Table S1 Woody species type and biomass regression models

Species	Regression models	Reference
Alangium platanifolium	$Y=0.1216(D^2H)^{0.803}$-$0.045388(D^2H)^{0.666}$	Du et al. 2015
Cupressus funebris	$Y=0.0641(D^2H)^{0.9313}$	Luo et al. 2016
Robinia pseudoacacia, Cladrastis platycarpa, Lespedeza sps, Albizia kalkora	$Y=0.0810(D^2H)^{0.8619}$	Luo et al. 2016
Millettia pachycarpa, Hylocereus undulatus	$lnY=-1.423+2.155ln(d)$	Yuan et al. 2009
Itea yunnanensis	$Y=1.9545(D^2H)^{0.8996}$	Liu et al. 2009
Liquidambar formosana	$Y=0.0761(D^2H)^{0.9078}$	Luo et al. 2016
Melia azedarach, Toona sinensis	$Y=0.0766(D^2H)^{1.0028}$	Luo et al. 2016
Coriaria nepalensis	$Y=0.001348(d^2H)^{0.832}$	Wang 2009
Vitis vinifera	$Y=0.0230(d^2H)^{1.0766}$	Wu et al. 2012
Rhus punjabensis,Toxicodendron vernicifluum	$lnY=4.0226+0.8738(D^2H)$	Li et al. 2000
Rhus chinensis	$Y=0.13292(D^2H)^{0.718}$-$0.027(D^2H)^{0.740}$	Du et al. 2015
Acer oblongum	$Y=0.1606(D^2H)^{0.8974}$	Luo et al. 2016
Broussonetia papyrifera,Cudrania tricuspidata	$Y=1.7579(D^2H)^{1.5784}$	Wei et al. 2007
Camellia oleifera	$Y=0.02d^{2.031}+0.082D^{2.088}$	Wang et al. 2015
Cryptomeria fortunei	$Y=0.0180(D^2H)+21.7811$	Mo 2013
Cunninghamia lanceolata	$Y=0.05497\times D^{1.9233}H^{0.6505}$	Zeng et al. 2011
Rhamnus rosthornii ,Rhamnus virgata	$Y=0.9598(d^2H)^{0.8849}$	Liu et al. 2009
Pinus massoniana	$Y=0.1039(D^2H)^{0.81942}$	Luo et al. 2016
Eucalyptus robusta	$Y=0.138D^{2.436}$-$0.06D^{1.771}$	Wang et al. 2015
Kalopanax septemlobus,Aralia chinensis	$Y=1.1416(D^2H)^{0.8828}$	Liu et al. 2009
Litsea rubescens	$Y=0.104D^{2.53}$-$0.043D^{2.165}$	Wang et al. 2015
Cinnamomum bodinieri	$Y=0.1910(D^2H)^{0.8089}$	Luo et al. 2016
Catalpa ovata	$Y=0.104D^{2.53}$-$0.043D^{2.165}$	Wang et al. 2015
Mallotus sps,Vernicia fordii,Amygdalus persica,Eriobotrya japonica ,Crataegus pinnatifida,Prunus salicina,Populus adenopoda ,Myrica rubra,Celtis sinensis	$Y=0.171D^{2.382}$-$0.06D^{2.148}$	Wang et al. 2015
Pyracantha fortuneana,Maesa perlarius,Dendrolobium triangulare, Discocleidion rufescens,Prinsepia utilis,Indigofera bungeana,Morus australis,Ficus gasparriniana ,Za	$Y=0.247\times(d^2H)^{0.3732}+0.462\times(d^2H)^{0.5657}$	Ju et al. 2012

nthoxylum bungeanum,Zanthoxyl um armatum, other tree seedlings		
Cerasus tomentosa, Rosa henryi,Rosa cymosa	$Y=0.042\times(d^2H)^{0.67}$	Luo et al. 2017
Viburnum chinshanense	$Y=0.003\times(CH)^{0.90}$	Luo et al. 2017

Note: Y, D, d, H and C in regression models indicate biomass, diameter at 1.3 m, ground diameter at 2 cm, height and cross sectional area at 1.3 m.

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Table S2 Pearson correlation coefficients of soil PLFA indices

	Total bacterial PLFA	Total bacterial PLFA	General bacterial PLFA	G-	G+	Fungal PLFA	Actinomycic PLFA	Eucaryotic PLFA	G+/G-	F/B	Cy/Pr	S/M	Microbial S	Microbial H
Total PLFA	1													
Total bacterial PLFA	0.999**	1												
General bacterial PLFA	0.964**	0.969**	1											
G-	0.975**	0.978**	0.905**	1										
G+	0.983**	0.979**	0.960**	0.924**	1									
Fungal PLFA	-0.23	-0.252*	-0.286*	-0.233	-0.229	1								
Actinomycic PLFA	0.974**	0.963**	0.920**	0.928**	0.975**	-0.228	1							
Eucaryotic PLFA	0.423**	0.419**	0.373**	0.439**	0.394**	-0.073	0.380**	1						
G+/G-	-0.399**	-0.402**	-0.276*	-0.528**	-0.278*	0.078	-0.365**	-0.283*	1					
F/B	-0.458**	-0.476**	-0.535**	-0.432**	-0.450**	0.830**	-0.444**	-0.163	0.284*	1				
Cy/Pr	-0.153	-0.162	-0.243	-0.088	-0.193	0.494**	-0.161	-0.068	-0.162	0.434**	1			
S/M	0.068	0.066	-0.006	0.132	0.019	0.243	0.035	0.244	-0.309*	0.15	0.611**	1		
Microbial S	-0.205	-0.219	-0.246	-0.191	-0.22	0.737**	-0.211	-0.13	-0.015	0.625**	0.474**	0.277*	1	
Microbial H	0.001	-0.002	-0.089	0.083	-0.06	0.314*	-0.02	-0.055	-0.387**	0.256*	0.429**	0.420**	0.666**	1

Table S3 Principal components analysis of soil PLFA indices

Principal components	PC–1	PC–2	PC–3
Eigenvalues	6.715	3.135	1.303
Variation (%)	47.967	22.394	9.308
Cumulative (%)	47.967	70.361	79.669
Total PLFA	**0.971**	0.187	0.141
Total bacterial PLFA	**0.974**	0.173	0.124
General bacterial PLFA	**0.953**	0.064	.186
G-	**0.946**	0.252	0.018
G+	**0.953**	0.128	0.228
Fungal PLFA	-0.428	0.673	0.475
Actinomycic PLFA	**0.946**	0.161	0.171
Eucaryotic PLFA	0.465	0.168	-0.158
G+/G-	-0.421	-0.406	**0.571**
F/B	-0.633	0.490	0.450
Cy/Pr	-0.286	**0.719**	-0.190
S/M	.003	0.668	-0.456
Microbial S	-0.386	**0.751**	0.276
Microbial H	-0.108	0.**739**	-0.228

Note: PC–1, PC–2 and PC–3 indicate the first to third principal component, respectively. Bold factors are considered highly weighted.

Table S4 Pearson correlation coefficients of edaphic factors

	SOC	TN	TP	Soil C:N	Soil C:P	Soil N:P	Ts	pH	SWC	BD	NH_4^+	NO_3^-	Soil AP	Soil AK	Soil TK	Soil Ca	Soil Mg
SOC	1																
TN	0.973**	1															
TP	0.317*	0.420**	1														
Soil C:N	0.780**	0.637**	0.14	1													
Soil C:P	0.720**	0.616**	-0.388**	0.646**	1												
Soil N:P	0.540**	0.473**	-0.548**	0.387**	0.948**	1											
Ts	-0.049	0.034	0.277*	-0.245	-0.286*	-0.286*	1										
pH	0.523**	0.536**	0.313*	0.352**	0.236	0.105	-0.198	1									
SWC	0.676**	0.584**	0.02	0.712**	0.643**	0.497**	-0.408**	0.352**	1								
BD	-0.513**	-0.488**	-0.339**	-0.531**	-0.222	-0.072	0.014	-0.279*	-0.486**	1							
NH_4^+	0.634**	0.542**	-0.17	0.535**	0.743**	0.645**	-0.129	0.225	0.553**	-0.204	1						
NO_3^-	-0.13	-0.012	0.289*	-0.429**	-0.359**	-0.306*	0.355**	0.175	-0.385**	0.155	-0.184	1					
Soil AP	0.034	0.141	0.678**	-0.178	-0.391**	-0.451**	0.411**	0.246	-0.194	0.011	-0.226	0.461**	1				
Soil AK	0.519**	0.550**	0.418**	0.342**	0.159	0.027	0.007	0.810**	0.308*	-0.291*	0.233	0.327**	0.379**	1			
Soil TK	0.037	0.06	-0.350**	-0.091	0.342**	0.473**	-0.401**	0.056	0.06	0.112	0.282*	0.01	-0.197	0.134	1		
Soil Ca	0.168	0.206	0.165	-0.005	-0.022	-0.075	0.208	0.603**	0.112	-0.102	-0.015	0.313*	0.305*	0.519**	-0.176	1	
Soil Mg	0.355**	0.307*	0.131	0.381**	0.253*	0.135	-0.397**	0.561**	0.281*	-0.330**	0.246	0.052	0.026	0.552**	0.11	0.415**	1

Table S5 Principal components analysis of soil PLFA indices

Principal components	PC–1	PC–2	PC–3	PC–4
Eigenvalues	5.999	3.81	1.804	1.421
Variation (%)	35.289	22.412	10.613	8.359
Cumulative (%)	35.289	57.701	68.314	76.674
SOC	**0.914**	0.183	-0.219	0.208
TN	**0.837**	0.292	-0.185	0.288
TP	0.062	**0.816**	-0.373	-0.057
Soil C:N	0.817	-0.031	-0.364	-0.194
Soil C:P	**0.831**	-0.441	0.057	0.252
Soil N:P	0.668	-0.567	0.196	0.344
Ts	-0.316	0.419	-0.337	**0.633**
pH	0.589	0.541	0.381	-0.171
SWC	0.807	-0.117	-0.183	-0.191
BD	-0.529	-0.242	0.403	0.270
NH_4^+	0.726	-0.248	0.027	0.324
NO_3^-	-0.260	0.574	0.399	0.378
Soil AP	-0.154	**0.777**	-0.025	0.220
Soil AK	0.543	0.644	0.347	-0.011
Soil TK	0.213	-0.374	**0.606**	0.170
Soil Ca	0.204	0.583	0.380	-0.024
Soil Mg	0.526	0.281	0.404	-0.455

Table S6 Pearson correlation coefficients of environment background factors

	sand	silt	clay	Elevation	MAP	MAT	Soil depth
sand	1						
silt	-0.996**	1					
clay	-0.207	0.121	1				
Elevation	0.550**	-.547**	-0.116	1			
MAP	0.169	-0.161	-0.108	-0.171	1		
MAT	-0.389**	0.362**	0.349**	-0.545**	0.270*	1	
Soil depth	-0.733**	0.740**	0.034	-0.112	-0.355**	-0.063	1

Table S7 Principal components analysis of environment background factors

Principal components	PC–1	PC–2	PC–3
Eigenvalues	3.174	1.698	1.051
Variation (%)	45.34	24.25	15.01
Cumulative (%)	45.34	69.591	84.6
sand	**-0.976**	0.106	0.064
silt	**0.965**	-0.129	-0.145
clay	0.282	0.248	**0.876**
Elevation	-0.655	-0.497	0.202
MAP	-0.163	**0.713**	-0.429
MAT	0.504	**0.716**	0.158
Soil depth	0.708	-0.583	-0.087

Table S8 Pearson correlation coefficients of plant factors

	S	H	D	J	woody biomass	herb biomass	litter biomass	leaf C	leaf N	leaf P	leaf C:N	leaf C:P
S	1											
H	0.891**	1										
D	0.744**	0.953**	1									
J	0.679**	0.917**	0.988**	1								
woody biomass	0.475**	0.451**	0.473**	0.479**	1							
herb biomass	-0.109	-0.134	-0.19	-0.223	-0.22	1						
litter biomass	0.007	0.139	0.244	0.270*	0.081	-0.058	1					
leaf C	0.194	0.171	0.219	0.216	0.116	-0.196	0.185	1				
leaf N	0.183	0.088	0.108	0.082	0.355**	-0.360**	-0.065	-0.171	1			
leaf P	0.035	-0.159	-0.202	-0.211	0.206	-0.053	-0.157	-0.266*	0.599**	1		
leaf C:N	-0.194	-0.12	-0.118	-0.111	-0.256*	0.403**	0.002	0.336**	-0.918**	-0.585**	1	
leaf C:P	0.033	0.178	0.23	0.233	-0.07	-0.025	0.119	0.432**	-0.519**	-0.884**	0.568**	1
leaf N:P	0.122	0.213	0.267*	0.246	0.094	-0.224	0.098	-0.07	0.337**	-0.454**	-0.311*	0.464**
litter C	0.041	0.028	0.084	0.065	-0.113	-0.238	0.229	0.482**	-0.171	-0.192	0.16	0.252*
liitter N	0.09	0.093	0.105	0.084	-0.012	-0.254*	-0.098	0.064	0.327**	0.344**	-0.314*	-0.268*
litter P	-0.16	-0.188	-0.171	-0.165	-0.033	-0.121	-0.17	-0.073	0.326**	0.519**	-0.296*	-0.407**
litter C:N	-0.178	-0.158	-0.11	-0.086	-0.022	0.153	0.249*	0.202	-0.425**	-0.424**	0.422**	0.395**
litter C:P	-0.021	0.034	0.095	0.105	-0.081	-0.083	0.244	0.285*	-0.363**	-0.593**	0.333**	0.618**
litter N:P	0.232	0.331**	0.370**	0.355**	-0.082	-0.182	0.217	0.271*	-0.286*	-0.643**	0.241	0.636**
litter K	0.361**	0.353**	0.248*	0.232	0.328**	0.096	-0.17	-0.301*	0.184	0.09	-0.227	-0.177
litter Ca	-0.018	0.085	0.152	0.145	0.107	-0.405**	0.021	-0.317*	0.627**	0.324**	-0.645**	-0.347**
litter Mg	-0.142	-0.171	-0.211	-0.232	-0.093	-0.034	-0.225	-0.445**	0.301*	-0.055	-0.293*	-0.037
leaf K	-0.2	-0.24	-0.275*	-0.258*	-0.035	-0.049	-0.213	-0.639**	0.346**	0.526**	-0.456**	-0.559**

leaf Ca	0.291*	0.411**	0.479**	0.477**	0.1	-0.451**	0.072	-0.055	.488**	0.224	-.527**	-0.217
leaf Mg	-0.021	-0.075	-0.148	-0.143	-0.036	-0.362**	-0.195	-.384**	.393**	0.185	-.492**	-.282*
	leaf N:P	litter C	liitter N	litter P	litter C:N	litter C:P	litter N:P	litter K	litter Ca	litter Mg	leaf K	leaf Ca
leaf N:P	1											
litter C	-0.1	1										
liitter N	-0.081	0.092	1									
litter P	-0.207	-0.054	0.803**	1								
litter C:N	0.036	0.339**	-0.806**	-0.619**	1							
litter C:P	0.266*	0.417**	-0.521**	-0.572**	0.755**	1						
litter N:P	0.364**	0.333**	-0.261*	-0.553**	0.366**	0.844**	1					
litter K	0.144	-.0452**	0.288*	0.154	-0.501**	-0.456**	-0.236	1				
litter Ca	0.319*	-0.092	0.381**	0.397**	-0.408**	-0.333**	-0.205	0.151	1			
litter Mg	0.557**	-0.409**	0.082	0.043	-0.291*	-0.221	-0.106	0.380**	0.486**	1		
leaf K	-0.23	-0.259*	0.036	0.137	-0.23	-0.344**	-0.362**	0.141	0.288*	0.258*	1	
leaf Ca	0.174	0.021	0.344**	0.254*	-0.354**	-0.064	0.197	0.024	0.614**	0.042	0.076	1
leaf Mg	0.173	-0.213	0.027	0.026	-0.227	-0.19	-0.13	0.253*	0.485**	0.540**	0.516**	0.304*

Table S9 Principal components analysis of plant factors

Principal components	PC–1	PC–2	PC–3	PC–4	PC–5	PC–6	PC–7
Eigenvalues	6.721	5.035	2.794	2.308	1.862	1.128	1.016
Variation (%)	26.885	20.14	11.177	9.232	7.449	4.511	4.065
Cumulative (%)	26.885	47.025	58.203	67.434	74.883	79.394	83.458
S	-0.003	0.779	-0.228	-0.280	-0.156	-.072	-0.231
H	-0.088	**0.908**	-0.176	-0.274	-0.072	-0.170	-0.001
D	-0.129	**0.933**	-0.154	-0.143	-0.055	-0.110	0.124
J	-0.137	**0.912**	-0.149	-0.125	-0.072	-0.108	0.144
woody biomass	0.135	0.531	-0.162	-0.198	-0.345	**0.503**	-0.217
herb biomass	-0.192	-0.406	-0.220	-0.571	-0.036	-0.022	0.367
litter biomass	-0.270	0.233	-0.023	0.260	-0.184	0.221	**0.676**
leaf C	-0.501	0.240	-0.391	0.362	0.197	0.294	-0.289
leaf N	**0.729**	0.323	0.196	0.242	-0.184	0.338	-0.055
leaf P	**0.767**	-0.143	-0.356	0.152	-0.395	0.065	-0.037
leaf C:N	**-0.752**	-0.329	-0.261	-0.237	0.246	-0.153	-0.018
leaf C:P	**-0.773**	0.202	0.249	-0.048	0.416	0.072	-0.090
leaf N:P	-0.059	0.425	**0.708**	-0.043	0.308	0.350	0.096
litter C	-0.408	0.103	-0.181	**0.644**	0.004	-0.078	-0.137
liitter N	0.555	0.199	-0.389	0.260	**0.578**	-0.082	0.007
litter P	0.632	-0.101	-0.403	0.277	0.427	0.050	0.077
litter C:N	**-0.737**	-0.195	0.233	0.106	-0.459	0.153	0.013
litter C:P	**-0.779**	0.108	0.367	0.265	-0.169	-0.065	-0.053
litter N:P	-0.654	0.409	0.353	0.170	0.047	-0.283	-0.039
litter K	0.425	0.289	-0.009	-0**.654**	0.210	0.040	-0.073
litter Ca	0.657	0.303	0.342	0.299	0.106	0.000	0.216
litter Mg	0.415	-0.063	**0.692**	-0.266	0.349	0.107	-0.001
leaf K	0.604	-0.272	0.215	-0.059	-0.412	-0.319	-0.044
leaf Ca	0.382	0.598	0.109	0.388	-0.011	-0.342	0.149
leaf Mg	0.517	0.024	0.571	0.030	-0.099	-0.239	-0.278

Table S10 Forward selection of soil microbial communities with background, edaphic and plant variables in two soil depth karst communities

Community	PLFA of general bacteria, G+, G-, fungi, eukaryote, actinomycete		G+/G-, F/B		Cy/Pr, S/M		Microbial S and H	
	Predictors	Accumulated Adj R^2	Predictors	Accumulated Adj R^2	Predictors	Accumulated Adj R^2	Predictors	Accumulated Adj R^2
all	SWC	0.16	MAT	0.15	pH	0.50	SOC	0.41
	pH	0.21	NH_4^+	0.25	TP	0.56	leaf P	0.47
	leaf Mg	0.33	soil C:P	0.36	elevation	0.60	sand	0.52
	soil C:N	0.37	soil AP	0.41	leaf N:P	0.62	NH_4^+	0.57
	herb biomass	0.41	J	0.48			soil Mg	0.60
			leaf Mg	0.52			leaf Mg	0.63
			litter Mg	0.57				
			pH	0.60				
			SWC	0.63				
			BD	0.66				
thin	litter P	0.19	litter C:P	0.27	soil AK	0.39	TN	0.67
	leaf N	0.45	leaf Mg	0.46	MAT	0.58	leaf K	0.74
	herb biomass	0.51	MAT	0.56	NO_3^-	0.64		
			woody biomass	0.62				
	TP	0.56			soil Mg	0.69		
			litter C:N	0.71				
thick	SWC	0.32	MAT	0.12	pH	0.53	elevation	0.15
	leaf C	0.41	NH_4^+	0.31	soil Ca	0.63	soil TK	0.25
			soil AP	0.38	soil Mg	0.68	sand	0.31
			soil N:P	0.54	Ts	0.74	soil Mg	0.43
			leaf P	0.62	sand	0.80		
			litter C:N	0.65	leaf Ca	0.83		
			BD	0.72	J	0.86		
			S	0.75	soil AP	0.88		
			litter biomass	0.79				