SUPPORTING INFORMATION

Table S1. Basic location information of plots in the Nanling National Nature Reserve, southern China.

Plot	vegetation type	longitude	latitude	altitude(m)	mnt(℃)	mnp(mm)	min_JAN(℃)	max_JU(℃)	slope	sn_aspect	we_aspect	TPI	TRI
NL05R1	DWF	112.991861	24.9271	1698	12.81	1977.67	0	25	0.28	-0.28	0.96	-29	46.25
NL05R2	DWF	112.991713	24.926655	1691	12.81	1977.67	0	25	0.24	-0.28	0.96	-57.625	59.125
NL05R3	DWF	112.990807	24.92682	1687	12.81	1977.67	0	25	0.14	-0.62	0.79	80.125	80.125
NL06R1	EMF	112.970663	24.915195	1360	14.81	1835.00	2	27	0.37	-0.06	-1.00	-41.25	64.75
NL06R2	EMF	112.968695	24.914674	1504	14.81	1835.00	2	27	0.20	-0.78	-0.62	-0.875	34.875
NL06R3	EMF	112.969294	24.914571	1398	14.81	1835.00	2	27	0.20	-0.78	-0.62	-0.875	34.875
NL07R1	EMF	113.028596	24.894103	1360	14.75	1856.33	2	27	0.11	0.96	0.29	36.5	38.25
NL07R2	EMF	113.029578	24.895416	1388	14.08	1886.00	1	26	0.28	0.58	0.82	-37.75	62.75
NL07R3	EMF	113.026502	24.896219	1517	14.08	1886.00	1	26	0.19	0.29	0.96	14	25.5
NL02	MBF	113.0309057	24.94045031	1410	13.89	1900.67	1	26	0.31	1.00	-0.04	26.5	68
NL03	MBF	113.0124064	24.93131868	1035	15.11	1820.00	2	27.33	0.25	-0.96	-0.29	1.5	45.75
NL03R1	MBF	113.011765	24.931699	1170	15.11	1820.00	2	27.33	0.09	-0.98	-0.18	-67.875	67.875
NL03R2	MBF	113.011194	24.932324	1182	15.11	1820.00	2	27.33	0.09	-0.98	-0.18	-67.875	67.875
NL03R3	MBF	113.007707	24.934903	1205	14.08	1906.67	1	26	0.21	-1.00	0.00	45.25	64.5
NL08R1	MBF	112.962969	24.87281	920	16.03	1744.33	3	29	0.13	0.92	-0.39	-40.625	40.625
NL08R2	MBF	112.963612	24.87338	918	16.03	1744.33	3	29	0.11	0.38	-0.93	-23.25	36.25
NL08R3	MBF	112.961438	24.872592	925	16.03	1744.33	3	29	0.14	1.00	0.08	-30.5	30.5
NL01	VBF	113.082721	24.919878	544	17.33	1621.67	4	30	0.34	0.98	-0.19	-56.875	67.875
NL01R1	VBF	112.746567	24.921856	843	15.83	1744.33	2	28	0.40	1.00	0.03	4.25	71.75
NL01R2	VBF	112.745843	24.922182	839	15.83	1744.33	2	28	0.40	1.00	0.03	4.25	71.75
NL01R3	VBF	112.745326	24.922053	842	15.83	1744.33	2	28	0.45	1.00	0.00	-4.125	83.375
NL02R1	VBF	112.7947	24.836247	413	18.47	1615.00	5	31	0.19	-0.43	-0.90	-15	39.75

NL02R2	VBF	112.795231	24.836617	421	18.47	1615.00	5	31	0.19	-0.43	-0.90	-15	39.75
NL02R3	VBF	112.795225	24.83709	439	18.47	1615.00	5	31	0.19	-0.43	-0.90	-15	39.75

Table S2. Allometric growth equation of different plants in Nanling.

Category	Formula	Organs	Model coefficient		Statistical information		Range of application (cm)	Reference
			a	*b*	r[p]	R^2		
Cunninghamia lanceolata	$W = aD^b$	Stem	0.0556	2.3579		0.99	D：5~59	(Zhou et al. 2018)
		Branch	0.0198	2.1333		0.99		
		Leaves	0.0700	1.5090		0.98		
		Root	0.3366	1.1952		0.98		
Schima superba	$W = aD^b$	Stem	0.0359	2.6733		0.99	D：5~72	(Zhou et al. 2018)
		Branch	0.0730	1.9435		0.99		
		Leaves	0.0141	2.0587		0.99		
		Root	0.0310	2.2582		0.99		
Liquidambar formosana	$W = aD^b$	Stem	0.0726	2.5980		0.99	D：5~64	(Zhou et al. 2018)
		Branch	0.0153	2.5437		0.99		
		Leaves	0.0010	3.0161		0.84		
		Root	0.0256	2.6166		0.97		
Cyclobalanopsis glauca; Cyclobalanopsis myrsinifolia;	$W = aD^b$	Stem	0.1025	2.3764		0.96	D：5~62	(Zhou et al. 2018)
		Branch	0.0320	2.3399		0.98		

Cyclobalanopsis poilanei		Leaves	0.0278	1.8434	0.93		
		Root	0.0407	2.3376	0.99		
		Stem	0.1870	2.0310	0.95		
Lithocarpus glaber; *Lithocarpus harlandii;* *Lithocarpus hancei*	$W = aD^b$	Branch	0.0735	1.9800	0.98	D：5~44	(Zhou et al. 2018)
		Leaves	0.0230	1.9700	0.93		
		Root	0.0750	2.0100	0.99		
		Stem	0.2931	1.9700	0.88		
Pinus massoniana	$W = aD^b$	Branch	0.0048	2.6300	0.82	D：5~74	(Zhou et al. 2018)
		Leaves	0.0670	1.4600	0.91		
		Root	0.0532	1.9800	0.99		
		Stem	0.0250	2.7300	0.99		
Cinnamomum camphora	$W = aD^b$	Branch	0.0020	3.0880	0.99	D：5~66	(Zhou et al. 2018)
		Leaves	0.0070	2.4470	0.98		
		Root	0.0070	2.8190	0.99		
		Stem	0.0686	2.2830	0.98		
Castanopsis eyrei	$W = aD^b$	Branch	0.0788	1.9990	0.98	D：5~64	(Zhou et al. 2018)
		Leaves	0.0182	2.1764	0.98		

Fokienia hodginsii	$W = aD^b$	Root	0.0436	2.1659	0.99		(Zhou et al. 2018)
		Stem	0.0937	2.2225	0.99		
		Branch	0.0323	2.3338	0.99		
		Leaves	0.0236	2.3106	0.99		
Nothotsuga longibracteata	$W = aD^b$	Root	0.0570	2.1651	0.99		(Zhou et al. 2018)
		Stem	0.1909	1.9859	0.99		
		Branch	0.0205	2.2230	0.99		
		Leaves	0.0453	1.8432	0.99		
Betula luminifera	$W = aD^b$	Root	0.0223	2.3840	0.99		(Zhou et al. 2018)
		Stem	0.1555	2.2273	0.99		
		Branch	0.0134	2.4932	0.99		
		Leaves	0.0092	2.0967	0.99		
Cryptocarya chinensis	$W = a\ (D^2H)^{\ b}$	Root	0.0242	2.4750	0.99	D：0.8~19	(Luo et al. 2015)
		Stem	0.1776	0.8714	＞0.90		
		Branch	0.0386	0.9105			
		Leaves	0.0112	0.7983			
		Root	0.0694	0.9639			

Castanopsis lamontii	$W = aD^b$	Stem	0.1178	2.3426		0.99	D：5.8~31.7	(Zuo et al. 2015)
		Branch	0.0025	3.0512		0.89		
		Leaves	0.0015	3.2150		0.91		
		Root	0.0265	2.5053		0.88		
Castanopsis fissa	$W = aD^b$	Stem	0.1530	2.2007				(Ma 2020)
		Branch	0.0117	2.7605				
		Leaves	0.0133	2.3320				
		Root	0.0255	2.3650				
Engelhardia roxburghiana	$W = aD^b$	Stem	0.7353	1.6369	0.9720		D：8~28	(Luo et al. 2015)
		Branch	3.9E-04	3.9931	0.9660			
		Leaves	0.0014	3.1161	0.8190			
		Root	7.7E-04	3.6203	0.9860			
Castanopsis tibetana	$W = aD^b$	Stem	0.1915	2.0980		0.96	D：5.2~31.7	(Zuo et al. 2015)
		Branch	0.0047	2.7655		0.93		
		Leaves	0.0056	2.7888		0.90		
		Root	0.0366	2.3897		0.95		
Daphniphyllum oldhami	$W = aD^b$	Stem	0.1369	2.3000		0.94	D：5.9~17.2	(Zuo et al. 2015)

DBH ＜ 5cm Broad-leaved trees	$W = aD^b$	Branch	0.0061	2.6251	0.84	D：＜5	(Zhou et al. 2018)
		Leaves	0.0018	3.0804	0.84		
		Root	0.0286	2.3983	0.92		
		Stem	0.0500	2.5669	0.99		
		Branch	0.0453	2.0341	0.99		
		Leaves	0.0138	2.1576	0.99		
		Root	0.0529	1.5822	0.99		
DBH ≥ 5cm Broad-leaved trees	$W = aD^b$	Stem	0.0763	2.5022	0.94	D： 5~65	(Zhou et al. 2018)
		Branch	0.0189	2.4996	0.78		
		Leaves	0.0080	2.6528	0.80		
		Root	0.0067	2.8327	0.98		
DBH ＜ 5cm Coniferous trees	$W = aD^b$	Stem	0.1100	2.1680	0.99	D：＜5	(Zhou et al. 2018)
		Branch	0.0190	2.2930	0.99		
		Leaves	0.0700	1.6640	0.99		
		Root	0.0820	1.8260	0.99		
DBH ≥5cm Coniferous trees	$W = aD^b$	Stem	0.0542	2.5449	0.89	D：5~94	(Zhou et al. 2018)
		Branch	0.0097	2.6923	0.81		

Leaves	0.0302	2.0212	0.62
Root	0.0551	2.0671	0.73

Table S3. Pearson correlation coefficients of environmental and biodiversity indices.

	mnp	min_JAN	slope	sn_aspect	we_aspect	TPI	TRI	DS	J	S	pd	mpd	mntd	FEve	FDiv	FDis	CWM.stn	CWM.stp	CWM.stk	CWM.sgc	CWM.ltc	CWM.ltn	CWM.rtc	CWM.rtn	CWM.rgc	CWM.rgc
mnp	1	-0.96	-0.07	-0.21	0.70	0.28	0.19	-0.14	-0.14	0.06	0.22	0.48	0.25	-0.02	0.17	0.44	-0.09	0.24	-0.11	0.10	0.46	0.07	0.57	-0.19	-0.35	-0.24
min_JAN	-0.96	1	-0.12	0.06	-0.77	-0.27	-0.35	0.02	-0.01	-0.12	-0.29	-0.47	-0.19	-0.03	-0.26	-0.29	0.01	-0.25	0.11	-0.09	-0.48	-0.18	-0.61	0.10	0.29	0.20
slope	-0.07	-0.12	1	0.44	0.08	0.04	0.52	0.09	0.23	-0.04	0.00	0.09	0.00	0.29	0.11	-0.38	0.12	0.29	0.11	0.00	0.12	0.16	0.15	0.24	0.11	-0.17
sn_aspect	-0.21	0.06	0.44	1	0.18	0.02	0.11	0.09	0.14	-0.06	0.05	0.25	-0.25	0.25	0.30	-0.21	-0.05	-0.22	0.00	-0.59	-0.16	0.00	0.00	-0.13	0.00	-0.20
we_aspect	0.70	-0.77	0.08	0.18	1	0.18	0.23	0.12	0.14	0.12	0.25	0.34	0.32	-0.12	0.30	0.15	0.11	0.27	-0.23	-0.02	0.43	0.25	0.60	0.03	0.06	0.13
TPI	0.28	-0.27	0.04	0.02	0.18	1	0.04	0.25	0.29	0.13	0.15	0.01	-0.07	0.09	-0.01	0.25	-0.13	0.08	-0.18	0.19	0.22	-0.07	0.11	-0.09	-0.03	-0.02
TRI	0.19	-0.35	0.52	0.11	0.23	0.04	1	0.26	0.35	0.10	0.08	0.04	-0.15	0.01	0.29	-0.34	0.16	-0.13	-0.16	0.17	0.19	0.17	0.26	0.19	-0.15	0.10
DS	-0.14	0.02	0.09	0.09	0.12	0.25	0.26	1	0.96	0.76	0.65	0.05	-0.45	0.08	0.07	-0.21	0.63	-0.15	-0.07	0.15	0.10	0.41	-0.06	0.62	0.31	0.40
J	-0.14	-0.01	0.23	0.14	0.14	0.29	0.35	0.96	1	0.67	0.58	0.04	-0.38	0.20	0.06	-0.30	0.58	-0.08	-0.02	0.18	0.12	0.41	-0.05	0.61	0.27	0.31
S	0.06	-0.12	-0.04	-0.06	0.12	0.13	0.10	0.76	0.67	1	0.91	0.12	-0.36	-0.04	-0.24	0.06	0.50	0.09	-0.14	0.11	0.24	0.36	0.11	0.55	0.21	0.08
pd	0.22	-0.29	0.00	0.05	0.25	0.15	0.08	0.65	0.58	0.91	1	0.42	-0.16	0.06	-0.32	0.25	0.33	0.09	-0.09	0.08	0.30	0.16	0.19	0.33	0.01	-0.08

mpd	0.48	-0.47	0.09	0.25	0.34	0.01	0.04	0.05	0.04	0.12	0.42	1	0.28	0.30	-0.18	0.39	-0.22	-0.08	0.14	-0.27	0.22	-0.40	0.30	-0.33	-0.51	-0.51
mntd	0.25	-0.19	0.00	-0.25	0.32	-0.07	-0.15	-0.45	-0.38	-0.36	-0.16	0.28	1	0.02	-0.50	0.42	-0.51	0.47	-0.08	0.14	0.39	-0.51	0.37	-0.40	-0.03	-0.17
FEve	-0.02	-0.03	0.29	0.25	-0.12	0.09	0.01	0.08	0.20	-0.04	0.06	0.30	0.02	1	-0.09	0.15	-0.11	-0.17	0.00	-0.27	0.14	-0.17	-0.07	-0.15	-0.37	-0.49
FDiv	0.17	-0.26	0.11	0.30	0.30	-0.01	0.29	0.07	0.06	-0.24	-0.32	-0.18	-0.50	-0.09	1	-0.38	0.29	-0.38	0.08	-0.21	-0.29	0.50	-0.07	0.06	0.02	0.35
FDis	0.44	-0.29	-0.38	-0.21	0.15	0.25	-0.34	-0.21	-0.30	0.06	0.25	0.39	0.42	0.15	-0.38	1	-0.54	0.10	-0.17	-0.09	0.24	-0.54	0.10	-0.59	-0.27	-0.35
CW M.stn	-0.09	0.01	0.12	-0.05	0.11	-0.13	0.16	0.63	0.58	0.50	0.33	-0.22	-0.51	-0.11	0.29	-0.54	1	-0.11	0.00	0.19	-0.06	0.82	-0.02	0.91	0.29	0.52
CW M.stp	0.24	-0.25	0.29	-0.22	0.27	0.08	-0.13	-0.15	-0.08	0.09	0.09	-0.08	0.47	-0.17	-0.38	0.10	-0.11	1	-0.01	0.44	0.39	0.13	0.35	0.20	0.49	-0.14
CW M.stk	-0.11	0.11	0.11	0.00	-0.23	-0.18	-0.16	-0.07	-0.02	-0.14	-0.09	0.14	-0.08	0.00	0.08	-0.17	0.00	-0.01	1	0.05	-0.63	-0.05	-0.58	-0.03	-0.19	-0.09
CW M.sgc	0.10	-0.09	0.00	-0.59	-0.02	0.19	0.17	0.15	0.18	0.11	0.08	-0.27	0.14	-0.27	-0.21	-0.09	0.19	0.44	0.05	1	0.09	0.14	-0.01	0.35	0.28	0.39
CW M.ltc	0.46	-0.48	0.12	-0.16	0.43	0.22	0.19	0.10	0.12	0.24	0.30	0.22	0.39	0.14	-0.29	0.24	-0.06	0.39	-0.63	0.09	1	0.01	0.88	0.05	0.08	-0.17
CW M.ltn	0.07	-0.18	0.16	0.00	0.25	-0.07	0.17	0.41	0.41	0.36	0.16	-0.40	-0.51	-0.17	0.50	-0.54	0.82	0.13	-0.05	0.14	0.01	1	0.07	0.78	0.41	0.38
CW M.rtc	0.57	-0.61	0.15	0.00	0.60	0.11	0.26	-0.06	-0.05	0.11	0.19	0.30	0.37	-0.07	-0.07	0.10	-0.02	0.35	-0.58	-0.01	0.88	0.07	1	0.02	0.06	-0.11
CW M.rtn	-0.19	0.10	0.24	-0.13	0.03	-0.09	0.19	0.62	0.61	0.55	0.33	-0.33	-0.40	-0.15	0.06	-0.59	0.91	0.20	-0.03	0.35	0.05	0.78	0.02	1	0.50	0.45

CW M.rgc	-0.35	0.29	0.11	0.00	0.06	-0.03	-0.15	0.31	0.27	0.21	0.01	-0.51	-0.03	-0.37	0.02	-0.27	0.29	0.49	-0.19	0.28	0.08	0.41	0.06	0.50	1	0.56
CW M.rgc	-0.24	0.20	-0.17	-0.20	0.13	-0.02	0.10	0.40	0.31	0.08	-0.08	-0.51	-0.17	-0.49	0.35	-0.35	0.52	-0.14	-0.09	0.39	-0.17	0.38	-0.11	0.45	0.56	1

Figure S1. Phylogenetic tree of the 201 species in this study.

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