CLIMATE ACTION RESERVE

Mexico Forest Protocol V3.1

Workgroup Meeting

November 21, 2022

Housekeeping

- Working group members may actively participate during the meeting.
  - We ask you to be quiet unless/until you would to talk.
- We will answer questions throughout the session.
- All other attendees/observers are in listen-only mode
  - Observers can submit questions in the GoToWebinar question box and we'll try to answer them at the end, time permitting.
- We will follow up via email to answer any questions not addressed during the meeting.
- The slides (in Spanish and English) and a recording of the presentation will be posted online.

Agenda

1. Process and timeline for update
2. Review considerations for the update
   - Mangrove Soil Carbon
   - Secondary Effects
3. Questions, comments, & next steps

General Description of the Protocol Update

- **OBJECTIVE:** Update the Mexico Forest Protocol V3.0 to incorporate soil organic carbon for mangrove reforestation and restauration activities, aligned with best practices for GHG accounting, and the laws, regulations, and conditions in Mexico, in order to generate Climate Reserve Tons (CRTs) for forest owners in Mexico.
  - Comply with high-quality compensation criteria and Reserve principles.
  - Take advantage of the lessons learned through implementation of the protocol, emerging technologies, advances applied to other protocols and compensation projects, etc.
  - Solicit and incorporate feedback from expert stakeholders

Process and Timeline for Update

Step	Details	Oct	Nov	Dec	Jan	Feb
Workgroup Formation	Presentation of SOI: Oct 25-Nov 14th					
	Kickoff meeting					
Workgroup Meetings	November-December, time TBD					
Protocol development	Drafting and revisions					
Public comment period	January 2023					
	Public Coment Period Webinar					
	Comments revision and Protocol update					
Protocol Published	February 2023					

Considerations for Update

QUANTIFICATION OF SOIL CARBON FOR MANGROVES

Section 5.1.2: Increase of Carbon in Restauration and Reforestation Activity Areas for Mangroves

- Two options for calculating soil carbon in the Activity Area:
- Field sampling of soils within the Activity Area to measure changes to soil organic carbon over time.
- Appendix D includes standardized methodology
- Multiply the rate of carbon sequestration in organic soil by the hectares of AA

$$\Delta AC_{SOC} = \sum_{AA} R_{SOC,AA} \times A_{AA}$$

Section 5.1.2: Increase of Carbon in Restauration and Reforestation Activity Areas for Mangroves

- Two options for calculating soil carbon in the Activity Area:
- The application of a default sequestration rate based on the location of the Activity Area multiplied by the mangrove canopy cover as a percentage of AA per hectare of AA

$$\Delta AC_{soc} = \sum_{AA} R_{SOC,AA} \times CC_{y,AA} \times A_{AA}$$

- Using the most conservative default value per region

Table 5.1 Default rates for soil carbon by region

Region	Default sequestarion rate ($tCO_2e/ha/yr$)
North Pacific	8.4
Central Pacific	5.5
South Pacific	22.8
Gulf of México	14.7
Yucatán Peninsula	11.7

Questions for Workgroup:

- Are these regions the correct/most up to date regions per analysis by CONABIO?
- Are there other studies to be considered?

Appendix D Inventory Methodology for Soil Carbon Quantification through Field Sampling for Mangrove Restoration and Reforestation

- Projects that choose to take direct samples of soils in Activity Areas focused on the restoration or reforestation of mangroves must use the standardized inventory method:
- Direct sampling will be used as the basis for estimating changes in soil organic carbon (SOC) levels sampled over the life of the project.
- Exception: Projects can initially use the default values until the second soil measurement is taken and the sequestration rate can be determined.
- OSC is estimated from sampled inventories based on the calculation of carbon density from bulk density and COS content (%Corg) as well as soil depth.
- Confidence deductions will be applied to estimates of changes in carbon stocks on an increasing basis as the statistical uncertainty associated with sampling increases.

Appendix D Metodología de Inventario para Cuantificación de Carbono en Suelo mediante Muestre en Campo para Restauración y Reforestación de Manglares

General steps for quantifying a soil carbon inventory based on field sampling, excerpted from The Blue Carbon Initiative's Coastal Blue Carbon Handbook:

1. Determine soil depth
2. Obtaining Soil Cores
3. Sampling a Soil Core
4. Record and store samples
5. Perform Laboratory Analysis
6. Determine dry bulk density
7. Determine organic carbon content
8. Calculate total soil carbon stocks
9. Calculate the confidence statistic

- The location of the plots should be based on the methodology used to measure living and dead trees with a core of soil taken at the center of each plot.
- Sample analyses must be performed by a laboratory that has demonstrated proficiency by having participated in the North American Proficiency Testing Program and in particular the voluntary Performance Evaluation Program.
- The soil inventory must be updated at least every 6 years with all the data of all the plots replaced at the time of a new sampling in the field.

Questions for Workgroup:

- For considering accredited labs, what are the accreditation requirements and oversight procedures for the Red Mexicana de Laboratorios de análisis de suelo? Do they have ongoing oversight of the labs?

Considerations for Update

MANGROVE REFORESTATION OR RESTORATION SECONDARY EFFECTS

Secondary Effects from Methane and Nitrous Oxide Emissions

- Reforestation and restoration of mangrove may result in changes to methane and nitrous oxide emissions
- Although such changes vary based on specific site conditions, we are considering applying a conservative standardized approach:
    - Assume no methane or nitrous oxide emissions occur under the baseline while accounting for such emissions under the project.
    - For methane, the emissions rate applied is based on the assumption that methane emissions equate to 16%, on a ton of CO2e basis, of total carbon sequestration occurring in Activity Area soils each year.
- Allow accounting to be excluded under certain circumstances (no deduction but also no crediting)
    - If project activity increases the salinity of the site → CH4 excluded
    - If project increases the salinity of the site AND raises the water table → N2O excluded

Questions for Workgroup:

- In general, what do restoration projects look like? What changes do they bring? Could WG members provide examples of kinds of restoration and the changes created?
- Are there qualitative measurements to confirm increases in salinity, i.e. opening up a channel to connect to salt water?

Methane Emissions Calculations

- Based on the average rate of methane emissions per ton of carbon sequestered in mangrove ecosystem soils for the latitudinal bands in which Mexico's mangrove sites are located as reported by:

  Rosentreter, J. A., Maher, D. T., Erler, D. V., Murray, R. H., & Eyre, B. D. (2018). Methane emissions partially offset "blue carbon" burial in mangroves. Science Advances 4(6).

- Results adjusted to reflect the standard global warming potential of 28 for methane used under the Reserve's protocols at the time of protocol adoption.

Latitude	CH4 emissions, GWP100 (Tg C/yr)	C burial (Tg C/yr)	%CH4 of C burial	Adjusted CH4 emissions GWP100 AR5 (28)	Adjusted% CH4 of C burial
0 - 5	0.1	17.45	0.6%	0.082352941	0.5%
5 - 10	0.23	19.53	1.2%	0.189411765	1.0%
10 - 15	0.32	6.74	4.7%	0.263529412	3.9%
15 - 20	0.24	1.72	14.0%	0.197647059	11.5%
20 - 25	0.81	3.13	25.9%	0.667058824	21.3%
25 - 30	0.06	0.79	7.6%	0.049411765	6.3%
30 - 35	0.003	0.057	5.3%	0.002470588	4.3%
35 - 40	0.002	0.064	3.1%	0.001647059	2.6%
	1.765	49.481	3.6%	1.453529412	2.9%

19.7%	Average %CH4 of C burial for MX latitudes (15-30)

16%	Average %CH4 of C burial for MX latitudes (15-30) Adjusted for GWP AR5 (28)

Questions for Workgroup:

- Do these values look correct?
- Other considerations?

Secondary Effects from Methane and Nitrous Oxide Emissions

- Nitrous oxide emissions varies based on levels of salinity and water table level.
- Potential default values to consider (Smith et al 1983):

	Open water			Mangrove		
Salinity	**>18 ppt**	**>5-18 ppt**	**other**	**>18 ppt**	**>5-18 ppt**	**other**
tN2O/ha/yr	0.000157	0.00033	0.00053	0.000487	0.000754	0.000864
tCO2e/ha/yr	0.046786	0.09834	0.15794	0.145126	0.224692	0.257472

  - m
- Sites with direct hydrological inputs from point or non-point sources of N not eligible

Questions for Workgroup:

- Are these emissions significantly different from baseline emissions? We can assume 0 baseline emissions to be conservative, but is that accurate?
- Are these emissions significant or would they be considered de minimus?

Allochthonous Carbon

- Allocthonous carbon is carbon that originates from outside of the project area that flows into the project area

- **Questions for the workgroup:**
  - Would this be significantly different from baseline scenario?
  - Alternatively, would it be appropriate to include this carbon since otherwise it would not be stored and protected over a long time?

Allochthonous Carbon: potential methodology

- Adjust the sequestration rate to compensate for allochthonous SOC accumulating in the Activity Area, assuming such carbon would have been present in the absence of the project.
- The sequestration rate applied to an AA is adjusted according to the SOC content of the AA, $\%C_{org,AA}$, based on the regional default factor from (when applying a default sequestration rate) or as determined from soil sampling (when measuring sequestration rates based on field sampling).
- Projects able to demonstrate an organic surface layer of >10 cm throughout the Activity Area are not required to apply the adjustment for allochthonous carbon.

Equation 5.2.A:

$$\Delta AC_{SOC} = \sum_{AA} R_{SOC,AA} \times CC_{y,AA} \times A_{AA} \left(100\% - 213.17\left(\%C_{org,AA}\right)^{-1.184}\right)$$

Equation 5.2.B:

$$\Delta AC_{SOC} = \sum_{AA} R_{SOC,AA} \times A_{AA} \left(100\% - 213.17\left(\%C_{org,AA}\right)^{-1.184}\right)$$

Where,

			Units
ΔAC_{SOC}	=	Change in actual soil organic carbon	tCO_2e
$R_{SOC,AA}$	=	Rate of sequestration of soil organic carbon in Activity Area AA	$tCO_2e/ha/yr$
$CC_{mangrove,y,AA}$	=	Mangrove canopy cover as a percentage of Activity Area AA for reporting period y	%
A_{AA}	=	Size of the Activity Area AA	Hectares
$\%C_{org}$	=	Average percent organic carbon content of Activity Area AA	%

[1] Based on Needelman, B. A., Emmer, I. M., Emmett-Mattox, S., Crooks, S., Megonigal, J. P., Myers, D., Oreska, M. P. J., McGlathery, K. (2018). The Science and Policy of the Verified Carbon Standard Methodology for Tidal Wetland and Seagrass Restoration. *Estuaries and Coasts* 41(8), 2159–2171. https://doi.org/10.1007/s12237-018-0429-0

Questions for Workgroup:

- We'd need to develop regional default values for organic carbon content: are there any studies or data available?
- Other considerations?

Next Steps

- Please send any written comments by November 28th

- The Reserve will prepare a draft protocol for workgroup review from December 12th-December 16th
  - Tentative workgroup webinar to review comments: December 15th

- The Reserve will then review comments and update the protocol for public comment, estimated to be January 16th-February 10th
  - Tentative Public Comment Webinar: January 25th

QUESTIONS OR COMMENTS?

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