Supplementary Table 2 | Africa's mangrove canopy height, aboveground biomass (AGB), and carbon estimates based on region-specific allometric equations.

	Country	Max height (m)	Mean height (m)	Max AGB (Mg ha^{-1})	Mean AGB (Mg ha^{-1})	Total AGB (Mg)	Total carbon (Mg)	Total area (ha)
1	Gabon	62.8	23.5	910.5	244.0	33,578,276	61,504,323	137,597
2	Equatorial Guinea	57.7	21.6	800.0	208.6	2,630,892	5,337,399	12,613
3	Cameroon	47.5	22.6	594.5	208.7	41,603,704	84,360,030	199,303
4	Angola	45.8	16.6	562.3	139.7	3,738,534	10,090,736	26,779
5	Cote d'Ivoire	44.1	16.1	530.8	130.4	249,076	708,115	1,911
6	Liberia	37.3	13.2	411.1	97.0	724,245	2,599,351	7,465
7	Nigeria	33.9	13.4	355.3	96.5	66,791,716	240,715,439	691,986
8	Comoros	32.2	19.2	658.0	246.7	26,858	48,867	109
9	Democratic Rep. of Congo	30.5	10.9	302.4	68.8	1,396,076	6,684,097	20,304
10	Ghana	28.8	9.4	277.1	59.8	689,229	3,724,126	11,523
11	Sierra Leone	28.8	11.3	277.1	74.7	11,701,745	52,204,468	156,682
12	South Africa	28.8	14.9	519.2	160.9	226,963	551,950	1,411
13	Tanzania	28.8	16.4	519.2	182.0	17,214,904	38,347,862	94,628
14	Madagascar	27.2	14.6	456.3	146.8	39,610,740	102,656,269	268,686
15	Mayotte	25.5	15.3	397.7	152.1	78,149	197,952	514
16	Europa Island	23.8	16.5	343.4	166.5	96,445	228,726	579
17	Reunion and Mauritius	23.8	8.3	343.4	65.7	2,107	10,497	32
18	Guinea	22.1	10.2	183.9	60.4	14,682,286	78,699,556	243,227
19	Seychelles	22.1	13.3	293.3	114.4	124,380	391,309	1,087
20	Togo	22.1	6.8	183.9	39.3	4,894	38,560	125
21	Djibouti	20.4	11.3	269.2	93.4	50,933	188,495	545
22	Guinea Bissau	20.4	11.8	162.7	71.6	24,783,942	114,576,720	346,015
23	Kenya	20.4	8.8	247.3	55.3	1,789,149	10,363,775	32,373
24	Mozambique	20.4	10.6	247.3	73.9	23,639,760	106,169,069	319,023
25	Gambia	18.7	8.1	142.4	42.0	2,932,013	21,735,458	69,842
26	Egypt	17.0	6.6	186.7	45.1	9,502	66,810	214
27	Eritrea	15.3	8.2	151.1	53.1	307,640	1,847,310	5,797
28	Somalia	15.3	6.3	134.0	30.7	78,608	777,134	2,559
29	Senegal	13.6	6.2	87.5	28.4	4,587,751	48,735,342	161,316
30	Mauritania	10.2	6.2	56.3	29.2	814	8,450	28
31	Benin	8.5	3.0	42.6	10.0	47,369	1,370,222	4,729
32	Soudan	8.5	3.4	46.5	11.0	3,551	93,902	323
33	Congo	0.8	1.0	1.3	1.3	445	100,260	353

Supplementary Table 3 | Oceania's mangrove canopy height, aboveground biomass (AGB), and carbon estimates based on region-specific allometric equations.

	Country	Max height (m)	Mean height (m)	Max AGB (Mg ha^{-1})	Mean AGB (Mg ha^{-1})	Total AGB (Mg)	Total Carbon (Mg)	Total area (ha)
1	Papua New Guinea	45.8	27.7	432.5	242.4	113,948,576	209,577,515	469,983
2	Micronesia	40.7	21.6	366.4	189.0	1,839,511	3,990,518	9,733
3	New Zealand	30.5	12.3	257.3	118.6	3,669,821	11,229,992	30,968
4	Australia	25.5	11.9	212.6	119.4	112,797,816	342,085,251	940,941
5	Hawaii	25.5	10.6	122.6	35.6	25,154	216,808	706
6	Palau*	25.5	16.4	212.6	149.4	601,312	1,543,040	4,025
7	Solomon Islands*	25.5	14.2	212.6	136.0	4,268,817	11,753,573	31,396
8	Vanuatu	25.5	12.1	212.6	120.3	163,396	494,188	1,358
9	Wallis and Futuna	25.5	12.8	212.6	124.7	1,717	5,052	14
10	Samoa*	23.8	13.0	199.0	127.2	36,766	106,538	289
11	French Polynesia	22.8	18.5	191.7	161.7	176	425	1
12	Fiji*	22.1	5.5	185.9	83.5	8,344,792	33,924,129	100,058
13	Northern Mariana Islands*	21.9	14.6	184.6	133.1	98	273	1
14	New Caledonia	18.7	8.0	161.5	92.1	2,198,955	8,233,948	23,874
15	Tuvalu	17.0	4.5	150.0	76.8	585	2,549	8
16	Tonga	13.6	7.0	128.5	89.9	69,344	264,770	771
17	Kiribati	0.8	0.8	57.4	57.4	980	5,490	17
18	Marshall islands	0.8	0.8	57.4	57.4	60	334	1

*Maximum canopy height could not be accurately measured due to misclassification of mangrove extent.

Supplementary Table 4 | Asia's mangrove canopy height, aboveground biomass (AGB), and carbon estimates based on region-specific allometric equations.

	Country	Max height (m)	Mean height (m)	Max AGB (Mg ha^{-1})	Mean AGB (Mg ha^{-1})	Total AGB (Mg)	Total carbon (Mg)	Total area (ha)
1	Indonesia	44.1	24.3	409.5	215.3	574,318,208	1,140,797,712	2,667,356
2	Brunei	39.0	28.4	346.2	241.1	2,624,305	4,843,908	10,885
3	Malaysia	33.9	19.9	290.6	172.9	95,561,040	220,641,786	552,741
4	Singapore	33.9	16.7	290.6	152.0	86,206	218,443	567
5	Myanmar	30.5	13.7	257.3	130.7	61,974,552	175,266,415	472,156
6	Andaman and Nicobar*	25.5	16.1	421.2	192.7	9,023,870	19,319,468	46,839
7	Bangladesh	25.5	15.4	421.2	171.7	73,916,552	171,532,878	430,607
8	Timor Leste*	25.5	21.3	212.6	180.8	6,423	14,369	36
9	Philipines	23.8	10.4	199.0	110.3	27,886,714	90,271,662	252,763
10	Japan*	22.1	13.3	185.9	127.4	100,112	289,565	785
11	Thailand	22.1	13.4	185.9	126.0	30,703,280	89,541,480	243,495
12	Cambodia	20.4	9.8	173.4	107.1	5,040,616	16,706,995	47,066
13	Taiwan	18.7	8.0	161.5	96.4	12,994	46,890	135
14	Hong Kong	17.0	5.7	150.0	80.9	46,635	194,432	576
15	China	15.3	5.6	139.0	81.8	1,266,828	5,243,015	15,518
16	Macau	15.3	8.3	139.0	98.6	477	1,689	5
17	Sri Lanka	15.3	7.6	151.1	43.4	989,212	7,118,467	22,805
18	Vietnam	15.3	6.4	139.0	87.0	17,462,792	68,489,813	200,548
19	India	13.6	7.3	119.3	41.1	13,331,113	100,688,547	324,135
20	Pakistan	8.5	5.0	46.5	17.9	961,184	15,842,946	53,700

*Maximum canopy height could not be accurately measured due to misclassification of mangrove extent.

Supplementary Table 5 | Americas' mangrove canopy height, aboveground biomass (AGB), and carbon estimates based on region-specific allometric equations.

	Country	Max height (m)	Mean height (m)	Max AGB (Mg ha^{-1})	Mean AGB (Mg ha^{-1})	Total AGB (Mg)	Total carbon (Mg)	Total area (ha)
1	Colombia	54.3	24.0	413.3	129.5	26,648,548	75,973,344	205,179
2	Venezuela	52.6	30.7	392.8	184.0	45,505,364	100,551,457	247,252
3	Panama	50.9	27.7	372.6	155.6	23,676,218	58,979,743	152,189
4	French Guyana	49.2	23.2	352.9	129.2	10,290,431	29,453,310	79,640
5	Costa Rica	45.8	23.4	314.7	116.4	4,512,007	13,998,836	38,752
6	Guyana	42.4	24.5	278.2	127.8	2,806,631	8,105,363	21,976
7	Brazil	40.7	19.9	260.5	92.5	97,833,808	363,245,344	1,051,244
8	Ecuador	40.7	19.4	260.5	88.2	11,611,429	45,065,625	131,671
9	Guatemala	40.7	24.2	260.5	120.2	4,142,346	12,548,011	34,503
10	Suriname	40.7	17.3	260.5	80.7	6,937,571	29,000,268	86,001
11	El Salvador	39.0	18.0	243.3	75.9	2,550,341	11,216,253	33,578
12	Saint Lucia	32.2	17.7	179.1	71.6	9,892	45,725	138
13	Trinidad and Tobago	32.2	19.5	179.1	84.3	532,507	2,144,539	6,313
14	Honduras	30.5	16.9	164.2	68.0	4,519,796	21,857,392	66,502
15	US Virgin Islands	30.5	13.6	164.2	47.1	8,510	56,878	181
16	Nicaragua	28.8	14.7	149.9	55.1	4,017,509	23,354,504	72,985
17	Barbados	27.2	15.6	136.0	58.6	2,094	11,514	36
18	Dominican Republic	27.2	12.9	136.0	45.3	801,214	5,543,970	17,687
19	Martinique	27.2	14.9	136.0	54.6	58,613	343,171	1,073
20	Mexico	27.2	11.1	136.0	37.9	26,388,806	212,888,568	689,596
21	Anguilla*	25.5	8.3	122.6	29.4	56	574	2
22	Grenada	25.5	16.1	122.6	61.1	12,704	67,394	208
23	Jamaica	25.5	10.6	122.6	35.6	325,390	2,806,067	9,143
24	Saint Vincent and the Grenadines*	23.8	11.7	109.8	40.7	1,642	12,536	40
25	Belize	22.1	8.8	97.5	26.0	1,447,931	16,717,298	55,634
26	Cuba	22.1	9.9	97.5	30.2	12,797,064	128,397,896	423,316
27	Peru	22.1	12.1	97.5	40.1	162,545	1,256,800	4,055
28	Saint Kitts and Nevis	22.1	9.9	97.5	31.6	1,637	15,732	52
29	United States (continental)	22.1	10.6	97.5	33.3	7,666,705	70,281,607	230,140
30	Guadeloupe	20.4	11.0	85.7	34.1	101,593	911,443	2,979
31	Cayman Islands	18.7	11.2	74.6	34.3	259,153	2,309,178	7,544
32	Aruba	17.0	7.2	64.0	20.2	1,956	28,741	97
33	British Virgin Islands	17.0	5.8	64.0	14.2	1,090	22,465	77
34	Puerto Rico	17.0	8.2	64.0	21.8	170,687	2,333,429	7,840
35	Antigua and Barbuda	15.3	9.1	54.0	25.2	22,607	269,102	897
36	Bahamas	13.6	5.8	44.7	13.3	1,016,952	22,295,189	76,367
37	Haiti	13.6	7.5	44.7	18.0	261,748	4,280,545	14,504
38	Turks and Caicos Islands	10.2	6.9	28.2	15.4	262,418	4,992,163	17,017

*Maximum canopy height could not be accurately measured due to misclassification of mangrove extent.

Supplementary Table 6 | Middle East's mangrove canopy height, aboveground biomass (AGB), and carbon estimates based on region-specific allometric equations.

	Country	Max height (m)	Mean height (m)	Max AGB (Mg ha^{-1})	Mean AGB (Mg ha^{-1})	Total AGB (Mg)	Total carbon (Mg)	Total area (ha)
1	Oman	17.0	6.1	186.7	33.7	7,825	70,433	230
2	Iran	11.9	5.5	91.3	24.4	300,787	3,692,116	12,332
3	Saudi Arabia	11.9	3.9	91.3	16.2	109,564	1,941,001	6,599
4	Yemen	11.9	7.4	91.3	35.2	36,737	319,725	1,043
5	Qatar	10.2	4.7	67.0	18.0	6,892	112,853	382
6	United Arab Emirates	10.2	3.7	67.0	11.9	140,746	3,435,388	11,805
7	Bahrain	6.8	2.0	29.7	4.5	328	20,902	73

Supplementary Table 7 | Results from the multivariate ordinary least squares regression between the SRTM H_{max} and annual precipitation, temperature and tropical cyclone landfall frequency at every 1-degree latitude. Sample size n = 61; adjusted R^2 = 0.74, VIF: variance inflation factor.

	Coefficient	p- value	standard error	95% Confidence Interval	VIF scores
Annual Precipitation (mm)	0.0068	<0.001	0.002	0.004 to 0.010	1.97349
Mean Temperature (°C)	0.2424	<0.001	0.039	0.164 to 0.321	1.87399
Tropical Cyclone Landfall Frequency	-0.001	<0.05	0.000	-0.002 to 0	1.41523

Supplementary Table 8 | Aboveground biomass calibration models. Where $H_{ba} = 1.0754 \times H_{SRTM}$, $H_{max} = 1.697 \times H_{SRTM}$ (with ICESat RH100), $H_{CHM} = 2.7191 \times H_{SRTM}^{0.676}$.

Allometric model	R^2	RMSE (Mg ha^{-1})	Allometry name	Region Covered by Model
$AGB = 3.254 \times H_{ba}^{1.5295}$	0.55	134.3	Global generic power	Global
$AGB = 1.066 \times H_{ba}^{2.1295}$	0.84	72.0	East Africa generic power	Somalia to South Africa
$AGB = 1.418 \times H_{ba}^{1.6038}$	0.71	54.3	Americas generic power	North, Central and South America
$AGB = 1.589 \times H_{ba}^{2.0067}$	0.46	103.4	Middle East Asia generic power	Djibouti to Bangladesh
$AGB = \exp(3.9042+0.0858 \times H_{CHM})$	0.55	148.0	South East Asia generic power[2]	Myenmar to Hawaii
$AGB = 2.572 \times H_{max}^{1.5191}$	0.70	180.0	Global Hmax power	Global
$AGB = 0.440 \times H_{max}^{2.1578}$	0.85	66	East Africa Hmax power	Somalia to South Africa
$AGB = 0.745 \times H_{max}^{1.6228}$	0.70	65	Americas Hmax power	North, Central and South America

Supplementary Table 9 | Comparison of this sudy with published global estimates of mangrove aboveveground biomass (AGB), belowground biomass (BGB) and carbon (C).

Study	AGB (Pg)	BGB (Pg)	Total biomass (Pg)	Soil C (Pg)	Total C (Pg)	Soil C depth (m)	Mangrove cover map used	Year of estimate
Hutchison et al. (2014)[7]	2.83	1.11	-	-	-	-	World Atlas of Mangroves (Spalding et al. 2010)[8]	1999-2003
Twilley et al. (1992)[9]	2.34	1.69	4.03	-	-	-	World Resources (1986) (see ref. [9])	1986
Sanders et al. (2016)[10]	1.6	-	-	9.6	11.2	2	Giri et al. (2011)[11]	2000
Sanderman et al. (2018)[12]	-	-	-	6.4, resp. 12.6	-	1, resp. 2	Giri et al. (2011)[11]	2000
Hamilton & Friess (2018)[13]	0.82	0.41	-	2.96	4.19	1	Hamilton and Casey (2016)[14]	2012
Atwood et al. (2017)[15]	1.8	-	-	2.6	4.4	1	Hamilton and Casey (2016)[14]	2012
Jardine & Siikamäki (2014)[16]	-	-	-	5.00 ± 0.94		1	Giri et al. (2011)[11]	2000
Siikamäki et al. (2012)[17]	-	-	2.1	4.4	6.5	-	Giri et al. (2011)[11]	2000
Tang et al. (2018)[18]	1.908	0.725	2.633	-	1.32	-	World Atlas of Mangroves (Spalding et al. 2010)[8]	2000
Donato et al. (2011)[19]	data from various sources	data from various sources	data from various sources	data from various sources	4 to 20	-	FAO (2007)[20] & Giri et al. (2011)[11]	
Rovai et al. (2018)[21]	-	-	-	2.26	-	-	Hamilton and Casey (2016)[14]	
This study	**1.75 ± 0.77**	**0.84 ± 0.377**	**1.72**	**3.6**	**5.03**	**1**	**Giri et al. (2011)[11]**	**2000**

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