

Identification_Information:

Citation:

Citation_Information:

Originator: Commission for Environmental Cooperation

Publication_Date: 2021

Title: North American Mangroves Distribution

Geospatial_Data_Presentation_Form: Vector digital data

Publication_Information:

Publication_Place: Montréal, Québec, Canada

Publisher: Commission for Environmental Cooperation

Online_Linkage: <http://www.cec.org/north-american-environmental-atlas/>

Description:

Abstract:

The extent of Mangroves in North America was estimated by combining datasets from different sources using different methods. These include global and national datasets that were generated from remote sensed imagery. The current dataset serves as an updated of the previously North American Mangroves distribution map published by the Commission for Environmental Cooperation in 2016.

Commission for Environmental Cooperation (CEC). 2016. "North American Blue Carbon". Ed. 1.0, Vector digital data [1:10,000,000]. Available at <http://www.cec.org/tools-and-resources/map-files/north-american-blue-carbon-2017> CEC. 2016. North America's Blue Carbon: Assessing Seagrass, Salt Marsh and Mangrove Distribution and Carbon Sinks. Montreal, Canada: Commission for Environmental Cooperation. 54 pp. Available at <http://www3.cec.org/islandora/en/item/11664-north-america-s-blue-carbon-assessing-seagrass-salt-marsh-and-mangrove-en.pdf>

A) Datasets used in the North American 2021 Mangroves Distribution Map. A more detailed description of all the datasets used, as well as the preprocess performed to extract Mangroves information is available in the accompanying document "Blue Carbon Map source data notes 2021.docx".

MG_01 Global Distribution of Mangroves USGS (2011)

World Conservation Monitoring Center-United Nations Environment Programme

Spatial Domain: Global

Geometry: Polygon

Data: <https://data.unep-wcmc.org/datasets/4>

Source metadata: https://data.unep-wcmc.org/pdfs/4/Global_Distribution_of_Mangroves_USGS.pdf?1615453294

Source file name: 14_001_WCMC010_MangroveUSGS2011_v1_3.shp

Scale/Resolution: 30 meters

Version: 1.3

Year of Origin: 2011

Year of Publication: 2015

MG_02 Mangrove distribution in Mexico, 2020

National Commission for the Knowledge and Use of Biodiversity (CONABIO)

Spatial Domain: Mexico

Geometry: Polygon

Data: http://geoportal.conabio.gob.mx/metadatos/doc/html/mx_man20gw.html

Source metadata:

http://geoportal.conabio.gob.mx/metadatos/doc/html/mx_man20gw.html

Source file name: *mx_man20gw.shp*
Scale/Resolution: 1:50,000
Version: 1.0
Year of Origin: 2020
Year of Publication: 2021

MG_03 Disturbed Mangrove distribution in Mexico, 2020
National Commission for the Knowledge and Use of Biodiversity (CONABIO)
Spatial Domain: Mexico
Geometry: Polygon
Data: http://geoportal.conabio.gob.mx/metadatos/doc/html/mx_mp2020gw.html
Source metadata:
http://geoportal.conabio.gob.mx/metadatos/doc/html/mx_mp2020gw.html
Source file name: *mx_mp2020gw.shp*
Scale/Resolution: 1:50,000
Version: 1.0
Year of Origin: 2020
Year of Publication: 2021

Purpose:

This dataset was created as part of a collaborative effort between the Mexican Carbon Program that conducted an exhaustive search for data updates or new datasets available, as well as coordinate three national workshops with Blue Carbon experts from Canada, the United States and Mexico to retrieve feedback on the best practices to map Blue Carbon ecosystems across North America; and the Commission for Environmental Cooperation that conducted the review and evaluation of the datasets collected, as well as the map integration process and cartographic refinement in collaboration with Ricardo Llamas (rllamas@comunidad.unam.mx) as independent geospatial consultant.

The goal of this datasets is to serve as a geospatial tool to estimate Blue Carbon Sink potential of North America in ecosystems such as Mangroves, as well as provide a standardized and publicly available input dataset for various Carbon Budget analyses.

Supplemental_Information:

The Commission for Environmental Cooperation (CEC) is an international organization created by Canada, Mexico, and the United States of America under the North American Agreement on Environmental Cooperation (NAAEC). The CEC was established to address regional environmental concerns, help prevent potential trade and environmental conflicts, and to promote the effective enforcement of environmental law. The Agreement complements the environmental provisions of the North American Free Trade Agreement (NAFTA). Further information on the CEC is available from <http://www.cec.org/> or from

- >Commission for Environmental Cooperation
- >700 de la Gauchetière St. West
- >Suite 1620
- >Montréal (Québec)
- >H3B 5M2 Canada
- >
- >Telephone: 1 514 350 4300
- >Facsimile: 1 514 350 4314
- >Electronic mail: info@cec.org
- >

A more detailed description of all the datasets used, as well as the preprocess performed to extract Mangroves information is available in the accompanying document "Blue Carbon Map source data notes 2021.docx"

Information related to the Blue Carbon legacy maps produced by the Commission for Environmental Cooperation can be found in the following reports:

1) CEC. 2014. North America's Blue Carbon: Assessing Seagrass, Salt Marsh and Mangrove Carbon Sinks A Final Report. Montreal, Canada: Commission for Environmental Cooperation. 219 pp

2) CEC. 2017. Blue Carbon Seagrass Mapping in Canada and The United States: British Columbia Washington and Oregon, Developing an Algorithm and Quantifying Eelgrass Extent A Final Report. Montreal, Canada: Commission for Environmental Cooperation. 82 pp

Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 3 May 2021

Currentness_Reference: Publication date

Status:

Progress: Complete

Maintenance_and_Update_Frequency: Irregular

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate: -170.5

East_Bounding_Coordinate: -50.0

North_Bounding_Coordinate: 85.0

South_Bounding_Coordinate: 14.0

Keywords:

Theme:

Theme_Keyword_Thesaurus: ISO 19115 Topic Category

Theme_Keyword: biota

Theme_Keyword: environment

Theme_Keyword: oceans

Theme:

Theme_Keyword_Thesaurus: GCMD science keywords

Theme_Keyword: Saltmarsh

Theme_Keyword: Mangrove

Theme_Keyword: Disturbed Mangrove

Place:

Place_Keyword_Thesaurus: None

Place_Keyword: North America

Theme_Keyword: Canada

Place_Keyword: Mexico

Place_Keyword: United States of America

Access_Constraints: None

Use_Constraints:

None. Acknowledgement of the Commission for Environmental Cooperation would be appreciated in products derived from these data.

Point_of_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Commission for Environmental Cooperation

Contact_Address:

Address_Type: Mailing and physical address

Address: 700 de la Gauchetière St. West, Suite 1620

City: Montreal

State_or_Province: Quebec

Postal_Code: H3B 5M2

Country: Canada

Contact_Voice_Telephone: 1 514 350 4300

Contact_Facsimile_Telephone: 1 514 350 4314

Contact_Electronic_Mail_Address: info@cec.org

Data_Quality_Information:

Attribute_Accuracy:

Attribute_Accuracy_Report:

Attributes and values were reviewed manually. No additional tests for attribute accuracy was performed on this data set.

Logical_Consistency_Report:

No tests for logical consistency have been performed on this data set.

Completeness_Report:

The international, national, and local dataset used in this analysis have known data gaps. In this dataset, the most updated and spatially extended Mangroves datasets to our knowledge have been used. Future updates are envisioned as new data is available and new data providers offer spatial information over areas omitted in the current map.

North American 2021 Mangroves Distribution, Map Integration Report:

The datasets used for the North America Blue Carbon Maps integration were preprocessed to extract spatial information representing the distribution of Saltmarshes, Mangroves and Seagrasses.

Preprocesses conducted with the Mangroves datasets were performed between December 2020 and March 2021.

NOTE: A more complete and detailed report of the North America 2021 Mangroves Distribution map is available in the accompanying report "NA BC Cartographic Integration Process.docx"

Preprocessing by dataset:

MG_01. Global Distribution of Mangroves USGS (2011)

A "selection by attributes process" was performed to isolate all mangrove polygons within the United States and Mexico territories. All polygons located in the USA territories over the Pacific Ocean as well as Puerto Rico were deselected. A final saltmarshes layer was exported from the remaining polygons selection.

MG_02. Distribución de los manglares en México en 2020

No preprocessing was needed for this dataset.

MG_03. Distribución de manglar perturbado de México en 2020
No preprocessing was needed for this dataset.

Cartographic Integration Process:

As some of the datasets show spatial overlaps, some criteria were defined to deal with overlapping polygons from different data sources and keep as much spatial information as possible.

In order to define the criteria to prioritize sources datasets on areas where information overlaps, the Mexican Carbon Program conducted a series of three national workshops with experts from Canada, the United States and Mexico.

Experts were asked to rank the sources datasets features that should be considered when selecting the sources of information that must prevail over areas with overlapping polygons. Six quality features were evaluated by the experts, comprising:

- > Most updated datasets
- > Fine spatial resolution over coarse spatial resolution
- > Datasets reporting accuracy
- > National or regional datasets over global datasets
- > Independent research studies over institutional datasets
- > Most complete metadata

A group of eleven experts participated in a survey to rank the criteria

>-----

Name	Institution	Email
Nate Herold	NOAA	nate.herold@noaa.gov
Margot Hessing-Lewis	Hakai Institute	margot@hakai.org
Gail Chmura	McGill University	gail.chmura@mcgill.ca
Dan Mulrooney	Parks Canada	dan.mulrooney@canada.ca
Anna Hilting	NOAA	anna.hilting@noaa.gov
Ma. Teresa Rodríguez	CONABIO	mrodrig@conabio.gob.mx
Joanna Acosta Velázquez	Aura Manglares y costas	joanna.acosta@gmail.com
Iliana Pérez Espinosa	CONABIO	iperez@conabio.gob.mx
Carlos Troche	CONABIO	ctroche@conabio.gob.mx
Beatriz Corral Osuna	INECC	beatriz.corral@gmail.com
Zulia Sánchez Mejía	ITSON	zulia.sanchez@itson.edu

As a result of the experts-defined criteria and the characteristics of the information provided by each source dataset, we defined each dataset as authoritative over its corresponding region.

The Mexico Mangrove Distribution map and the Disturbed Mangrove distribution map produced by the National Commission for the Knowledge and Use of Biodiversity (CONABIO) were the defined as the only authoritative source over Mexico. Thus, mangrove distribution data provided by the WCMC map was not used as input layer over Mexico. Mangrove polygons from both mangrove distribution and disturbed mangrove distribution over Mexico spatially complement each other without any overlapping, thus, no further processes were required prior the use of these layers for the North America Mangrove distribution map.

All polygons from the WCMC Global Distribution of Mangroves corresponding to USA territory were selected and exported to a new spatial layer.

Output = WCMC_mangroves_laea_final.shp

Step 02

All the layers previously prepared and preprocessed with no overlapping areas between source data sets were merged in a new spatial layer.

```
> WCMC_mangroves_laea_final.shp
> MEX_mangroves_laea_final.shp
> MEX_disturbed_mangroves_laea_final.shp
```

Output = NorthAmerica_mangrove_layers_merge.shp

Step 03

A process of "Multipart to Single part" was applied to the output layer from the previous step. This way, all polygons are individually accounted as single polygons, which will allow to dissolve spatially connected polygons that share the same values in all the attribute fields.

Output = NorthAmerica_mangrove_layers_singlepart.shp

Step 04

A "Dissolve" process was applied to the output layer from the previous step. All individual polygons that are spatially connected and share the same values across the thirteen common attributed fields (except area) will break down into new polygons. This way, the number of polygons and the size of the final spatial layer file is reduced. No multipart features creation is allowed in this step.

Output = NorthAmerica_mangrove_polygons_dissolve.shp

Step 05

A new field "AREA_SQMT" is created and the area in squared meters is calculated for this field. The area is calculated based on the map coordinate reference system, 1 decimal point and thousands separated by comas are defined.

Step 06

After a final check of attribute table consistency and data display on different GIS platforms, a spatial data file in ESRI "shp" format is generated to provide the final CEC North America mangroves distribution map.

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: G-polygon

Point_and_Vector_Object_Count: 34630

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Sphere_ARC_INFO_Lambert_Azimuthal_Equal_Area
Projection: Lambert
Longitude_of_Projection_Center/Central Meridian: -100.0
Latitude_of_Projection_Center/Origin: 45.0
False_Easting: 0.0
False_Northing: 0.0

Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: Coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.001
Ordinate_Resolution: 0.001
Planar_Distance_Units: Meter

Geodetic_Model/Datum:
Horizontal_Datum_Name: D_Sphere_ARC_INFO
Ellipsoid_Name: Sphere_ARC_INFO
Semi-major_Axis: 6370997.0
Semiminor Axis: 6370997.0
Denominator_of_Flattening_Ratio/Inverse Flattening: 0.0

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: North American 2021 Mangroves Distribution
Entity_Type_Definition:
Vector polygons representing Mangroves areas in North America.

Entity_Type_Definition_Source:

<See Datasets section>

Attribute:

Attribute_Label: FID
Attribute_Definition: Unique identifier for each polygon.
Attribute_Definition_Source: Automatically generated
Attribute_Domain_Values:
Range_Domain:
Range_Domain_Minimum: 0
Range_Domain_Maximum: 34630

Attribute:

Attribute_Label: COUNTRY
Attribute_Definition: Country.
Attribute_Definition_Source: Country of location of each polygon (CAN:
Canada, USA: United States of America, MEX: Mexico). CEC 2005.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> MEX
> USA

Reference:

Commission for Environmental Cooperation (2005) *Guidelines for Geo-spatial data for Compatibility with the North American Atlas Framework*.
CEC: Montreal pp.5-11

Attribute:

Attribute_Label: STATEABB
Attribute_Definition: State or Province.
Attribute_Definition_Source: State or province code defining the location of each polygon (two letters country code + two letters state/province code).

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> MX-BCN
> MX-BCS
> MX-CAM
> MX-CHP
> MX-COL
> MX-GRO
> MX-JAL
> MX-MIC
> MX-NAY
> MX-OAX
> MX-ROO
> MX-SIN
> MX-SON
> MX-TAB
> MX-TAM
> MX-VER
> MX-YUC
> US-FL
> US-LA
> US-TX

See complete list in:

Commission for Environmental Cooperation (2005) *Guidelines for Geo-spatial data for Compatibility with the North American Atlas Framework*.
CEC: Montreal pp.5-11

Attribute:

Attribute_Label: NAME
Attribute_Definition: Reported Name.
Attribute_Definition_Source: Name of the features described by each polygon, as reported by the source of each dataset.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> Disturbed Mangrove
> Mangrove

Attribute:

Attribute_Label: INPT_SRCE
Attribute_Definition: Input Source.

Attribute_Definition_Source: Description of the original dataset used to acquire each polygon.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> National Commission for the Knowledge and Use of Biodiversity (CONABIO)
> UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)

Attribute:

Attribute_Label: YEAR_PUB

Attribute_Definition: Year of Publication.

Attribute_Definition_Source: Year of the publication of the last update of the dataset used as input.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> 2015
> 2021

Attribute:

Attribute_Label: RESP_PARTY

Attribute_Definition: Responsible Party.

Attribute_Definition_Source: Name of the entity responsible on providing each dataset.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> Giri et al., 2011
> MEX: National Commission for the Knowledge and Use of Biodiversity (CONABIO)

Attribute:

Attribute_Label: YEAR_ORGN

Attribute_Definition: Year of Origin.

Attribute_Definition_Source: Year of origin of data reported by the source of each dataset (this can be year when data was taken or when the data was originally published by the source).

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> 2011
> 2020

Attribute:

Attribute_Label: SURVEY_MET

Attribute_Definition: Survey Method.

Attribute_Definition_Source: Reported method of data acquisition as reported by the source of each dataset.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> Remote Sensing

Attribute:

Attribute_Label: SCAL_RPRTD

Attribute_Definition: Scale Reported.

Attribute_Definition_Source: Scale of the input data used in each polygon or general dataset as reported by the source.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> 1:50,000
> Not Reported

Attribute:

Attribute_Label: RESL_RPRTD

Attribute_Definition: Resolution Reported.

Attribute_Definition_Source: Resolution of the input data used in each polygon or general dataset as reported by the source.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> 30 m
> Not Reported

Attribute:

Attribute_Label: SOURCE_DES

Attribute_Definition: Source Description.

Attribute_Definition_Source: General description of the source dataset used to derive each polygon.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> Distribution and extension of the disturbed mangrove cover across Mexico in 2020, obtained from an interdependent classification method. A set of 94 ESA Sentinel-2 satellite constellation images were used, January-May 2020.
> Distribution and extension of the mangrove cover across Mexico in 2020, obtained from an interdependent classification method. A set of 94 ESA Sentinel-2 satellite constellation images were used, January-May 2020.
> This dataset shows the global distribution of mangrove forests, derived from earth observation satellite imagery. The dataset was created using Global Land Survey (GLS) data and the Landsat archive.

Attribute:

Attribute_Label: CITATION

Attribute_Definition: Full citation of the used data source.

Attribute_Definition_Source: Modified APA 7th citation style to fit in a maximum of 254 characters.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: (see table below)

Enumerated_Domain_Value_Definition:

>-----
> CONABIO (2021) 'Distribución de los manglares en México en 2020', 1:50,000, Ed. 1. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad - Sistema de Monitoreo de los Manglares de México (SMMM), Mexico City, Mexico.
> CONABIO (2021) 'Distribución de manglar perturbado de México en 2020', 1:50,000, Ed. 1. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad - Sistema de Monitoreo de los Manglares de México (SMMM), Mexico City, Mexico.
> Giri, C. et al. (2011) 'Status and distribution of mangrove forests of the world using earth observation satellite data', Global Ecology and Biogeography, 20 (1), pp. 154-159.

Attribute:

Attribute_Label: SOURCE_ID

Attribute_Definition: Identification code of the datasets reported in the data sources full description document.

Attribute_Definition_Source: Assigned by the GIS consultant

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum: SM_01

Range_Domain_Maximum: SM_03

Attribute:

Attribute_Label: AREA_SQMT

Attribute_Definition: The size of the shape in square meters.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum: 795.823

Range_Domain_Maximum: 1165690000

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Commission for Environmental Cooperation

Contact_Address:

Address_Type: Mailing and physical address

Address: 700 de la Gauchetière St. West, Suite 1620

City: Montreal

State_or_Province: Quebec

Postal_Code: H3B 5M2

Country: Canada

Contact_Voice_Telephone: 1 514 350 4300

Contact_Facsimile_Telephone: 1 514 350 4314

Contact_Electronic_Mail_Address: info@cec.org

Distribution_Liability:

Although these data have been processed successfully on a computer system at the Commission for Environmental Cooperation, no warranty expressed or implied is made by the CEC regarding the utility of the data on any other system, nor shall the act of distribution constitute any such warranty. No responsibility is assumed by CEC in the use of these data.

Standard_Order_Process:

Digital_Form:

Digital_Transfer_Information:

Format_Name: ESRI Shapefile

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name: <http://www.cec.org/north-american-environmental-atlas/>

Metadata_Reference_Information:

Metadata_Date(YYYYMMDAY): 20210425

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Commission for Environmental Cooperation

Contact_Address:

Address_Type: Mailing and physical address

Address: 700 de la Gauchetière St. West, Suite 1620

City: Montreal

State_or_Province: Quebec

Postal_Code: H3B 5M2

Country: Canada

Contact_Voice_Telephone: 1 514 350 4300

Contact_Facsimile_Telephone: 1 514 350 4314

Contact_Electronic_Mail_Address: info@cec.org

Metadata_Standard_Name:

FGDC Content Standard for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Access_Constraints: None

Metadata_Use_Constraints: None