of SAR with Landsat and Sentinel images to improve the land forest change.	August 2019	10%
3	An updated technical report of the LULUC change methodology, including a method to integrate SAR images with optic images.	August 2019	5%
4	Report of Workshop or technical meeting	December 2019	5%

b) Development of an Early Warning System methodology (EWS).			40%
11	The EWS system is installed and the methodology describing the use of satellite images to produce a near real-time monitoring of alerts for forest disturbance and fires produce at national scale is produce.	Draft version: April 2019 Second version: September 2019 Final version: November 2019	20%
12	Analysis and validation of alerts	July 2019	10%
13	Presentation of a methodology and the first results in a workshop or technical meeting	December 2019	10%

11. Recommended Presentation of Technical Proposal

A. Profile of the service provider

Interested service providers shall state why they are the best-suited to carry out the above task. This should include a detailed organization profile, outline the service provider's strengths and expertise highlighting directly relevant experiences to the assignment.

B. Methodology to conduct the assignment

The service provider shall propose a tailored methodology to successfully carry out the assignment.

C. Team structure

The service provider shall submit the proposed team structure to successfully deliver the assignment. The specific roles and responsibilities of each team member shall be clearly presented. And the service provider shall also provide the updated CV of each team member as the supporting evidence of their qualification.

D. Timeline/work plan

In addition, the service provider shall submit the proposed timeline/work plan to implement the assignment.

12. Approval

Signature: .....

Name: Carlos Riano

Title/Unit/Cluster: MRV Expert – FCPF project

Date: January 25 2018