

Supporting Information for
Sustained biomass carbon sequestration by China's forests from 2010 to
2050

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This file contains Table S1–S5, and references.

Table S1. Classification of forest ages for different forest types in China (modified from Xiao (2005)).

Forest type	Region ^a	Origin	Age class (years)					Age span (years)
			Young	Middle-aged	Premature	Mature	Overmature	
<i>Cypress</i> , Mixed conifer-broadleaf forest, <i>Picea</i> , <i>Pinus koraiensis</i> , <i>Tsuga chinensis</i>	North	Natural	≤60	61–100	101–120	121–160	≥161	20
	North	Planted	≤40	41–60	61–80	81–120	≥121	20
	South	Natural	≤40	41–60	61–80	81–120	≥121	20
	South	Planted	≤20	21–40	41–60	61–80	≥81	20
<i>Abies</i> , <i>Larix</i> , Mixed coniferous forest, <i>Pinus densifolia</i> , <i>Pinus sylvestris</i> , <i>Pinus thunbergii</i>	North	Natural	≤40	41–80	81–100	101–140	≥141	20
	North	Planted	≤20	21–30	31–40	41–60	≥61	10
	South	Natural	≤40	41–60	61–80	81–120	≥121	20
	South	Planted	≤20	21–30	31–40	41–60	≥61	10
<i>Pinus armandi</i> , <i>Pinus densata</i> , <i>Pinus kisiya</i> , <i>Pinus massoniana</i> , <i>Pinus tabulaeformis</i> , <i>Pinus taeda</i> , <i>Pinus yunnanensis</i>	North	Natural	≤30	31–50	51–60	61–80	≥81	10
	North	Planted	≤20	21–30	31–40	41–60	≥61	10
	South	Natural	≤20	21–30	31–40	41–60	≥61	10
	South	Planted	≤10	11–20	21–30	31–50	≥51	10
<i>Casuarina</i> , <i>Eucalyptus</i> , <i>Populus</i> , <i>Sassafras</i> , softwoods	North	Planted	≤10	11–15	16–20	21–30	≥31	5
	South	Planted	≤5	6–10	11–15	16–25	≥26	5
<i>Acacia</i> , <i>Acer</i> , <i>Betula</i> , <i>Davidia</i> , <i>Ulmus</i>	North	Natural	≤30	31–50	51–60	61–80	≥81	10
	North	Planted	≤20	21–30	31–40	41–60	≥61	10
	South	Natural	≤20	21–40	41–50	51–70	≥71	10
	South	Planted	≤10	11–20	21–30	31–50	≥51	10
<i>Cinnamomum</i> , <i>Fraxinus</i> , Hardwoods, <i>Juglans</i> , Mixed broadleaf forest, <i>Phellodendron</i> , <i>Phoebe</i> , <i>Quercus</i> , <i>Tilia</i>	North & South	Natural	≤40	41–60	61–80	81–120	≥121	20
	North & South	Planted	≤20	21–40	41–50	51–70	>71	10
<i>Cunninghamia lanceolata</i> , <i>Cryptomeria fortunei</i> , <i>Keteleeria</i> , <i>Metasequoia glyptostroboides</i> , tropical forests	South	Planted	≤10	11–20	21–25	26–35	>36	5

^aNorth China here includes the provinces of Liaoning, Jilin, Heilongjiang, Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, Shandong, Henan, Shannxi, Gansu, Qinghai, Ningxia, and Xinjiang. South China includes Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Tibet, and Yunnan.

Table S2. Projected forest area by 2050 in China.

Year	Coverage (%)	Area (10 ⁴ ha)		
		Total forests	Forest stands	Newly planted forests
2010	21.4	20555.91	16460.35	
2020	23.5	22528.90	18040.24	1579.89
2030	25.5	24503.30	19621.26	1581.02
2040	26.9	25865.00	20711.66	1090.39
2050	28.4	27226.60	21801.97	1090.31

Total forest area was obtained from the forest coverage plan and total land area of China (960.27×10^6 ha). We subtracted the area of special shrubs and forests in Hong Kong, Macao, and Taiwan from the total forest area. Coverage data are from China Forestry Sustainable Development Strategy Research Group (2002). Data in 2010 are based on the national forest inventory period of 2009–2013.

Table S3. Projected area of newly planted forests of different forest types during the period of 2010–2050 in China.

Forest type	Existing forest		Area of newly planted forest (10 ⁴ ha)			
	Area (10 ⁴ ha)	Proportion (%)	2020	2030	2040	2050
<i>Abies, Picea</i>	734.79	0.87	13.80	27.60	37.12	46.64
<i>Acacia</i>	21.1	0.43	6.76	13.52	18.19	22.86
<i>Acer, Tilia, Ulmus</i>	66.71	0.86	13.64	27.28	36.70	46.11
<i>Betula</i>	1126.34	0.30	4.73	9.47	12.74	16.00
<i>Casuarina</i>	5.4	0.11	1.73	3.47	4.66	5.86
<i>Cinnamomum, Phoebe</i>	30.63	0.30	4.80	9.60	12.91	16.22
<i>Cryptomeria fortunei, Keteleeria, Tsuga chinensis</i>	95.77	1.00	15.78	31.57	42.46	53.35
<i>Cunninghamia lanceolata</i>	1096.36	19.01	300.29	600.79	808.04	1015.27
<i>Cypress</i>	365.85	3.11	49.08	98.19	132.07	165.94
<i>Davidia</i>	18.17	0.34	5.29	10.59	14.24	17.90
<i>Eucalyptus</i>	445.52	9.47	149.54	299.18	402.39	505.59
<i>Fraxinus, Juglans, Phellodendron</i>	37.91	0.05	0.77	1.53	2.06	2.59
Hardwoods, Softwoods	1236.06	8.49	134.20	268.50	361.12	453.74
<i>Larix</i>	1069.46	6.66	105.29	210.66	283.32	355.99
<i>Metasequoia glyptostroboides</i>	8.17	0.16	2.50	5.00	6.73	8.45
Mixed broadleaf forest	3588.86	2.73	43.15	86.33	116.11	145.88
Mixed conifer-broadleaf forest	1029.1	5.16	81.45	162.96	219.17	275.38
Mixed coniferous forest	681.89	7.57	119.60	239.29	321.84	404.38
<i>Pinus armandi</i>	83.72	1.15	18.15	36.31	48.84	61.36
<i>Pinus densata</i>	170.44	0.12	1.86	3.73	5.01	6.30
<i>Pinus densifolia, Pinus sylvestris</i>	89.45	0.99	15.67	31.36	42.18	53.00
<i>Pinus kisiya, Pinus yunnanensis</i>	511.33	1.17	18.50	37.01	49.78	62.54
<i>Pinus koraiensis</i>	35.37	0.58	9.14	18.29	24.60	30.91
<i>Pinus massoniana</i>	1000.63	6.51	102.78	205.63	276.57	347.50
<i>Pinus tabulaeformis</i>	251.33	3.42	53.99	108.01	145.27	182.53
<i>Pinus taeda</i>	4.64	0.10	1.56	3.12	4.19	5.27
<i>Populus</i>	997.26	18.14	286.59	573.38	771.18	968.96
<i>Quercus</i>	1656.32	1.19	18.75	37.52	50.46	63.40
<i>Sassafras</i>	1.53	0.03	0.51	1.03	1.38	1.74
Tropical forests	0.24	0.00	0.00	0.00	0.00	0.00
Total	16460.35	100.00	1579.89	3160.91	4251.31	5341.62

The area proportion of existing planted forests was obtained from the national forest inventory data of 2009–2013.

The newly planted forest area from 2010 to 2050 in China was allocated into different forest types based on the present area proportion of planted forests.

Table S4. Projected forest area, biomass carbon stock, carbon density, and BCS for five different age classes between 2010 and 2050 in six regions of China.

Age classes	Area (10 ⁴ ha)					Carbon stock (Tg C)					Carbon density (Mg C ha ⁻¹)					BCS (Tg C year ⁻¹)				
	2010	2020	2030	2040	2050	2010	2020	2030	2040	2050	2010	2020	2030	2040	2050	2010	2020	2030	2040	2050
Young	928.21	1060.29	1192.46	1283.62	1374.77	233.59	471.47	694.09	879.78	1037.49	25.17	44.47	58.21	68.54	75.47	7.73	23.79	22.26	18.57	15.77
Middle-aged	905.60	1024.29	1143.07	1224.99	1306.90	332.47	465.35	581.70	664.94	737.74	36.71	45.43	50.89	54.28	56.45	4.48	13.29	11.64	8.32	7.28
Premature	318.08	380.00	441.96	484.69	527.42	134.94	183.65	228.05	259.39	288.67	42.42	48.33	51.60	53.52	54.73	6.18	4.87	4.44	3.13	2.93
Mature	207.85	247.47	287.11	314.45	341.79	101.33	126.64	150.83	168.25	185.07	48.75	51.17	52.53	53.50	54.15	7.66	2.53	2.42	1.74	1.68
Overmature	29.62	35.81	42.00	46.27	50.55	17.80	21.27	25.69	29.12	32.57	60.11	59.40	61.15	62.93	64.44	1.01	0.35	0.44	0.34	0.34
East region	2389.36	2747.85	3106.61	3354.03	3601.43	820.13	1268.38	1680.35	2001.47	2281.55	34.32	46.16	54.09	59.67	63.35	27.06	44.82	41.20	32.11	28.01
Young	636.73	716.98	797.30	852.68	908.07	102.55	256.82	449.63	567.44	670.68	16.11	35.82	56.39	66.55	73.86	0.26	15.43	19.28	11.78	10.32
Middle-aged	776.57	822.54	868.54	900.26	931.99	263.81	325.35	378.57	422.11	464.20	33.97	39.55	43.59	46.89	49.81	5.08	6.15	5.32	4.35	4.21
Premature	364.17	384.95	405.75	420.10	434.44	160.05	184.93	207.77	227.47	246.18	43.95	48.04	51.21	54.15	56.67	6.48	2.49	2.28	1.97	1.87
Mature	341.99	368.06	394.15	412.14	430.13	154.74	172.61	190.25	205.32	219.58	45.25	46.90	48.27	49.82	51.05	7.61	1.79	1.76	1.51	1.43
Overmature	165.47	181.39	197.31	208.30	219.28	72.04	78.34	84.92	90.27	95.32	43.53	43.19	43.04	43.34	43.47	2.34	0.63	0.66	0.53	0.51
North region	2284.93	2473.92	2663.05	2793.48	2923.91	753.17	1018.05	1311.14	1512.61	1695.96	32.96	41.15	49.23	54.15	58.00	21.77	26.49	29.31	20.15	18.34
Young	816.16	905.12	994.15	1055.55	1116.95	206.82	431.41	716.85	927.17	1101.83	25.34	47.66	72.11	87.84	98.65	-1.12	22.46	28.54	21.03	17.47
Middle-aged	1110.93	1156.50	1202.11	1233.57	1265.02	501.92	602.45	681.59	737.68	783.80	45.18	52.09	56.70	59.80	61.96	-0.55	10.05	7.91	5.61	4.61
Premature	608.63	636.63	664.66	683.98	703.31	356.56	397.84	429.29	450.72	468.81	58.58	62.49	64.59	65.90	66.66	9.41	4.13	3.15	2.14	1.81
Mature	403.37	426.63	449.90	465.95	482.00	255.14	271.80	287.23	298.17	308.54	63.25	63.71	63.84	63.99	64.01	8.85	1.67	1.54	1.09	1.04
Overmature	153.65	161.37	169.09	174.41	179.74	96.68	100.83	104.97	107.91	110.81	62.92	62.48	62.08	61.87	61.65	4.19	0.42	0.41	0.29	0.29
Northeast region	3092.74	3286.26	3479.91	3613.47	3747.02	1417.12	1804.33	2219.93	2521.65	2773.80	45.82	54.91	63.79	69.78	74.03	20.77	38.72	41.56	30.17	25.21
Young	300.89	347.02	393.18	425.02	456.85	58.06	127.68	226.48	296.64	364.96	19.30	36.79	57.60	69.80	79.89	2.69	6.96	9.88	7.02	6.83
Middle-aged	312.28	337.16	362.06	379.23	396.41	118.39	168.59	214.41	253.09	291.76	37.91	50.00	59.22	66.74	73.60	2.83	5.02	4.58	3.87	3.87
Premature	180.34	185.19	190.05	193.40	196.75	91.95	110.77	128.11	143.74	158.65	50.99	59.81	67.41	74.32	80.63	-0.15	1.88	1.73	1.56	1.49
Mature	194.35	199.85	205.35	209.14	212.94	110.15	121.97	133.97	144.57	154.48	56.67	61.03	65.24	69.12	72.55	3.27	1.18	1.20	1.06	0.99
Overmature	131.48	134.22	136.96	138.85	140.74	82.03	85.71	90.57	94.74	98.45	62.39	63.86	66.13	68.23	69.95	1.82	0.37	0.49	0.42	0.37

Northwest region	1119.34	1203.44	1287.60	1345.64	1403.68	460.58	614.71	793.54	932.78	1068.30	41.15	51.08	61.63	69.32	76.11	10.45	15.41	17.88	13.92	13.55
Young	1593.43	1790.36	1987.43	2123.34	2259.25	382.30	661.90	972.96	1235.06	1468.84	23.99	36.97	48.96	58.17	65.01	9.95	27.96	31.11	26.21	23.38
Middle-aged	1114.00	1291.17	1468.47	1590.75	1713.02	377.35	549.02	714.49	838.09	947.35	33.87	42.52	48.66	52.69	55.30	5.19	17.17	16.55	12.36	10.93
Premature	362.56	433.09	503.66	552.34	601.01	144.68	195.60	245.11	281.73	315.67	39.91	45.16	48.67	51.01	52.52	6.76	5.09	4.95	3.66	3.39
Mature	215.98	263.42	310.90	343.64	376.38	93.88	120.89	147.79	167.98	187.69	43.47	45.89	47.54	48.88	49.87	2.88	2.70	2.69	2.02	1.97
Overmature	39.16	49.15	59.14	66.03	72.92	19.43	24.44	29.74	33.77	37.83	49.63	49.72	50.28	51.14	51.87	0.57	0.50	0.53	0.40	0.41
South region	3325.13	3827.19	4329.60	4676.10	5022.58	1017.65	1551.84	2110.09	2556.62	2957.37	30.60	40.55	48.74	54.67	58.88	25.36	53.42	55.82	44.65	40.07
Young	1056.41	1138.43	1220.51	1277.11	1333.72	299.55	469.83	665.03	835.05	978.42	28.36	41.27	54.49	65.39	73.36	3.26	17.03	19.52	17.00	14.34
Middle-aged	1092.23	1188.34	1284.53	1350.86	1417.19	436.94	568.11	690.01	790.53	885.82	40.00	47.81	53.72	58.52	62.51	8.01	13.12	12.19	10.05	9.53
Premature	748.98	787.08	825.20	851.49	877.78	454.58	514.91	570.26	615.19	656.44	60.69	65.42	69.11	72.25	74.78	3.58	6.03	5.54	4.49	4.13
Mature	812.73	841.99	871.27	891.47	911.66	674.72	718.44	763.75	801.53	837.05	83.02	85.33	87.66	89.91	91.82	3.87	4.37	4.53	3.78	3.55
Overmature	538.50	545.74	552.99	557.99	562.99	561.88	583.46	609.47	632.62	654.73	104.34	106.91	110.21	113.37	116.30	6.76	2.16	2.60	2.31	2.21
Southwest region	4248.85	4501.58	4754.50	4928.93	5103.35	2427.67	2854.75	3298.52	3674.91	4012.47	57.14	63.42	69.38	74.56	78.62	25.48	42.71	44.38	37.64	33.76

Data in 2010 were estimated from the national forest inventory data of 2009–2013 (Zhang *et al.*, 2015). The negative value indicate a carbon source, and vice versa.

Table S5. Projected forest area, biomass carbon stock and carbon density between 2010 and 2050 in different provinces of China.

Province	Area (10 ⁴ ha)					Carbon stock (Tg C)					Carbon density (Mg C ha ⁻¹)				
	2010	2020	2030	2040	2050	2010	2020	2030	2040	2050	2010	2020	2030	2040	2050
Anhui	291.69	340.31	388.96	422.51	456.06	92.33	140.11	184.82	219.24	250.16	31.65	41.17	47.52	51.89	54.85
Beijing	42.90	50.07	57.24	62.19	67.14	9.62	17.06	26.16	32.87	39.50	22.42	34.07	45.70	52.85	58.84
Chongqing	210.90	232.17	253.45	268.13	282.80	65.33	93.61	122.75	147.42	170.49	30.98	40.32	48.43	54.98	60.29
Fujian	606.72	699.99	793.32	857.69	922.06	281.62	396.19	523.84	623.35	707.22	46.42	56.60	66.03	72.68	76.70
Gansu	247.19	273.64	300.11	318.37	336.63	104.06	139.99	183.36	221.42	261.46	42.10	51.16	61.10	69.55	77.67
Guangdong	714.75	849.19	983.74	1076.53	1169.31	214.30	350.49	496.51	606.01	701.66	29.98	41.27	50.47	56.29	60.01
Guangxi	904.10	1048.08	1192.16	1291.53	1390.90	284.55	456.62	641.58	787.65	916.43	31.47	43.57	53.82	60.99	65.89
Guizhou	478.72	540.52	602.37	645.03	687.68	157.88	230.19	306.35	372.23	434.16	32.98	42.59	50.86	57.71	63.13
Hainan	97.11	112.48	127.85	138.46	149.06	47.64	61.99	77.61	90.46	102.08	49.06	55.11	60.70	65.33	68.48
Hebei	311.01	357.13	403.28	435.11	466.94	69.15	136.25	215.71	268.51	317.25	22.23	38.15	53.49	61.71	67.94
Heilongjiang	1949.70	2030.52	2111.40	2167.18	2222.96	833.99	1037.10	1237.15	1369.15	1474.86	42.78	51.08	58.59	63.18	66.35
Henan	305.36	363.73	422.13	462.42	502.70	91.07	129.50	167.63	199.27	230.05	29.82	35.60	39.71	43.09	45.76
Hubei	572.42	616.45	660.51	690.89	721.28	177.09	247.15	313.37	368.79	418.42	30.94	40.09	47.44	53.38	58.01
Hunan	731.39	837.26	943.21	1016.28	1089.34	203.01	306.09	413.39	504.43	588.74	27.76	36.56	43.83	49.64	54.05
Inner Mongolia	1713.05	1819.27	1925.57	1998.88	2072.19	619.15	778.26	950.55	1068.81	1173.21	36.14	42.78	49.36	53.47	56.62
Jiangsu	125.17	165.41	205.68	233.45	261.23	32.15	84.40	115.82	138.03	160.60	25.69	51.03	56.31	59.13	61.48
Jiangxi	789.91	876.49	963.13	1022.89	1082.64	244.55	354.78	473.98	570.25	648.31	30.96	40.48	49.21	55.75	59.88
Jilin	753.42	804.59	855.80	891.12	926.44	445.50	540.06	641.62	717.10	780.17	59.13	67.12	74.97	80.47	84.21
Liaoning	389.62	451.14	512.71	555.17	597.62	137.63	227.16	341.15	435.41	518.77	35.32	50.35	66.54	78.43	86.81
Ningxia	15.85	19.25	22.65	25.00	27.35	3.75	6.59	8.96	11.25	13.79	23.67	34.23	39.57	45.00	50.43
Qinghai	37.85	39.61	41.37	42.58	43.80	17.05	20.62	24.14	26.90	29.58	45.04	52.05	58.36	63.17	67.54
Shandong	161.44	212.24	263.08	298.15	333.21	43.98	118.79	158.65	188.24	219.07	27.24	55.97	60.30	63.14	65.75
Shanghai	4.36	5.82	7.29	8.30	9.31	1.24	2.64	4.38	5.92	7.52	28.47	45.37	60.08	71.33	80.82

Shannxi	639.26	679.07	718.92	746.40	773.87	216.48	268.81	329.24	385.08	440.77	33.86	39.58	45.80	51.59	56.96
Shanxi	210.45	237.61	264.78	283.53	302.27	53.37	81.46	111.87	134.05	155.97	25.36	34.28	42.25	47.28	51.60
Sichuan	1183.75	1286.27	1388.86	1459.61	1530.36	625.42	739.54	866.89	976.38	1082.65	52.83	57.49	62.42	66.89	70.74
Tianjin	7.52	9.84	12.17	13.77	15.37	1.89	5.02	6.85	8.36	10.04	25.08	50.95	56.32	60.74	65.28
Tibet	848.53	849.97	851.40	852.40	853.39	790.98	833.00	868.38	897.74	922.94	93.22	98.00	101.99	105.32	108.15
Xinjiang	179.19	191.86	204.55	213.29	222.04	119.23	178.71	247.83	288.14	322.70	66.54	93.14	121.16	135.09	145.33
Yunnan	1526.95	1592.66	1658.42	1703.77	1749.12	788.06	958.41	1134.16	1281.14	1402.22	51.61	60.18	68.39	75.19	80.17
Zhejiang	410.07	447.59	485.14	511.04	536.93	124.26	171.46	218.86	256.44	288.67	30.30	38.31	45.11	50.18	53.76

Data in 2010 were estimated from the national forest inventory data of 2009–2013 (Zhang *et al.*, 2015).

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