Table S1: Data summary of the modeling and validation plots

Modeling data													
PlotNo	H_{100}		Age		N (tree.ha^{-1})		Size (m^2)	BA $M^2.ha^{-1}$		Elevation (m)	Aspect (degree)	Slope (%)	Soil depth (cm)
	2008	2016	2008	2016	2008	2016		2008	2016				
1	24.6	25.9	54	62	1089	1032	707	62.6	71.2	375	330	45	44.4
2	9.4	10	66	74	2144	2122	452	27	32.7	548	330	30	23.4
3	15.4	17.2	41	49	535	530	1963	35.6	41.1	454	180	11	26.8
4	16.7	18.8	40	48	727	727	908	48.1	54.1	475	180	11	26.2
5	20.9	22.6	39	47	881	870	908	55.6	65.6	485	210	5	30
6	18.6	22.9	25	33	858	833	804	47.8	60.5	934.2	225	10	44.2
7	17	22.5	28	36	1348	1238	452	48.3	63.0	669	225	12	19.6
8	24.5	25.2	47	55	493	493	1257	51.8	60.7	427	210	0	150
9	15.2	19.3	32	40	748	748	1257	17.6	29.8	787	330	23	30.6
10	14.3	14.5	61	69	891	891	707	20.7	29.1	444	150	0	17.4
11	11.3	11.9	48	56	2500	2500	240	40.5	47.0	780	110	42	28.8
12	11	11.2	67	75	3144	3065	254	39.3	43.9	673	25	40	35.8
13	9.5	11.8	57	65	622	622	707	11.0	15.4	486	210	14	30.2
14	18.4	19	96	104	224	219	1963	23.0	23.8	598	300	6	20.4
15	21.3	22	76	84	454	446	1257	46.1	52.1	647	250	10	24.4
16	21.5	22.2	87	95	383	377	1593	44.4	50.6	629	330	5	35.6
17	16.9	18.1	55	63	1753	1711	282	26.6	33.2	668	330	20	27.8
18	21.7	22.6	55	63	753	734	531	55.4	61.8	618	120	60	38.8
19	20.1	21	60	68	645	637	1257	56.0	60.4	657	200	20	28.8
20	14.6	16.5	51	59	1356	1337	531	38.3	45.2	658	160	30	28.8
21	19.4	20.5	55	63	1019	991	707	48.8	56.9	651	180	45	38
22	11.4	12	69	77	2499	2399	200	42.9	49.7	590	280	30	28.8
23	21.1	21.6	60	68	934	892	707	45.5	54.0	612	240	75	43.2
24	14	14.9	51	59	1394	1394	531	29.0	38.0	142	0	55	42.8
25	9.5	10.8	49	57	2476	2432	452	21.5	29.1	137	345	40	31.2

26	16	16.1	90	98	275	270	1963	31.8	33.0	306	200	25	29.2
27	19	19.5	82	90	302	294	1257	42.5	44.7	390	310	30	26.8
28	11.4	11.6	65	73	523	523	707	31.6	36.8	964	330	33	29.2
29	12.8	17.1	30	38	1304	1238	452	24.8	34.4	899	25	40	37.6
30	16.2	19.5	34	42	2165	2070	314	56.5	63.2	839	180	22	44.4
31	16	18.8	35	43	806	806	707	30.7	42.1	131	295	10	37.2
32	22.9	26.8	36	44	764	736	707	39.2	54.7	399	310	16	27.2
33	9.7	12	16	24	634	613	931	6.1	15.6	505	300	25	29.8
34	20.5	20.6	71	79	622	608	707	53.2	57.3	328	175	20	40.2
35	22.3	23.4	60	68	474	474	908	36.4	43.9	404	115	50	34.8
36	13.2	15.9	30	38	1868	1789	380	31.8	45.2	937	195	10	29.2
37	12.9	14.1	74	82	525	517	1257	23.9	30.0	903	315	36	96.4
38	17.7	19	65	73	778	764	707	36.9	46.7	624	250	55	28.4
39	20.3	23	52	60	652	652	690	20.0	29.6	341	215	25	22.8
40	15.1	17.7	32	40	1789	1736	380	48.0	56.4	268	170	21	44.4
41	20.6	22.9	43	51	1092	1036	531	50.6	62.9	522	350	25	42.2
42	24.2	25.8	43	51	672	639	908	56.3	63.7	975	205	25	94.6
43	12.1	12.3	69	77	440	440	750	27.7	33.8	796	345	45	70.8
44	14.1	15.5	77	85	301	295	1662	23.5	27.2	795	270	30	32.2
45	12.3	12.7	121	129	509	501	1257	22.3	25.1	567	130	40	38
46	25.8	26.4	55	63	1282	1216	452	67.4	77.4	328	205	11	44.4
47	14.5	15.4	81	89	1499	1473	380	48.2	54.0	590	35	16	21
48	23.7	24.2	68	76	297	283	707	36.6	44.5	590.5	100	17	31.2
49	16.9	19	64	72	1184	1131	380	61.9	64.1	616	85	33	27.2
50	19.9	23.9	30	38	684	684	380	43.5	54.8	680	20	25	29.6
51	13.42	14.58	66	74	1089	1032	452	46.6	51.1	796	190	35	27.8
52	13.1	14.4	45	53	2934	2585	201	30.8	43.7	561	120	15	34.6
53	15.4	17.8	40	48	2069	1941	314	40.7	50.9	582	60	18	38.6
54	21.1	22.5	93	101	137	137	804	20.5	23.3	643	330	10	21.8
55	12.4	15.6	34	42	1920	1867	380	33.4	45.3	851	160	9	44.6
56	17.4	19.3	33	41	1342	1236	380	32.0	47.9	47	275	3	14.8

57	18.8	20.1	98	106	420	420	452	60.4	64.9	801	245	25	37.8
58	8.3	11.8	37	45	2429	2143	70	28.2	35.5	758	170	21	48
59	19.1	21.1	39	47	707	662	452	50.5	55.9	743	60	15	31.6
60	21.3	24.0	36	44	906	839	452	47.5	59.9	487	200	30	29.2
61	9.0	9.2	102	110	1342	1236	380	31.9	37.8	47	275	3	14.8

Validation data

PlotNo	H_{100}		Age		N (tree.ha^{-1})		Size (m^2)	BA $M^2.ha^{-1}$		Elevation (m)	Aspect (degree)	Slope (%)	Soil depth (cm)
	2008	2016	2008	2016	2008	2016		2008	2016				
1	13.9	15.7	51	59	650	650	1963	48.6	52.8	670	225	60	28.6
2	19.2	19.6	89	97	540	522	706	34.4	37.3	430	25	45	18.3
3	8.3	8.9	65	73	700	640	706	28.6	33.7	710	210	0	26.2
4	5.5	6.2	76	84	717	680	804	18.5	21.1	444	310	42	35.6
5	33.3	34.5	76	84	680	652	706	55.8	63.1	780	80	40	28.1
6	26.2	27.0	80	88	450	380	1256	49.2	52.7	930	320	14	35.8
7	28.7	29.5	80	88	458	404	1256	52.6	56.6	657	310	6	30.2
8	13.4	16.5	23	31	2910	2910	1593	11.2	20.6	550	170	15	21.1
9	23.0	23.4	90	98	280	272	1963	29.7	32.2	673	330	35	19.6
10	13.3	19.5	15	23	2888	2798	452	22.6	28.8	486	60	5	140
11	10.2	13.9	17	25	2500	2500	314	7.2	13.5	598	130	11	31.3
12	10.1	11.4	55	63	990	990	706	35.5	39.9	647	210	12	24
13	7.6	11.4	18	26	1622	1622	314	10.2	16.4	60	5	5	30
14	17.7	19.3	62	70	324	324	1256	41.3	46.7	660	210	20	42.2
15	4.6	8.8	12	20	2924	2830	200	11.5	18.7	590	225	10	23.4
16	8.2	10.6	29	37	1328	1328	452	16.2	20.6	345	110	25	26.6
17	8.0	11.8	18	26	1753	1711	314	12.5	21.5	675	210	12	37.7
18	6.4	13.0	10	18	1810	1770	530	4.3	13.6	855	330	25	27.7
19	7.3	11.6	14	22	1654	1654	282	7.6	14.6	440	160	20	23

Table S2: Models used to fit the site index curves: H_{100} (t_2) = f (H_{100} (t_1), (t_1), (t_2)), whereby M1-M4 are algebraic models and M5-M8 generalized algebraic difference models

No	Name	Base equations	Parameter related to site	Model equation with reference
M1	Korf (1939)	$H_{100} = a_0 \cdot \exp(-a_1/t^{a_2})$	a_1	$H_{100}(t_2)=b_0 \cdot \frac{H_{100}(t_1)^{(t_1/t_2)^{b_2}}}{b_0}$ (Kitikidou *et al.*, 2011)
M2	McDill & Amateis (1992)	$H_{100} = \frac{a_1}{1 + a_3/t^{a_2}}$	a_3	$H_{100}(t_2) = b_0/(1 - \left(1 - \frac{b_0}{H_{100}(t_1)}\right) \cdot ({t_1}/{t_2})^{b_1})$ (McDill & Amateis, 1992)
M3	Korf I	$H_{100} = a_0 \cdot \exp(-a_1/t^{-a_2})$	a_2	$H_{100}(t_2) = b_0 \cdot \exp(-b_1 \cdot {t_2}^{\ln(-\frac{\ln(H_{100}(t_1)/b_0)}{-b_1}/\ln(t_1))})$ (Sharma,2013)
M4	Hossfeld I (Rojo Alboreca *et al.*, 2017)	$H_{100} = \frac{t^2}{a_0 + a_1 \cdot t + a_2 \cdot t^2}$	a_2	$H_{100}(t_2) = \frac{{t_2}^2}{b_0+t_2\cdot(\frac{t_1}{H_{100}(t_1)}-\frac{b_0}{t_1}+b_2\cdot(t_2-t_1))}$ (Rojo Alboreca *et al.*,2017)
M5	Sloboda (1971)	$H_{100} = a_0 \cdot \exp(-a_1 \cdot \exp(\frac{a_2}{(a_3-1)\cdot t^{(a_3-1)}}))$	a_1	$H_{100}(t_2) = b_2 \cdot (\frac{H_{100}(t_1)}{b_2})^{e^{-\frac{b_0}{1-b_1}\times({t_2}^{(1-b_1)}-{t_1}^{(1-b_1)}}}$ (Sharma, 2013)
M6	King-Prodan	$H_{100} = \frac{t^{a_0}}{a_1+a_2\cdot t^{a_0}}$	a_1, a_2	$H_{100}(t_2) = \frac{{t_2}^{b_0}}{b_1+b_2\cdot(\frac{{t_1}^{b_0}}{b_2+{t_1}^{b_0}})+(\frac{{t_1}^{b_0}}{b_2+{t_1}^{b_0}})\cdot{t_2}^{b_0}}$ (Sharma, 2013)
M7	Richard-Chapman	$H_{100} = a_0 \cdot (1 - \exp(-a_1 \cdot t))^{a_2}$	a_1	$H_{100}(t_2)=b_0 \cdot (1 - \exp(\ln(1 - (H_{100}(t_1)/b_0)^{\frac{1}{b_3}}) \cdot (t_1/t_2)))^{b_2}$ (Cieszewski & Strub, 2008)
M8	Hossfeld	$H_{100} = \frac{a_0}{1+a_1\cdot t^{-a_2}}$	a_0, a_1	$H_{100}(t_2) = \frac{b_0+\frac{H_{100}(t_1)-b_0}{1-b_1\cdot H_{100}(t_1)\cdot {t_1}^{-b_2}}}{1+\frac{{t_1}^{-b_2}\cdot b_1\cdot(H_{100}(t_1)-b_0)}{1-b_1\cdot H_{100}(t_1)\cdot {t_1}^{-b_2}}}$ (Sharma, 2013)

a_1, a_2 ..., a_n are parameters in the base models; b_1, b_2, ..., b_n are parameters in the dynamic models; $H_{100}(t_1)$ and $H_{100}(t_2)$ are top heights (in m) at age t_1 and t_2 (in years), respectively

Table S3: Methods of evaluation of developed candidate equations (Pretzsch, 2009)

Performance criteria	Formula	Ideal value
Model bias	$\frac{1}{n} \cdot \sum_{i=1}^{n} (\hat{Y}_i - Y_i)$	Zero
Relative bias	$\frac{\bar{e} \cdot 100}{\bar{Y}}$	Zero
Model precision	$S_e = \sqrt{\frac{\sum_{i=1}^{n} (\hat{Y}_i - \bar{e} - Y_i)^2}{n-1}}$	Zero
Relative model precision	$S_e\% = \frac{S_e \times 100}{\bar{Y}}$	Zero
Model accuracy	$m_x = \sqrt{{S_e}^2 + \bar{e}^2}$	Zero
Relative model accuracy	$m_x\% = \frac{m_x \times 100}{\bar{Y}}$	Zero
Coefficient of determination	$R^2 = 1 - \frac{\sum_{i=1}^{n} (\hat{Y}_i - Y_i)^2}{(Y_i - \bar{Y})^2}$	One

Table S4: Estimated parameters and coefficient of determination (R^2) for the tested site index equations; and results of different statistical tests made to candidate equations for the permanent plot and validation data

Model	Parameter			R^2	Modelling data			Validation data		
	b_0	b_1	b_2		Relative bias	Relative precision	Relative accuracy	Relative bias	Relative precision	Relative accuracy
M1	59.53	-	0.558	0.955	0.573	4.138	4.178	0.164	4.138	4.178
M2	38.51	1.289	-	0.966	0.581	4.023	4.064	0.176	4.023	4.064
M3	47.576	12.666		0.967	0.182	3.932	3.936	-0.172	3.932	3.936
M4	8.712	-	0.024	0.967	0.163	3.925	3.928	-0.145	3.925	3.928
M5	1.446	0.804	2075.73	0.99	0.205	3.457	3.463	-0.091	3.457	3.463
M6	1.59	-28.321	1213.806	0.97	0.0741	3.5553	3.5561	-0.175	3.5553	3.5561
M7	40.793	1.009		0.967	-0.14	3.9	3.9	-0.3	3.9	3.9
M8	-65975.7	0.002	1.236	0.966	0.222	4.164	4.170	0.061	4.164	4.170