Monitoring report form for CDM programme of activities (Version 05.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT			
Title of the PoA	Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia		
UNFCCC reference number of the PoA	10554		
Version number of the PoA-DD applicable to this monitoring report	2.1		
Version number of this monitoring report	1.0		
Completion date of this monitoring report	22/12/2021		
Monitoring period number	1		
Duration of this monitoring period	28/01/2020 to 31/12/2020 338 days		
Monitoring report number for this monitoring period	1		
Coordinating/managing entity	EcoEye Co. Ltd		
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)	
	Republic of the Union of Myanmar	Yes	
Applied methodologies and standardized baselines	CDM methodology AR-AM0014 version 3 Large Scale A/R Methodology Afforestation and reforestation of degraded mangrove habitats		
Sectoral scopes	Sectoral Scope 14		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0	2,674	0
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the CPA-DDs for the CPAs covered in this monitoring report	1,709t CO_2-e		

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

>> Mangroves are salt-tolerant evergreen forests commonly found along sheltered coastlines in the tropics and subtropics where they fulfil important socio-economic and environmental functions. These include the provision of a large variety of wood and NTFPs; coastal protection against the effects of wind, waves and water currents; conservation of biological diversity; protection of coral reefs, seagrass beds and shipping lanes against siltation; and provision of spawning grounds and nutrients for a variety of fish and shellfish, including many commercial species. Mangroves are important ecosystems providing wood, food, fodder, medicine and honey. They are also habitats for many organisms.

The programme looks at (i) reforestation and restoration of degraded mangrove habitats and (ii) Afforestation on grasslands on land accretions present within degraded mangrove habitats with the goal of mangrove restoration/establishment, coastal protection, sustainable livelihoods and development of local communities, biodiversity improvement. Climate mitigation in suitable mangrove habitats is achieved through sequestration of carbon in woody biomass and soils

The purpose of the PoA is to (i) Reforest/restore degraded or severely degraded mangrove habitats (ii) Afforest grassy land accretions within degraded mangrove habitats along the coastline of the Republic of the Union of Myanmar, resulting in increased area under mangroves. The proposed A/R CDM PoA plans to establish mangrove plantations in suitable locations within currently degraded costal/ intertidal mangrove habitats in Myanmar. Reforest/restore degraded or severely degraded mangrove habitats: The Purpose of the PoA activity is to reforest degraded mangrove habitats. These include lands that were previously mangrove habitats and that were subjected to impacts resulting in decrease of forest cover below that of the definition of forest as defined by the host country. The host country defines a forest as a land with tree crown cover of more than 10 percent and area of more than 0.5 hectares (ha). The trees should be able to reach a minimum height of 5 meters (m) at maturity in situ.

Afforest grassy land accretions within degraded mangrove habitats: Land accretions are formed as a natural phenomenon as a counter to erosion. These lands have accreted as a result of excessive siltation at river mouths which occur as a result of excessive soil erosion upstream in the river or due to post tsunami/cyclone landscape changes, or a combination of both. In the case of land accretions, the CPA implementer chooses lands only if the land meets certain criteria that show the lands are suitable for mangrove establishment and do not result in a conversion of ecosystems. The lands selected have grasses established on them as well as dispersed mangrove plants. The establishment of grass is used as an indicator that shows that the lands are suitable for mangrove establishment. Studies have shown that once grasses establish, the next natural ecological succession will be mangroves. 1 Afforestation" is the direct humaninduced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.

The establishment of mangrove systems will further bind the soil and allow for further capture of silt and prevent excess silt from being washed away. This will help in further land accretion and reduces negative impacts of silt on seagrass, meadows and corals.

The lands selected under this PoA activity are new lands created as a result of a combination of siltation and landscape changes due to natural events such as the 2004 tsunami and subsequent storms. The lands selected for implementation of PoA activities are lands that are classified as Protected Public Forest (PPF) or are proposed PPF lands. The CPA implementer is authorised by the Forest Department to implement project activities on these lands.

The coastline of Myanmar is particularly climate vulnerable and have been severely impacted in recent years by a number of natural disasters, including the 2004 Indian Ocean tsunami as well as subsequent cyclones and storms, most significantly Cyclone Nargis in 2008.
High population pressure in coastal areas has led to the conversion of many mangrove areas to other uses including infrastructure, aquaculture, rice and salt production.

A.1.1. Corresponding generic component project activities (CPAs)

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines
Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia CPA X, Generic CPA 01	2.1	14	CDM methodology AR-AM0014 version 3 Large Scale A/R Methodology Afforestation and reforestation of degraded mangrove habitats

A.1.2. CPAs included in the PoA

Title and UNFCCC reference number of the CPA	Version of the PoA-DD	Title and reference number of the corresponding generic CPA	Crediting period type and duration	Covered in this monitoring report? (yes/no)
Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia CPA 1 version 2 10554-P1-0001-CP1	2.1	Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia CPA X, Generic CPA 01	Renewable Crediting period 20 years renewable twice upto 60 years First crediting period is 28/01/2020 to 27/01/2040	Yes

A.2. Coordinating/managing entity

>> EcoEye Co. Ltd

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

>> The PoA Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia was registered on 28/01/20.

The CPA implementer was responsible for training and capacity building of persons employed by the CPA to carry out project activities. All training or capacity building exercise was documented.

The CME collected all documents/information necessary to check the compliance of the CPA with the eligibility criteria of the PoA, checking whether the CPA and included technology fulfils eligibility criteria of the PoA or not. In addition, the CME reviewed the monitoring plan of the CPA to ensure that it was in line with the monitoring plan mentioned in Section J of the PoA DD. The CPA and its project activities was compared to existing databases to assess if it is already under validation or registered at the UNFCCC or any other standard or mechanism in order to avail climate change

mitigation benefits.The CPA implementers have been made aware of the double counting principle i.e. the CPA should not be a CDM project by itself and/or as a part of any other CDM PoA and/or any other mechanism to avail climate change mitigation benefits. The individual CPA has issued an authorization letter to the CME informing them that they are aware of and have agreed to their activity being subscribed to this proposed PoA and to confirm that they are not registered either as a CDM project activity or as a CPA of another PoA. To avoid double counting, all plots of land where planting will happen have been clearly demarcated using GIS software. Any planting activity other than that outlines in the PoADD and CPA-DD that happens within this plot boundary has not be counted as a part of this programme. In addition, any planting that happens outside the plot boundary has not been counted towards calculation of CERs.The project personnel have been trained in the methods employed for data collection and data archiving, ensuring that strict QA/QC procedures are followed. The plots on which planting will happen will be clearly demarcated using GIS software. Other locations where project activities will occur, such as the nurseries etc. will also be clearly marked. The following data has been clearly recorded for all planting activities (i) Plot Location (ii) Date of site preparation, if any (iii) Location of nursery from where the seedlings were transferred (iv) Number of seedlings planted (v) Date of Planting (vi) Species (vii) Names of all Personnel participating in the process including at nursery/transport/planting/others (viii) Other parameters as detailed in the monitoring plan. All data that is collected will has been archived in hard and electronic format with the CPA and has been shared with the CME for the purpose of preparation of the MR.

At the time of the preparation of this Monitoring Report, 1 CPA has been included under the PoA. 10554-P1-0001-CP1 Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia CPA 1.

Only one CPA has been included in this MP. The sampling approach was applied for CPA 1, and not a group of CPAs.

B.2. Post-registration changes to PoA

B.2.1. Corrections

>> NA as there are no corrections to programme information or parameters fixed at the registration or renewal of the PoA period.

B.2.2. Inclusion of monitoring plan

>> NA as there is no a post-registration change to include a monitoring plan into the PoA-DD, for which the delayed submission of the monitoring plan was chosen by the coordinating/managing entity at the time of the registration of the PoA.

B.2.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>> NA as there are no permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baseline, or methodological regulatory documents.

B.2.4. Changes to programme design

>> NA as there are no changes to the programme design of the PoA.

B.2.5. Changes specific to afforestation or reforestation activities

>> NA as there are no changes specific to afforestation or reforestation activities of the PoA.

PART II Monitoring of CPAs

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SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

>> The lands selected for the project are land accretions that are present within degraded mangrove habitats along an eroded coastline. In the baseline scenario, the land is expected to continue with its pre-project use and therefore will remain grasslands with sparse mangrove establishment. Establishment of grasses is an indicator that mangroves will be the next ecological succession of the land. This is also used to ensure that there is no planting on mudflats, and ensures no conversion of ecosystems. Natural regeneration sufficient to create a forest as per the Host Country definition is not possible without human intervention in the form of afforestation.

The species identified for this afforestation project are *Rhizophora apiculata, Rhizophora mucronata, Bruguiera gymnorrhiza, Bruguiera sexangular, Avicennia officinalis* and *Sonneratia apetala* . Key factors that were considered in selecting the species are that (i) The species are already common species found in the area (not been a new species to the area), (ii) The species are not an invasive.

Mangrove nurseries were established. Mangrove species can be established by direct seed sowing method but at least 50% of target plants must be established in the nursery one year ahead. The nursery system is a pound nursery system and water flow is controlled by a sluice gate. Nurseries were set up to meet the following criteria

(1) Boats should be able to enter every low tide and high tide
(2) Ground level should be low ground or medium ground
(3) It should be easy to monitor

An area of 1 meter depth will be dug and an embankment was made. The depth of the pond is around 1 meter and even during a low tide day in the dry season water should be able to flow into the nursery area. Sluice gate is the best method to control tide inundation. Natural mangrove soil is the best to put in plastic bags. Mangrove seeds were collected during February to May and are grown in these plastic bags.

For direct seed sowing, 40ft x 20ft of seed storage building was constructed. This has the capacity to store about 150,000 seedlings. Most of the mangrove species seeds are viviparous and mature during the dry season (February to April). Almost all propagules already produce new shoots on the mother tree. Direct seed sowing is not possible during the hot weather due to exposing to direct sun light.

Plant spacing in afforested areas is 1.1 meter by 3 meter or 3000 plants per hectare. Seedlings were carried out to the planting site from the nursery. The seedlings were placed in plastic baskets and loaded on to the boat. Each basket carries 50 seedlings and one boat can transport 30 baskets. Both direct seed sowing and planting seedlings is applied for this project activity.

The climbers that need to be removed are species such as *Finlaysonia maritima, Derris trifoliate, Acanthus ilicifolius, Dalbergia spinosa*. The initial weeding should be done in June followed up with a second weeding operation in November. Weeding is done manually.

About 10% of the planted seedlings will need to be replanted due to damages caused by crab attacks and damages to seedlings during loading and unloading operation. Patching operation will be carried out in August using potted seedlings.

The project is implemented with a high level of community involvement and members of the local community are employed and trained for the purpose of implementation of project activities. Income Generating Activities (IGAs).

Location	Area (ha)	Date of Planting	Species planted	Planting Density (trees/ha)	Spacing
Letkokhnenone	52.8	15/03/19	*Rhizophora apiculata* *Avicennia officinalis* *Sonneratia apetala* *Ceriops tagal* *Sonneratia caseolaris*	3000	1.8 m x 1.8m
Crab Island	500	09/02/20	*Rhizophora apiculata* *Rhizophora mucronata* *Bruguiera gymnorrhiza* *Bruguiera sexangula* *Avicennia officinalis* *Bruguiera cylindrica*	3000	1.8 m x 1.8m

Crab Island:

The species planted are: *Bruguiera sexangula, Bruguiera gymnorhiza, Rhizophora mucronata, Rhizophora apiculata, and Avicennia officinalis*.

These species are well adapted to the environmental as well as edaphic settings of Crab Island. Due to the local conditions and professional planting, the trees are fast-growing and in good health. The CPA implementer raised a total of 300,000 seedings of Sonneratia apetala in the nursery for patching and planting. Sonneratia apetala is an endemic mangrove species on the island.

Weeding, patching, and maintaining the established plantation have been carried out as follow-up activities since mid-June 2020. Both weeding and patching activities were finished at the end of December 2020. A total of 54 permanent sample plots were laid out for survival counting and monitoring purposes. Out of 54 plots, 50 sample plots were ultimately selected for survival counting..

Patrolling is routinely carried out by four designated forest guards, accompanied by some office staff on Crab island once or twice a week as required. During the patrolling, the following are scrutinized.
(1) Agricultural encroachment;

(2) Survival condition of the planted trees; and

(3) Any other unscrupulous activities.

Patching would be carried out when seed and propagule are available if the planted trees are affected by any reason.

Covid-19 measures
The Alpha and Delta variants of Covid-19 is seriously affecting the country, killing people every day. The office on Crab Island receives required medicines and guidelines on personal preventive measures against Covid-19 to protect the staff themselves from Covid-19 first and the associated team members then.

Survival Counting Results:
The WIF project staff conducted a survival counting on the 500-hectare plantation from 10-12 December 2020. The team carried out survival counting on 50 permanent sample plots; each permanent sample plot's size is 10 meters by 10 meters, each containing 36 trees. The permanent sample plots were systematically distributed with an equal distance of 300 meters apart between the adjacent plots. The survival percentage was 91.6%, meaning that 91 out of 100 trees can survive.

Conclusions
Crab Island is biologically diverse, especially in terms of mangrove species. To date, a total of 15 true mangroves and 16 mangrove associates have been observed and recorded on Crab Island.

Seeds of *Avicennia officinalis* and *Sonneratia apetala* are available starting from August until the end of September. Seeds are available only during the seeding season. Seedlings of both species (*Sonneratia apetala* and *Avicennia officinalis*) can be raised in a nursery, but direct seed sowing can be possible with *Avicennia officinalis*. Primary planting operations were finished. The WIF appointed forest guards to routinely patrol and guard the planted area to ensure the planted trees are safe and well protected. At present, patrolling and safeguarding are the two ongoing activities on Crab Island.

Stationary were distributed to the schools located in the four project villages: Aung Kan Thar, Htein Pin, Zaike Ka Yae, and Thone Eain Su.

Compilation of village profile was implemented in the two villages: thone Eain Su and Zaike Ka Yae, to learn the current situation and problems within the villages. The compendium was undertaken through meeting with the village leaders, village development committee members, elderly and respectable persons.

The meeting for commercial mushroom production was held with trainees of the mushroom production training and interested parties. The site is limited due to the flood in the monsoon season but will be available in the coming winter and summer seasons.

Crab breeding, including fish breeding activities, is undergoing with beneficiaries in Thaton. The beneficiaries include both permanent and daily laborers. The following work plan of the livelihood team for the Thaton project area includes distribution of stationaries, monitoring of mushroom production, collection of village profile in the remaining villages, meeting with VDC members for project implementation, solar lamp distribution, and computers installation at schools, distribution of mushroom seedlings and plastic sheets for mushroom production, and trash campaign activities in Aun Kan Thar village.
The following Livelihood Development Activities are in the process of implementation in Aung Kan Thar Village in which a total of 217 households are residing. Agriculture and fishery are the major livelihoods in the village.

Other initiatives are in progress:
1. Establishment of an Ice Plant for local fishermen;

2. Expanding an Existing Water Pond (5 acres = 12.35 hectares) as a source of fresh water to satisfy the need for clean drinking water and water for the proposed ice plant.

3. Establishment of an Integrated Fish Farming;
4. Introduction of an Improved Solar Drying System for fishery products.

1. Provide a brief summary of the CPAs covered in this monitoring report in terms of the purpose of the CPAs and the measures taken for GHG emission reductions or net anthropogenic GHG removals.
2. Provide information on the implementation status of the CPAs in accordance with the applicable provisions on the description of implemented CPAs in the project standard, including:
   (a) Description of the installed technologies, technical processes and equipment for the CPAs;
   (b) Information on the implementation and actual operation of the CPAs, including relevant dates (e.g. construction, commissioning, start of operation). If a CPA consists of more than one site, describe the status of implementation and start date of operation for each site. If a CPA is implemented in phases, indicate the progress of the CPA achieved in each phase.
3. For the description of the installed technologies, technical processes and equipment, include diagrams, where appropriate.

If applicable, present information on any post-registration changes to the CPAs in section **Error! Reference source not found.**

C.2. Location of CPAs

>> The CPA is located in Myanmar, in the Yangon Region and Mon State The CPA is implemented in tracts of land falling under Protected Public Forests (PPF). Three PPFs are included in this CPA-Kanyashe PPF, Crab Island PPF and Kyipi Shwethaung PPF, covering an area of 2552.84 ha.

CPA Title and Reference	Host Party	CPA Area	Region/State	Area (ha)
Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia CPA 1	Myanmar	Kyanyashe PPF, Letkokkon (called Letkokhenone, Kinyashe PPF in CPA DD, herenin after referred to as	Yangon	52.84

10554-P1-0001-CP1		Letkokkon in this document)		
		Crab Island PPF, Thaton (called Crab Island, Thaton PPF in CPA-DD)	Mon	2000
		Kyaipi Shwethaung PPF, Kyaikto (referred to as Kyaikto, Kyaikto PPF in CPA-DD)	Mon	500

CPA Area	Coordinates	
Crab Island	Upper Left	97 11 38.7853 E 16 50 46.6298 N
	Lower Right	97 11 59.1906 E 16 50 27.3399 N
Letkokkon	Upper Left	96 10 28.6389 E 16 20 25.6194 N
	Lower Right	96 11 6.8755 E 16 20 12.5411 N
Kyaikto	Upper Left	96 55 59.2804 E 17 17 42.9652 N
	Lower Right	96 58 35.7641 E 17 14 6.7178 N

C.3. Post-registration changes to CPAs

C.3.1. Temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies, standardized baselines or other methodological regulatory documents

>> NA as there are no temporary deviations from the monitoring plans in the included CPA-DDs, the applied methodologies, the applied standardized baselines or the other applied methodological regulatory documents during this monitoring period, for any of the CPAs covered in this monitoring report.

C.3.2. Corrections

>> NA as there are no corrections to programme information or parameters fixed at the registration or renewal of the PoA period.

C.3.3. Changes to the start date of the crediting period

>> As per para 7, point (a) of Annex 1 to the EB 109 Regulatory Requirements under temporary measures for post-2020 cases (CDM-EB109-A01), the start date of the crediting period is defined as the date when the DOE submitted a complete request for registration, or, in the case of a project activity,any later date as specified in the PDD.

Date		
15/03/19	Date of first planting of CPA	Start date as per CPA DD
28/01/20	Date of registration of PoA DD as per Para 7, point (a) of CDM-EB109-A01	Revised start date

C.3.4. Inclusion of monitoring plan

>> NA as the montitoring plan was submitted with the CPA DD. There are no post-registration changes to include a monitoring plan into the CPA-DDs, for which the delayed submission of the monitoring plan was chosen by the coordinating/managing entity at the time of the inclusion of the CPAs, for any of the CPAs covered in this monitoring report.

C.3.5. Permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>> NA as there are no are permanent changes to the monitoring plans in the included CPA-DDs, or permanent deviation of monitoring from the applied methodologies, applied standardized baseline, or other methodological regulatory documents, for any of the CPAs covered in this monitoring report.

C.3.6. Changes to project design

>> There are no changes to the project design.

C.3.7. Changes specific to afforestation or reforestation CPA

>> There are no changes to the project design.

The CPA has changes in the planting schedule as per the proposed planting schedule in the CPA DD and actual planting activities.

Location	PPF	Date of start of planting	Area planted (ha)	Area planted at date of end of MP (ha)
Letkokkon	Kanyashe PPF	15/03/19	52.84	52.84
Crab Island Phase 1	Crab Island PPF	09/02/20	500	500
Crab Island Phase 2	Crab Island PPF	2021	1500	0
Kyaikto	Kyaipi Shwethaung PPF	2021	500	0

SECTION D. Description of monitoring system of CPAs

>> The PoA will be managed by the CME EcoEye Co. Ltd hereinafter referred to as EcoEye. An implementation partner, Worldview International Foundation, hereinafter referred to as WIF, in coordination and cooperation with the local community, will implement the programme as CPA implementer. ECOEYE Co., LTD as a coordinating and managing entity (CME) will implement the CDM PoA- Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia. ECOEYE Co., LTD is a leading carbon offset project developer and trader that assist forprofit and not for profit organizations to implement climate mitigation projects.

1. Under the program, ECOEYE Co., LTD will develop the component of project activities (CPAs).
2. It will be responsible for communication with CDM Executive Board and coordinate the work relating to validation, registration, verification and issuance of carbon credits generated by the program.
3. Additional CPAs may be associated with the programme during its lifetime subject to the condition that they must adhere to the general implementing framework described in the PoA-DD.
4. To propose the PoA;
5. To communicate with the Board, including on matters related to the distribution of Certified Emission Reductions (CERs);
6. To review and assist in the selection and preparation of CPAs, ensuring that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA and that the CPA is subscribed to the PoA;
7. To ensure that the same approved baseline and monitoring methodology is applied to all the CPAs;
8. Companies registered in the Republic of Korea will be providing 100 % of the costs to the project implementation
9. To establish CER ownership agreements with the implementing partner organizations; x. To ensure that the project participants maintain and provide monitoring data for calculating CERs;
10. To establish and manage the data base for calculating CERs based on data received from the CPA implementing partner organization;
11. To facilitate validation and verification of the program by a Designated Operational Entity.

The implementers of the CPA are responsible for the following. These systems outlined here are elaborated on in further sections of this MR.

12. Demarcating the lands on which project activities will be implemented
13. To institute adequate record keeping and data monitoring systems for the compilation, computation and storage of data;
14. To establish quality control procedures for all monitoring parameters; iv. To monitor and record the data.

The CME, ECOEYE Co., LTD is a leading CDM project developer and trader that assists for-profit and not-for-profit organizations to implement climate mitigation projects. With over fifteen years of experience, the CME has a team of experienced professionals who are highly skilled in CDM project identification and development, renewable energy technologies, rural markets and sampling techniques. Over the past fifteen years, CME has developed many carbon offset projects in a number of sectoral scopes. As the CME, ECOEYE Co., LTD will be responsible for the following:

15. General management of the PoA ,
16. Ecoeye Co., Ltd. will be responsible for financing the implementation of the PoA.
17. Identification of CPA implementers and selection and preparation of CPAs for their inclusion in the PoA, ensuring that any CPAs under the PoA are neither registered as an individual CDM project activity nor included in another registered PoA
18. To sign agreements with CPA implementers and establish CER ownership agreements with the CPA implementer
19. To sign agreements with DOE for inclusion and verification services;
20. To communicate with the CDMEB, including on matters related to the distribution of Certified Emission Reductions (CERs);
21. To review and assist in the selection and preparation of CPAs, ensuring that all CPAs fulfils eligibility criteria and neither registered as an individual CDM project activity nor included in another registered PoA ;
22. To ensure that the same approved baseline and monitoring methodology is applied to all the CPAs
23. To establish CER ownership agreements with the CPA implementers;

24. To ensure that the CPA implementer have CER transfer agreements with each local partner
25. Assess competency of entities (external consultant/partner, if any) involved in CPA inclusions as well as ensure that project documents are technically reviewed (either internally or externally outsourced)
26. To ensure that the CPA implementers maintain and provide monitoring data for calculating CERs
27. To establish and manage the data base (document control for each CPA) for calculating ERs based on data received from the CPA implementer;
28. Communications with the CDM EB, including on matters related to PoA/CPA inclusion, validation, verifications and emission reductions
29. Liaison with GHG auditors for Validation and Verification of PoA and CPAs added to the PoA and Verification of CPAs for issuance of Carbon Credits (CERs)
30. In-Charge of submission of all relevant documents (PoA-DDs, CPA-DDs, legal documents, etc.) for Certification from CDM for projects and issuance of CERs

The CPA implementer, Worldview International Foundation (WIF) is responsible for the following:

31. To implement all project activities such as site identification, nursery management, site preparation, planting and monitoring;
32. Recruitment of personnel, mostly members of the local community, for the purpose of project management
33. Training and capacity building of recruited project management team as well as local institutions involved in implementation such as village committees etc.
34. To institute adequate data collection and archiving systems;
35. To establish quality control procedures for all monitoring parameters;
36. To monitor and record the data
37. To execute agreement with the local partners, for transfer of emission reductions in favour of themselves / CME.
38. Disbursement of incentives/subsidies to the local partner (according to their role and as per CME instructions, if any).

WIF has specialized in communication development and project implementation since 1979. From 2012, WIF has been working in cooperation with the Ministry of Environmental Conservation and Forestry, and various universities in the research and development of effective methods for mangrove restoration. These institutions have professionals with valuable knowledge and capacity but lack resources and infrastructure. It has been a win-win partnership with the aim of building up national capacity on mangrove restoration at a time with urgent need for action to meet national challenges of climate change. The following are the team members of WIF:

2. Bo Ni, Managing Director, former Director of the Forest Department. 30 year working experience in forest conservation and CDM experience.
3. Win Maung, Project Director, former Assistant Director Forest Research Institute. 30 year working experience in mangrove conservation as government official; researcher and Project Manager of NGO/UN-LIFT projects.
4. Dr. Aung Myat San, the project manager, formar Assistant Director of Forest Department, 19 years experience in mangrove research and restoration.
5. Aung Aung Myint, formar Assistant Director of Forest Department 30 years working experience in RS & GIS.
6. Prof. Htay Aung, science advisor and field controller in charge of liaison with Pathein University and local communities. Over 20 years experience in marine science research in the project area.
7. Dr. Ranil Senanayake, Senior Science Director WIF, Founder of Analog Forestry and Chairman Raniforest Rescue International.
8. NawHtoo Say WahKhaing, communication specialist in charge of social mobilisation.

9. Myint Sein, Field Manager, served as Field administrator with over 20 years of experience of mangrove conservation and community development activities at Forest Department.

The CPA implementer will be responsible for training and capacity building of persons employed by the CPA to carry out project activities. The CME will collect all documents/information necessary to check the compliance of the CPA with the eligibility criteria of the PoA, checking whether the CPA and included technology fulfils eligibility criteria of the PoA or not. In addition, the CME will review monitoring plan of the CPA to ensure that it is in line with the monitoring plan mentioned in Section J of the PoA DD.

Every new CPA and its project activities will be compared to existing databases to assess if it is already under validation or registered at the UNFCCC or any other standard or mechanism in order to avail climate change mitigation benefits. The CME is responsible for identifying, registering and managing all CPAs included in the proposed PoA. This means that those operating the CPA are aware and have agreed that their activity is subscribed to the proposed PoA.
The CPA implementers in the PoA will be made aware of the double counting principle i.e. the CPA should not be a CDM project by itself and/or as a part of any other CDM PoA and/or any other mechanism to avail climate change mitigation benefits. The individual CPA also has to issue an authorization letter to the CME informing them that they are aware of and have agreed to their activity being subscribed to this proposed PoA and to confirm that they are not registered either as a CDM project activity or as a CPA of another PoA. To avoid double counting, all plots of land where planting will happen will be clearly demarcated using GIS software. Any planting activity other than that outlines in the PoADD and CPA-DD that happens within this plot boundary will not be counted as a part of this programme. In addition, any planting that happens outside the plot boundary will not be counted towards calculation of CERs.

The project personnel will be trained in the methods employed for data collection and data archiving, ensuring that strict QA/QC procedures are followed. The methods of data collection and archiving will be standardised across all CPAs. The plots on which planting will happen will be clearly demarcated using GIS software. Other locations where project activities will occur, such as the nurseries etc. will also be clearly marked. The following data will be clearly recorded for all planting activities

1. Plot Location
2. Date of site preparation, if any
3. Location of nursery from where the seedlings were transferred
4. Number of seedlings planted
5. Date of Planting
6. Species
7. Names of all Personnel participating in the process including at nursery/transport/planting/others
8. Other parameters as detailed in the monitoring plan.

All data that is collected will be archived in hard and electronic format with the CPA. This will be shared with the CME as and when required for the purpose of creating relevant documents for validation/verification.

The PoA management system will be reviewed by the CME on a regular basis for timely identification and resolution of issues. The review system will identify and resolve any problems related to implementation of project activities, monitoring, data collection and maintenance. This is done through a monthly progress/status report from the CPA implementer is reviewed by the CME on the second Monday of every month. In addition, a completion report is also submitted to the CME at the end of each month. The CME undertakes visits to the project sites at time of verification and through random visits between verifications. Input from the CPA implementers will be taken into consideration.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

Data/Parameter	$\Delta CBSL,t$
Unit	tCO2
Description	Baseline net GHG removals by sinks in year t
Source of data	NA
Value(s) applied	0
Choice of data or measurement methods and procedures	Value based on section 5 of AR-TOOL14
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	NA

Data/Parameter	CF_{TREE}
Unit	tC (t d.m.)-1
Description	Carbon fraction of tree biomass
Source of data	Default value of AR CDM tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" Version 04.2
Value(s) applied	0.47
Choice of data or measurement methods and procedures	Default value of AR-TOOL14 is used unless transparent and verifiable information can be provided to justify a different value
Purpose of data/parameter	Calculation of project emissions
Additional comments	NA

Data/Parameter	*fj(x1,l,x2,l,x3,l,...)*
Unit	t d.m.
Description	Total biomass of the tree returned by the allometric equation for species j relating the measurements of tree l to the total biomass of the tree
Source of data	Ya Min Thant *et al.* (2012)
Value(s) applied	. Above ground - WTop = 0.22 ρ (DBH2H) 0.82 Below ground - WRoot = 1.69 ρ (DBH2H) 0.40
Choice of data or measurement methods and procedures	Most appropriate allometric equations applied
Purpose of data/parameter	Calculation of project emissions
Additional comments	NA

Data/Parameter	*Dj*
Unit	kg m-3
Description	Basic wood density for species or group of species j

Source of data	The source of data, in order of preference, shall be any of the following: (a) National and species-specific data (e.g. from national GHG inventory); (b) Species-specific data from neighbouring countries with similar conditions; (c) Globally available species-specific data (e.g. Table 3A.1.9 IPCC GPG-LULUCF 2003)
Value(s) applied	0.8
Choice of data or measurement methods and procedures	Average of species planted
Purpose of data/parameter	Calculation of baseline net GHG removals by sinks; calculation of actual net GHG removals by sinks; and Calculation of leakages
Additional comments	NA

E.2. Data and parameters monitored

Data/Parameter	*Ai*
Unit	Hectare (ha)
Description	Area of tree biomass stratum i
Measured/calculated/ Default	Measured
Source of data	GPS/GIS
Value(s) of monitored parameter	Letkokkon: 52.8 Crab Island Phase 1: 500 Total: 552.8
Monitoring equipment	Areas in project area will be tracked in the field using the GPS. Each plot which will be subject to planting is tracked - a standard procedure of the baseline and monitoring inventory
Measuring/reading/recording frequency	Before the start of the project (planting) and adjusted thereafter every two years since the year of the initial verification
Calculation method (if applicable)	NA as this is measured
QA/QC procedures	Field-team members are fully aware of all procedures and the importance of collecting data as accurately as possible; all field team members are trained in GPS/GIS application. The field manager ensures that the GPS instruments used are free of error and as per the manufacturer's specifications
Purpose of data/parameter	Calculation of project emissions
Additional comments	NA

Data/Parameter	*ni*
Unit	Dimensionless
Description	Number of sample plots in stratum i
Measured/calculated/ Default	Calculated
Source of data	Calculated
Value(s) of monitored parameter	Letkokkon: 50 Crab Island Phase 1: 50 Total: 100
Monitoring equipment	NA

Measuring/reading/recording frequency	n_i is calculated for each monitoring event, at least every five years At each monitoring and verification event
Calculation method (if applicable)	The calculation method is described in the tool "Calculation of the number of sample plots for measurements within A/R CDM project activities" (version 02.1.0)
QA/QC procedures	NA
Purpose of data/parameter	Estimation of project emissions
Additional comments	NA

Data/Parameter	*wi*		
Unit	Dimensionless		
Description	Relative weight of the area of stratum i, the area of the stratum i divided by the project area.		
Measured/calculated/ Default	Calculated		
Source of data			
Value(s) of monitored parameter	Letkokkon	52.8	0.1
	Crab Island Phase 1	500	0.9
	Total	552.8	1
Monitoring equipment			
Measuring/reading/recording frequency	Calculated for each monitoring event, at least every five year		
Calculation method (if applicable)	Wi=Area of stratum i/Sum of areas of all strata included in the MR		
QA/QC procedures	NA		
Purpose of data/parameter	Estimation of project emissions		
Additional comments	NA		

Data/Parameter	*APLOT,i*
Unit	Ha
Description	Size of sample plot in stratum i
Measured/calculated/ Default	Measured
Source of data	Field measurement, GPS and GIS
Value(s) of monitored parameter	0.01
Monitoring equipment	Areas in the project area are tracked in the field using the GPS. Each planting area is tracked as a standard procedure of the baseline and monitoring inventory. Each plot represents a 0.01 ha of area covering the trees within the plot. 10 m x 10 m plots are laid using random sampling in the project area after calculating the number of sample plots needed for each stratum
Measuring/reading/recording frequency	Annually
Calculation method (if applicable)	NA
QA/QC procedures	Field teams are trained in all inventory procedures including layout of plots. Field-team members are fully aware of all procedures and the importance of collecting data as accurately as possible.
Purpose of data/parameter	Estimation of project emissions
Additional comments	NA

Data/Parameter	DBH
Unit	Cm
Description	Diameter at breast height of tree
Measured/calculated/ Default	Measured
Source of data	Field Measurements
Value(s) of monitored parameter	Refer to excel sheet and calculations
Monitoring equipment	DBH Tape
Measuring/reading/recording frequency	Annually measured and recorded
Calculation method (if applicable)	NA
QA/QC procedures	Field teams are trained in all inventory procedures including correct measurement. Field-team members are fully aware of all procedures and the importance of collecting data as accurately as possible. Two people take measurements each time. One person measures and reads it loudly to the person who records. He then confirms the value by reading it loud to the measurer. This way recording errors are minimized. A pole with a mark at 1.3 m length is used to determine the 1.3 m from the bottom. This way if anyone takes the measurement, GBH is measured at 1.3m from the ground. For trees which are less than 1.3 m, the following protocol is used. Using the measuring stick, the height of the seedling is recorded by measuring from the ground to the base of the uppermost apical shoot and the result is recorded in the datasheet. A caliper or other instrument is used to measure the stem diameter of the seedling. This height will be determined by the height of the seedlings but 10 cm or 30 cm above ground height would in most cases be an appropriate height (D10 or D30). For species that propagate using an elongated propagule rather than a seed (e.g. Rhizophora spp.) the measurement is taken at the base of the stem, just above the swelling of where the propagule meets the emerging stem or the I" prop root is visible.16
Purpose of data/parameter	Estimation of project emissions
Additional comments	NA

Data/Parameter	Height
Unit	m or cm
Description	Height of tree in sample plot
Measured/calculated/ Default	Measured
Source of data	Field Measurements
Value(s) of monitored parameter	Refer to excel sheet and calculations
Monitoring equipment	Height of tree is measured using a pole or clinometer
Measuring/reading/recording frequency	Annually measured and recorded.
Calculation method (if applicable)	NA

QA/QC procedures	Field teams are trained in all inventory procedures including correct measurement. Field-team members are fully aware of all procedures and the importance of collecting data as accurately as possible. Two people take measurements each time. One person measures and reads it loudly to the person who records. He then confirms the value by reading it loud to the measurer. This way recording errors are minimized. To measure the height of each mangrove tree: • Stand the height pole up directly below the highest point of the tree (Figure). • Measure the height of the tree to the nearest 10cm, based on the known length of the pole. • Record the result. If the tree canopy is higher than 10m a clinometer is used.
Purpose of data/parameter	Estimation of project emissions
Additional comments	NA

Data/Parameter	T
Unit	Year
Description	Time period elapsed between two successive estimations of carbon stock in a carbon pool
Measured/calculated/ Default	Measured
Source of data	NA
Value(s) of monitored parameter	2
Monitoring equipment	NA
Measuring/reading/recording frequency	At every monitoring and verification event, at least once every 5 years.
Calculation method (if applicable)	NA
QA/QC procedures	NA
Purpose of data/parameter	Estimation of project emissions
Additional comments	NA

Data/Parameter	dSOCt
Unit	t C ha-1 yr-1
Description	The rate of change in SOC stocks within the project boundary, in year t
Measured/calculated/ Default	Default
Source of data	The value of dSOC will be determined for each CPA based on most relevant value for the CPA region and type of intervention- reforestation/restoration on degraded lands or afforestation on grassy accretions present within degraded mangrove habitats. The most relevant/applicable of the following will be chosen 1. Default value from methodology 2. SOC estimated from soil samples collected from the CPA area or any other transparent and verifiable information
Value(s) of monitored parameter	0.5
Monitoring equipment	NA
Measuring/reading/recording frequency	NA

Calculation method (if applicable)	NA
QA/QC procedures	NA
Purpose of data/parameter	Calculation of project emissions and and sinks
Additional comments	NA

Data/Parameter	Nbaseline
Unit	Number
Description	Number of baseline trees in sample plot
Measured/calculated/ Default	Measured
Source of data	Field Measurements, Monitored
Value(s) of monitored parameter	0
Monitoring equipment	NA
Measuring/reading/recording frequency	Annually
Calculation method (if applicable)	NA
QA/QC procedures	NA
Purpose of data/parameter	Monitoring of survival of pre-project trees
Additional comments	The parcels of land under project implementation in CPA 1 were predominantly grasslands with very sparse establishment of some mangrove plants. There were no baseline trees present in the sample plots and therefore no monitoring of pre-project or baseline trees was conducted. In addition, the project design ensures that no trees are lost due to harvest or suffer mortality due to planting of project trees.

E.3. Implementation of sampling plan

>>

The sampling plan was applied to CPA 1 alone. The ex-ante stratification of the project was done by year of planting. Such stratification was selected to increase the measuring precision without increasing unnecessary costs.

In order to monitor the project through time, permanent-sampling plots will be established and maintained. These will be managed in an identical way to the rest of the project, and will permit the most cost and labor effective form of forest monitoring.

These permanent plots will be monitored annually to assess actual above and below ground biomass accumulation. Carbon stock changes in above- and below-ground biomass on each plot are estimated using the diameter and height as a parameter. Sample plots of 0.01 ha (100m2) with 10 m x 10m will be established systematically with a random start for each strata based on the year of planting. Stratification for ex ante estimation of the actual net GHG removals by sinks was done according to the year of planting. Stratification for sampling is be the same as above. These plots will be monitored and the information will be collected and recorded as per the SOP and QA/QC proctocols.

As per the PDD, the CPA has the following strata

Location	PPF	Area	Year of Planting	Planting Completed (Yes/No)
Letkokkon	Kanyashe PPF	52.84	2019	Yes
Crab Island Phase 1	Crab Island PPF	500	2020	Yes
Crab Island Phase 2	Crab Island PPF	1500	2021	No
Kyaikto	Kyipi Shwethaung PPF	500	2021	No

Sampling framework The number of samples and sample size was determined using “Calculation of the number of sample plots for measurements within A/R CDM project activities (Version 02.1.0)”.

Initial estimate of number of plots is done with targeted precision level for biomass estimation within each stratum at +/- 10% of the mean at a 90% confidence level. The number of required plots (n) was calculated using the following equation:

$$n = \frac{N * {t_{VAL}}^2 * \left(\sum_i w_i * s_i\right)^2}{N * E^2 + {t_{VAL}}^2 * \sum_i w_i * {s_i}^2} \quad (1)$$

Where:

n: Number of sample plots required for estmation of biomass stocks within the project boundary, dimensionless

N: Total number of possible sample plots within the project boundary (i.e the sampling space or the population); dimensionless

t_{VAL} – Two-sided Student’s t- value, at infinite degrees of freedom, for the required confidence level; dimensionless

w_i: Relative weight of the stratum area I (i.e the area of the stratum i divided by the project area); dimensionless

s_i: Esrtimated standard deviation of biomass stock in stratum i; t d.m (or t dm ha^{-1})

E: Accesptable margin of error (.i.e one half of the confidence interval) in estimation of biomass stock within the project boundary; t dm (or t d.m ha^{-1}). i.e the units used for s_i

i: 1,2,3,…. Biomass stock estimation strata within the project boundary

The number of plots was calculated to be 70. The CPA has 100 sample plots for the strata included in this MP, based on the expert opinion of the CPA implementer.

To allocate the number of plots allocated to each stratum the following equation was used.

$$n_i = n * \frac{w_i * s_i}{\sum_i w_i * s_i} \quad (4)$$

Where,

ni: Number of sample plots allocated to stratum i; dimensionless
n: Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
wi: Relative weight of the area of stratum i (i.e. the area of stratum i divided by project area); dimensionless
si: Estimated standard deviation of biomass stock in stratum i; t d.m. (or t d.m. ha-1)
i 1,2,3,….. Biomass stock estimation strata within the project boundary

Strata		Sample plots as per the tool	Sample plots in the CPA
Letkokkon	Kanyashe PPF	10	50
Crab Island Phase 1	Crab Island PPF	59	50
		69	100

Sampling plot area:
Sample plots of 10 m x 10 m plots of 0.01 ha (100m2) have been laid out. The QC and QA procedures under the project aim at implementing standard and methodical procedures for monitoring and collection of precise field measurements. Location of sampling plots In order to avoid bias with regard to plot locations, permanent sample plots will be been located systematically with a random start. The geographical position (GPS coordinate), location, stratum and sub-stratum series number of each plot is recorded and archived. It is to be ensured that the sampling plots are distributed randomly.
Quality control (QC) and quality assurance (QA) procedures that have been applied to monitor actual GHG removals by sinks include.

1. Collecting reliable field measurements and Precise field monitoring
   A team consisting of members representing the entire project area was formed. This team involved in field monitoring was carefully trained in data collection and analysis. Each team member has been assigned in duties related to monitoring actual GHG removal. The persons responsible for the measurement work are trained in all aspects of the field data collection and data analyses. The project uses the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003) as the main reference document for all monitoring activities. These SOPs describe in detail all steps that should be taken in the field measurements and contain provisions for documentation for verification purposes so that future field personnel can check past results and repeat the measurements in a consistent fashion. In order to ensure the collection and maintenance of reliable field data: a) Field-team members are made fully aware of all procedures and the importance of collecting data as accurately as possible; b) Field teams will establish test plots if needed in the field and measure all pertinent components using the SOPs to estimate measurement errors; c) The document will list all names of the field team and the project manager will certify that the team is trained; d) New staff will be adequately trained.

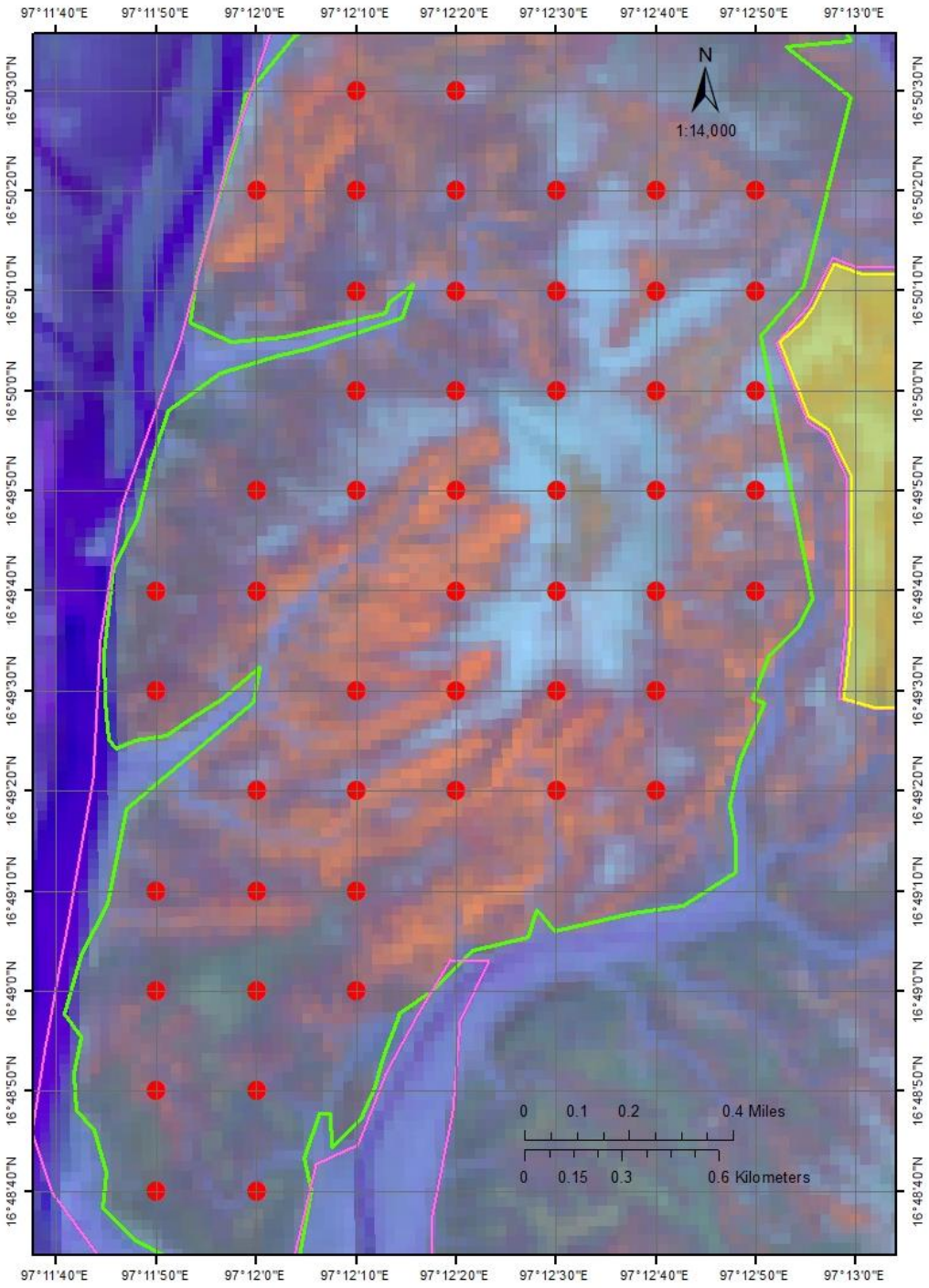
2. Verifying methods used to collect field data using independent expert opinion
   The data collected by the team was verified by taking random checks from stands, including their remeasurement by a senior member of the monitoring team. In case of errors, they were corrected and recorded for each stratum

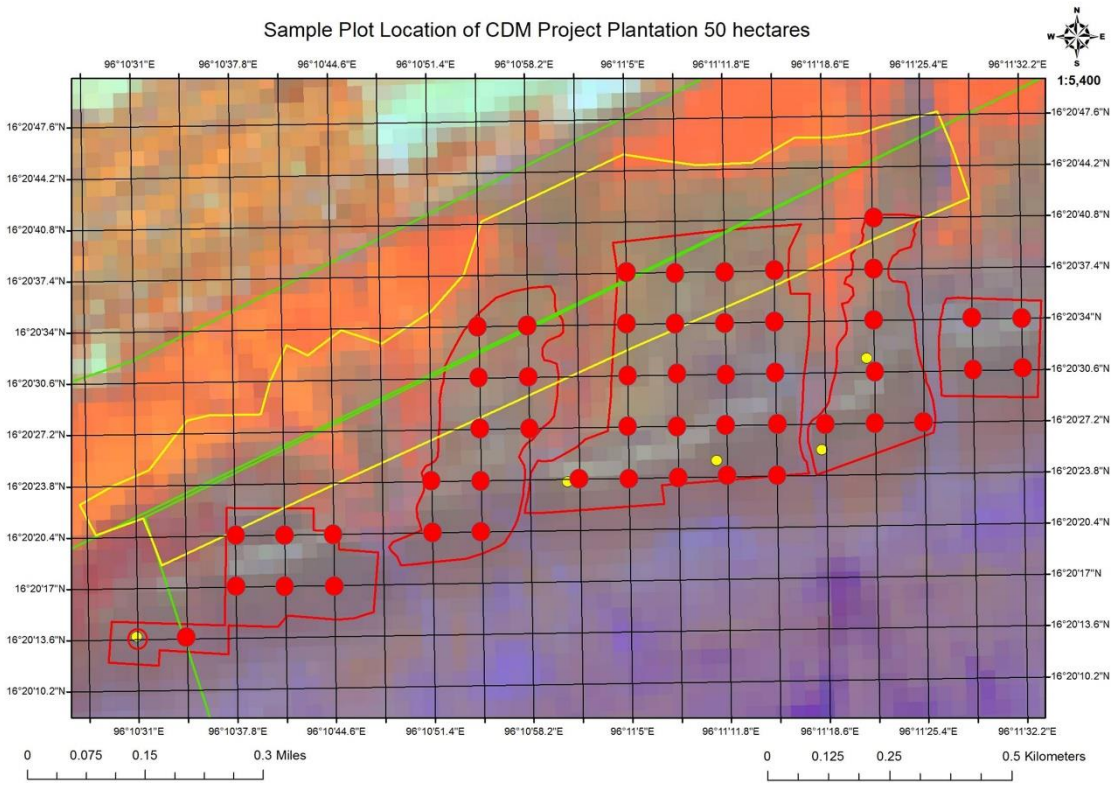
3. Verifying data entry and analysis techniques using independent expert opinion
   Reliable carbon estimates require proper entry of data into the data analysis spreadsheets. Possible errors in this process were minimized by cross checking these entries. Communication between all personnel involved in measuring and analyzing data will be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed. If there are any problems with the monitoring plot data that cannot be resolved, the plot will not be used in the analysis.

4. Data maintenance and archiving.
   Because of the relatively long-term nature of these project activities, data archiving (maintenance and storage) is an important component of the work. Data archiving will take several forms and copies (electronic and paper) of all field data, data analyses, and models; estimates of the changes in carbon stocks and corresponding calculations and models used; any GIS products; and copies of the measuring and monitoring reports will be stored in a dedicated and safe place, preferably offsite. These monitored data will be achieved for 2 years following the end of the crediting period as well (Note that this project has a renewable crediting period).

MONITORING

Location Map of 50 PSPs of KICC Mangrove Plantation 500ha, Crab Island, Thaton, Mon State





SECTION F. Calculation of emission reductions or net anthropogenic removals

F.1. Calculation of baseline emissions or baseline net removals

>> Baseline emissions

As per the applicability conditions of the applied methodology AR-AM0014 "Afforestation and reforestation of degraded mangrove habitats" (Version 03.0), it is expected that the baseline carbon stocks in litter and soil organic carbon pools will not show a permanent net increase.

The baseline net GHG removals by sinks are calculated using Equation 1 of the methodology:

$$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{SHRUB\_BSL,t} + \Delta C_{DW\_BSL,t} \qquad \text{Equation (1)}$$

Where,

$\Delta CBSL,t$ = Baseline net GHG removals by sinks in year t; t CO2-e

$\Delta CTREE\_BSL,t$ = Change in carbon stock in baseline tree biomass within the project boundary in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities";

t CO2-e $\Delta CSHRUB\_BSL,t$ = Change in carbon stock in baseline shrub biomass within the project boundary, in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities";

t CO2-e $\Delta CDW\_BSL,t$ = Change in carbon stock in baseline dead wood biomass within the project boundary, in year t, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities" ; t CO2-e

Section 5 of the methodological tool AR-Tool 14 (Version 04.2) explains conditions under which carbon stock and change in carbon stock may be estimated as zero.
According to the tool the carbon stock in trees in the baseline can be accounted as zero if all of the following conditions are met:

(a) The pre-project trees are neither harvested, nor cleared, nor removed throughout the crediting period of the project activity;
(b) The pre-project trees do not suffer mortality because of competition from trees planted in the project, or damage because of implementation of the project activity, at any time during the crediting period of the project activity;
(c) The pre-project trees are not inventoried along with the project trees in monitoring of carbon stocks but their continued existence, consistent with the baseline scenario, is monitored throughout the crediting period of the project activity.

There is no timber harvesting in this project and there will be monitoring to protect the existing and newly planted plants. Furthermore these existing mangrove plants are not removed or allowed to suffer mortality. These existing plants are not accounted for the carbon stocks but will be left to grow and are monitored throughout the crediting period of the project activity. Hence all applicability conditions (a), (b) and (c) are met.

Paragraph 12 of the same tool states that the changes in carbon stocks in trees and shrubs in the baseline may be accounted as zero for those lands that have met above (a), (b) and (c) conditions.

Hence the Baseline net GHG removals by sinks have been conservatively accounted as zero.

F.2. Calculation of project emissions or actual net removals

>> The net GHG removals by sinks are estimated using the equation 2 described in section 5.5 of the methodology AR-AM0014 A/R Methodology: Afforestation and reforestation of degraded mangrove habitats Version 03.0.

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \qquad \text{Equation (2)}$$

Where:

$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year *t*; t CO_2-e
$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e
$GHG_{E,t}$	=	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year *t*, as estimated in the tool "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO_2-e

Change in the carbon stocks in project, occurring in the selected carbon pools in year t were calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta SOC_{PROJ,t} \quad \text{Equation (3)}$$

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e

$\Delta C_{TREE\_PROJ,t}$ = Change in carbon stock in tree biomass in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{SHRUB\_PROJ,t}$ = Change in carbon stock in shrub biomass in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; t CO_2-e

$\Delta C_{DW\_PROJ,t}$ = Change in carbon stock in dead wood in project in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; t CO_2-e

$\Delta SOC_{PROJ,t}$ = Change in carbon stock in the soil organic carbon (SOC) pool within the project boundary, in year *t*; t CO_2-e

Carbon Pool	Included (Yes/No)
Biomass in trees	Yes
Biomass in shrubs	No
Biomass in dead wood	No
Biomass in litter	No
Biomass in SOC	Yes

Estimation of the changes in carbon stocks in tree biomass: CTREE_PROJ,t

The change in carbon stock in tree biomass in this project within the project boundary for the MP was estimated using the A/R methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (Version 04.2).

Biomass

Ex-post tree biomass was established using the method under section 8 of the tool, option (a) Estimation by measurement of sample plots.

The project area is stratified on the basis of planting year and location. For this MP, the project is stratified into:

Strata	Location	Year of planting	Area (ha)	Ratio of stratum area to project area (w_i)
Stratum 1	Letkokkon, Kanyashe PPF	2019	52.8	0.1
Stratum 2	Thaton, Crab Island PPF	2020	500	0.9

The stock difference method was applied as per the requirements of the tool and for estimation of the changes in carbon stocks in tree biomass ex-post, field measurements in permanent sample plot is done. The calculations will be carried out as per the guidance of Section 6 of the tool, Para 14, point (b) Direct estimation of change by re-measurement of sample plots;

Permanent sample plots were established for the purpose of estimating carbon stock through the project period. The guidance of Appendix 1 of the tool was used to assess the same. The plots are fixed area plots. In this method, sample plots of the same size are installed in a stratum. All trees in a sample plot above a minimum dimension are measured and the biomass of each tree is estimated. The biomass of the individual trees is added and the sum is divided by the area of the sample plot to obtain the plot biomass value.

Biomass of a tree in a sample plot was calculated using the following equation from Ya Min Thant *et al* for ex-post estimations.

Above ground - $WTop = 0.22 \rho (DBH^2H) 0.82$

Below ground - $WRoot = 1.69 \rho (DBH^2H) 0.40$

Where:
DBH = Diameter at breast height; cm
H = Height (m)
ρ = Wood density (kg/m^3)

A detailed assessment by Ya Min Thant, Mamoru Kanzaki, Seiichi Ohta from Kyoto University and Maung Maung Than (DFID program, British Council) was conducted and five common allometric equations for stem, branch, leaf, above ground and below ground biomass were developed for six mangrove species, based on specific gravity of stem. Their study was published in the journal TROPICs published by Japan Society of Tropical Ecology[1], titled “Carbon sequestration by mangrove plantations and a natural regeneration stand in the Ayeyarwady Delta, Myanmar”. The equations to estimate above ground and below ground biomass seem to be most plausible equations.

The above assessment was conducted in Ayeyarwady Delta. The CPA is also implemented in the same region. The assessment by Ya Min Thant *et al.* was conducted for 6-7-year-old mangroves therefore the equation is well fitted for the estimation required in this MP.
Ya Min Thant studied the following species: *Avicenia marina, Avicenia officinalis* and *Sonneratia apetala* and a naturally regenerated stand under regeneration improving felling operation (NR: consists of *Ceriops decandra, Bruguiera sexangula, and Aegicerus corniculatum*) protected for seven years since 2000. The total carbon stock in biomass was 73 tC ha-1 in the naturally regenerated stand, 43 tC ha-1 in *Sonneratia apetala*, 21 tC ha-1 in *Avicenia marina* and 18 tC ha-1 in *Avicenia officinalis* for 6-year-old plantations.
Using the same equation, the project a 2.48 tC ha-1 for a 2 year-old stand. The CME has taken a very conservative approach and these equations are the most suitable equations for ex-post estimations. Using the equation provided by Ya Min Thant *et al*. provides a conservative ex-post estimate for the species used in this CPA. In addition, Myanmar is classified as a Least Developed Country (LDC), and the CME has used the best available allometric equation to conservatively calculate ex-post reductions.

[1] https://www.jstage.jst.go.jp/article/tropics/21/1/21_1/_article/-char/en

$$b_{TREE,p,i} = \frac{B_{TREE,p,i}}{A_{PLOT,i}}$$ Equation (1)

$$B_{TREE,p,i} = \sum_{j} B_{TREE,j,p,i}$$ Equation (2)

$$B_{TREE,j,p,i} = \sum_{l} B_{TREE,l,j,p,i}$$ Equation (3)

Where:

$b_{TREE,p,i}$	=	Tree biomass per hectare in sample plot *p* of stratum *i*; t d.m. ha^{-1}
$B_{TREE,p,i}$	=	Tree biomass in sample plot *p* of stratum *i*; t d.m.
$A_{PLOT,i}$	=	Size of sample plot in stratum *i;* ha
$B_{TREE,j,p,i}$	=	Biomass of trees of species *j* in sample plot *p* of stratum *i*; t d.m.
$B_{TREE,l,j,p,i}$	=	Biomass of tree *l* of species *j* in sample plot *p* of stratum *i*; t d.m.

The value of tree biomass per hecater is sample plot p of stratum i, in t.d.m ha^{-1} ($b_{TREE,p,i}$) were calculated for all strata included in this MR. the calculations are available in the submitted folder 'Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia Calculation Sheets'.
As per Section 8.1 Estimation by measurement of sample plots, under this method, carbon stock in trees is estimated on the basis of measurements of sample plots. Sample plots are installed in one or more strata. Two sampling designs are available:

(1) Stratified random sampling
(2) Double sampling

The CME has chosen to use to stratified random sampling approach.

Under this method, random sample plots are installed in the strata (e.g. systematic sampling with a random start) and measured.

Mean tree biomass per hectare in a stratum and the associated variance were estimated as follows:

$$b_{TREE,i} = \frac{\sum_{p=1}^{n_i} b_{TREE,p,i}}{n_i}$$ Equation (16)

$$s_i^2 = \frac{n_i \times \sum_{p=1}^{n_i} b_{TREE,p,i}^2 - \left(\sum_{p=1}^{n_i} b_{TREE,p,i}\right)^2}{n_i \times (n_i - 1)}$$ Equation (17)

Where:

$b_{TREE,i}$	=	Mean tree biomass per hectare in stratum *i*; t d.m. ha^{-1}
$b_{TREE,p,i}$	=	Tree biomass per hectare in plot *p* of stratum *i*; t d.m. ha^{-1}
s_i^2	=	Variance of mean tree biomass per hectare in stratum *i*; (t d.m. ha^{-1})^2
n_i	=	Number of sample plots in stratum *i*.

Mean carbon stock in trees within the tree biomass estimation strata and the associated uncertainty were estimated as follows.

$$C_{TREE} = \frac{44}{12} \times CF_{TREE} \times B_{TREE}$$ Equation (12)

$$B_{TREE} = A \times b_{TREE}$$ Equation (13)

$$b_{TREE} = \sum_{i=1}^{M} w_i \times b_{TREE,i}$$ Equation (14)

$$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}}$$ Equation (15)

Where:

C_{TREE} = Carbon stock in trees in the tree biomass estimation strata; t CO_2e

CF_{TREE} = Carbon fraction of tree biomass; t C (t d.m.)$^{-1}$.
A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.

B_{TREE} = Tree biomass in the tree biomass estimation strata; t d.m.

A = Sum of areas of the tree biomass estimation strata; ha

b_{TREE} = Mean tree biomass per hectare in the tree biomass estimation strata; t d.m. ha^{-1}

w_i = Ratio of the area of stratum *i* to the sum of areas of tree biomass estimation strata (i.e. $w_i = A_i/A$); dimensionless

$b_{TREE,i}$ = Mean tree biomass per hectare in stratum *i*; t d.m. ha^{-1}

u_C = Uncertainty in C_{TREE}

t_{VAL} = Two-sided Student's *t*-value for a confidence level of 90 per cent and degrees of freedom equal to *n* – *M*, where *n* is total number of sample plots within the tree biomass estimation strata and *M* is the total number of tree biomass estimation strata

s_i^2 = Variance of tree biomass per hectare across all sample plots in stratum *i*; (t d.m. ha^{-1})^2

n_i = Number of sample plots in stratum *i*.

	w_i	$b_{TREE,i}$	Survival	Standard Deviation	SEM	SEM expanded to 90% CI	si^2	uncertainty
Letkokkon	0.1	5.28	89%	1.68	0.24	0.40	2.81	8%
Crab Island Phase 1	0.9	1.79	92%	1.02	0.14	0.24	1.04	13%
		b_{TREE}						
Project	1	2.13	91%	-	-	-	-	10%

As per para 37 of the tool, if U_c estimated from Equation (15) is greater than 10 per cent, is made conservative by applying uncertainty discount according to the procedure provided in Appendix 2.

When the uncertainty in the estimated mean value of a parameter is more than 10 per cent, the estimated mean value is either increased or decreased by a percentage of the uncertainty. Table 1 provides the uncertainty discount factors to be applied for different ranges of uncertainty.

Table 1. Uncertainty discount factors

Uncertainty	Discount (% of U)	How applied
U ≤ 10%	0%	*Example:* Estimated mean = 60±9 t d.m ha^{-1} i.e. U=9/60x100 = 15% Discount = 25% x 9 = 2.25 t d.m ha^{-1} Discounted conservative mean: In baseline = 60+2.25 = 62.25 t d.m ha^{-1} In project = 60-2.25 = 57.75 t d.m ha^{-1}
10 < U ≤ 15	25%	
15 < U ≤ 20	50%	
20 < U ≤ 30	75%	
U > 30	100%	

Uncertainty	
Stratum 1	8%
Stratum 2	13%
Project	10%

As the project uncertainty is less than or equal to 10%, as per the guidance of Appendix 2 of the tool no uncertainty deductions are applied.

All calculations are present in the attached excel sheet.

Estimation in changes in carbon stock in soil organic carbon (SOC)
As per Section 5.5 point 17 of the methodology AR-AM0014 Version 3, changes in SOC are estimated using the following equation

$$\Delta SOC_{PROJ,t} = \frac{44}{12} \times \sum_{t=1}^{t} A_{PLANT,t} \times dSOC_t \times 1\ year \qquad \text{Equation (4)}$$

Where:

$\Delta SOC_{PROJ,t}$ = Change in SOC stock within the project boundary, in year *t*; t CO_2-e

$A_{PLANT,t}$ = Area planted in year *t*; ha

$dSOC_t$ = The rate of change in SOC stocks within the project boundary, in year *t*; t C ha^{-1} $yr^{-}1$.

The following default value of is used, unless transparent and verifiable information can be provided to justify a different value:

(i) $dSOC_t$ = 0.50 t C ha^{-1} yr^{-1} for $t = t_{PLANT}$ to $t = t_{PLANT}$ + 20 years, where t_{PLANT} is the year in which planting takes place;

(ii) $dSOC_t$ = 0 t C ha^{-1} yr^{-1} for $t > t_{PLANT}$ +20.

As per the CPA DD, the value of dSOC will be determined based on the most relevant value for the CPA region. The most relevant/applicable of the following will be chosen of the following at the time of monitoring and verification to apply for ex-post estimations:
1. Default value from methodology
2. SOC estimated from soil samples collected from the CPA area or any other transparent and verifiable information

For ex-ante estimations, the methodology default value of 0.5 tC/ha/year has been used. The most appropriate value for the CPA location will be chosen for each monitoring period based on availability of transparent and verifiable information and will be used for ex-post estimations. The CPA makes use of the methodology default of 0.5tC/ha/year for ex-post estimations for this MP.

dSOC (tC/ha/year)	Date of crediting period start/planting (whichever is later)	End of MP	Days	Years	Area (ha)	SOC (tCo2)
0.5	1/28/2020	12/31/2020	338	0.93	52.84	90
0.5	9/2/2020	12/31/2020	326	0.33	500	819

The project stock has been calculated from the date of planting for both stratum. However, as per the As per para 7, point (a) of Annex 1 to the EB 109 Regulatory Requirements under temporary measures for post-2020 cases (CDM-EB109-A01), the start date of the crediting period is defined as the date when the DOE submitted a complete request for registration, or, in the case of a project activity,any later date as specified in the PDD, as detailed in the tables below. The necessary adjustments and deductions have been made on a pro-rate basis for the first stratum so as to discount the period between the initial start date of crediting and the revised start date.

Date		
15/03/19	Date of first planting of CPA	Start date as per CPA DD
28/01/20	Date of registration of PoA DD as per Para 7, point (a) of CDM-EB109-A01	Revised start date

Stratum	Start Date of Planting	Start date of Crediting period
Letkokkon	15/03/19	28/01/20
Crab Island	09/02/20	28/01/20

After adjustments, the total ER claim for this MP is 2,674 tCo2-e.

F.3. Calculation of leakage emissions

>> According to the methodology AR-AM0014 (Version 03.0), leakage emission have to be assessed with using the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”.

This tool evaluates the displacement of crop cultivation and grazing activities. Section 6 of this tool indicates that leakage emissions can be considered insignificant if they meet the following requirements:

1. Leakage emission attributable to the displacement of agricultural activities due to implementation of an A/R CDM project activity is estimated as the decrease in carbon stocks in the affected carbon pools of the land receiving the displaced activity.

   (i) The project areas consist of land accretions within degraded mangrove habitats that are currently covered with grasses and sparse population of mangroves.The project lands were not previously agricultural lands and therefore there is no displacement of agricultural activities as a result of project activities.

2. Leakage emission attributable to the displacement of grazing activities under the following conditions is considered insignificant and hence accounted as zero:
    1. Animals are displaced to existing grazing land and the total number of animals in the receiving grazing land (displaced and existing) does not exceed the carrying capacity of the grazing land;
    2. Animals are displaced to existing non-grazing grassland and the total number of animals displaced does not exceed the carrying capacity of the receiving grassland;
    3. Animals are displaced to cropland that has been abandoned within the last five years;
    4. Animals are displaced to forested lands, and no clearance of trees, or decrease in crown cover of trees and shrubs, occurs due to the displaced animals;
    5. Animals are displaced to zero-grazing system.

The project areas consist of land accretions within degraded mangrove habitats that are currently covered with grasses and sparse population of mangroves. Grazing is not a common practice in the area. Protection from any future illegal grazing on mangrove sites is part of the project activities.

Therefore, leakage in the whole project area can be assumed as zero for the duration of the project.

F.4. Calculation of emission reductions or net anthropogenic removals

CPA UNFCCC reference number	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/ 2021	Total amount
10554-P1-0001-CP1	0	2,674	0	0	2,674	0	2,674
Total	0	2,674	0	0	2,674	0	2,674

F.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the included CPA-DDs

CPA UNFCCC reference number	Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the CPA-DD (t CO_2e)
10554-P1-0001-CP1	2,674	1,709
Total	2,674	1,709

F.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the CPA-DD"

>> The The ex-ante actual net GHG removals by sinks were estimated using the equation 2 described in section 5.5 of the methodology AR-AM0014 A/R Methodology: Afforestation and reforestation of degraded mangrove habitats Version 03.0:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$$

Where:

$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year *t*; t CO_2-e
$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e
$GHG_{E,t}$	=	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year *t*, as estimated in the tool "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO_2-e

Change in the carbon stocks in project, occurring in the selected carbon pools in year t were calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta SOC_{PROJ,t}$$

Where:

$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e
$\Delta C_{TREE\_PROJ,t}$	=	Change in carbon stock in tree biomass in project in year *t*; t CO_2-e
$\Delta C_{SHRUB\_PROJ,t}$	=	Change in carbon stock in shrub biomass in project in year *t*; t CO_2-e
$\Delta C_{DW\_PROJ,t}$	=	Change in carbon stock in dead wood in project in year *t*; t CO_2-e
$\Delta SOC_{PROJ,t}$	=	Change in carbon stock in the soil organic carbon (SOC) pool within the project boundary, in year *t*; t CO_2-e

Change in carbon stock in tree biomass

The change in carbon stock in tree biomass in this project within the project boundary was estimated using the A/R methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (Version 04.2). The stock difference method was applied as per the requirements of the tool and the ex-ante tree biomass was estimated using the method of "Estimation by modelling of tree growth and stand development", presented in section 8 of the tool.
For the estimation of the changes in carbon stocks in tree biomass ex-post, field measurements in permanent sample plot at two points of time will be done, and the calculations will be carried out following the method "difference of two independent stock estimations" as per Section 6 of the tool. Under the "Estimation by modelling of tree growth and stand development" method, existing data (DBH) were used in combination with tree growth models to predict the growth of trees and the development of the tree stand over time.
As per the methodology, ex-ante estimation of carbon stock in tree biomass is not subject to uncertainty control, although the project participants should use the best available data and models that apply to the project site and the tree species.

Mean carbon stock in trees within the tree biomass per hectare was estimated as follows:

$$C_{TREE} = \frac{44}{12} \times CF_{TREE} \times B_{TREE}$$

$$B_{TREE} = A \times b_{TREE}$$

$$b_{TREE} = \sum_{i=1}^{M} w_i \times b_{TREE,i}$$

Where:

C_{TREE}	= Carbon stock in trees in the tree biomass estimation strata; tCO_2e
CF_{TREE}	= Carbon fraction of tree biomass; t C (t d.m.)$^{-1}$ A default value of 0.47 was used as per the methodology
B_{TREE}	= Tree biomass in the tree biomass estimation strata; t d.m.
A	= Sum of areas of the tree biomass estimation strata; ha
b_{TREE}	= Mean tree biomass per hectare in the tree biomass estimation strata; t d.m.ha^{-1}
w_i	= Ratio of the area of stratum *i* to the sum of areas of tree biomass estimation strata (wi = A_i/A); dimensionless
$b_{TREE,i}$	= Mean tree biomass per hectare in stratum *i;* t d.m. ha^{-1}

Estimating mean tree biomass per hectare in each stratum ($b_{TREE,i}$)

According to Tool 14, V.4.2 the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities (Version 01.0.0)" was applied to assess the applicability of the allometric equation used ex-ante. The tool states "For ex ante estimation of aboveground tree biomass in project scenario any allometric equation can be used."
A thorough literature review was conducted to identify most suitable allomatric equation for ex-ante estimations since there are no equations developed in the project area.
A study conducted by Sukardjo & Yamada (1992) on mangrove species in Indonesia was used as most plausible equation. Results on this equation and results from field measurements gave similar results thus proving that this equation is the most plausible for ex-ante estimations.

Total aboveground and belowground biomass was estimated using –
log10 (total biomass) = -0.9036 + 2.9499 log10 DBH (Sukardjo & Yamada, 1992)
Where;
Total biomass (kg) – Biomass of both above-ground and below-ground
DBH (cm) - Diameter at breast height

For ex-ante estimations, DBH values were obtained from the Mangrove Service Network (MSN). For ex-ante estimation of growth, the following values were used:

Table 3: DBH values used ex-ante

Year	DBH (cm)
1	2
2	2.5
3	3
4	4
5	5
6	6.5
7	8
8	9.5
9	10.5
10	12
11	13
12	14
13	14.5
14	15.2
15	16
16	16.4
17	16.8
18	17.5
19	18.5
20	19

The equation was applied for each year and then the tool AR-Tool 14 (Version 04.2) was used to develop the calculations in Microsoft Excel sheets. The ex-ante planting density is 3000 plants ha-1 with a survival rate of 80%. The value for carbon fraction used is the default value of 0.47 as per A/R methodological tool.

Estimation of the changes in carbon stocks in shrub biomass:
As no shrubs are planted as part of this project this carbon stock will be accounted as zero for the ex-ante and ex-post estimations.

Estimation of the changes in carbon stocks in dead wood:
Deadwood is expected to remain in the project area and will not be removed. Therefore carbon stock in this pool is assumed not to increase under a conservative approach.

Estimation of the changes in carbon stocks in soil organic carbon (SOC):
Changes in carbon stocks in the SOC pool is calculated as indicated in the Methodology AR-AM0014 (03.0):

$$\Delta SOC_{PROJ,t} = \frac{44}{12} \times \sum_{t=1}^{t} A_{PLANT,t} \times dSOC_t \times 1\ year$$

Where,

$\Delta SOC_{PROJ,t}$ = Change in SOC stock within the project boundary, in year *t*; t CO_2-e

$A_{PLANT,t}$ = Area planted in year *t*; ha

$dSOC_t$ = The rate of change in SOC stocks within the project boundary, in year *t*; t C ha^{-1} $yr^{-}1$.

The following default value of is used, unless transparent and verifiable information can be provided to justify a different value:

(i) $dSOC_t$= 0.50 t C ha^{-1} yr^{-1} for $t = t_{PLANT}$ to $t = t_{PLANT}$ + 20 years, where t_{PLANT} is the year in which planting takes place;

(ii) $dSOC_t$ = 0 t C ha^{-1} yr^{-1} for $t > t_{PLANT}$ +20.

The value of dSOC was determined based on the most relevant value for the CPA region. The most relevant/applicable of the following will be chosen from
1. Default value from methodology
2. SOC estimated from soil samples collected from the CPA area or any other transparent and verifiable information

For ex-ante estimations, the methodology default value of 0.5 tC/ha/year has been used. The most appropriate value for the CPA location will be chosen for each monitoring period based on availability of transparent and verifiable information and will be used for ex-post estimations.

F.6. Remarks on increase in achieved emission reductions

>> There is an increase of 448 tCo2 for this MP. The significant differences in the ex-ante method of estimation and the ex-post method are:

Parameter	Ex-ante approach	Ex-post approach
DBH values	For ex-ante estimations DBH values obtained from the MSN was used along with the relevant allometric equation	For ex-post estimations, the growth data from sample plots were used. All data is available in submitted excel sheets in the folder 'Restoration of degraded mangroves as a climate change mitigation and adaptation strategy in Asia Calculation Sheets' The ex-post estimations also use height for estimation of biomass.
Allometric	Sukardjo and Yamada et al was used for ex-ante estimations as (1) No suitable allometric equation was available (2) Lack of ex-ante data on height	Ya min thant et al used for ex-post equations as (i) Height data is also available from sample plots (ii) Equation more appropriate to the region

F.7. Remarks on scale of small-scale CPAs

>> NA as this is not a small scale CPA.

Document information

Version	*Date*	*Description*
05.0	8 October 2021	Revision to: • Ensure consistency with version 03.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN).
04.0	6 April 2021	Revision to: • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN); • Add a section on remarks on the observance of the scale limit of small-scale CPAs during the crediting periods; • Add "changes specific to afforestation or reforestation activities/CPA" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R PoAs between two commitment periods; • Make structural and editorial improvements.
02.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the “CDM project standard for programmes of activities (CDM-EB93-A07-STAN); • Make editorial improvements.
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