研究資料（Research record）

Dataset of soil carbon stock in Cambodian forests

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Abstract

Knowledge of the spatial distribution of the soil carbon stock is essential for assessing the productivity, sustainability, and carbon sequestration capacity of agricultural and forested land. To contribute to the development and improvement of soil carbon models of tropical forest regions, we have collected soil carbon data in Cambodian forests since 2002 to facilitate several research projects conducted by the Forestry and Forest Products Research Institute. Our dataset contains meta-data for 66 sites (site data) and data for 309 soil horizons (soil profile data). The data for 36 sites are newly described herein, while the data for the other 30 sites are derived from the synthesis of published documents.

Keywords: Cambodia, forest soil, soil carbon stock

1. Introduction

The spatial distribution of the soil carbon stock is essential for assessing the productivity, sustainability, and carbon sequestration capacity of agricultural and forested land. Recently, the Food and Agriculture Organization of the United Nations released a high-resolution global map of the soil carbon stock (FAO 2017). However, the soil carbon model used for mapping has not been validated sufficiently, especially in tropical forests, due to a lack of validation data. Since 2002, a research group at the Forestry and Forest Products Research Institute (FFPRI) has studied Cambodian forest soil to facilitate several research projects. Here, we release these soil carbon data for enhancing public access, and to contribute to the development and improvement of soil carbon models.

2. Materials and method

The dataset contains meta-data for 66 sites (site data; Table 1) and data for 309 soil horizons (soil profile data; Table 2). The data for 36 sites are newly described herein, while the data for the other 30 sites were derived from the synthesis of published data (see *Remarks* in Table 1), with the addition of new information such as the location and time period of the soil survey.

2.1 Study site

All of the published soil samples for the dataset were collected at less disturbed forest sites, except for sites in rubber plantations and shrubland. The 66 sites cover evergreen forests (n = 33), deciduous forests (n = 25), rubber plantations (n = 6), a shrubland (n = 1), and an inland swamp forest (n = 1) (see *Forest* in Table 1). The study sites where deciduous tree species are exclusively distributed are classified as deciduous forest, and those containing evergreen tree species as evergreen forest. The soil surveys were conducted from March 2003 to November 2011 (*Period* in Table 1). The positions of the study sites were recorded by GPS devices (e.g. 60CSx, Garmin, USA) and are denoted in the dataset using hddd.ddd° and the WGS84 coordination system (*Lat* and *Lon* in Table 1).

2.2 Soil sampling

Soil was sampled using two approaches: Category I and Category II (*Category* in Table 1). Category I obtained one replicate of a representative soil profile to a soil depth exceeding 30 cm. The location of the representative soil profile was determined after considering the typical topography and composition of tree species in the study area. The data in Category II are based on four replicates in the study plot, and for soil depths up to 30 cm (0–5, 5–15, and 15–30 cm). In both categories, two types of soil samples were

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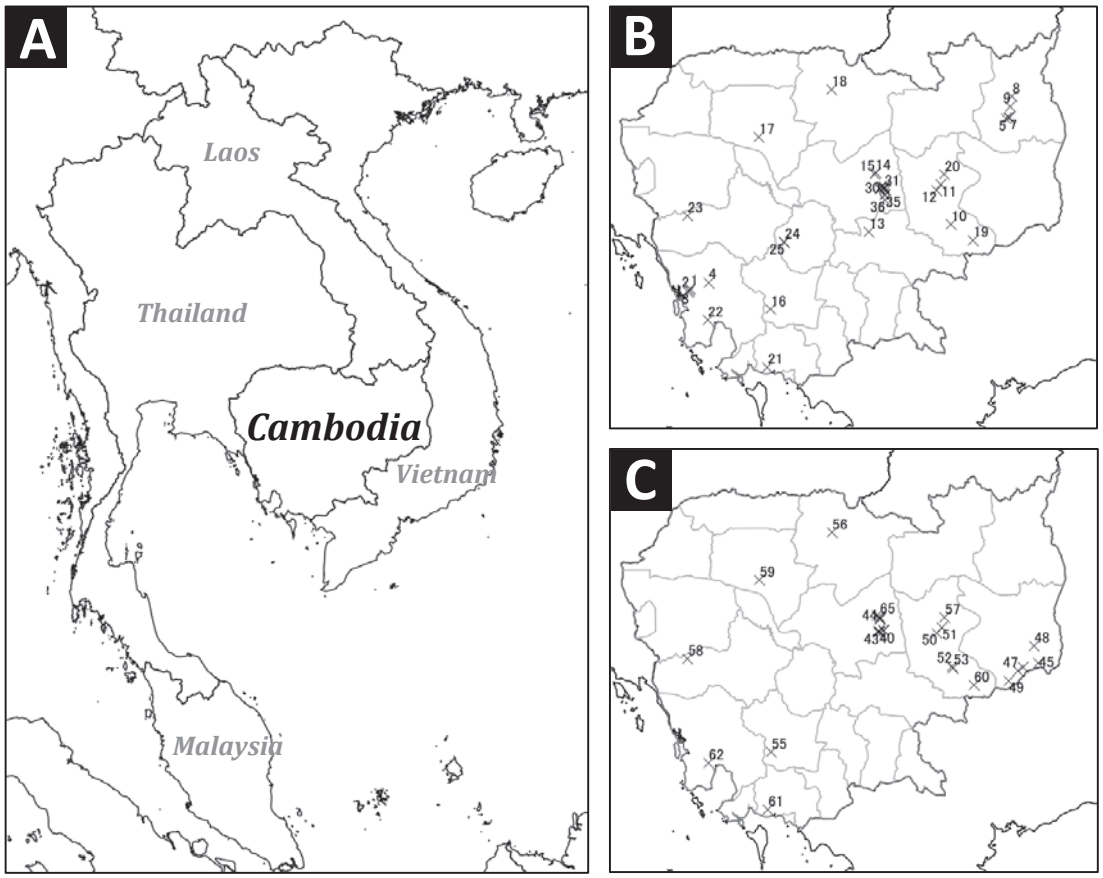

Fig. 1. Locations of the soil sampling sites in Cambodia.
A: Location of Cambodia. B and C: Locations of the soil survey, denoted by crosses. The number is the plot number (*Plot_N*), which is either newly described in this report (map B) or has been previously published (map C). Some numbers are not shown on the map because of the high concentration of points. The gray lines are provincial borders.

collected for measuring the carbon concentration and bulk density, respectively. The soil sample for measuring carbon concentration was collected in a plastic bag, air-dried, and sieved to pass a 2-mm mesh. The soil sample used to determine bulk density was collected using three 100 cm^3 metal cylinders in each soil horizon. For the two deciduous forest sites in Ratanakiri (plots 6 and 7 in Table 1) where gravel larger than the cylinder was observed, the soil bulk density was measured using cuboid-space sampling approach (Ugawa et al. 2012).

2.3 Chemical analysis

The air-dried fine soil (< 2 mm) used for measuring the carbon concentration was oven-dried (105˚C for 24 h) and weighed to determine the soil moisture content. The carbon concentration of fine soil was determined using the dry combustion method (e.g. Sumigraph NC analyzer NC-22F; Sumika Chemical Analysis Service, Osaka, Japan). The fine soil in the metal cylinders was also dried at 105˚C for 24 h and weighed to measure the bulk density. The average carbon concentrations and bulk densities for four replicates are shown in the dataset for Category II.

2.4 Calculating the soil carbon stock

The soil carbon stock per cm thickness (*SoilC_cm*, MgC ha^{-1} cm^{-1}) in each soil horizon was calculated using variables in the soil profile data (Table 2) as follows,

$$SoilC\_cm = C\_conc \times BD\_fine \times 0.1,$$

where *C_conc* is the carbon concentration of fine soil (gC kg^{-1} (= kgC Mg^{-1})), *BD_fine* is the bulk density of fine soil (Mg m^{-3}), and the coefficient 0.1 is the product of 100 (m^3 ha^{-1} cm^{-1}) and 0.001 (Mg kg^{-1}). The soil carbon stock at a depth of 0–30 cm (*SoilC_30* in Table 1) is calculated as the sum of *SoilC_cm* at that same depth. The soil carbon stocks of two sites (plots 4 and 11 in Table 1) were not calculated due to a lack of bulk density data.

Table 1. Site data

Plot_N	Region[*1]	Lat	Lon	Forest[*2]	Category	Period	SoilC_30	N_horizon	Max_depth	Remarks[*3]
		hddd.ddd°					MgC ha^{-1}		cm	
1	KKN	N11.558	E103.178	E	I	2011.2	48.2	8	150	Ref1
2	KKN	N11.536	E103.163	E	I	2011.2	46.6	5	105	Ref1
3	KKN	N11.522	E103.160	E	I	2011.2	47.7	6	140	Ref1
4	KKN	N11.633	E103.394	E	I	2011.2	n.d.	4	50	Ref1
5	RTK	N13.574	E106.926	E	I	2011.11	44.0	4	50	Ref1
6	RTK	N13.588	E106.962	D	I	2011.11	24.6	6	140	Ref1
7	RTK	N13.588	E106.963	D	I	2011.11	15.9	5	70	Ref1
8	RTK	N13.835	E107.000	E	I	2011.11	55.0	5	115	Ref1
9	RTK	N13.719	E106.977	R	I	2011.11	54.6	5	115	Rubber age over 50 and Ref1
10	KRC	N12.320	E106.275	E	I	2004.2	19.2	5	170	Ref1
11	KRC	N12.794	E106.156	D	I	2009.2	n.d.	5	100	Ref1
12	KRC	N12.728	E106.101	D	I	2009.11	39.3	4	130	Ref1
13	KRC	N12.230	E105.303	D	I	2009.11	30.6	3	60	Ref1
14	KPT	N12.931	E105.374	D	I	2006.2	58.7	7	170	Ref1
15	KPT	N12.918	E105.366	D	I	2006.2	27.3	6	140	Ref1
16	KPS	N11.312	E104.133	D	II	2009.12	28.8	3	30	Ref1
17	SMR	N13.355	E103.994	E	II	2010.1	26.4	3	30	Ref1
18	PRV	N13.919	E104.856	D	II	2009.12	39.5	3	30	Ref1
19	KRC	N12.133	E106.535	E	II	2010.1	77.8	3	30	Ref1
20	KRC	N12.912	E106.195	D	II	2010.1	24.5	3	30	Ref1
21	KMP	N10.628	E104.096	E	II	2009.12	89.1	3	30	Ref1
22	KKN	N11.186	E103.386	E	II	2011.3	49.3	3	30	Ref1
23	PST	N12.424	E103.144	D	II	2011.2	43.2	3	30	Ref1
24	KPS	N12.112	E104.297	D	II	2011.2	24.1	3	30	Ref1
25	KPS	N12.109	E104.294	D	II	2011.2	20.6	3	30	Ref1
26	KPT	N12.762	E105.477	E	II	2011.11	25.4	3	30	Ref1
27	KPT	N12.726	E105.500	E	II	2011.11	37.1	3	30	Ref1
28	KPT	N12.670	E105.494	E	II	2011.11	29.6	3	30	Ref1
29	KPT	N12.744	E105.425	SH	II	2011.11	34.0	3	30	Ref1
30	KPT	N12.746	E105.427	D	II	2011.11	51.0	3	30	Ref1
31	KPT	N12.742	E105.482	E	II	2011.11	32.1	3	30	Ref1
32	KPT	N12.773	E105.445	E	II	2011.11	25.1	3	30	Ref1
33	KPT	N12.737	E105.484	E	II	2011.11	25.8	3	30	Ref1
34	KPT	N12.761	E105.478	E	II	2011.11	31.5	3	30	Ref1
35	KPT	N12.670	E105.494	E	II	2011.11	34.8	3	30	Ref1
36	KPT	N12.613	E105.489	R	II	2010.12	33.5	3	30	Rubber age 2 and Ref1
37	KPT	N12.747	E105.419	D	I	2003.2	14.9	8	200	DDF1 in Ref2
38	KPT	N12.759	E105.474	E	I	2003.5	22.9	10	200	DEF1 in Ref2
39	KPT	N12.750	E105.414	SW	I	2003.2	220.9	4	45	SWF in Ref2
40	KPT	N12.749	E105.415	E	I	2003.2	54.9	11	200	MF1 in Ref2
41	KPT	N12.749	E105.415	E	I	2003.2	49.3	10	220	MF2 in Ref2
42	KPT	N12.748	E105.416	D	I	2003.2	18.5	8	210	DDF2 in Ref2
43	KPT	N12.735	E105.411	E	I	2003.5	29.9	9	200	DEF2 in Ref2
44	KPT	N12.931	E105.390	E	I	2006.2	61.7	6	200	E5 in Ref3

3. Data format and citation remarks

Dataset is also distributed as a text file (Table S1) and two csv files (Tables S2 and S3). Table S1 contains a readme file to help users of dataset (Tables S2 and S3) including descriptions of variables and methodology. Tables S2 and S3 are site data (same as Table 1 in this report) and soil profile data (same as Table 2), respectively. The users of data can download Table S2 and import it directly into geographic information system (GIS) software as a delimited text file. When using the dataset, please cite this report as the format indicated in the Table S1.

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Table 1. Site data (continued)

Plot_N	Region[*1]	Lat	Lon	Forest[*2]	Category	Period	SoilC_30	N_horizon	Max_depth	Remarks[*3]
		hddd.ddd°					MgC ha^{-1}		cm	
45	MDK	N12.374	E107.312	E	I	2004.5	128.6	8	200	E1 in Ref3
46	MDK	N12.319	E107.132	E	I	2004.5	52.1	7	200	E2 in Ref3
47	MDK	N12.280	E107.064	E	I	2004.5	63.0	7	200	E3 in Ref3
48	MDK	N12.574	E107.258	D	I	2004.5	86.9	5	90	D1 in Ref3
49	MDK	N12.163	E106.953	E	I	2004.5	50.0	4	110	E4 in Ref3
50	KRC	N12.729	E106.101	D	I	2004.2	35.6	7	150	NT-1 in Ref4
51	KRC	N12.792	E106.163	D	I	2004.2	30.4	6	150	NT-2 in Ref4
52	KRC	N12.336	E106.279	D	I	2004.2	22.7	6	115	SE-1 in Ref4
53	KRC	N12.314	E106.298	D	I	2004.2	19.4	6	150	SE-2 in Ref4
54	KPT	N12.760	E105.474	E	I	2006.02	38.1	10	800	LSP in Ref5
55	KPS	N11.313	E104.134	D	II	2009.12	31.1	3	30	D3 in Ref6
56	PRV	N13.918	E104.856	D	II	2009.12	61.2	3	30	D1 in Ref6
57	KRC	N12.912	E106.196	D	II	2010.1	26.2	3	30	D4 in Ref6
58	PST	N12.421	E103.142	D	II	2011.2	38.4	3	30	D2 in Ref6
59	SMR	N13.356	E103.993	E	II	2010.1	20.1	3	30	E4 in Ref6
60	KRC	N12.111	E106.542	E	II	2010.1	37.0	3	30	E3 in Ref6
61	KMP	N10.633	E104.095	E	II	2009.12	80.5	3	30	E1 in Ref6
62	KKN	N11.186	E103.387	E	II	2011.3	36.7	3	30	E2 in Ref6
63	KPT	N12.895	E105.429	R	II	2009.12	46.0	3	30	Rubber age 1 and R1 in Ref7
64	KPT	N12.895	E105.430	R	II	2009.12	47.8	3	30	Rubber age 2 and R2 in Ref7
65	KPT	N12.921	E105.422	R	II	2009.12	34.4	3	30	Rubber age 6 and R6 in Ref7
66	KPT	N12.903	E105.418	R	II	2009.12	40.7	3	30	Rubber age 9 and R9a in Ref

n.d.: no data available. *Plot_N*, number of the survey plot; *Region*, name of the region in Cambodia; *Lat and Lon*, latitude and longitude, respectively; *Forest*, forest type at the time of the soil survey; *Category*, soil sampling category; *Period*, period of the soil survey; *SoilC_30*, soil carbon stock (MgC ha^{-1}) at 0–30 cm depth; *N_horizon*, number of horizons in each soil survey plot; *Max_depth*, maximum depth of the soil profile (cm); *Remarks*, other remarks and references for each soil survey plot.

*1 KKN, Koh Kong; KMP, Kampot; KPT, Kampong Thom; KPS, Kampong Speu; KRC, Kratié; MDK, Mondulkiri; PRV, Preah Vihear; PST, Pursat; RTK, Ratanakiri; SMR, Siem Reap

*2 E, evergreen forest; D, deciduous forest; R, rubber plantation; SH, shrubland; SW, inland swamp forest.

*3 Ref1, this report; Ref2, Toriyama et al. (2007); Ref3, Toriyama et al. (2013b); Ref4, Toriyama et al. (2010); Ref5, Toriyama et al. (2013a); Ref6, Toriyama et al. (2015); Ref7, Toriyama et al. (2011).

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Table 2. Soil profile data

Serial_N	Plot_N	Horizon	Depth_top cm	Depth_bot cm	Thick cm	C_conc g kg^{-1}	BD_fine Mg m^{-3}
1	1	A1	0	2	2	43.37	0.935
2	1	A2	2	6	4	29.24	0.935
3	1	E	6	14	8	12.54	1.083
4	1	Bh	14	27	13	10.89	1.152
5	1	Bw1	27	48	21	5.12	1.266
6	1	Bw2	48	77	29	2.99	1.299
7	1	Bw3	77	116	39	2.04	1.324
8	1	Bw4	116	150	34	1.56	1.326
9	2	A	0	4	4	42.79	0.924
10	2	E1	4	15	11	12.02	1.250
11	2	E2	15	27	12	7.96	1.322
12	2	Bw	27	60	33	3.87	1.415
13	2	Bs	60	105	45	2.35	1.431
14	3	A1	0	3	3	28.77	1.072
15	3	A2	3	20	17	15.85	1.231
16	3	E	20	38	18	3.59	1.471
17	3	Bw	38	70	32	2.47	1.410
18	3	Bs	70	107	37	1.36	1.468
19	3	CB	107	140	33	1.19	n.d.
20	4	A	0	3	3	74.91	n.d.
21	4	B1	3	17	14	33.02	n.d.
22	4	B2	17	38	21	8.71	n.d.
23	4	B3	38	50	12	5.11	n.d.
24	5	A	0	5	5	27.09	1.280
25	5	B1	5	15	10	n.d.	1.308
26	5	B2	15	30	15	7.82	1.404
27	5	B3	30	50	20	6.51	1.357
28	6	Ah	0	3	3	19.12	1.331
29	6	Bw	3	22	19	6.63	1.312
30	6	Bc	22	44	22	2.94	0.202
31	6	Bs1	44	75	31	n.d.	0.868
32	6	Bs2	75	115	40	n.d.	1.391
33	6	BC	115	140	25	0.88	1.352
34	7	A1	0	5	5	13.59	0.771
35	7	A2	5	13	8	8.47	0.812
36	7	Bc1	13	30	17	3.41	0.888
37	7	Bc2	30	47	17	3.85	0.650
38	7	Bc3	47	70	23	3.15	0.586
39	8	A	0	5	5	35.12	0.865
40	8	AB	5	15	10	19.97	1.031
41	8	Bw1	15	35	20	12.20	1.051
42	8	Bw2	35	75	40	8.46	1.081
43	8	Bw3	75	115	40	6.25	1.111
44	9	A	0	6	6	33.94	0.978
45	9	Bw1	6	27	21	17.14	0.883
46	9	Bw2	27	50	23	9.98	0.968
47	9	Bw3	50	87	37	7.06	1.001
48	9	Bw4	87	115	28	5.80	1.024
49	10	Ah	0	5	5	14.06	1.240
50	10	BA	5	30	25	6.46	0.649
51	10	B1	30	63	33	4.42	1.035
52	10	B2	63	117	54	2.80	0.831

Table 2. Soil profile data (continued)

Serial_N	Plot_N	Horizon	Depth_top cm	Depth_bot cm	Thick cm	C_conc g kg^{-1}	BD_fine Mg m^{-3}
53	10	C	117	170	53	0.45	1.602
54	11	Ah	0	14	14	14.04	n.d.
55	11	AE	14	27	13	7.11	n.d.
56	11	B1	27	45	18	3.06	n.d.
57	11	B2	45	76	31	2.43	n.d.
58	11	Bv	76	100	24	2.70	n.d.
59	12	Ah	0	6	6	58.96	0.713
60	12	BA	6	28	22	14.59	0.421
61	12	B1	28	69	41	7.21	0.406
62	12	BC	69	130	61	2.93	0.565
63	13	Ah	0	7	7	15.66	1.185
64	13	E	7	25	18	7.81	1.076
65	13	Bv	25	60	35	3.73	1.324
66	14	A1	0	15	15	25.79	1.264
67	14	A2	15	52	37	4.55	1.440
68	14	B1	52	75	23	0.85	1.263
69	14	B2	75	91	16	0.95	n.d.
70	14	Bx	91	96	5	1.24	n.d.
71	14	B3	96	138	42	n.d.	1.373
72	14	C	138	170	32	0.39	1.530
73	15	A1	0	13	13	15.09	1.165
74	15	A2	13	35	22	4.03	0.652
75	15	B1	35	59	24	3.04	0.437
76	15	B2	59	70	11	3.31	1.033
77	15	BC	70	120	50	0.60	1.441
78	15	C	120	140	20	1.66	1.556
79	16	0_5	0	5	5	17.65	1.101
80	16	5_15	5	15	10	9.26	1.042
81	16	15_30	15	30	15	8.46	0.745
82	17	0_5	0	5	5	9.76	1.332
83	17	5_15	5	15	10	6.17	1.551
84	17	15_30	15	30	15	4.30	1.604
85	18	0_5	0	5	5	23.27	1.034
86	18	5_15	5	15	10	15.34	1.068
87	18	15_30	15	30	15	8.81	0.836
88	19	0_5	0	5	5	22.11	1.496
89	19	5_15	5	15	10	15.58	1.576
90	19	15_30	15	30	15	12.07	2.025
91	20	0_5	0	5	5	12.10	1.103
92	20	5_15	5	15	10	8.64	0.890
93	20	15_30	15	30	15	7.31	0.925
94	21	0_5	0	5	5	47.51	0.781
95	21	5_15	5	15	10	35.98	1.068
96	21	15_30	15	30	15	16.64	1.289
97	22	0_5	0	5	5	26.79	1.069
98	22	5_15	5	15	10	13.41	1.184
99	22	15_30	15	30	15	10.41	1.223
100	23	0_5	0	5	5	30.41	0.940
101	23	5_15	5	15	10	12.23	1.133
102	23	15_30	15	30	15	9.04	1.108
103	24	0_5	0	5	5	13.52	1.135
104	24	5_15	5	15	10	7.73	1.116

Table 2. Soil profile data (continued)

Serial_N	Plot_N	Horizon	Depth_top cm	Depth_bot cm	Thick cm	C_conc g kg^{-1}	BD_fine Mg m^{-3}
105	24	15_30	15	30	15	4.79	1.085
106	25	0_5	0	5	5	9.96	1.173
107	25	5_15	5	15	10	7.50	1.148
108	25	15_30	15	30	15	3.67	1.112
109	26	0_5	0	5	5	12.67	1.386
110	26	5_15	5	15	10	5.44	1.551
111	26	15_30	15	30	15	3.28	1.666
112	27	0_5	0	5	5	14.20	1.375
113	27	5_15	5	15	10	8.93	1.567
114	27	15_30	15	30	15	5.43	1.642
115	28	0_5	0	5	5	13.65	1.263
116	28	5_15	5	15	10	7.41	1.578
117	28	15_30	15	30	15	3.95	1.572
118	29	0_5	0	5	5	10.63	1.582
119	29	5_15	5	15	10	7.58	1.632
120	29	15_30	15	30	15	5.62	1.568
121	30	0_5	0	5	5	30.01	0.876
122	30	5_15	5	15	10	13.09	1.311
123	30	15_30	15	30	15	9.21	1.495
124	31	0_5	0	5	5	13.30	1.314
125	31	5_15	5	15	10	7.21	1.599
126	31	15_30	15	30	15	4.81	1.638
127	32	0_5	0	5	5	8.48	1.432
128	32	5_15	5	15	10	5.93	1.605
129	32	15_30	15	30	15	3.94	1.613
130	33	0_5	0	5	5	9.80	1.352
131	33	5_15	5	15	10	6.13	1.633
132	33	15_30	15	30	15	3.94	1.561
133	34	0_5	0	5	5	11.57	1.430
134	34	5_15	5	15	10	7.28	1.573
135	34	15_30	15	30	15	4.84	1.621
136	35	0_5	0	5	5	13.98	1.363
137	35	5_15	5	15	10	8.12	1.604
138	35	15_30	15	30	15	5.04	1.622
139	36	0_5	0	5	5	8.56	1.472
140	36	5_15	5	15	10	9.07	1.570
141	36	15_30	15	30	15	5.20	1.658
142	37	A1	0	6	6	5.66	1.565
143	37	A2	6	18	12	3.96	1.590
144	37	E1	18	45	27	1.04	1.620
145	37	E2	45	70	25	0.61	1.576
146	37	B1	70	100	30	0.90	1.627
147	37	B2	100	130	30	0.50	1.804
148	37	B3	130	160	30	1.63	1.812
149	37	BC	160	200	40	1.15	1.791
150	38	A1	0	6	6	8.78	1.409
151	38	A2	6	16	10	4.92	1.620
152	38	AB	16	30	14	3.44	1.566
153	38	B1	30	55	25	2.05	1.546
154	38	B2	55	86	31	1.58	1.585
155	38	B3	86	110	24	1.17	1.564
156	38	B4	110	136	26	1.24	1.521

Table 2. Soil profile data (continued)

Serial_N	Plot_N	Horizon	Depth_top cm	Depth_bot cm	Thick cm	C_conc g kg^{-1}	BD_fine Mg m^{-3}
157	38	B5	136	162	26	0.98	1.591
158	38	BC	162	190	28	1.92	1.551
159	38	CB	190	200	10	0.88	1.582
160	39	Ah1	0	5	5	249.21	0.378
161	39	Ah2	5	13	8	111.41	0.673
162	39	Ah3	13	25	12	105.17	0.797
163	39	C	25	45	20	19.40	1.363
164	40	Ah	0	5	5	31.78	1.049
165	40	E1	5	14	9	13.58	1.270
166	40	E2	14	30	16	10.64	1.336
167	40	Bs1	30	41	11	11.15	1.487
168	40	Bhs	41	55	14	7.43	1.452
169	40	Bhs	55	77	22	4.61	1.519
170	40	Bw1	77	101	24	2.14	1.561
171	40	Bw2	101	131	30	1.42	1.609
172	40	Bs2	131	149	18	0.82	1.710
173	40	Bs3	149	179	30	0.79	1.782
174	40	C	179	200	21	0.97	1.794
175	41	Ah1	0	5	5	16.62	1.205
176	41	Ah2	5	24	19	10.05	1.568
177	41	Ah3	24	42	18	9.60	1.612
178	41	AB	42	67	25	6.17	1.581
179	41	B1	67	98	31	3.36	1.593
180	41	B2	98	130	32	2.72	1.661
181	41	B3	130	159	29	1.57	1.732
182	41	B4	159	187	28	2.14	1.768
183	41	C1	187	205	18	1.15	1.801
184	41	C2	205	220	15	0.96	1.861
185	42	Ah	0	5	5	13.70	1.343
186	42	AE	5	23	18	2.64	1.588
187	42	E1	23	39	16	1.50	1.601
188	42	E2	39	67	28	0.32	1.616
189	42	Bh	67	93	26	0.69	1.879
190	42	Bhs	93	137	44	0.44	1.902
191	42	BS	137	169	32	0.50	1.917
192	42	C	169	210	41	0.64	1.921
193	43	Ah1	0	7	7	9.65	1.386
194	43	Ah2	7	17.5	10.5	6.97	1.578
195	43	AB	17.5	33.5	16	4.58	1.560
196	43	B1	33.5	60	26.5	3.20	1.484
197	43	B2	60	91	31	2.54	1.504
198	43	B3	91	118	27	3.35	1.480
199	43	B4	118	153	35	2.32	1.493
200	43	BC	153	190	37	1.62	1.467
201	43	C	190	200	10	1.69	1.497
202	44	A1	0	10	10	32.85	1.080
203	44	A2	10	29	19	12.25	1.093
204	44	B1	29	60	31	6.53	1.149
205	44	B2	60	94	34	4.21	n.d.
206	44	B3	94	159	65	4.57	1.227
207	44	B4	159	200	41	4.60	1.084
208	45	Ah1	0	8	8	80.94	0.719

Table 2. Soil profile data (continued)

Serial_N	Plot_N	Horizon	Depth_top cm	Depth_bot cm	Thick cm	C_conc g kg^{-1}	BD_fine Mg m^{-3}
209	45	Ah2	8	25	17	50.75	0.832
210	45	B1	25	53	28	22.83	0.900
211	45	B2	53	82	29	12.99	0.946
212	45	B3	82	126	44	10.71	0.882
213	45	B4	126	149	23	8.98	0.998
214	45	B5	149	185	36	7.24	0.973
215	45	BC	185	200	15	6.46	1.018
216	46	Ah1	0	10	10	36.02	0.646
217	46	Ah2	10	35	25	20.68	0.698
218	46	BA	35	62	27	19.48	0.797
219	46	B1	62	92	30	11.57	0.834
220	46	B2	92	126	34	7.49	0.923
221	46	B3	126	160	34	5.45	0.945
222	46	B4	160	200	40	5.36	0.954
223	47	Ah1	0	9	9	58.74	0.729
224	47	Ah2	9	23	14	22.65	0.628
225	47	BA	23	52	29	11.53	0.559
226	47	B1	52	82	30	7.54	0.716
227	47	B2	82	111	29	3.54	0.794
228	47	BC	111	145	34	3.98	1.127
229	47	CB	145	200	55	5.36	1.083
230	48	Ah	0	11	11	42.26	1.073
231	48	Ahc	11	26	15	25.10	0.889
232	48	Bc	26	39	13	11.13	0.793
233	48	B	39	71	32	5.33	1.307
234	48	CB	71	90	19	1.37	1.235
235	49	Ah	0	7	7	26.65	1.058
236	49	B1	7	24	17	13.35	1.126
237	49	B2	24	43	19	12.95	0.606
238	49	RB	43	110	67	9.90	0.482
239	50	Ah	0	10	10	14.08	1.430
240	50	E1	10	23	13	6.53	1.409
241	50	E2	23	35	12	3.50	1.416
242	50	BEt	35	50	15	5.03	1.432
243	50	Bv1	50	84	34	2.64	0.703
244	50	Bv2	84	117.5	33.5	2.14	0.703
245	50	C	117.5	150	32.5	1.82	1.559
246	51	Ah	0	13	13	10.20	1.455
247	51	E	13	34	21	4.41	1.484
248	51	BEt	34	68	34	3.05	1.513
249	51	Bv1	68	95	27	2.03	0.715
250	51	Bv2	95	141.5	46.5	1.39	0.899
251	51	C	141.5	150	8.5	0.99	1.035
252	52	Ah	0	6	6	10.85	1.269
253	52	E	6	14.5	8.5	4.54	1.340
254	52	BEt	14.5	32	17.5	4.61	1.299
255	52	CB	32	70	38	4.52	0.779
256	52	C1	70	90	20	2.22	1.744
257	52	C2	90	115	25	0.64	1.793
258	53	Ah	0	8	8	8.87	1.428
259	53	AE	8	18.5	10.5	3.52	1.574
260	53	Bt1	18.5	47	28.5	1.81	1.673

Table 2. Soil profile data (continued)

Serial_N	Plot_N	Horizon	Depth_top cm	Depth_bot cm	Thick cm	C_conc g kg^{-1}	BD_fine Mg m^{-3}
261	53	Bt2	47	70	23	1.53	1.686
262	53	C1	70	118	48	0.77	1.674
263	53	C2	118	150	32	0.52	1.746
264	54	2.5	0	10	10	20.65	1.415
265	54	50	10	75	65	2.86	1.541
266	54	100	75	150	75	1.25	1.483
267	54	200	150	250	100	0.86	1.528
268	54	300	250	350	100	0.67	1.634
269	54	400	350	450	100	0.51	1.688
270	54	500	450	550	100	0.48	1.756
271	54	600	550	650	100	0.36	1.789
272	54	700	650	750	100	0.42	1.783
273	54	800	750	800	50	0.43	1.748
274	55	0_5	0	5	5	15.60	1.257
275	55	5_15	5	15	10	8.07	1.271
276	55	15_30	15	30	15	5.45	1.356
277	56	0_5	0	5	5	39.54	0.980
278	56	5_15	5	15	10	22.50	0.986
279	56	15_30	15	30	15	16.36	0.800
280	57	0_5	0	5	5	11.44	1.308
281	57	5_15	5	15	10	6.95	1.369
282	57	15_30	15	30	15	4.57	1.346
283	58	0_5	0	5	5	24.53	0.998
284	58	5_15	5	15	10	12.84	0.980
285	58	15_30	15	30	15	10.81	0.841
286	59	0_5	0	5	5	6.63	1.401
287	59	5_15	5	15	10	4.75	1.438
288	59	15_30	15	30	15	4.12	1.403
289	60	0_5	0	5	5	16.53	1.145
290	60	5_15	5	15	10	8.69	1.287
291	60	15_30	15	30	15	7.07	1.540
292	61	0_5	0	5	5	75.88	0.662
293	61	5_15	5	15	10	30.99	0.910
294	61	15_30	15	30	15	16.72	1.086
295	62	0_5	0	5	5	31.55	0.770
296	62	5_15	5	15	10	12.85	0.960
297	62	15_30	15	30	15	8.09	1.034
298	63	0_5	0	5	5	21.14	0.805
299	63	5_15	5	15	10	18.54	0.946
300	63	15_30	15	30	15	15.09	0.880
301	64	0_5	0	5	5	19.17	0.926
302	64	5_15	5	15	10	17.79	1.025
303	64	15_30	15	30	15	12.63	1.091
304	65	0_5	0	5	5	13.93	1.037
305	65	5_15	5	15	10	11.67	1.072
306	65	15_30	15	30	15	9.91	0.988
307	66	0_5	0	5	5	19.56	1.052
308	66	5_15	5	15	10	14.49	1.136
309	66	15_30	15	30	15	8.82	1.053

n.d., no data available; *Serial_N*, serial number of soil horizons; *Plot_N*, serial number of the survey plot, consistent with *Plot_N* in Table 1; *Horizon*, type of soil horizon, i.e., A, E, B, and C, which are described *in situ*; if no horizon is defined, the sampling depth is described; *Depth_top* and *Depth_bot*, top and bottom depths of the soil horizon (cm), respectively; *Thick*, thickness of the soil horizon (cm); *C_conc*, carbon concentration of fine soil (gC kg^{-1}); *BD_ fine*, bulk density of fine soil (Mg m^{-3})

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Supplementary Date

Supplementary date can be found at https://www.ffpri.affrc.go.jp/pubs/bulletin/446/index.html

Table S1

This is a readme file for Tables S2 and S3. The file can be updated in future as necessary.

Table S2

Site data (Table 1) is compiled in csv format.
The first line contains the names of the variables. The file can be updated in future as necessary.

Table S3

Soil profile data (Table 2) is compiled in csv format.
The first line contains the names of the variables. The file can be updated in future as necessary.

カンボジアにおける森林土壌炭素蓄積に関するデータセット

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要 旨

土壌炭素貯留量の空間分布は農林地の生産力、持続性および炭素隔離能を評価するために不可欠な情報である。本報告では、熱帯林地域における土壌炭素貯留量の推定モデルの開発と改善のため、森林総合研究所が 2002 年から研究活動を行っているカンボジア国の熱帯林で取得された土壌炭素データを公開する。データセットは 66 点の地点データと、309 点の土壌層位データを含む。36 点は新規で公開されるものであり、残る 30 点は既存の研究論文等で出版された分析値に、空間情報等を付加して整備したものである。

キーワード：カンボジア、森林土壌、土壌炭素

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