Detailed Insights: Belize

Contents

Welcome!

You have reached the CCN Inventory Tool Detailed Insights Report.

Congratulations! This geography has available data.

Potential data availability within the Inventory Tool ranges from Tier I, Tier II, or Tier III Carbon stock estimates.

This document includes country-specific insights and more detailed analysis, including carbon stocks, emissions factors, and ecosystem wetland area for mangrove, marsh, and seagrass habitats. This report details information for the selected geography, **Belize**.

Explore the rest of the dashboard for more exciting visualizations, map features and data.

Resources referenced to calculate estimates for **Belize** are listed below under 'References' at the end of this document.

If you have any questions or data you would like to add to the Coastal Carbon Network, please reach out to us at CoastalCarbon@si.edu.

Total Carbon Stock Estimates

Total Carbon stock estimates were calculated for each geography in total, and for mangrove, tidal marsh, and seagrass habitats when available.

We estimate that **Belize** contains a mean estimate of 2.6267×10^7 metric tonnes soil Carbon.

We estimate that **Belize** contains between 3.06339×10^7 to 2.19002×10^7 metric tonnes of soil C to a depth of 1 m, with a mean estimate of 2.6267×10^7 metric tonnes C.
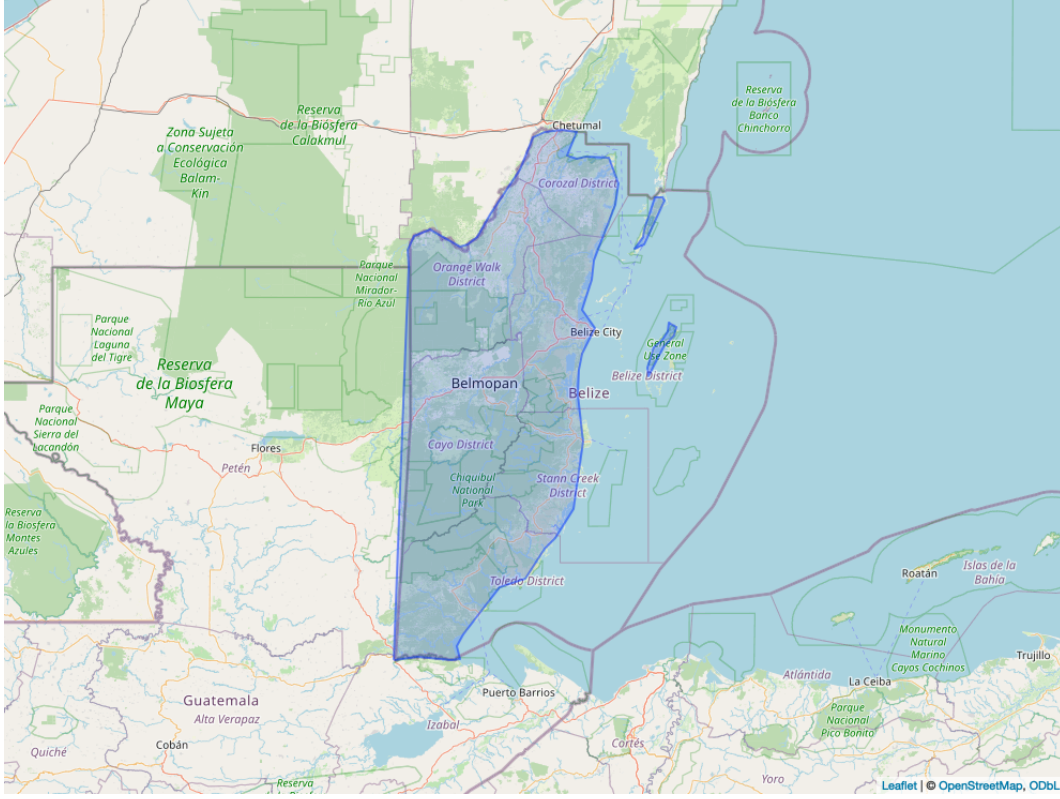
Figure 1: Belize

Table 1: Total Geography Level Carbon Stocks

Country	Territory	Total Stocks	Upper CI	Lower CI
Belize	Belize	26267025	21900167	30633883

This total estimate includes total mangrove soil carbon stocks, with a mean estimate of 2.45211×10^7 metric tonnes of soil C to a depth of 1 meter.

This total estimate also includes total tidal marsh carbon stocks, ranging from 1.27454×10^6 to 7740.01 metric tonnes of soil C to a depth of 1 m, with a mean estimate of 1.74589×10^6

We estimate seagrass soil carbon stocks for **Belize** to have a mean estimate of 5.2356672×10^7

Wetland Areas and Activities

We estimate mangrove area in **Belize** to be 49850 to 65820 hectares, with a mean estimate of 56780 hectares according to Global Mangrove Watch Bunting et al. (2018).

We estimate tidal marsh area in **Belize** to be 4147 to 7740 hectares, with a mean estimate of hectares according to Worthington et al. (2024).

We estimate seagrass area to be **Belize** to be a mean of 484800 hectares, according to McKenzie et al. (2020), which aggregates global seagrass data from a number of sources.

Calculated Stocks and Emissions Factors

This section of the report details whether data is available to estimate Tier I, Tier II, or Tier III value estimates for tidal marsh, mangrove, and seagrass ecosystems in **Belize**.

If data for the selected country is available in the Coastal Carbon Atlas, we have applied a Tier II emission factor based on a simple average of country specific data queried from the Atlas.

Data from **Belize** included in the Coastal Carbon Atlas consists of 118 soil profiles from 11 watersheds. This data comes from 3 distinct habitat type(s).

In the case that there is not yet any country specific information in the Coastal Carbon Atlas, we instead applied IPCC Tier I estimate. IPCC Tier I estimates for mangrove, marsh, and seagrass ecosystems are listed below.

The table in this section also details whether the calculated Tier II value is significantly different from the estimated Tier I values. This is observed in the "Overlap" column.

Table 2: IPCC Tier I Value Estimates

Habitat	Mean	Lower_CI	Upper_CI
mangrove	386	351	424
marsh	255	254	297
seagrass	108	84	139

Data Availiability by Tier

Table 3: Availiability of Tier I and Tier II Data

Country	Territory	Habitat	Tier	Overlap
Belize	Belize	mangrove	Tier II	Country-specific average overlaps Tier I
Belize	Belize	marsh	Tier I	No Tier II data available at this time
Belize	Belize	seagrass	Tier I	No Tier II data available at this time

Tier I Carbon Stocks

This section includes Tier I Carbon Stocks included for **Belize**. In the case that all habitats; mangrove, tidal marsh, and seagrass have availiable Tier II estimates, please refer to Table 2: IPCC Tier I Value Estimates for applicable Tier I values.

Table 4: Tier I Carbon Stock Estimates

Country	Territory	Habitat	Mean Stock (MgHa)	Lower CI	Upper CI
Belize	Belize	marsh	255	254	297
Belize	Belize	seagrass	108	84	139

Good news! The selected country has Tier II data for each available habitat. Please refer to Table 2: IPCC Tier I Value Estimates for applicable Tier I estimates and Table 5: Tier II Carbon Stock Estimates.

Tier II Carbon Stocks

This table includes Tier II Carbon Stock estimates for **Belize**. Estimates in this table were derived from data queried from the Coastal Carbon Atlas.

A selected country may have available Tier II values for one or multiple habitats, this is dependent on core data accessible through the Coastal Carbon Atlas. At the time of analysis, referencing Version 1.5.0, **Belize** represents a total of 118 cores across 3 distinct habitats.

Table 5: Tier II Carbon Stock Estimates

Country	Territory	Habitat	Mean Stock (MgHa)	Lower CI	Upper CI	Standard Error
Belize	Belize	mangrove	432	397	467	17.80666

Tier III Carbon Stocks

Tier III carbon stocks were estimated, when available, from remote sensing data from Maxwell et al 2021 and Sanderman et al 2018. The table below details whether estimated values are available for **Belize**, and any overlap with associated Tier I or Tier II values.

If there are no Tier III estimates associated with the selected country and specific habitat of interest, please refer to above Tier I and Tier II tables.

Table 6: Tier III Carbon Stock Estimates

| Country	Territory	Habitat	Mean Stock (MgHa)	Lower CI	Upper CI
Belize	Belize	mangrove	322	134	511

In the selected geography, Belize ,Tier III estimated stock MgHa values are less than Tier II values estimated from Coastal Carbon Atlas Data. In this case, the Tier III Remote-sensing esimate overlaps country-specific average. Additionally, estimated Tier III stock values derived from remote sensing are less than estimates Tier I values. In this case, the Tier III Remote-sensing esimate overlaps Tier I estimate.
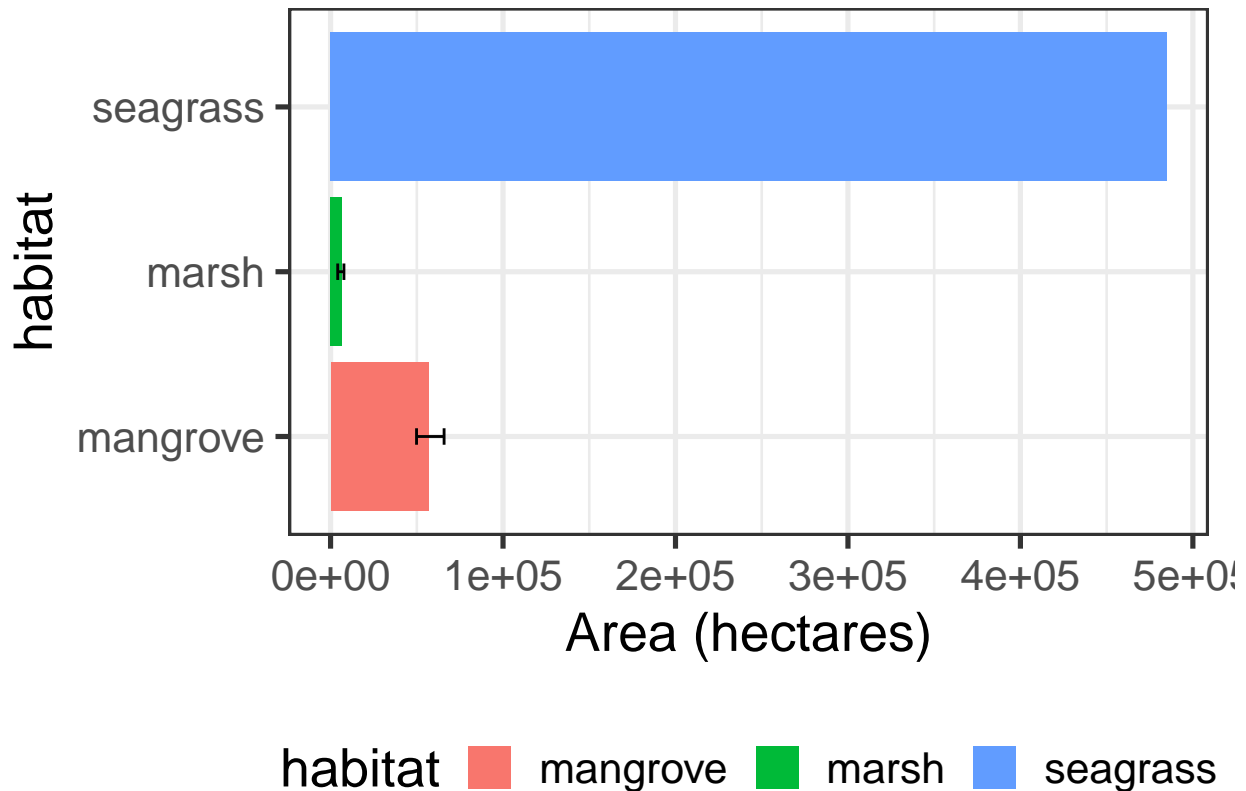
Visualizations

1. **Data Metrics**
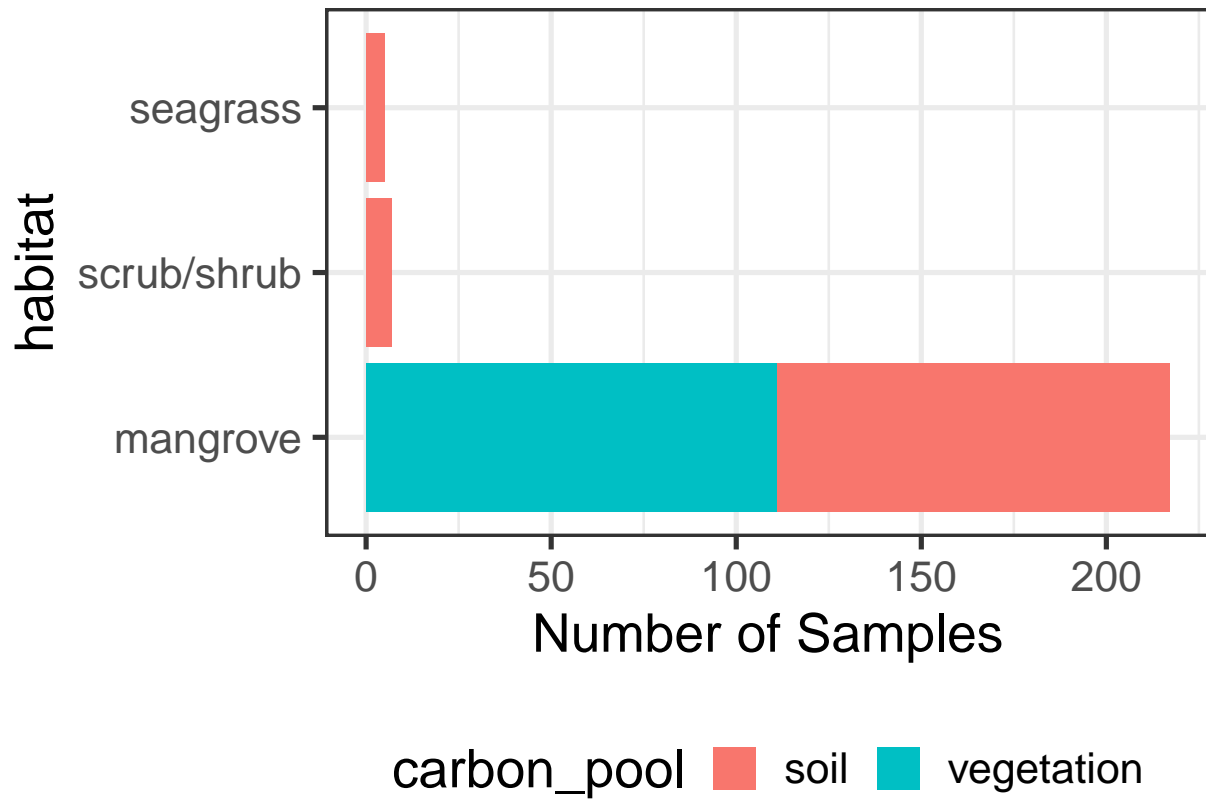
2. Emissions Factors
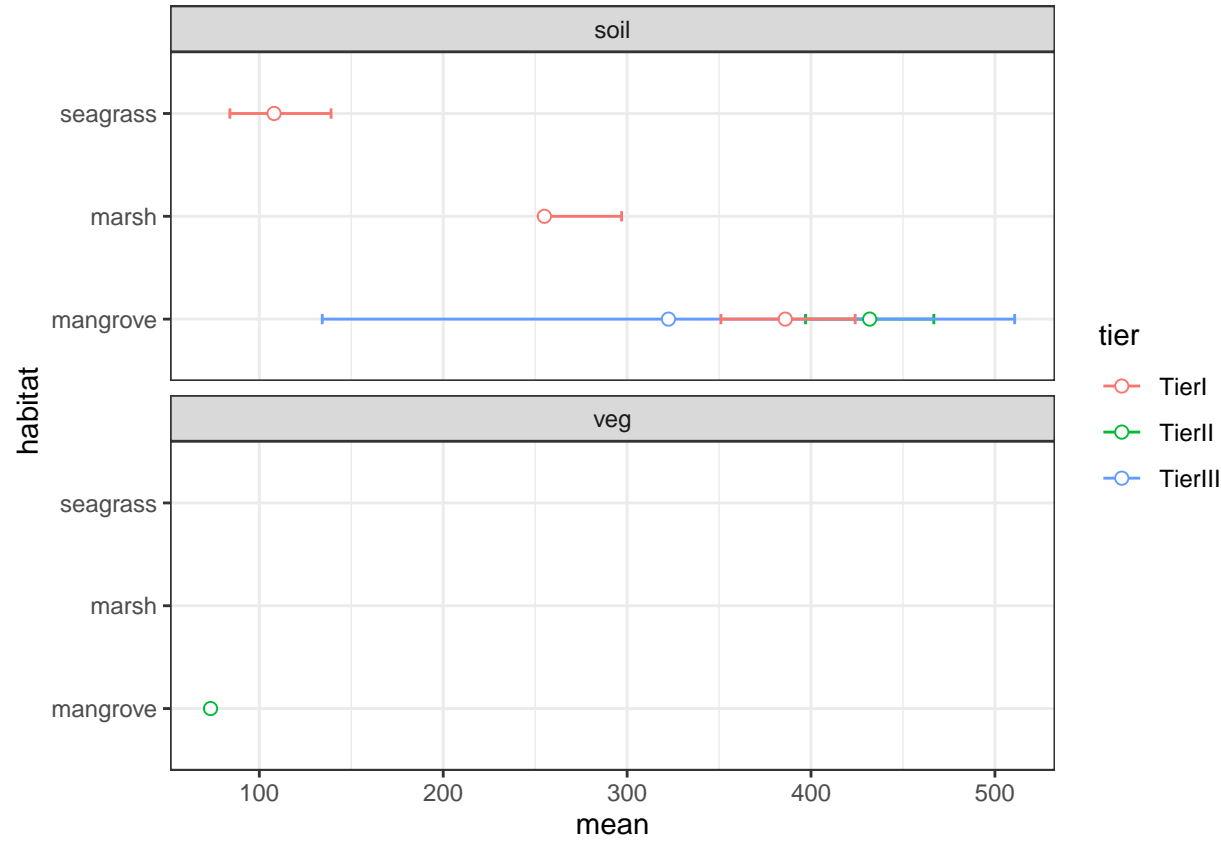
3. Activity Data

References

Bunting, Pete, Ake Rosenqvist, Richard M. Lucas, Lisa-Maria Rebelo, Lammert Hilarides, Nathan Thomas, Andy Hardy, Takuya Itoh, Masanobu Shimada, and C. Max Finlayson. 2018. "The Global Mangrove Watch—a New 2010 Global Baseline of Mangrove Extent." *Remote Sensing* 10 (10): 1669. https://doi.org/10.3390/rs10101669.

McKenzie, Len J, Lina M Nordlund, Benjamin L Jones, Leanne C Cullen-Unsworth, Chris Roelfsema, and Richard K F Unsworth. 2020. "The Global Distribution of Seagrass Meadows." *Environmental Research Letters* 15 (7): 074041. https://doi.org/10.1088/1748-9326/ab7d06.

Morrissette, Hannah K., Stacy K. Baez, Lisa Beers, Nadia Bood, Ninon D. Martinez, Kevin Novelo, Gilbert Andrews, et al. 2023a. "Belize Blue Carbon: Establishing a National Carbon Stock Estimate for Mangrove Ecosystems." *Science of The Total Environment*, January, 161829. https://doi.org/10.1016/j.scitotenv.2023.161829.

———, et al. 2023b. "Belize Blue Carbon: Establishing a National Carbon Stock Estimate for Mangrove Ecosystems." *Science of The Total Environment*, January, 161829. https://doi.org/10.1016/j.scitotenv.2023.161829.

Morrissette, Hannah, Stacy K. Baez, Lisa M Schile-Beers, Nadia Bood, Ninon D. Martinez, Kevin Novelo, Gilbert Andrews, et al. 2023a. "Dataset: National Total Ecosystem Carbon Stock for the Mangroves of Belize." Smithsonian Environmental Research Center. https://doi.org/10.25573/SERC.21298338.

———, et al. 2023b. "Dataset: National Total Ecosystem Carbon Stock for the Mangroves of Belize." Smithsonian Environmental Research Center. https://doi.org/10.25573/SERC.21298338.

Rogers, Kerrylee, Jeffrey J. Kelleway, Neil Saintilan, J. Patrick Megonigal, Janine B. Adams, James R. Holmquist, Meng Lu, et al. 2019b. "Wetland Carbon Storage Controlled by Millennial-Scale Variation

in Relative Sea-Level Rise." *Nature* 567 (7746): 91–95. https://doi.org/10.1038/s41586-019-0951-7.

———, et al. 2019a. "Wetland Carbon Storage Controlled by Millennial-Scale Variation in Relative Sea-Level Rise." *Nature* 567 (7746): 91–95. https://doi.org/10.1038/s41586-019-0951-7.

Sanderman, Jonathan. 2017a. "Global Mangrove Soil Carbon: Dataset and Spatial Maps." Harvard Dataverse. https://doi.org/10.7910/dvn/ocyuit.

———. 2017b. "Global Mangrove Soil Carbon: Dataset and Spatial Maps." Harvard Dataverse. https://doi.org/10.7910/dvn/ocyuit.

Schile-Beers, Lisa M, Andrew H. Altieri, and J. Patrick Megonigal. 2023b. "Dataset: Mangrove, Tidal Wetland and Seagrass Soil Carbon Stocks Along Latitudinal Gradients." Smithsonian Environmental Research Center. https://doi.org/10.25573/SERC.11971527.

———. 2023a. "Dataset: Mangrove, Tidal Wetland and Seagrass Soil Carbon Stocks Along Latitudinal Gradients." Smithsonian Environmental Research Center. https://doi.org/10.25573/SERC.11971527.

UNEP-WCMC, and FT Short. 2018. "Global Distribution of Seagrasses (Version 6.0)." UN Environment Programme World Conservation Monitoring Centre. https://wedocs.unep.org/bitstream/handle/20.500.11822/34031/GDS.pdf?sequence=1&isAllowed=y.

Wooller, Matthew, Smallwood, Barbara, Jacobson, Myrna, Fogel, and Marilyn. 2003. "Carbon and Nitrogen Stable Isotopic Variation in Laguncularia Racemosa (l.)(white Mangrove) from Florida and Belize: Implications for Trophic Level Studies." *Hydrobiologia* 499. https://doi.org/10.1023/A:1026339517242.

Worthington, Thomas A., Mark Spalding, Emily Landis, Tania L. Maxwell, Alejandro Navarro, Lindsey S. Smart, and Nicholas J. Murray. 2024. "The Distribution of Global Tidal Marshes from Earth Observation Data." *Global Ecology and Biogeography* 33 (8). https://doi.org/10.1111/geb.13852.