GRUPO JARAGUA x Seacology

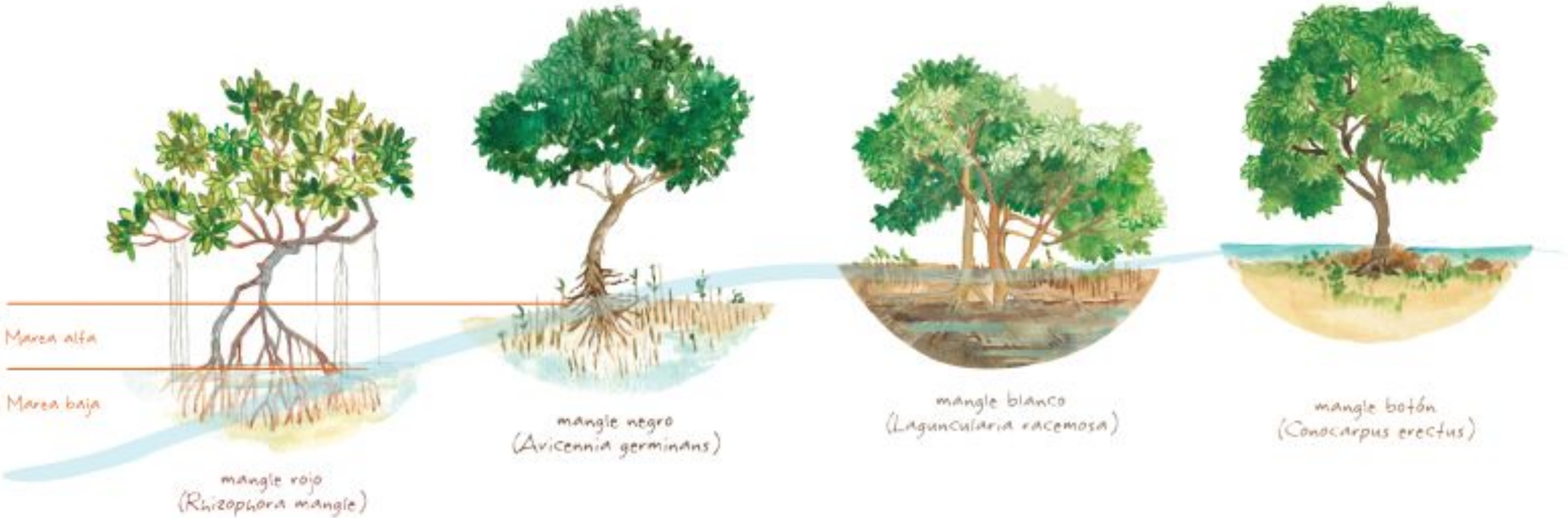
MANGLARES

Qué son, dónde están y amenazas

GRUPO JARAGUA

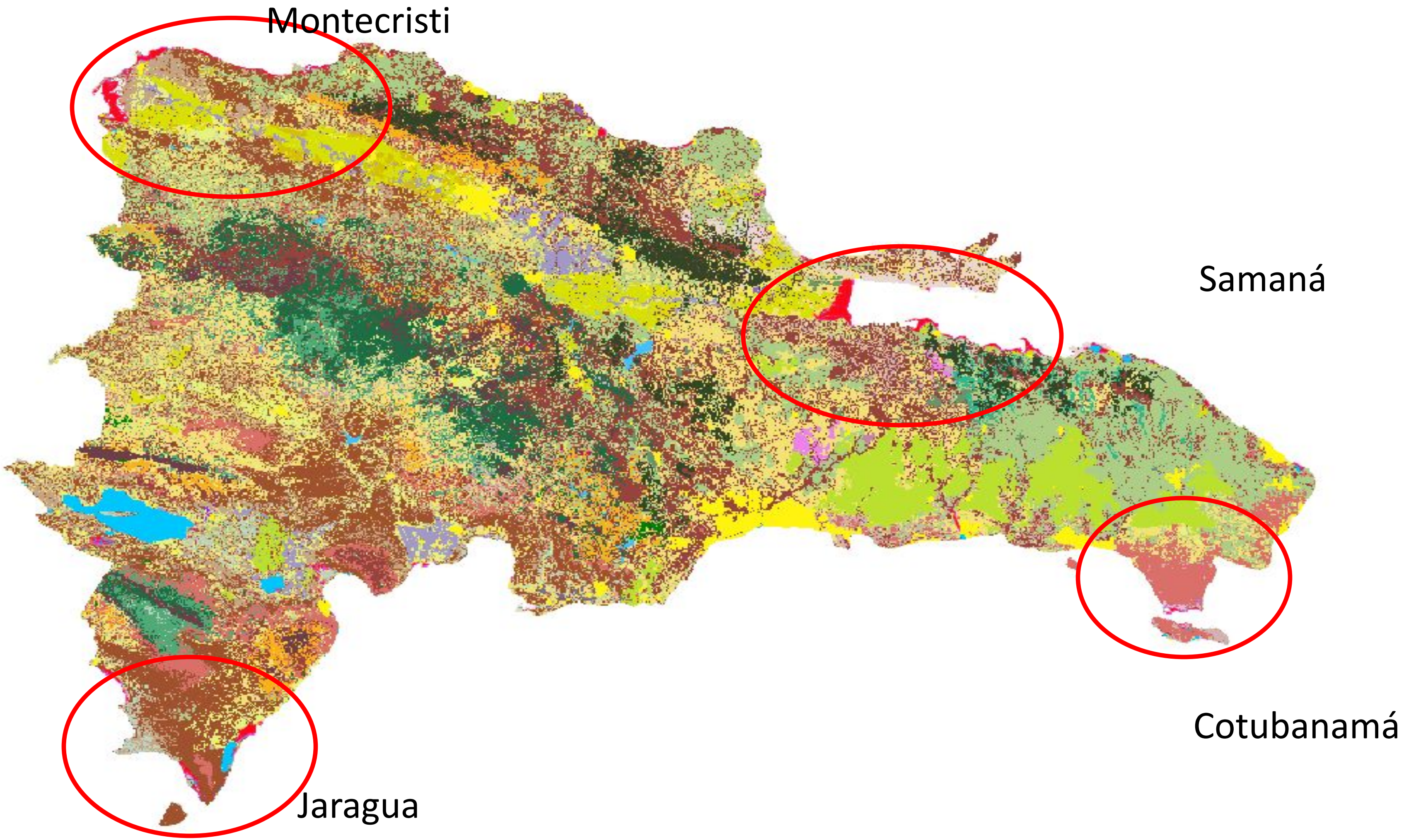
BirdLife INTERNATIONAL PARTNER


¿Qué son?


Marea alta
Marea baja
mangle rojo
(Rhizophora mangle)
mangle negro
(Avicennia germinans)
mangle blanco
(Laguncularia racemosa)
mangle botón
(Conocarpus erectus)



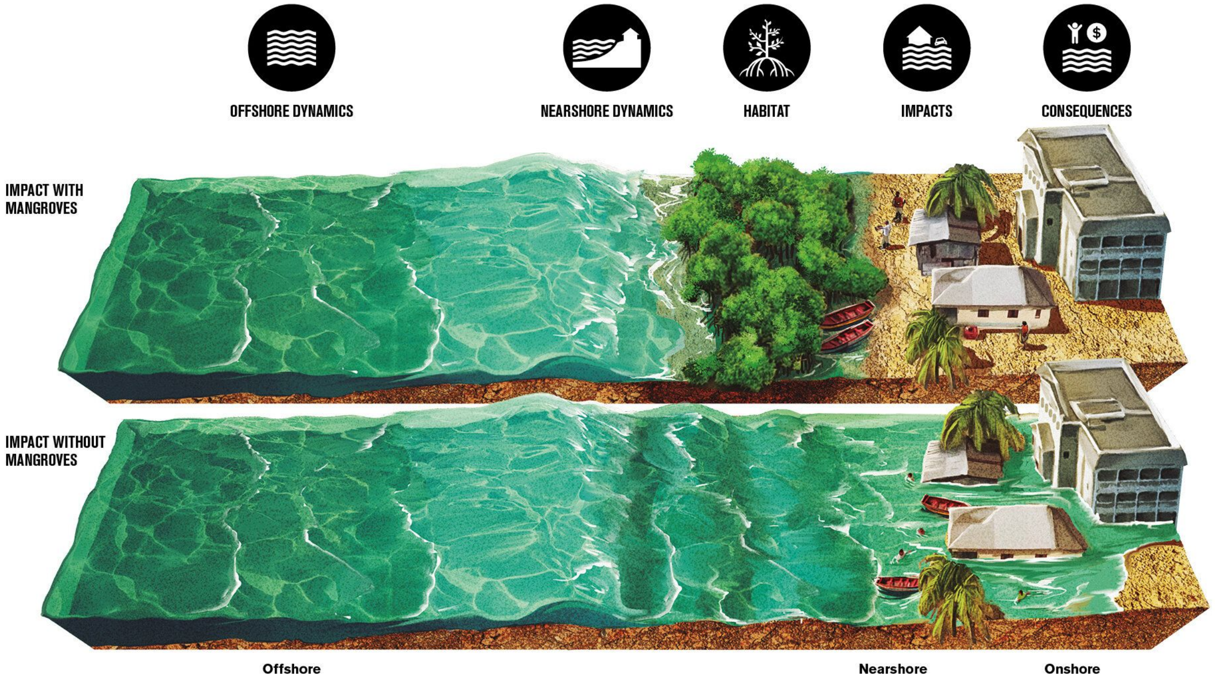
¿Dónde están?


Montecristi
Samaná
Cotubanamá
Jaragua


amenazas


Playa Macao
Image © 2022 Maxar Technologies
Image © 2022 CNES / Airbus
Google Earth
1985
Imagery Date: 5/6/2021
19 Q 548828.67 m E 2075381.13 m N
elev
0 m
eye alt
1.36 km

¿Qué perdemos?



Defensa costera.

Secuestro de carbono

nature geoscience | LETTERS
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Mangroves among the most carbon-rich forests in the tropics

Daniel C. Donato[1]*, J. Boone Kauffman[2], Daniel Murdiyarso[3], Sofyan Kurnianto[3], Melanie Stidham[4] and Markku Kanninen[5]

Mangrove forests occur along ocean coastlines throughout the tropics, and support numerous ecosystem services, including fisheries production and nutrient cycling. However, the areal extent of mangrove forests has declined by 30–50% over the past half century as a result of coastal development, aquaculture expansion and over-harvesting[1-4]. Carbon emissions resulting from mangrove loss are uncertain, owing in part to a lack of broad-scale data on the amount of carbon stored in these ecosystems, particularly below ground[5]. Here, we quantified whole-ecosystem carbon storage by measuring tree and dead wood biomass, soil carbon content, and soil depth in 25 mangrove forests across a broad area of the Indo-Pacific region—spanning 30° of latitude and 73° of longitude—where mangrove area and diversity are greatest[4,6]. These data indicate that mangroves are among the most carbon-rich forests in the tropics, containing on average 1,023 Mg carbon per hectare. Organic-rich soils ranged from 0.5 m to more than 3 m in depth and accounted for 49–98% of carbon storage in these systems. Combining our data with other published information, we estimate that mangrove deforestation generates emissions of 0.02–0.12 Pg carbon per year—as much as around 10% of emissions from deforestation globally, despite accounting for just 0.7% of tropical forest area[6,7].

Deforestation and land-use change currently account for 8–20% of global anthropogenic carbon dioxide (CO_2) emissions, second only to fossil fuel combustion[7,8]. Recent international climate agreements highlight Reduced Emissions from Deforestation and Degradation (REDD+) as a key and relatively cost-effective option for mitigating climate change; the strategy aims to maintain terrestrial carbon (C) stores through financial incentives for forest conservation (for example, carbon credits). REDD+ and similar programs require rigorous monitoring of C pools and emissions[8,9], underscoring the importance of robust C storage estimates for various forest types, particularly those [illegible] a combination of high [illegible] disproportionate importance in the link between land use and climate change has received significant attention since 1997, when peat fires associated with land clearing in Indonesia increased [illegible]mospheric CO_2 enrichment by 13–40% over global annual [illegible]ssil fuel emissions[11]. This importance has prompted calls to [illegible] international climate [illegible][13].

Overlooked in this discussion are mangrove forests, which occur along the coasts of most major oceans in 118 countries, adding ~30–35% to the global area of tropical wetland forest over peat swamps alone[4,6,12]. Renowned for an array of ecosystem services, including fisheries and fibre production, sediment regulation, and storm/tsunami protection[2-4], mangroves are nevertheless declining rapidly as a result of land clearing, aquaculture expansion, overharvesting, and development[2-6]. A 30–50% areal decline over the past half-century[1-3] has prompted estimates that mangroves may functionally disappear in as little as 100 years (refs 1,2). Rapid twenty-first century sea-level rise has also been cited as a primary threat to mangroves[14], which have responded to past sea-level changes by migrating landward or upward[15].

Although mangroves are well known for high C assimilation and flux rates[16-22], data are surprisingly lacking on whole-ecosystem carbon storage—the amount which stands to be released with land-use conversion. Limited components of C storage have been reported, most notably tree biomass[17,18], but evidence of deep organic-rich soils[22-25] suggests these estimates miss the vast majority of total ecosystem carbon. Mangrove soils consist of a variably thick, tidally submerged suboxic layer (variously called 'peat' or 'muck') supporting anaerobic decomposition pathways and having moderate to high C concentration[16,20,21]. Below-ground C storage in mangrove soils is difficult to quantify[5,21] and is not a simple function of measured flux rates—it also integrates thousands of years of variable deposition, transformation, and erosion dynamics associated with fluctuating sea levels and episodic disturbances[15]. No studies so far have integrated the necessary measurements for total mangrove C storage across broad geographic domains.

In this study we quantified whole-ecosystem C storage in mangroves across a broad tract of the Indo-Pacific region, the geographic core of mangrove area (~40% globally) and diversity[4,6]. Study sites [illegible]mprised wide variation in stand composition and stature [illegible]g. 1, Supplementary Table S1), spanning 30° of la[illegible] 73° of longitude (90°–163° E), and inclu[illegible]esia (Kosrae); western Micronesia (Yap [illegible]), [illegible]lawesi, Java, Borneo (Indonesia); and the Sundar[illegible] [illegible]maputra Delta, Bangladesh). Along transects running inland from the seaward edge, we combined established biometric techniques with soil coring to assess variations in above- and below-ground C pools as a function of distance from the seaward edge in two major geomorphic settings: estuarine/river-delta and oceanic/fringe. Estuarine mangroves ($n = 10$) were situated on large alluvial deltas, often with a protected lagoon; oceanic mangroves ($n = 15$) were situated in

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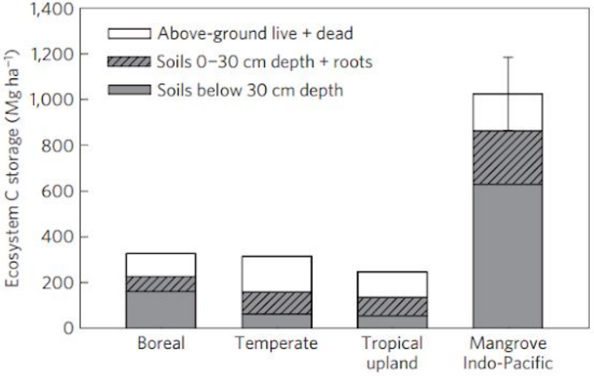

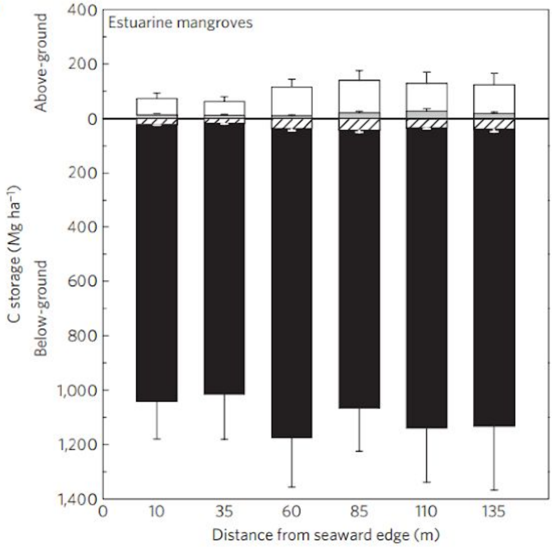





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