



PV CLIMATE TOOL

PT##a

Calculating emissions due to channelling in Mangrove ecosystems

Version 0.3

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1 Summary

This tool must be used by projects employing PU###b that dig channels to promote mangrove restoration. It calculates the following parameters:



= Expected project CO₂ emissions in the soil organic carbon pool in each relevant Zone of the *Project Area* (tCO₂e) for each year of the *Crediting Period*



= Actual project CO₂ emissions in the soil organic carbon pool in each relevant Zone of the *Project Area* (tCO₂e) for each year of the *Verification Period*

Projects can use this module before channelling with predicted values for channel dimensions, based on restoration/rehabilitation plans. To calculate actual emissions, use this sheet at *Verification* with actual values for channel dimensions.

A [Google Sheet](#)¹ has been created to enable easy implementation of this module.

2 Sources

This tool is to be used in conjunction with the following Plan Vivo methodology and module:

PM00X Coastal Blue Carbon Methodology, Version 1.0

PU###b Simplified Mangrove Restoration module, Version 1.0

3 Definitions

Capitalised terms in this module are defined in the latest version of PM00X or below. Terms that are both Capitalised and *italicised* are defined in the Plan Vivo Climate Glossary.

Channel Design – A distinct channel configuration, defined by the width (at the channel’s widest point) and depth (at the deepest point) of the channel.

Channel Dimensions – The width, depth and length of channels that have been or will be created by the project.

4 Applicability Conditions

To use this tool, projects must have:

- a mangrove restoration/rehabilitation plan that details the dimensions of the channels that will be created OR

¹ <https://docs.google.com/spreadsheets/d/1Llu1nYkF6IMjxmk6aj-LCv32f6B5ILN0ynG4W4U2Qcs/edit?usp=sharing>

- spatially explicit data indicating the dimensions of the channels that have already been created.

Channel Dimensions are defined by its width, depth and length.

Channel depths cannot be greater than 1m.

There are no geographical restrictions to the implementation of this tool.

5 Procedures

These procedures are designed and written to be implemented in conjunction with the supporting [Google Sheet](#)². Sheet and cell references are detailed below. Only cells highlighted in blue require input. All other cells calculate automatically. The Google Sheet is view only. To make edits, create a copy.

5.1 Define the project's *Crediting Period*

In cell C2 at the top of the 'INSTRUCTIONS' sheet, fill in the length of the project's *Crediting Period*, in years.

5.2 Define the project's Zones and soil organic carbon stocks

In the 'Zones' sheet, in Column A list the name of the Zones of the *Project Area* where channelling will occur/has occurred.

This tool requires channel depths to be less than or equal to 1m. For each Zone where channelling will occur/has occurred, projects must define the following parameter:



= Top 1m carbon stock in the soil organic carbon pool (tCO₂e/ha)

A default value is provided for this parameter. The value used - 1,415 tCO₂e/ha (386 tC/ha) in the top 1m of soil - is the Tier I value for soil carbon stocks prior to extraction (SOBEFORE) of aggregate organic and mineral mangrove soils in the 2013 Wetlands Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (see Table 4.11 in the supplement).

Projects can define their own value for the top 1m soil carbon stock using any of the following methods/sources:

- Soil sampling techniques in degraded mangrove areas within the *Project Area*, following standard operating procedures that are aligned with national guidelines or international best practice, such as Howard et al., 2014.

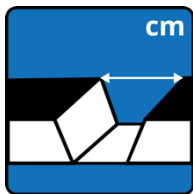
² <https://docs.google.com/spreadsheets/d/1Llu1nYkF6IMjxmk6aj-LCv32f6B5ILN0ynG4W4U2Qcs/edit?usp=sharing>

- Data provided in national greenhouse gas inventory reports of the country where the *Project Area* is located.
- Peer-reviewed literature detailing carbon stocks or emissions factors from the jurisdiction within which the Project Area is located. If peer-reviewed values are used, the applicability of the values must be explained in the *PDD*, model for instance through similarities in species composition, climate, tidal dynamics, salinity levels and sediment type between the area covered by the peer-reviewed study and the *Project Area*.

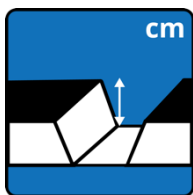
If not using the default value provided, update Column B in the 'Zones' sheet with the project-specific values for each Zone.

5.3 Define the Channel Design(s)

Using the restoration/rehabilitation plan (for expected emissions) or the actual the structure of channels already created (for actual emissions), complete the 'Channel Design' sheet. Use one 'Channel Design name' (Column A) for each distinct Channel Design. For each Channel Design, specify the following parameters:



= Channel width at the widest point (cm)



= Channel depth at the deepest point (cm)

5.4 Detail the channelling plan

Using the restoration/rehabilitation plan (for expected emissions) or the actual structure and density of channels already created (for actual emissions), complete the 'Channel Plan' sheet. For each year of the *Crediting Period* (Column A), detail which Channel Designs (see 'Channel Design' sheet) will be implemented in each Zone of the *Project Area* using the drop-down menus provided, and specify the following parameter:



= Channel length (metres)

Columns E-I calculate automatically and should not be edited.

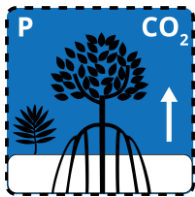
5.5 Calculate expected or actual emissions

The final parameter is calculated in the 'EMISSIONS' sheet. No edits are necessary in this sheet.

The table details the expected or actual emissions in each year of the *Crediting Period* when channelling occurs.

It is conservatively assumed that the total at-risk carbon stock is lost immediately following channelling.

If the restoration/rehabilitation plan was used to complete the 'Channel Design' and 'Channelling Plan' sheets, the following parameter is calculated:




= Expected project CO₂ emissions in the soil organic carbon pool in each relevant Zone of the *Project Area* (tCO₂e) for each year of the *Crediting Period*

If the actual structure and density of channels already created was used to complete the 'Channel Design' and 'Channelling Plan' sheets, the following parameter is calculated:




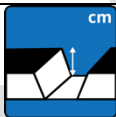
= Actual project CO₂ emissions in the soil organic carbon pool in each relevant Zone of the *Project Area* (tCO₂e) for each year of the *Crediting Period*


6 Parameters

Data/Parameter	
Units	tCO ₂ e/ha
Description	Top 1m carbon stock in the soil organic carbon pool in each Zone of the Project Area where channelling will occur/has occurred.
Equations	N/A. See Google Sheet .
Source	Default value from 2013 Wetlands Supplement to the 2006 IPCC Guidelines. Projects can define their own values using field data, jurisdictional values or peer-reviewed literature.
Value	Default value = 1,415 tCO ₂ e/ha
Justification of choice of data or description of measurement methods and procedures applied	See Section 5.2.


Purpose of Data	Estimating CO ₂ emissions due to channel digging in mangrove restoration projects.
Comments	N/A


Data/Parameter	
Units	cm
Description	Channel width at the widest point for each Channel Design.
Equations	N/A. See Google Sheet .
Source	Estimated emissions: the project's restoration/rehabilitation plan Actual emissions: the measured dimensions of channels created.
Value	N/A
Justification of choice of data or description of measurement methods and procedures applied	See Section 5.3.
Purpose of Data	Estimating CO ₂ emissions due to channel digging in mangrove restoration projects.
Comments	N/A

Data/Parameter	
Units	cm
Description	Channel depth at the deepest point for each Channel Design.
Equations	N/A. See Google Sheet .
Source	Estimated emissions: the project's restoration/rehabilitation plan Actual emissions: the measured dimensions of channels created.
Value	N/A
Justification of choice of data or description of measurement methods and procedures applied	See Section 5.3.
Purpose of Data	Estimating CO ₂ emissions due to channel digging in mangrove restoration projects.
Comments	N/A

Data/Parameter	
Units	Metres
Description	Channel length for each Channel Design in each Zone in each year of the <i>Crediting Period</i> .
Equations	N/A. See Google Sheet .
Source	Estimated emissions: the project's restoration/rehabilitation plan Actual emissions: the measured dimensions of channels created.
Value	N/A

Justification of choice of data or description of measurement methods and procedures applied	See Section .
Purpose of Data	Estimating CO ₂ emissions due to channel digging in mangrove restoration projects.
Comments	N/A

Data/Parameter	
Units	tCO ₂ e
Description	Expected project CO ₂ emissions in the soil organic carbon pool in each relevant Zone of the <i>Project Area</i> for each year of the <i>Crediting Period</i> .
Equations	N/A. See Google Sheet .
Source	Google Sheet .
Value	N/A
Justification of choice of data or description of measurement methods and procedures applied	Only projects whose <i>Project Interventions</i> include the digging of channels (e.g. to restore hydrology) are required to account for emissions from the soil organic carbon pool.
Purpose of Data	Estimating expected project CO ₂ emissions from the Vegetation and Soil Carbon Pools using PU##b.
Comments	N/A

Data/Parameter	
Units	tCO ₂ e
Description	Actual project CO ₂ emissions in the soil organic carbon pool in each relevant Zone of the <i>Project Area</i> for each year of the <i>Crediting Period</i> .
Equations	N/A. See Google Sheet .
Source	Google Sheet .
Value	N/A
Justification of choice of data or description of measurement methods and procedures applied	Only projects whose <i>Project Interventions</i> include the digging of channels (e.g. to restore hydrology) are required to account for emissions from the soil organic carbon pool.
Purpose of Data	Estimating actual project CO ₂ emissions from the Vegetation and Soil Carbon Pools using PU##b.
Comments	N/A

7 References

2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands Methodological Guidance on Lands with Wet and Drained Soils, and Constructed Wetlands for Wastewater Treatment. Available from: <https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/>

Glass, L., 2025. Mangrove channelling tool. Semi-automated Google Sheet designed for use with this tool. <https://docs.google.com/spreadsheets/d/1Llu1nYkF6IMjxmk6aj-LCv32f6B5ILN0ynG4W4U2Qcs/edit?usp=sharing>

Howard et al., 2014. Coastal Blue Carbon; methods for assessing carbon stocks and emissions factors in Mangroves, tidal salt marshes, and seagrass meadows <https://www.thebluecarboninitiative.org/manual>

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