GLOBAL MANGROVE WATCH

EO 4 Ecosystem Accounting 2022
Virtual Event, December 1, 2022

Global Mangrove Watch:
Mapping Extent, Changes and Blue Carbon

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Global Mangrove Watch
Mapping Extent, Changes and Blue Carbon

GMW Platform

Activity Data:

- Global mangrove habitat extent derived with a consistent methodology
- Mangrove net changes 1996-2020
- Mangrove Change Alerts (currently Africa)

Emission Factors:

- Mangrove Above Ground Biomass
- Mangrove Blue Carbon

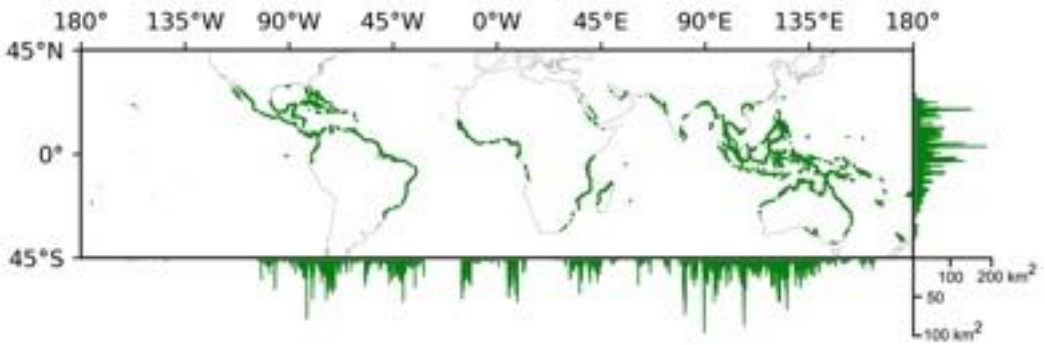
+ Data on mangrove species and protection status

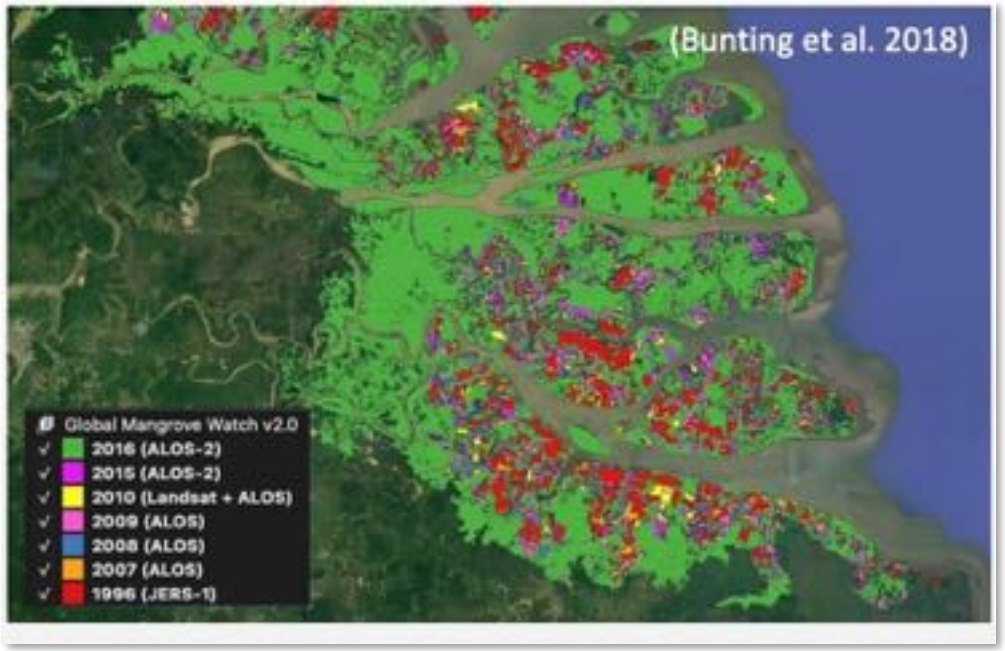
www.globalmangrovewatch.org

GLOBAL MANGROVE WATCH

Mangrove Spatial Extent & Annual Change

- Global Mangrove Watch v3.0 (Bunting et al. 2022)
- Global 25 m geospatial dataset
- GMW global mangrove extent @25 m, derived from optical (Landsat) and L-band SAR (ALOS PALSAR). Baseline year 2010.
- GMW mangrove changes @25 m for 11 annual epochs 1996 – 2020 derived from L-band SAR (JERS-1, ALOS, ALOS-2)
- Uncertainty
  - Mangrove extent: 93.8% (91.1–94.5% @95th conf)
  - Mangrove → Non-mangrove: 60.4% (56.1–64.8%)
  - Non-mangrove → Mangrove: 58.1% (52.4–65.3%)






remote sensing

MDPI

Article

Global Mangrove Extent Change 1996–2020: Global Mangrove Watch Version 3.0

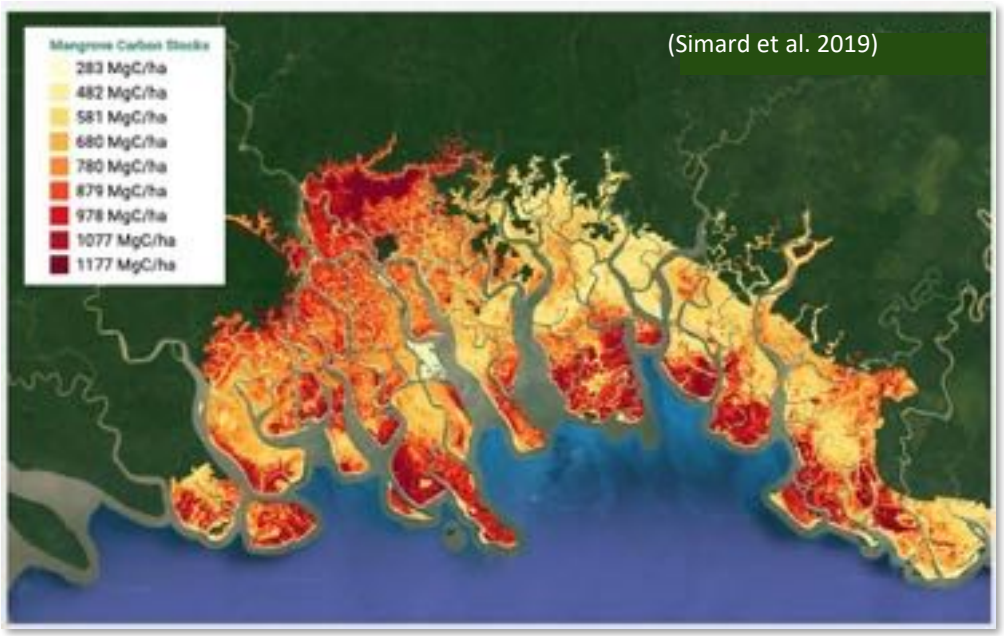
Pete Bunting, Ake Rosenqvist, Lammert Hilarides, Richard M. Lucas, Nathan Thomas, Takeo Tadono, Thomas A. Worthington, Mark Spalding, Nicholas J. Murray and Lisa-Maria Rebelo

Remote Sens. 2022, 14, 3657. https://doi.org/10.3390/rs14153657

GLOBAL MANGROVE WATCH

Mangrove Above Ground Biomass

- Derived from NASA JPL/GSFC (Simard et al. 2019)
- 30 m geospatial dataset. Baseline year 2000. Overlayed on GMW 2016 extent maps (Bunting et al 2018). Gaps filled by regional averages.
- Mangrove AGB closely related to tree height. Mangrove height derived from SRTM DEM (2000) and ICESat GLAS (2003-2009).
- Region specific allometric model correlated with in situ (height & basal area).
- Key AGB factors: annual precipitation, mean temperature and cyclone frequency + local factors (typology, nutrients, salinity)




ARTICLES

nature geoscience

Mangrove canopy height globally related to precipitation, temperature and cyclone frequency

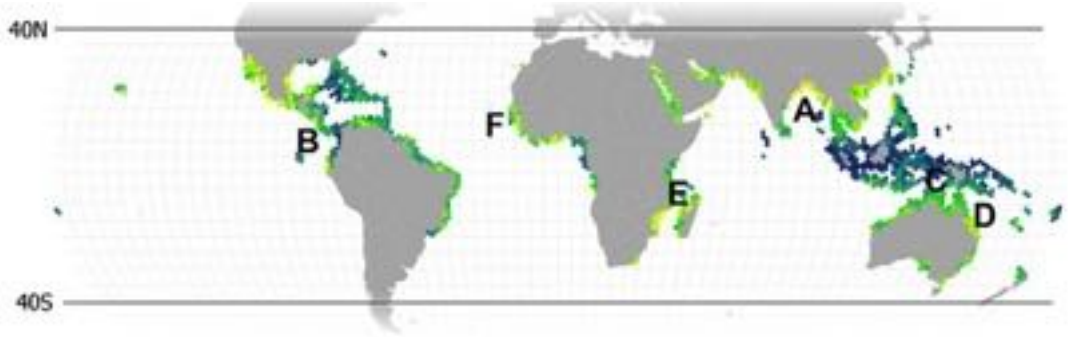
Marc Simard, Lola Fatoyinbo, Charlotte Smetanka, Victor H. Rivera-Monroy, Edward Castañeda-Moya, Nathan Thomas and Tom Van der Stocken

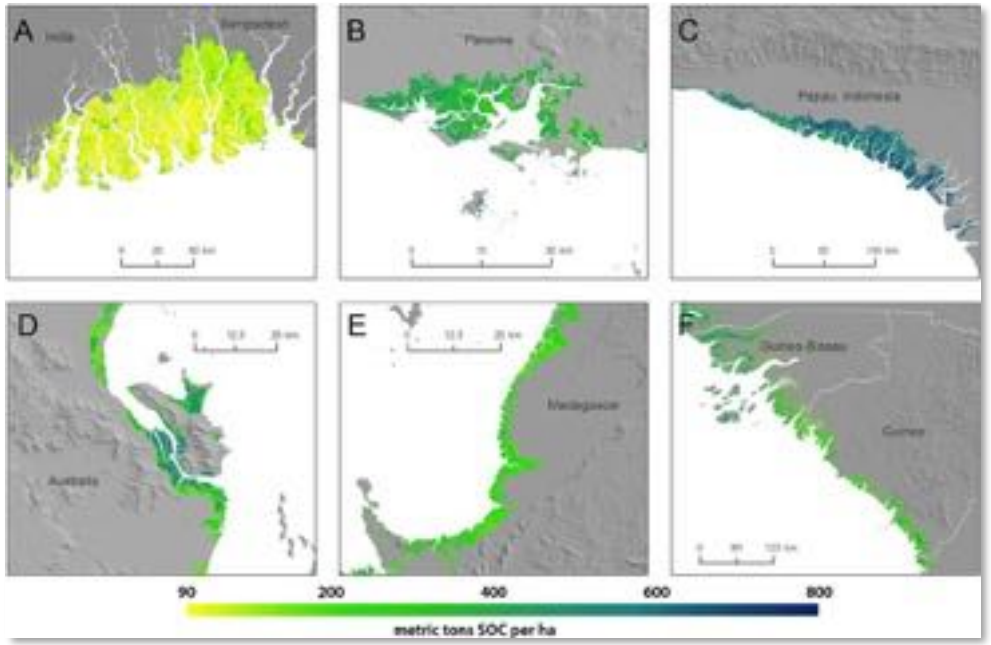
NATURE GEOSCIENCE | VOL 12 | JANUARY 2019 | 40–45 | www.nature.com/naturegeoscience

GLOBAL MANGROVE WATCH

Mangrove Soil Organic Carbon

- Organic Carbon Stock (OCS) from Sanderman et al. (2018)
- Geospatial dataset at 30 m. Based on ~2010 covariates. Overlayed on GMW 2016 extent maps (Bunting et al 2018)
- Key OCS controls: mineral sediment input (inv. corr.), forest productivity and soil conditions (pH, oxidation, salinity)
- ML-based statistical model of soil carbon density and distribution derived from *i.a.* SoilGrids 250m model, mangrove typology, Total Suspended Matter (MERIS 2003-2011), Veg % Cover (Hansen et al 2013) & Landsat SR
- OCS predicted at 30 m res, 0-200 cm depth. Uncertainty ~40% of mean OCS @ 100 cm.






ENVIRONMENTAL RESEARCH
LETTERS

LETTER • OPEN ACCESS

A global map of mangrove forest soil carbon at 30 m spatial resolution

Jonathan Sanderman, Tomislav Hengl, Greg Fiske, Kylen Solvik, Maria Fernanda Adame, Lisa Benson, Jacob J Bukoski, Paul Carnell, Miguel Cifuentes-Jara, Daniel Donato

Published 30 April 2018 • © 2018 The Author(s). Published by IOP Publishing Ltd

Environmental Research Letters, Volume 13, Number 5

Focus on The Role of Forests and Soils in Meeting Climate Change Mitigation Goals

Citation Jonathan Sanderman et al 2018 Environ. Res. Lett. 13 055002

DOI 10.1088/1748-9326/aabe1c

Planned GMW Platform improvements 2023

- Mangrove spatial extent:
  - 25 m spatial resolution insufficient for fragmented and small river mangroves
  - New 10 m baseline extent 2020 derived from Sentinel-2 under development
- Mangrove annual change:
  - Low accuracy caused by residual mis-registration of SAR datasets
  - JAXA re-processing of all L-band SAR data. Refined mangrove change maps by mid-2023
  - Change time-series to be extended to 2022
- Above Ground Biomass (AGB) and Organic Carbon Stock (OCS):
  - Maps from single year (AGB: 2000; OCS: 2010)
  - New AGB 2015 baseline at 12 m from TanDEM-X DEM under development
  - OCS revision completed using 2020 covariates
- Below Ground Biomass:
  - Currently missing. Difficult to measure *in situ*
  - To be added to GMW Portal. Model suggests ~0.5 x AGB
- Other new layers on the GMW Platform (2023 release):
  - Mangrove Restoration Potential map;
  - Country info: Coastal and marine NDC/NbS Status; Emission Mitigation Potential; C Market Potential

Global Mangrove Watch
Mapping Extent, Changes and Blue Carbon

- Global Mangrove Watch (GMW) Platform: www.globalmangrovewatch.org
- GMW v3.0 dataset open access:
  - UNEP-WCMC: data.unep-wcmc.org/datasets/45
  - Japan Aerospace Exploration Agency (JAXA): www.eorc.jaxa.jp/ALOS/en/dataset/gmw_e.htm
  - Zenodo Database: zenodo.org/record/6894273#.Y2pVH4KZNQI