

Panama Country Insights

21 Feb 2025

Congratulations! This country has available data.

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

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

Resources referenced to calculate estimates for **Panama** are listed below under ‘References’ at the bottom of this document.

Total Carbon Stock Estimates

Total Carbon stock estimates were calculated for each country and habitat. At this time, total Carbon stock estimates do not include seagrass.

We estimate that **Panama** contains between 58490070.99 to 43149768.11 metric tonnes of soil C to a depth of 1 m, with a mean estimate of 50819919.55 metric tonnes C.

country	territory	habitat	total_stocks	total_stocks_lower	total_stocks_upper	total_stocks_se
Panama	Panama	total	50819920	58490071	43149768	3913343

This total estimate includes total mangrove carbon stocks, from NA to NA metric tonnes of soil C to a depth of 1 m, with a mean estimate of 50751286.37.

country	territory	habitat	total_stocks	total_stocks_lower	total_stocks_upper	total_stocks_se
Panama	Panama	mangrove	50751286	NA	NA	3985220

This total estimate also includes total tidal marsh carbon stocks, ranging from NA to NA metric tonnes of soil C to a depth of 1 m, with a mean estimate of 68633.18.

country	territory	habitat	total_stocks	total_stocks_lower	total_stocks_upper	total_stocks_se
Panama	Panama	marsh	68633.18	NA	NA	9650.674

Seagrass carbon stocks were not included in the total value due to lack of a global, transparent, and independently assessed seagrass habitat map; however, best available areas and stocks for **Panama** are explored in the following ‘Wetland Areas and Activities’ section.

Wetland Areas and Activities

We estimate mangrove area in **Panama** to be 134141.036354949 to 304.269477886433 hectares, with a mean estimate of 152769.177527021 hectares according to Global Mangrove Watch Bunting et al. (2018).

We estimate tidal marsh area in **Panama** to be 163.026955113792 to 304.269477886433 hectares, with a mean estimate of hectares according to Worthington et al. (2024).

We estimate seagrass area to be **Panama** to be a mean of 180212 hectares, according to McKenzie et al. (2020), aggregating data from multiple sources.

McKenzie et al. (2020) classifies seagrass area estimates as either high or medium to low confidence. seagrass_area_high_confidence % of the estimated seagrass area of **Panama** is considered high to medium confidence, while seagrass_area_low_confidence % of the estimated seagrass area is categorized as low confidence.

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 **Panama**.

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 **Panama** includes 119 soil profiles from 40 watersheds. This data comes from 3 different habitat types.

If 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 4: IPCC Tier I Value Estimates

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

Table 5: Availability of Tier I and Tier II Data

Country	Territory	Habitat	Tier	Overlap
Panama	Panama	mangrove	Tier II	Country-specific average overlaps Tier I
Panama	Panama	marsh	Tier I	NA
Panama	Panama	seagrass	Tier II	Country-specific average overlaps Tier I

Tier I Carbon Stocks

This table includes Tier I Carbon Stocks included for **Panama**.

country	territory	habitat	stock_MgHa_mest	stock_MgHa_lowerCI	stock_MgHa_upperCI	tier	carbon_pool
Panama	Panama	marsh	255	254	297	TierI	soil

Tier II Carbon Stocks

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

country	territory	habitat	tier	carbon_pool	stock_MgHa_mest	stock_MgHa_lowerCI	stock_MgHa_upperCI	stock_MgHa_lowerCI
Panama	Panama	mangrove	TierII	soil	332.2089	10.60912	353.0024	311.4155
Panama	Panama	seagrass	TierII	soil	158.8280	27.33944	NA	NA

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 **Panama**, and any overlap with associated Tier I or Tier II values.

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

country	territory	habitat	stock_MgHa_mest	stock_MgHa_lowerCI	stock_MgHa_upperCI	tierIII	tierIII_greater_than_tierI	tierIII_greater_than_tierII	tierIII_greater_than_tierI_and_tierII
Panama	Panama	mangrove	122.28443	59.74184	82.8269	greater than	Remote-sensing estimate is significantly greater than country-specific average	greater than	Remote-sensing estimate overlaps Tier I

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>.
- 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>.