

Supplementary Captions

Supplementary Figures

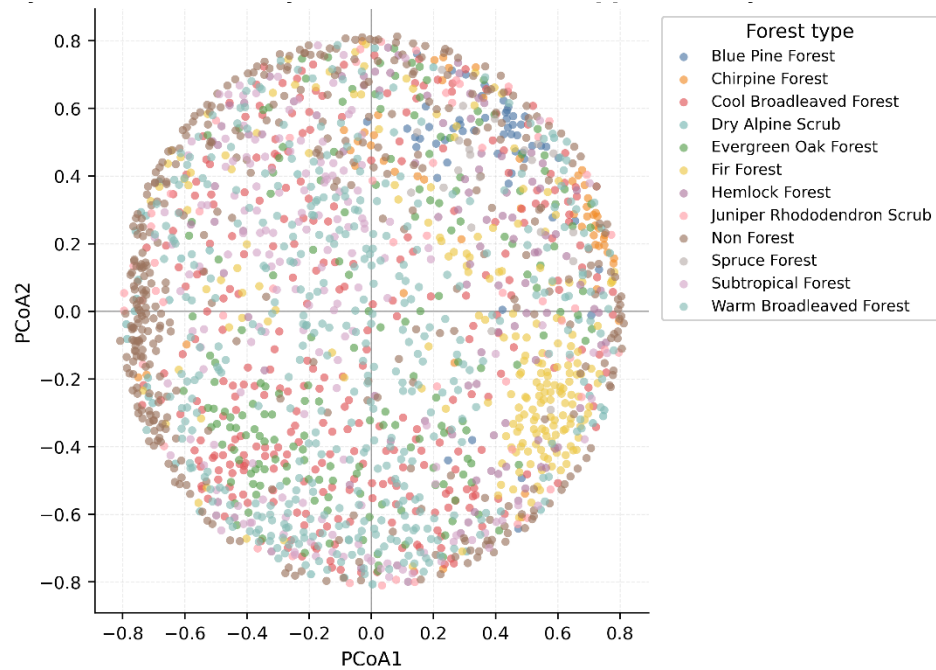


Fig. S1. Supplementary principal coordinates analysis (PCoA) ordination of plot species composition based on Bray–Curtis dissimilarity, provided as a metric complement to the NMDS in Fig. 3. Points are coloured by joined forest-type class. Axes represent the primary dimensions of variation in the dissimilarity matrix.

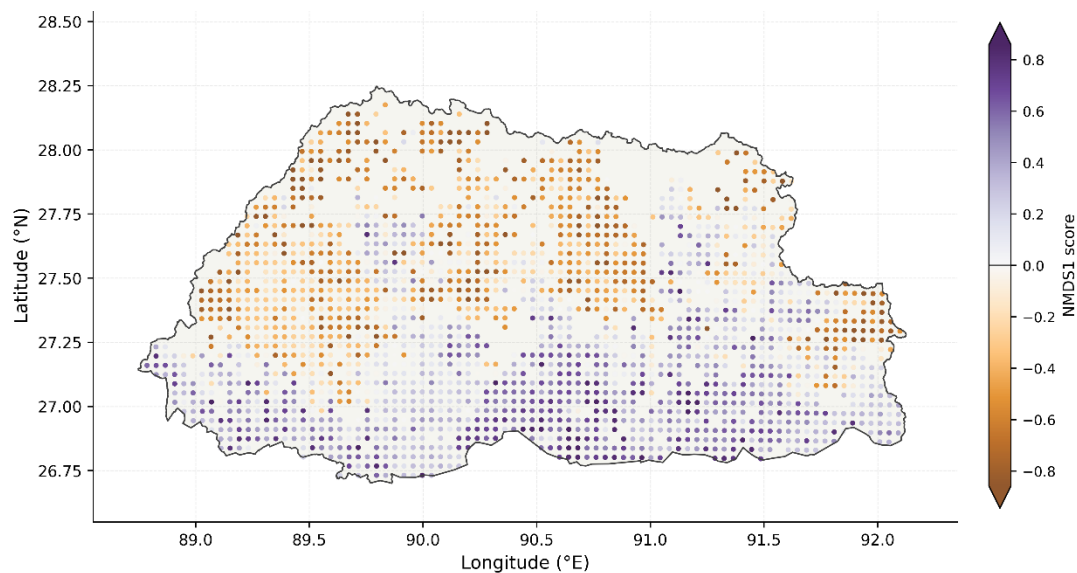


Fig. S2. Spatial distribution of NMDS axis-1 scores across the 1,942 inventory plots in Bhutan, illustrating the geographic organization of the primary compositional gradient. The two-dimensional NMDS solution (Kruskal stress-1 = 0.3384) indicates a poor low-dimensional fit; spatial patterns should therefore be interpreted with caution, as they may partly reflect ordination distortion rather than true compositional gradients. Map lines delineate study areas and do not necessarily depict accepted national boundaries.

Supplementary Tables

Table S1. Significant indicator species associated with Bhutan's forest types. Only species with FDR-adjusted p-values < 0.05 are shown. Indicator value refers to the IndVal statistic; higher values indicate stronger fidelity and specificity to a given forest type.

Forest type	Species	Indicator value (IndVal)	Adjusted p-value	Significance
Blue Pine Forest	<i>Pinus Wallichiana</i>	0.411	0.019	Yes
	<i>Elsholtzia Fruticosa</i>	0.245	0.019	Yes
	<i>Rosa Sericea</i>	0.233	0.019	Yes
	<i>Elaeagnus Parvifolia</i>	0.184	0.019	Yes
	<i>Berberis Asiatica</i>	0.181	0.019	Yes
	<i>Populus Ciliata</i>	0.152	0.019	Yes
	<i>Rosa Macrophylla</i>	0.103	0.019	Yes
	<i>Colquhounia Coccinea</i>	0.101	0.019	Yes
	<i>Jasminum Officinale</i>	0.093	0.019	Yes
	<i>Rubus Biflorus</i>	0.077	0.019	Yes
	<i>Philadelphus Tomentosus</i>	0.075	0.031	Yes
	<i>Benthamidia Capitata</i>	0.074	0.019	Yes
	<i>Coriaria Napalensis</i>	0.067	0.031	Yes
	<i>Geranium Sp.</i>	0.052	0.04	Yes
<i>Arisaema Sp.</i>	0.048	0.019	Yes	
Chirpine Forest	<i>Pinus Roxburghii</i>	0.794	0.019	Yes
	<i>Indigofera Dosua</i>	0.496	0.019	Yes
	<i>Rhus Paniculata</i>	0.359	0.019	Yes
	<i>Desmodium Elegans</i>	0.278	0.019	Yes
	<i>Osyris Lanceolata</i>	0.208	0.019	Yes
	<i>Woodfordia Fruticosa</i>	0.149	0.019	Yes
	<i>Phyllanthus Emblica</i>	0.118	0.019	Yes
	<i>Ageratina Adenophora</i>	0.115	0.019	Yes
	<i>Quercus Griffithii</i>	0.112	0.031	Yes
	<i>Quercus Lanata</i>	0.108	0.019	Yes
	<i>Duhaldea Cappa</i>	0.099	0.019	Yes
	<i>Sapium Insigne</i>	0.095	0.019	Yes
	<i>Desmodium Triflorum</i>	0.086	0.019	Yes
	<i>Desmodium Confertum</i>	0.079	0.031	Yes

	<i>Rhus Chinensis</i>	0.074	0.031	Yes
	<i>Grewia Optiva</i>	0.071	0.019	Yes
	<i>Dohaldia Cappa</i>	0.047	0.019	Yes
Cool Broadleaved Forest	<i>Elatostema Sp.</i>	0.089	0.031	Yes
Dry Alpine Scrub	<i>Rhododendron Anthopogon</i>	0.283	0.019	Yes
	<i>Rhododendron Aeruginosum</i>	0.166	0.019	Yes
	<i>Rhododendron Setosum</i>	0.163	0.019	Yes
	<i>Juniperus Squamata</i>	0.117	0.019	Yes
	<i>Berberis Angulosa</i>	0.098	0.031	Yes
	<i>Anaphalis Contorta</i>	0.097	0.019	Yes
	<i>Juniperus Communis</i>	0.091	0.019	Yes
	<i>Bergenia Purpurascens</i>	0.088	0.019	Yes
	<i>Potentilla Peduncularis</i>	0.079	0.031	Yes
	<i>Bistorta Griffithii</i>	0.078	0.019	Yes
	<i>Rhododendron Bhutanense</i>	0.064	0.019	Yes
	<i>Rhododendron Wightii</i>	0.059	0.019	Yes
	<i>Bistorta Amplexicaulis</i>	0.058	0.031	Yes
	<i>Rhododendron Wallichii</i>	0.055	0.04	Yes
Evergreen Oak Forest	<i>Quercus Lamellosa</i>	0.301	0.019	Yes
	<i>Persea Sp.</i>	0.208	0.019	Yes
	<i>Symplocos Sp.</i>	0.173	0.019	Yes
	<i>Quercus Oxyodon</i>	0.132	0.019	Yes
	<i>Persea Clarkeana</i>	0.126	0.019	Yes
	<i>Cinnamomum Sp.</i>	0.112	0.031	Yes
	<i>Quercus Glauca</i>	0.1	0.019	Yes
	<i>Eurya Sp.</i>	0.095	0.019	Yes
	<i>Mahonia Napaulensis</i>	0.08	0.019	Yes
	<i>Michelia Sp.</i>	0.075	0.04	Yes
	<i>Quercus Sp.</i>	0.074	0.04	Yes
Fir Forest	<i>Abies Densa</i>	0.387	0.019	Yes
	<i>Rhododendron Hodgsonii</i>	0.107	0.031	Yes
	<i>Sorbus Microphylla</i>	0.105	0.019	Yes
	<i>Sorbus Sp.</i>	0.098	0.019	Yes
	<i>Ribes Himalense</i>	0.094	0.019	Yes
	<i>Rhododendron Sp.</i>	0.089	0.031	Yes
	<i>Ribes Griffithii</i>	0.073	0.019	Yes
	<i>Rhododendron Cinnabarinum</i>	0.066	0.019	Yes
Hemlock Forest	<i>Tsuga Dumosa</i>	0.286	0.019	Yes

	<i>Betula Utilis</i>	0.165	0.019	Yes
	<i>Gamblea Ciliata</i>	0.156	0.019	Yes
	<i>Acer Campbellii</i>	0.133	0.019	Yes
	<i>Taxus Baccata</i>	0.128	0.019	Yes
	<i>Rhododendron Falconeri</i>	0.124	0.019	Yes
	<i>Rhododendron Barbatum</i>	0.116	0.019	Yes
	<i>Rhododendron Arboreum</i>	0.098	0.031	Yes
Juniper Rhododendron Scrub	<i>Juniperus Recurva</i>	0.102	0.019	Yes
	<i>Rhododendron Lepidotum</i>	0.086	0.04	Yes
Spruce Forest	<i>Picea Spinulosa</i>	0.463	0.019	Yes
	<i>Pieris Formosa</i>	0.264	0.019	Yes
	<i>Piptanthus Nepalensis</i>	0.245	0.019	Yes
	<i>Quercus Semecarpifolia</i>	0.225	0.019	Yes
	<i>Salix Sp.</i>	0.219	0.019	Yes
	<i>Larix Griffithii</i>	0.191	0.019	Yes
	<i>Fragaria Sp.</i>	0.184	0.019	Yes
	<i>Salvia Sp.</i>	0.164	0.019	Yes
	<i>Primula Denticulata</i>	0.161	0.019	Yes
	<i>Berberis Sp.</i>	0.125	0.019	Yes
	<i>Carex Sp.</i>	0.116	0.019	Yes
	<i>Enkianthus Deflexus</i>	0.109	0.019	Yes
	<i>Lyonia Sp.</i>	0.1	0.019	Yes
	<i>Rhododendron Triflorum</i>	0.083	0.031	Yes
	<i>Berberis Aristata</i>	0.069	0.04	Yes
<i>Hypericum Choisianum</i>	0.063	0.019	Yes	
<i>Spiraea Bella</i>	0.057	0.031	Yes	
Subtropical Forest	<i>Pterospermum Acerifolium</i>	0.314	0.019	Yes
	<i>Tabernaemontana Divaricata</i>	0.293	0.019	Yes
	<i>Boehmeria Sp.</i>	0.208	0.019	Yes
	<i>Psilanthus Bengalensis</i>	0.184	0.019	Yes
	<i>Leea Asiatica</i>	0.181	0.019	Yes
	<i>Duabanga Grandiflora</i>	0.146	0.019	Yes
	<i>Ficus Sp.</i>	0.146	0.019	Yes
	<i>Mallotus Philippensis</i>	0.144	0.019	Yes
	<i>Ostodes Paniculata</i>	0.144	0.019	Yes
	<i>Polyalthia Simiarum</i>	0.139	0.019	Yes
	<i>Wrightia Arborea</i>	0.135	0.019	Yes
	<i>Bauhinia Purpurea</i>	0.132	0.019	Yes
<i>Sterculia Villosa</i>	0.132	0.019	Yes	

<i>Tetrameles Nudiflora</i>	0.131	0.019	Yes
<i>Clerodendrum Viscosum</i>	0.13	0.019	Yes
<i>Chukrasia Tabularis</i>	0.122	0.019	Yes
<i>Aphanamixis Polystachya</i>	0.114	0.019	Yes
<i>Schima Wallichii</i>	0.111	0.019	Yes
<i>Maesa Indica</i>	0.107	0.019	Yes
<i>Phlogacanthus Thyrsiformis</i>	0.107	0.019	Yes
<i>Mangifera Sylvatica</i>	0.105	0.019	Yes
<i>Actinodaphne Obovata</i>	0.104	0.019	Yes
<i>Dendrocnide Sinuata</i>	0.103	0.019	Yes
<i>Stereospermum Personatum</i>	0.101	0.019	Yes
<i>Albizia Sp.</i>	0.099	0.019	Yes
<i>Callicarpa Arborea</i>	0.097	0.019	Yes
<i>Garuga Pinnata</i>	0.097	0.019	Yes
<i>Murraya Koenigii</i>	0.096	0.019	Yes
<i>Stereospermum Chelonoides</i>	0.091	0.031	Yes
<i>Gynocardia Odorata</i>	0.088	0.019	Yes
<i>Leea Indica</i>	0.088	0.019	Yes
<i>Phoebe Lanceolata</i>	0.087	0.019	Yes
<i>Alstonia Scholaris</i>	0.084	0.019	Yes
<i>Holmskioldia Sanguinea</i>	0.084	0.031	Yes
<i>Syzygium Cumini</i>	0.084	0.019	Yes
<i>Piper Mullesua</i>	0.083	0.031	Yes
<i>Capparis Acutifolia</i>	0.082	0.04	Yes
<i>Talauma Hodgsonii</i>	0.082	0.031	Yes
<i>Croton Roxburghii</i>	0.08	0.031	Yes
<i>Aphanamixis Sp.</i>	0.079	0.04	Yes
<i>Piper Pedicellatum</i>	0.077	0.019	Yes
<i>Terminalia Myriocarpa</i>	0.076	0.019	Yes
<i>Gmelina Arborea</i>	0.075	0.04	Yes
<i>Wallichia Densiflora</i>	0.072	0.031	Yes
<i>Stereospermum Sp.</i>	0.071	0.04	Yes
<i>Croton Sp.</i>	0.07	0.031	Yes
<i>Kydia Calycina</i>	0.07	0.031	Yes
<i>Clerodendrum Serratum</i>	0.068	0.019	Yes
<i>Ailanthus Grandis</i>	0.067	0.019	Yes
<i>Lagerstroemia Parviflora</i>	0.066	0.019	Yes
<i>Ageratum Conyzoides</i>	0.065	0.031	Yes
<i>Psychotria Calocarpa</i>	0.065	0.04	Yes

	<i>Mitrephora Harai</i>	0.061	0.04	Yes
	<i>Spondias Pinnata</i>	0.061	0.031	Yes
	<i>Lantana Camara</i>	0.059	0.04	Yes
	<i>Oroxylum Indicum</i>	0.059	0.04	Yes
	<i>Piper Longum</i>	0.058	0.04	Yes
	<i>Clerodendrum Colebrookeanum</i>	0.054	0.04	Yes
	<i>Ailanthus Integrifolia</i>	0.05	0.04	Yes
Warm Broadleaved Forest	<i>Maesa Chisia</i>	0.173	0.019	Yes
	<i>Syzygium Sp.</i>	0.135	0.019	Yes
	<i>Helicia Nilagirica</i>	0.116	0.019	Yes
	<i>Macaranga Denticulata</i>	0.102	0.019	Yes
	<i>Castanopsis Sp.</i>	0.094	0.031	Yes
	<i>Boehmeria Macrophylla</i>	0.076	0.04	Yes
	<i>Litsea Sp.</i>	0.071	0.031	Yes
	<i>Engelhardia Spicata</i>	0.07	0.04	Yes
	<i>Cinnamomum Bejolghota</i>	0.063	0.04	Yes

Table S2. Environmental variable summary for the 1,942 NFI plots. Columns: variable, mean, sd, min, max, n_missing. Includes elevation, slope, aspect_northness, aspect_eastness, and bio1–bio19.

variable	mean	sd	min	max	n_missing
bio1	12.335	6.371	-4.312	23.788	3
bio10	17.197	5.689	3.083	27.467	3
bio11	6.693	6.674	-11.267	18.783	3
bio12	1719.846	866.567	548.2	5202.6	3
bio13	409.466	225.126	126.8	1317.8	3
bio14	5.615	3.928	0.8	20.2	3
bio15	94.568	6.392	76.999	113.627	3
bio16	1017.696	565.662	286.4	3448.6	3
bio17	26.403	15.103	5	82.8	3
bio18	991.214	547.524	286.4	3448.6	3
bio19	37.67	18.86	7.4	94.6	3
bio2	8.398	1.255	5.658	13.158	3
bio3	42.017	2.976	32.707	50.189	3
bio4	430.57	52.651	330.33	643.002	3
bio5	21.04	5.763	6.7	31.7	3
bio6	1.087	7.162	-17.4	12.9	3
bio7	19.953	2.306	15.3	28.1	3
bio8	17.172	5.697	3.083	27.467	3
bio9	7.65	6.656	-9.95	19.783	3
elevation	2454.085	1271.203	113	5469	0

slope 27.701 11.63 0 71.392 0

Table S3. Table S3. Pairwise Dunn's post-hoc comparisons of species richness across nine 500-m elevation bands. Values are Benjamini-Hochberg false discovery rate (BH-FDR)-adjusted p-values. Only unique pairwise comparisons are shown. Significance is defined as adjusted p < 0.05.

Elevation band 1	Elevation band 2	Adjusted p-value
<500 m	500–1,000 m	0.046
<500 m	1,000–1,500 m	0.287
<500 m	1,500–2,000 m	0.46
<500 m	2,000–2,500 m	<0.001
<500 m	2,500–3,000 m	<0.001
<500 m	3,000–3,500 m	<0.001
<500 m	3,500–4,000 m	<0.001
<500 m	>4,000 m	<0.001
500–1,000 m	1,000–1,500 m	<0.001
500–1,000 m	1,500–2,000 m	<0.001
500–1,000 m	2,000–2,500 m	<0.001
500–1,000 m	2,500–3,000 m	<0.001
500–1,000 m	3,000–3,500 m	<0.001
500–1,000 m	3,500–4,000 m	<0.001
500–1,000 m	>4,000 m	<0.001
1,000–1,500 m	1,500–2,000 m	0.651
1,000–1,500 m	2,000–2,500 m	<0.001
1,000–1,500 m	2,500–3,000 m	<0.001
1,000–1,500 m	3,000–3,500 m	<0.001
1,000–1,500 m	3,500–4,000 m	<0.001
1,000–1,500 m	>4,000 m	<0.001
1,500–2,000 m	2,000–2,500 m	<0.001
1,500–2,000 m	2,500–3,000 m	<0.001
1,500–2,000 m	3,000–3,500 m	<0.001
1,500–2,000 m	3,500–4,000 m	<0.001
1,500–2,000 m	>4,000 m	<0.001
2,000–2,500 m	2,500–3,000 m	0.046
2,000–2,500 m	3,000–3,500 m	<0.001
2,000–2,500 m	3,500–4,000 m	<0.001
2,000–2,500 m	>4,000 m	<0.001
2,500–3,000 m	3,000–3,500 m	0.017
2,500–3,000 m	3,500–4,000 m	<0.001
2,500–3,000 m	>4,000 m	<0.001
3,000–3,500 m	3,500–4,000 m	<0.001
3,000–3,500 m	>4,000 m	<0.001

Table S4. Strongest significant species co-occurrence edges identified using a hypergeometric test. Only selected high-confidence positive associations are shown for readability. The complete machine-readable edge list is provided separately. P-values were adjusted using the Benjamini-Hochberg false discovery rate procedure.

Species 1	Species 2	Observed co-occurrence count	Occupancy of species 1	Occupancy of species 2	Adjusted p-value
<i>Persea Sp.</i>	<i>Symplocos Sp.</i>	196	353	356	<0.001
<i>Rhododendron</i>					
<i>Anthopogon</i>	<i>Rhododendron Setosum</i>	77	137	114	<0.001
<i>Pinus</i>					
<i>Wallichiana</i>	<i>Rosa Sericea</i>	90	105	292	<0.001
<i>Persea Sp.</i>	<i>Quercus Lamellosa</i>	138	353	204	<0.001
<i>Abies Densa</i>	<i>Rosa Sericea</i>	140	256	292	<0.001
<i>Quercus</i>					
<i>Lamellosa</i>	<i>Symplocos Sp.</i>	134	204	356	<0.001
<i>Picea Spinulosa</i>	<i>Rosa Sericea</i>	75	84	292	<0.001
<i>Maesa Chisia</i>	<i>Schima Wallichii</i>	124	338	208	<0.001
<i>Indigofera</i>					
<i>Dosua</i>	<i>Pinus Roxburghii</i>	50	108	78	<0.001
<i>Lyonia</i>					
<i>Ovalifolia</i>	<i>Rhododendron Arboreum</i>	109	218	249	<0.001
<i>Pinus</i>					
<i>Wallichiana</i>	<i>Quercus Semecarpifolia</i>	50	105	83	<0.001
<i>Lyonia</i>					
<i>Ovalifolia</i>	<i>Quercus Griffithii</i>	76	218	122	<0.001
<i>Indigofera</i>					
<i>Dosua</i>	<i>Quercus Griffithii</i>	56	108	122	<0.001
<i>Picea Spinulosa</i>	<i>Pinus Wallichiana</i>	48	84	105	<0.001
<i>Cinnamomum</i>					
<i>Sp.</i>	<i>Persea Sp.</i>	118	204	353	<0.001
<i>Quercus</i>					
<i>Griffithii</i>	<i>Quercus Lanata</i>	48	122	78	<0.001
<i>Abies Densa</i>	<i>Sorbus Sp.</i>	78	256	125	<0.001
<i>Pieris Formosa</i>	<i>Quercus Semecarpifolia</i>	42	79	83	<0.001
<i>Boehmeria Sp.</i>	<i>Maesa Chisia</i>	134	270	338	<0.001
<i>Acer Campbellii</i>	<i>Betula Utilis</i>	99	321	170	<0.001
<i>Elsholtzia</i>					
<i>Fruticosa</i>	<i>Pinus Wallichiana</i>	43	74	105	<0.001
<i>Persea</i>					
<i>Clarkeana</i>	<i>Quercus Lamellosa</i>	64	108	204	<0.001
<i>Abies Densa</i>	<i>Betula Utilis</i>	88	256	170	<0.001
<i>Abies Densa</i>	<i>Ribes Himalense</i>	57	256	74	<0.001
<i>Picea Spinulosa</i>	<i>Pieris Formosa</i>	39	84	79	<0.001

<i>Pinus Roxburghii</i>	<i>Rhus Paniculata</i>	31	78	45	<0.001
<i>Cinnamomum</i>					
<i>Sp.</i>	<i>Symplocos Sp.</i>	111	204	356	<0.001
<i>Berberis Asiatica</i>	<i>Pinus Wallichiana</i>	52	138	105	<0.001
<i>Berberis Asiatica</i>	<i>Rosa Sericea</i>	81	138	292	<0.001
<i>Pinus</i>					
<i>Wallichiana</i>	<i>Populus Ciliata</i>	28	105	30	<0.001
<i>Pterospermum</i>					
<i>Acerifolium</i>	<i>Tabernaemontana Divaricata</i>	44	88	110	<0.001
<i>Ribes Himalense</i>	<i>Rosa Sericea</i>	57	74	292	<0.001
<i>Pieris Formosa</i>	<i>Pinus Wallichiana</i>	41	79	105	<0.001
<i>Abies Densa</i>	<i>Rhododendron Cinnabarinum</i>	59	256	87	<0.001
<i>Abies Densa</i>	<i>Rhododendron Hodgsonii</i>	54	256	76	<0.001
<i>Abies Densa</i>	<i>Sorbus Microphylla</i>	55	256	80	<0.001
<i>Cinnamomum</i>					
<i>Sp.</i>	<i>Quercus Lamellosa</i>	80	204	204	<0.001
<i>Eurya Sp.</i>	<i>Persea Sp.</i>	110	217	353	<0.001
<i>Quercus</i>					
<i>Griffithii</i>	<i>Rhododendron Arboreum</i>	67	122	249	<0.001
<i>Picea Spinulosa</i>	<i>Quercus Semecarpifolia</i>	36	84	83	<0.001
<i>Boehmeria Sp.</i>	<i>Ostodes Paniculata</i>	79	270	160	<0.001
<i>Potentilla</i>					
<i>Arbuscula</i>	<i>Rhododendron Lepidotum</i>	35	66	103	<0.001
<i>Abies Densa</i>	<i>Acer Campbellii</i>	112	256	321	<0.001
<i>Michelia Sp.</i>	<i>Quercus Lamellosa</i>	49	84	204	<0.001
<i>Boehmeria Sp.</i>	<i>Ficus Sp.</i>	110	270	301	<0.001
<i>Beilschmiedia</i>					
<i>Sp.</i>	<i>Elatostema Sp.</i>	63	132	231	<0.001
<i>Elsholtzia</i>					
<i>Fruticosa</i>	<i>Rosa Sericea</i>	51	74	292	<0.001
<i>Juniperus</i>					
<i>Squamata</i>	<i>Rhododendron Setosum</i>	37	80	114	<0.001
<i>Abies Densa</i>	<i>Rhododendron Barbatum</i>	47	256	70	<0.001
<i>Aphanamixis</i>					
<i>Polystachya</i>	<i>Ostodes Paniculata</i>	40	72	160	<0.001
<i>Maesa Chisia</i>	<i>Ostodes Paniculata</i>	84	338	160	<0.001
<i>Desmodium</i>					
<i>Elegans</i>	<i>Rhus Paniculata</i>	23	53	45	<0.001
<i>Abies Densa</i>	<i>Ribes Griffithii</i>	49	256	76	<0.001
<i>Betula Utilis</i>	<i>Gamblea Ciliata</i>	45	170	90	<0.001
<i>Juniperus</i>					
<i>Recurva</i>	<i>Rosa Sericea</i>	51	76	292	<0.001
<i>Rhododendron</i>					
<i>Aeruginosum</i>	<i>Rhododendron Anthopogon</i>	30	44	137	<0.001
<i>Ficus Sp.</i>	<i>Syzygium Sp.</i>	85	301	184	<0.001
<i>Lyonia</i>					
<i>Ovalifolia</i>	<i>Quercus Lanata</i>	46	218	78	<0.001

<i>Enkianthus</i>					
<i>Deflexus</i>	<i>Tsuga Dumosa</i>	35	63	137	<0.001
<i>Abies Densa</i>	<i>Rhododendron Sp.</i>	96	256	266	<0.001
<i>Ostodes</i>					
<i>Paniculata</i>	<i>Syzygium Sp.</i>	61	160	184	<0.001
<i>Bistorta</i>					
<i>Macrophylla</i>	<i>Rhododendron Setosum</i>	29	49	114	<0.001
<i>Acer Campbellii</i>	<i>Prunus Sp.</i>	97	321	223	<0.001
<i>Juniperus</i>					
<i>Squamata</i>	<i>Rhododendron Lepidotum</i>	34	80	103	<0.001
<i>Desmodium</i>					
<i>Elegans</i>	<i>Pinus Roxburghii</i>	26	53	78	<0.001
<i>Abies Densa</i>	<i>Rhododendron Kesangiae</i>	43	256	65	<0.001
<i>Eurya Sp.</i>	<i>Symplocos Sp.</i>	100	217	356	<0.001
<i>Psilanthus</i>					
<i>Bengalensis</i>	<i>Tabernaemontana Divaricata</i>	28	49	110	<0.001
<i>Pieris Formosa</i>	<i>Rosa Sericea</i>	50	79	292	<0.001
<i>Elatostema Sp.</i>	<i>Persea Sp.</i>	103	231	353	<0.001
<i>Acer Campbellii</i>	<i>Symplocos Sp.</i>	127	321	356	<0.001
<i>Rosa Sericea</i>	<i>Salix Sp.</i>	39	292	51	<0.001
<i>Castanopsis Sp.</i>	<i>Syzygium Sp.</i>	72	239	184	<0.001
<i>Ageratum</i>					
<i>Conyzoides</i>	<i>Sida Acuta</i>	18	66	24	<0.001
<i>Indigofera</i>					
<i>Dosua</i>	<i>Quercus Lanata</i>	33	108	78	<0.001
<i>Ficus Sp.</i>	<i>Macaranga Denticulata</i>	73	301	154	<0.001
<i>Ageratina</i>					
<i>Adenophora</i>	<i>Artemisia Sp.</i>	51	130	176	<0.001
<i>Quercus</i>					
<i>Semecarpifolia</i>	<i>Rosa Sericea</i>	50	83	292	<0.001
<i>Gaultheria</i>					
<i>Fragrantissima</i>	<i>Rhododendron Arboreum</i>	40	62	249	<0.001
<i>Quercus</i>					
<i>Griffithii</i>	<i>Viburnum Cylindricum</i>	37	122	96	<0.001
<i>Rhododendron</i>					
<i>Cinnabarinum</i>	<i>Rosa Sericea</i>	51	87	292	<0.001
<i>Artemisia Sp.</i>	<i>Rubus Ellipticus</i>	45	176	105	<0.001
<i>Quercus</i>					
<i>Lamellosa</i>	<i>Symplocos Ramosissima</i>	31	204	44	<0.001
<i>Rosa</i>					
<i>Macrophylla</i>	<i>Rosa Sericea</i>	42	62	292	<0.001
<i>Dichroa</i>					
<i>Febrifuga</i>	<i>Persea Fructifera</i>	31	104	76	<0.001
<i>Castanopsis Sp.</i>	<i>Schima Wallichii</i>	75	239	208	<0.001
<i>Berberis Asiatica</i>	<i>Quercus Semecarpifolia</i>	36	138	83	<0.001
<i>Desmodium</i>					
<i>Elegans</i>	<i>Indigofera Dosua</i>	27	53	108	<0.001
<i>Ageratina</i>	<i>Rubus Ellipticus</i>	39	130	105	<0.001

Adenophora

<i>Picea Spinulosa</i>	<i>Tsuga Dumosa</i>	36	84	137	<0.001
<i>Taxus Baccata</i>	<i>Tsuga Dumosa</i>	28	48	137	<0.001
<i>Castanopsis Sp.</i>	<i>Helicia Nilagirica</i>	49	239	97	<0.001
<i>Berberis Asiatica</i>	<i>Picea Spinulosa</i>	36	138	84	<0.001
<i>Boehmeria Sp.</i>	<i>Macaranga Denticulata</i>	67	270	154	<0.001
<i>Ageratina</i>					
<i>Adenophora</i>	<i>Maesa Chisia</i>	68	130	338	<0.001
<i>Acer Campbellii</i>	<i>Rhododendron Grande</i>	51	321	83	<0.001
<i>Juniperus</i>					
<i>Squamata</i>	<i>Rhododendron Anthopogon</i>	35	80	137	<0.001
<i>Myrica</i>					
<i>Esculenta</i>	<i>Quercus Griffithii</i>	27	49	122	<0.001
<i>Acer Campbellii</i>	<i>Viburnum Nervosum</i>	53	321	89	<0.001
<i>Quercus Lanata</i>	<i>Rhododendron Arboreum</i>	44	78	249	<0.001

Supplementary Methods

SM1. Spatial autocorrelation assessment: Mantel test of Bray-Curtis dissimilarity vs. geographic distance (B1/S2). Haversine distances; 999 permutations.

SM2. Dunn's post-hoc test procedure: 36 pairwise comparisons across 9 elevation bands; BH-FDR correction (B2/S6).

SM3. PERMDISP test implementation: permutation-based F-test of homogeneity of multivariate dispersions following Anderson (2006) (B3/S9).

SM4. Hypergeometric co-occurrence threshold: per-pair significance testing replacing fixed plot-count threshold (B4/S16).

SM5. Mann-Kendall tie-corrected variance formula (A6/S18/S19).