

Supplementary Material

Global hotspots of endemism, rarity and speciation of aquatic macrophytes

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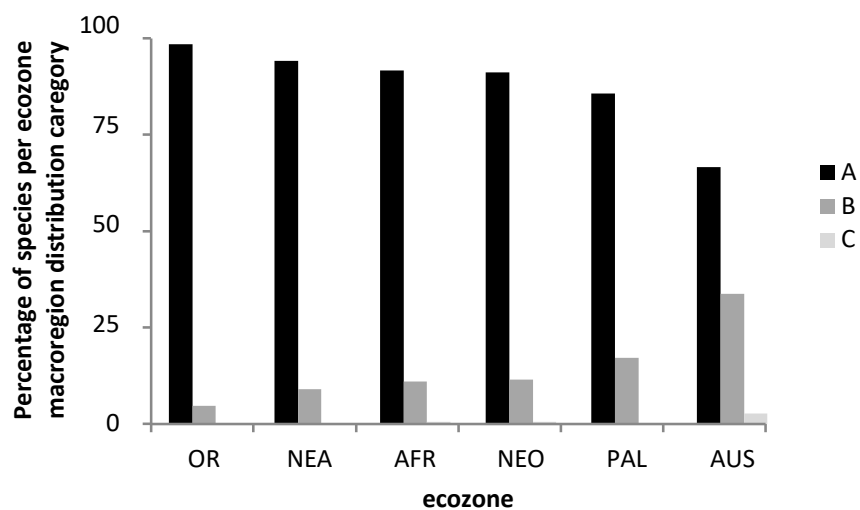


Fig S1. Occurrence of ecozone-endemic species by macroregion distribution category. A, restricted endemic distribution, with all records confined to a single geographical area (a single macroregion or >1 contiguous macroregions), within the ecozone; B, disjunct endemic distribution, with all records present in two or more non-contiguous macroregions within the ecozone; C, cosmopolitan endemic distribution across ecozone, with records present in all macroregions of the ecozone

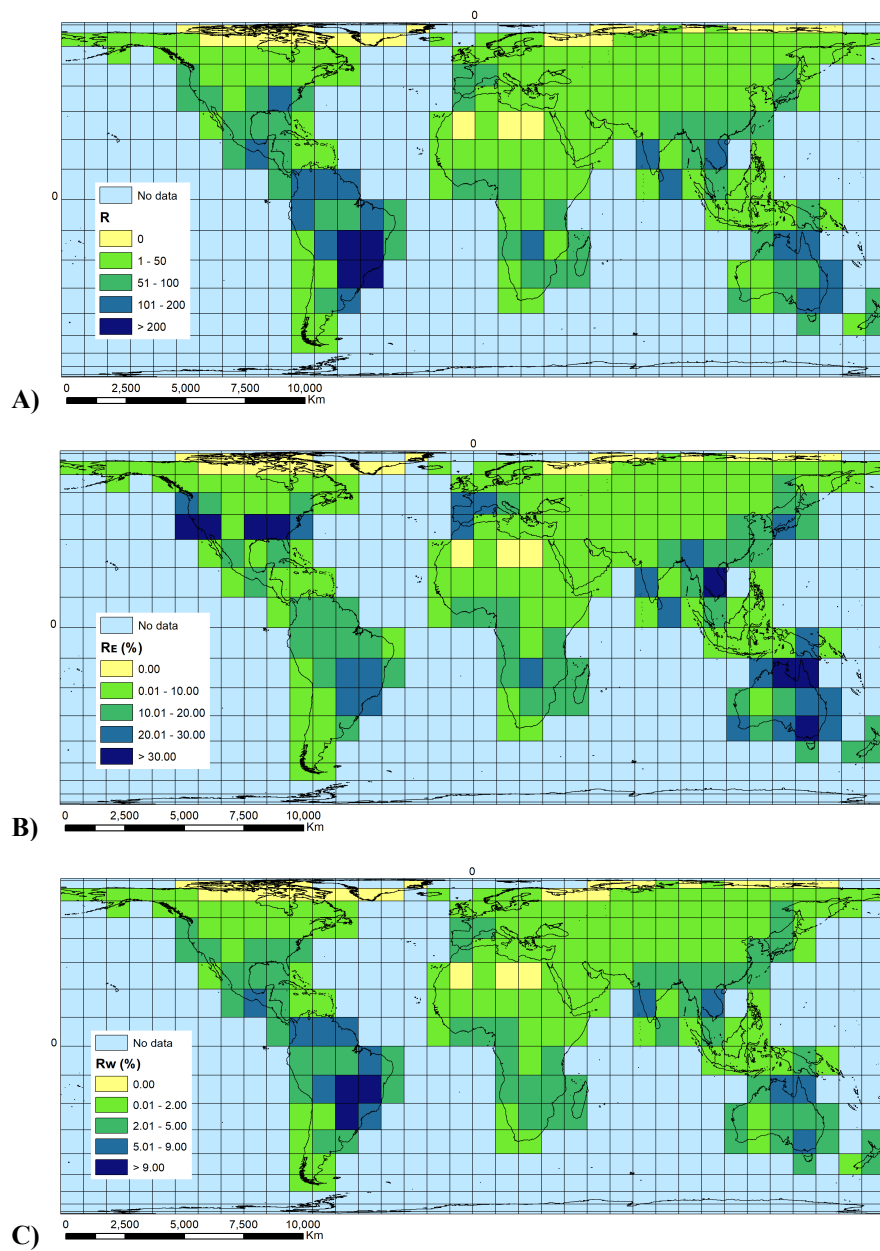
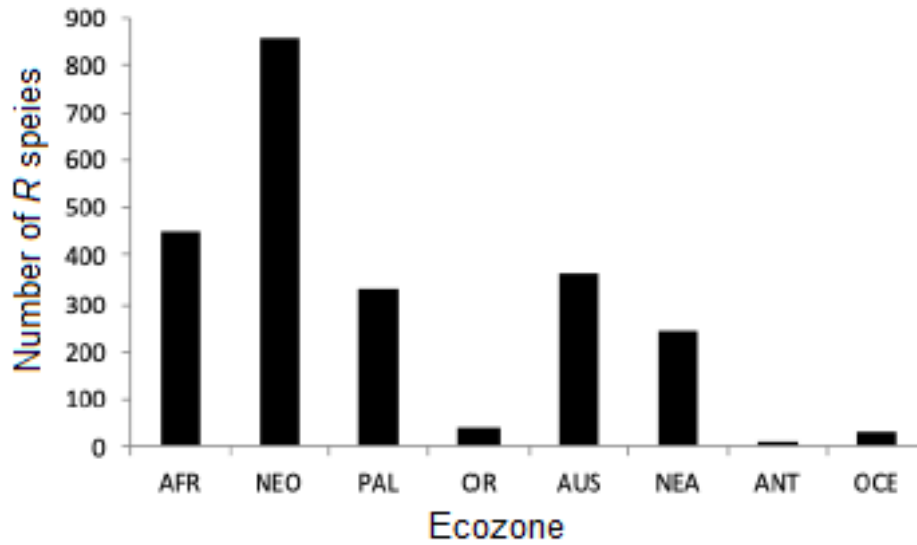


Fig S2. At grid-cell level the occurrence of all rare (*R*) species (with world distribution $\leq 5\%$ world grAH): (A) Number of rare (*R*) species (%RW) species map, (B) percentage of the total ecozone pool of *R* species (%RE), (C) percentage of the total world pool of *R*.

A)



B)

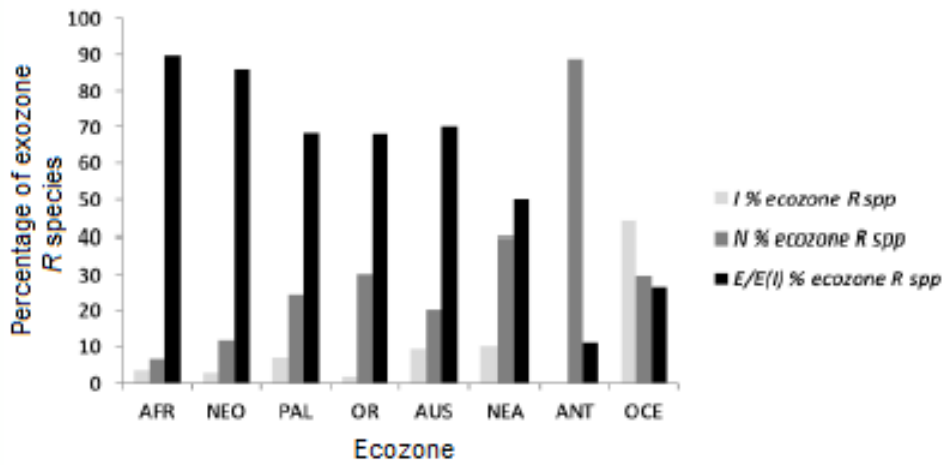


Fig S3. (A) Number of world-rare (*R*) macrophyte species present per ecozone; (B) proportion (as percentage of *R* species present in the ecozone) of world-rare macrophyte species occurring in each ecozone with *I*, *N* or *E/E(I)* origin status.

Table S1. Phylogenetic diversity indices of a global pool of macrophyte aquatic species

grid	SR	PD	MPD	MNTD	ses.PD	pd.obs.p	ses.MPD	mpd.obs.p	ses.MNTD	mntd.obs.p
NeaN A	91	4599.473	278.9917	57.29899	-3.274822763	0.002	-1.039314877	0.155	-2.0384703	0.011
NeaN B	138	5756.424	292.5777	42.0967	-4.298407095	0.001	-0.692285607	0.235	-3.6042518	0.001
NeaN C	153	6163.6058	280.5235	40.97449	-4.277542789	0.001	-1.429820772	0.073	-3.6583134	0.001
NeaN D	124	5272.2884	283.4877	36.88267	-4.64143591	0.001	-1.080748976	0.131	-4.6520277	0.001
NeaN E	116	5407.9004	277.4067	49.34774	-3.476334177	0.002	-1.275702919	0.105	-2.6852148	0.004
NeaN F	113	4993.0306	277.4634	46.60249	-4.439599842	0.001	-1.266089893	0.096	-3.2331355	0.001
NeaN G	60	3560.9451	296.3076	62.61082	-2.819347232	0.009	-0.208545844	0.46	-2.2257334	0.014
NeaN H	49	3510.5485	295.4815	87.13461	-1.350039015	0.102	-0.171134513	0.431	-0.7679236	0.23
NeaN I	25	2038.4675	262.0056	94.78468	-1.744182265	0.037	-0.719725423	0.216	-1.4774711	0.066
NeaN J	24	1603.298	215.7882	59.90526	-3.083815665	0.002	-1.664043283	0.004	-2.7977424	0.001
NeaN K	19	1351.9831	198.4121	63.2601	-2.867743615	0.001	-1.797773803	0.002	-2.6594124	0.001
NeaN L	114	5019.313	293.1051	42.26857	-4.421396187	0.001	-0.568520317	0.288	-3.7663596	0.001
NeaN M	155	6787.0854	299.3582	46.86433	-2.74764488	0.003	-0.371882984	0.354	-2.4118926	0.004
NeaN N	179	7308.1477	318.5678	41.41642	-3.057346663	0.002	0.737428621	0.767	-3.3538178	0.001
NeaN O	198	8059.3367	284.077	44.92586	-2.335302948	0.008	-1.383925769	0.079	-2.3001046	0.006
NeaN P	167	6909.542	289.8926	41.41983	-3.202846613	0.002	-0.896688095	0.189	-3.490053	0.001
NeaN Q	178	6971.8401	282.5857	39.53377	-3.906795744	0.001	-1.365512726	0.083	-3.8089849	0.001
NeaN R	146	6405.6398	276.3005	47.19134	-3.053286976	0.002	-1.546234594	0.058	-2.5533175	0.005
NeaN S	178	7332.9753	281.2537	46.81997	-3.040426035	0.003	-1.417693088	0.08	-2.1692581	0.015
NeaN T	133	6186.2384	279.4507	53.68428	-2.738972016	0.002	-1.302928552	0.101	-1.6043927	0.048
NeaN U	115	5379.4678	292.327	52.74797	-3.538005019	0.001	-0.601116664	0.285	-2.2153817	0.015
NeaN V	53	3278.2779	324.6766	55.78388	-2.719865407	0.005	0.71917767	0.767	-2.968348	0.002
NeaN W	40	3063.3034	309.2639	79.16944	-1.340826014	0.094	0.209563429	0.566	-1.6778698	0.037
NeaN X	16	1432.9193	220.3426	83.33135	-1.811869663	0.022	-1.183136937	0.063	-2.1131619	0.008
NeaN Y	14	1676.2568	291.8698	134.58023	-0.371163912	0.39	0.151330268	0.489	-0.8217409	0.218
NeaN Z	14	1441.6659	279.4825	101.41777	-1.353470956	0.08	-0.078423803	0.416	-1.6230575	0.036
NeaN AA	17	1759.7087	327.0271	93.34177	-0.942911585	0.19	0.711344175	0.735	-1.7653882	0.034
NeaN BB	14	1056.8899	199.8651	46.44977	-2.932915153	0.002	-1.456250699	0.008	-2.9844978	0.001
NeaN CC	9	818.7344	180.0745	45.9181	-2.48617701	0.001	-1.280074606	0.006	-2.6593638	0.001
NeaN DD	15	1138.1572	189.3031	61.19453	-2.772510999	0.001	-1.696666606	0.004	-2.6802955	0.003
NeaN EE	17	1583.1826	255.1921	103.50065	-1.525585616	0.066	-0.616836142	0.335	-1.481139	0.06
NeaS A	325	10908.1373	302.7595	36.7522	-2.702969486	0.001	-0.322838641	0.386	-3.5346977	0.001
NeaS B	268	9480.4056	307.1355	36.03536	-3.054031078	0.001	0.035442071	0.514	-4.0729888	0.001
NeaS C	163	7039.1521	295.7675	47.82786	-2.55777568	0.006	-0.606799292	0.282	-2.1912259	0.017
NeaS D	315	10564.9774	273.5116	37.49676	-3.043124797	0.002	-2.561887994	0.007	-3.3166473	0.001
NeaS E	340	10951.0484	279.242	37.37192	-3.367225932	0.001	-2.164082026	0.01	-3.2116528	0.002
NeaS F	375	11931.0925	283.9002	36.56019	-2.965512497	0.002	-1.840468686	0.034	-3.2386345	0.003
NeaS G	274	9615.4879	289.4787	39.78703	-3.090085084	0.002	-1.188670766	0.119	-2.9272404	0.002
NeaS H	146	6374.647	276.9682	49.41444	-3.224965904	0.001	-1.483090257	0.06	-2.1955863	0.012

NeaS I	317	10555.3459	296.5928	35.64598	-3.097987442	0.002	-0.833609339	0.2	-3.9769873	0.001
NeaS J	319	10375.2668	292.8896	36.01139	-3.558156508	0.001	-1.147282893	0.126	-3.7085776	0.001
NeaS K	213	7310.5388	278.3815	32.77708	-5.371487155	0.001	-1.831663728	0.029	-5.2052022	0.001
NeaS L	384	12351.1024	282.6215	36.79638	-2.536798543	0.005	-2.109691651	0.017	-3.0911405	0.002
NeaS M	401	12332.4316	298.1168	37.21662	-3.265076529	0.001	-0.840525113	0.214	-2.9134817	0.003
NeaS N	316	10874.35	277.9331	41.77614	-2.512799323	0.006	-2.216759666	0.019	-1.8442713	0.035
NeoC A	367	11881.4748	279.5753	36.8997	-2.680028544	0.005	-2.393096248	0.008	-3.2118115	0.001
NeoC B	372	12085.3479	276.8207	36.90847	-2.426366455	0.007	-2.61978447	0.008	-3.2019252	0.001
NeoC C	384	12623.8431	280.4418	37.73911	-1.889630204	0.035	-2.284361629	0.009	-2.6965905	0.005
NeoC D	119	5668.6497	249.8947	60.91398	-2.958224344	0.003	-2.608303391	0.004	-0.7723408	0.231
NeoC E	295	9626.8468	249.3193	36.85979	-4.082552818	0.001	-4.376755518	0.001	-3.5600594	0.001
NeoC F	490	14571.5136	279.9898	35.29028	-2.345249219	0.008	-2.777826183	0.004	-3.1211107	0.001
NeoC G	401	12621.4912	273.7193	36.70908	-2.600039587	0.004	-3.054951368	0.001	-2.971855	0.001
NeoC H	206	8199.6546	278.4465	46.30935	-2.570435534	0.005	-1.771456911	0.042	-1.802754	0.035
NeoC I	237	8622.7315	260.7903	43.55793	-3.335952075	0.001	-3.061411737	0.001	-2.1539534	0.013
NeoC J	323	10477.4097	264.6384	38.35582	-3.663413265	0.001	-3.233293712	0.001	-2.8710563	0.001
NeoC K	106	5331.5255	274.2803	48.80705	-2.657929489	0.006	-0.911664362	0.195	-2.8421023	0.001
NeoN C	503	15028.2606	285.9159	35.45462	-2.012049881	0.024	-2.208046798	0.013	-2.9722192	0.001
NeoN D	461	13588.8087	254.161	39.91894	-3.21743463	0.002	-5.263184914	0.001	-1.1413098	0.126
NeoN E	417	12066.6693	250.4684	37.69444	-4.501755888	0.001	-5.211223879	0.001	-2.4576713	0.011
NeoN F	416	13256.5328	300.0777	35.52833	-1.973226263	0.025	-0.682176593	0.256	-3.2717866	0.001
NeoN G	356	11437.515	269.6078	38.82078	-3.174194026	0.001	-3.156620643	0.001	-2.4279453	0.008
NeoN H	392	12289.9101	266.2233	39.00568	-2.927661404	0.004	-3.566267301	0.001	-2.0816937	0.012
NeoN I	457	13417.5953	270.4719	36.18336	-3.37730962	0.001	-3.60872424	0.001	-2.8019345	0.002
NeoN J	367	11798.2363	263.8708	40.28801	-2.854398973	0.002	-3.678104017	0.001	-1.8088513	0.029
NeoN K	174	7732.3753	310.5474	49.4197	-1.578622316	0.044	0.232030328	0.624	-1.6794722	0.046
NeoN L	481	14299.9843	276.0488	35.94739	-2.672870592	0.002	-3.009659399	0.002	-2.7489821	0.004
NeoN M	560	15336.7816	268.9626	34.48812	-3.631855546	0.001	-4.133484786	0.001	-3.1654652	0.001
NeoN N	579	15744.1337	263.2114	35.37622	-3.574162926	0.001	-4.90448213	0.001	-2.5623417	0.007
NeoN O	364	11893.7986	278.1118	40.6918	-2.51686499	0.005	-2.398212187	0.008	-1.7162733	0.044
NeoS A	69	4462.6375	270.5116	78.51966	-1.135714216	0.145	-1.137647873	0.127	-0.4533628	0.339
NeoS B	229	8252.2423	281.3942	42.1099	-3.821172976	0.001	-1.668736742	0.04	-2.5736586	0.003
NeoS C	566	15449.1535	277.8172	32.90686	-3.541320577	0.001	-3.268702928	0.001	-3.9904439	0.001
NeoS D	511	14670.7097	274.9765	35.08073	-3.089229554	0.001	-3.191975448	0.001	-3.1515059	0.001
NeoS E	119	6049.003	290.3056	52.57272	-1.790447763	0.035	-0.710446784	0.252	-2.1145596	0.015
NeoS F	195	8198.7233	266.7355	50.0408	-1.830295121	0.033	-2.30445529	0.009	-1.1047977	0.136
NeoS G	319	10657.2789	262.8486	41.98136	-3.086948713	0.001	-3.47105099	0.001	-1.7214267	0.045
NeoS H	123	5546.2515	276.8805	45.33973	-3.655866344	0.001	-1.377871163	0.087	-3.2647392	0.001
NeoS I	60	4206.3108	273.8288	91.76354	-0.756536246	0.221	-0.990965048	0.157	0.2093849	0.594
NeoS J	59	3634.6604	262.0848	85.53384	-2.415665379	0.009	-1.359252513	0.096	-0.3942109	0.354
NeoS K	55	3060.9038	248.3563	73.48496	-3.616544091	0.001	-1.715167174	0.031	-1.5237501	0.05
PaW A	100	4990.3672	307.0953	50.79892	-3.163175422	0.002	0.089939838	0.537	-2.7096045	0.002
PaW B	192	7359.5687	282.5731	37.06002	-3.972606667	0.001	-1.469964185	0.071	-4.1953043	0.001
PaW C	226	8439.3222	282.43	37.89828	-3.315899096	0.001	-1.592661737	0.058	-3.7995025	0.001
PaW D	224	8257.3497	282.8002	36.76611	-3.726420729	0.001	-1.568617878	0.055	-4.1803221	0.001
PaW E	133	6489.4417	305.7636	48.96186	-1.873486516	0.029	0.001286548	0.506	-2.4076371	0.003
PaW F	44	3578.1453	338.9449	81.51186	-0.31644899	0.358	1.058023196	0.862	-1.3834911	0.079
PaW G	263	9472.9057	277.3802	40.73837	-3.056660872	0.001	-2.142821117	0.018	-2.6268115	0.002
PaW H	307	10579.4582	281.6688	38.71695	-2.783489281	0.004	-2.015588718	0.025	-2.8708969	0.001
PaW I	305	10249.9326	274.0094	37.25556	-3.39053531	0.001	-2.560606061	0.006	-3.4014289	0.001

PaW J	236	8731.1966	275.0172	39.27683	-3.156948347	0.002	-2.178840654	0.013	-3.352856	0.001
PaW K	152	7205.265	277.8667	55.6504	-1.394518824	0.088	-1.456147476	0.077	-0.8177716	0.22
PaW L	184	7289.1053	269.0023	41.87382	-3.597712324	0.001	-2.173926905	0.012	-3.2428453	0.001
PaW M	322	10736.6457	298.922	37.91269	-3.028432055	0.001	-0.687496911	0.244	-3.0980336	0.002
PaW N	365	11561.3335	306.323	37.55317	-3.405641624	0.001	-0.104757462	0.458	-2.8438302	0.003
PaW O	329	11638.7817	290.4436	42.49239	-1.403030428	0.083	-1.320187153	0.095	-1.3859775	0.071
PaW P	251	9245.2252	272.656	39.78734	-2.777782123	0.004	-2.375229751	0.009	-3.105611	0.001
PaW Q	119	6023.4952	282.087	56.12959	-1.880980288	0.031	-1.118863425	0.128	-1.5534358	0.059
PaW R	217	8211.4431	276.7715	40.69696	-3.264883211	0.002	-1.941982981	0.026	-3.100578	0.001
PaW S	287	9958.152	299.6562	40.29805	-2.984866116	0.001	-0.575420538	0.287	-2.6380089	0.001
PaW T	140	6118.5565	283.4455	41.39009	-3.303841391	0.003	-1.124089195	0.13	-3.7375535	0.001
PaW U	109	5353.8166	293.8202	47.73869	-2.869112094	0.005	-0.510932565	0.33	-2.9433627	0.002
PaW V	159	6826.8747	276.2998	47.08228	-2.933335941	0.002	-1.607512947	0.048	-2.4318784	0.006
PaW W	205	8009.1418	272.9211	40.34958	-2.977924492	0.001	-2.064474123	0.017	-3.420872	0.001
PaW X	124	5351.5106	239.7708	51.50514	-4.416561229	0.001	-3.128686524	0.001	-2.1679111	0.015
PaW Y	72	3722.9009	247.9364	50.02001	-3.8991777	0.001	-2.054213438	0.006	-3.310459	0.001
PaW Z	3	869.5869	382.0008	364.59735	1.481881623	0.8325	1.706758462	0.824	1.08417	0.844
PaW AA	12	1818.2085	521.4271	106.42489	0.894376721	0.827	3.778438237	0.999	-1.6091348	0.031
PaW BB	10	1382.1489	298.4855	179.84701	-0.207829752	0.476	0.308411265	0.528	-0.1187037	0.494
PaW CC	23	2014.5745	299.7241	76.72942	-1.494057699	0.072	0.1371218	0.589	-2.1232745	0.008
PaW DD	93	4607.2656	263.6711	56.69661	-3.430321686	0.002	-1.654582976	0.046	-2.1143048	0.011
PaW EE	26	1621.4666	205.8481	59.07845	-3.395010134	0.001	-2.023408349	0.001	-2.7426893	0.001
PaC A	121	5362.1802	266.6781	51.08324	-3.966380698	0.001	-1.788207575	0.03	-2.4480197	0.008
PaC B	164	6571.3173	275.9528	39.38208	-4.06087212	0.001	-1.662400006	0.047	-3.9505294	0.001
PaC C	157	6486.8636	271.6378	41.42226	-3.783351004	0.001	-1.865768769	0.027	-3.6295524	0.001
PaC D	136	5908.4919	272.7788	48.39053	-3.775741394	0.001	-1.622463684	0.048	-2.5658666	0.006
PaC E	215	7578.9544	272.4048	31.92771	-4.913946179	0.001	-2.174228697	0.01	-5.4275262	0.001
PaC F	220	7726.2701	271.2338	35.26145	-4.79763749	0.001	-2.25080507	0.014	-4.6429387	0.001
PaC G	225	7575.4306	266.1891	33.3874	-5.443207981	0.001	-2.6185074	0.004	-5.0826877	0.001
PaC H	236	8501.6308	275.0904	38.40036	-3.753889563	0.001	-2.106328792	0.015	-3.7182083	0.001
PaC I	138	5636.1878	271.122	38.06709	-4.610345517	0.001	-1.743319261	0.037	-4.3949804	0.001
PaC J	177	6361.2554	257.8125	36.55805	-5.348194266	0.001	-2.776255113	0.005	-4.5960586	0.001
PaC K	230	7468.1328	261.3636	31.38147	-5.747511421	0.001	-2.976574714	0.001	-5.6045738	0.001
PaC L	268	8971.1942	272.6597	36.43769	-4.167703362	0.001	-2.425323062	0.007	-3.9339734	0.001
PaC M	71	3199.4786	219.2592	46.1005	-5.27922365	0.001	-2.986268971	0.001	-3.509814	0.001
PaC N	148	4940.6483	229.8175	37.66975	-7.432468947	0.001	-3.921764477	0.001	-4.5687083	0.001
PaC O	292	8885.6558	248.2257	32.61342	-5.746995987	0.001	-4.276528235	0.001	-5.0772661	0.001
PaC P	164	6692.4779	278.3838	42.88235	-3.582735761	0.001	-1.553403688	0.058	-3.1254449	0.001
PaC Q	31	2294.7477	238.5765	99.85635	-2.201090015	0.017	-1.379114942	0.114	-0.9471561	0.19
PaC R	28	2364.6276	256.5452	113.01448	-1.432736255	0.085	-0.932251926	0.171	-0.5723821	0.298
PaC S	26	2244.5522	297.2139	86.57746	-1.272288347	0.118	0.043857287	0.536	-1.7338123	0.034
PaC T	38	2817.5837	276.2884	81.13289	-1.756477526	0.047	-0.590665027	0.316	-1.611839	0.054
PaC U	60	3010.1919	243.8555	47.66653	-4.448123633	0.001	-1.911533843	0.029	-3.438615	0.001
PaC V	47	2665.6328	227.4255	56.57121	-3.649113166	0.001	-2.143912814	0.001	-2.8933309	0.002
PaE A	132	4936.8333	246.995	37.31761	-6.242724993	0.001	-2.844639694	0.001	-4.4629532	0.001
PaE B	137	5608.6918	255.5076	44.44219	-4.628764008	0.001	-2.478440231	0.003	-3.2717543	0.001
PaE C	141	5079.1556	241.5079	34.15007	-6.487729974	0.001	-3.297773865	0.001	-5.1206953	0.001
PaE D	155	5365.7408	241.6534	32.96468	-6.707570661	0.001	-3.403293196	0.001	-5.3798437	0.001
PaE E	159	6325.9166	251.6267	43.995	-4.317808014	0.001	-2.91610555	0.002	-3.0560348	0.001
PaE F	126	5422.034	262.8496	50.53479	-4.227384588	0.001	-2.04718357	0.019	-2.4002362	0.005

PaE G	133	5771.2184	273.7773	45.45162	-3.821299763	0.001	-1.550914419	0.059	-3.2584972	0.001
PaE H	115	5365.874	268.523	57.56353	-3.394187238	0.001	-1.635554283	0.043	-1.4640111	0.058
PaE I	114	5319.8602	266.8582	58.07747	-3.531176989	0.001	-1.709287441	0.024	-1.3979081	0.083
PaE J	201	7300.3611	271.8292	33.87362	-4.644619294	0.001	-2.108161582	0.017	-5.0340979	0.001
PaE K	222	8096.9733	270.1409	33.88925	-3.877892102	0.001	-2.123119185	0.016	-4.3806865	0.001
PaE L	209	7664.8807	258.9785	39.46849	-4.209850041	0.001	-2.974535033	0.002	-3.5823714	0.001
PaE M	225	8554.3468	265.1171	42.84143	-2.906569263	0.002	-2.721755087	0.002	-2.5232	0.008
PaE N	261	9068.2778	253.861	39.37209	-3.662454572	0.001	-3.841698332	0.001	-3.1752896	0.001
PaE O	184	7246.0949	268.928	42.16729	-3.56748744	0.001	-2.242535328	0.007	-3.1946953	0.001
PaE P	159	6910.5684	276.6129	48.92975	-2.716742466	0.002	-1.615050847	0.061	-2.1105962	0.01
PaE Q	158	7020.3076	277.9954	49.19572	-2.263286906	0.011	-1.547845667	0.066	-2.0461187	0.018
PaE R	221	6489.9595	241.9823	28.43989	-7.969934058	0.001	-4.277311934	0.001	-6.227739	0.001
PaE S	193	6120.3351	247.6704	31.76137	-7.500630671	0.001	-3.609698369	0.001	-5.3557853	0.001
PaE T	210	6917.7335	256.3638	32.33687	-6.34595175	0.001	-3.174237144	0.002	-5.3477164	0.001
PaE U	215	7786.0138	263.8215	38.47002	-4.388238386	0.001	-2.750515643	0.002	-3.7748345	0.001
PaE V	275	9317.977	258.527	39.2277	-3.80642175	0.001	-3.538090886	0.001	-3.1786093	0.001
PaE W	224	8518.7524	260.284	44.20834	-3.00250835	0.002	-3.009759821	0.001	-2.1914515	0.012
PaE X	159	6240.9656	263.3984	45.9819	-4.493208597	0.001	-2.351134481	0.005	-2.622777	0.004
PaE Y	243	8711.7222	277.5814	39.71638	-3.662950495	0.001	-1.867424021	0.027	-3.1718693	0.001
PaE Z	268	9257.741	272.1225	39.36282	-3.714628906	0.001	-2.399917553	0.008	-3.1386948	0.001
Pae AA	271	9707.6337	272.9861	40.33705	-2.746305124	0.003	-2.380429468	0.006	-2.7036047	0.003
PaE BB	365	11222.7403	271.1064	32.16268	-4.073729209	0.001	-3.061978337	0.001	-5.1244153	0.001
PaE CC	184	8209.725	280.8938	48.22337	-1.105404474	0.14	-1.526190277	0.067	-1.684887	0.044
PaE DD	44	3056.5259	258.1264	83.11878	-2.002120371	0.023	-1.248843118	0.082	-1.3014661	0.097
PaE EE	66	3510.4112	261.327	54.4918	-3.770948248	0.001	-1.479225717	0.077	-2.7230745	0.002
PaEFF	79	3612.5863	254.8055	44.51691	-5.02140733	0.001	-1.852799211	0.031	-3.700592	0.001
PaE GG	61	2743.1433	204.7974	38.58206	-5.37859282	0.001	-3.221918032	0.001	-4.1551915	0.001
PaE HH	58	3136.4134	235.1375	55.8343	-3.772666113	0.002	-2.145610541	0.004	-2.8154297	0.001
PaE II	52	2665.754	206.3653	59.11539	-4.43702927	0.001	-2.916263679	0.001	-2.6225517	0.004
PaE JJ	55	2752.9193	208.4139	56.71614	-4.573530654	0.001	-2.941934342	0.001	-2.7951508	0.001
PaE KK	55	2405.4389	193.948	39.33873	-5.597215199	0.001	-3.417796062	0.001	-4.0451202	0.001
Or A	170	7245.7639	249.8603	51.00934	-2.706347656	0.002	-3.02483358	0.001	-1.3974527	0.083
Or B	328	10110.3887	257.9717	33.98857	-4.779478743	0.001	-3.799297677	0.001	-4.5620115	0.001
Or C	403	12743.6421	271.4442	36.5146	-2.568722758	0.004	-3.10886748	0.001	-3.1305117	0.002
Or D	378	12305.9779	280.1987	35.79845	-2.372755524	0.009	-2.081682428	0.025	-3.6892854	0.001
Or E	330	11103.8289	277.6821	39.26607	-2.69940272	0.002	-2.233217187	0.012	-2.6294778	0.004
Or F	319	10295.1817	272.3759	34.94869	-4.002224737	0.001	-2.575332693	0.006	-4.4570344	0.001
Or G	203	7292.454	263.2682	45.18862	-4.765078676	0.001	-2.711253245	0.003	-2.2107691	0.013
r H	42	3385.7742	323.5124	92.83223	-0.683176433	0.25	0.664023663	0.768	-0.7326409	0.247
Or I	254	8693.0041	256.9667	40.10753	-4.227738807	0.001	-3.3989072	0.001	-2.9890664	0.002
Or J	410	12193.7637	260.4052	35.66144	-4.147931707	0.001	-4.063464065	0.001	-3.4563194	0.001
Or K	186	7732.0739	261.8176	51.02904	-2.486343788	0.002	-2.453157035	0.003	-1.0190985	0.151
Or L	70	4007.5878	255.616	78.55767	-2.829204442	0.003	-1.751102504	0.042	-0.4439582	0.333
Or M	247	8451.2742	248.3209	40.50617	-4.499850797	0.001	-3.900756423	0.001	-2.8963839	0.001
Or N	137	6276.4007	268.2029	55.96895	-2.74235595	0.005	-1.805258359	0.027	-1.1415662	0.137
Or O	187	7752.673	260.829	50.72105	-2.584317296	0.005	-2.585060355	0.003	-1.031434	0.152
Or P	109	5377.3522	276.1469	61.03446	-2.975785488	0.002	-1.219605464	0.116	-0.9448091	0.169
Or Q	72	4045.4943	263.9728	69.88165	-2.988236353	0.002	-1.404543392	0.066	-1.1863534	0.113
Or R	118	5878.8555	268.506	60.19569	-2.234961397	0.015	-1.721987653	0.04	-0.8650765	0.195
Or S	116	5883.0058	288.4743	62.05321	-2.131761134	0.02	-0.718304776	0.259	-0.643492	0.264

Aus E	136	5646.442	258.4364	51.04302	-4.51035463	0.001	-2.2958976	0.008	-2.1122458	0.022
Aus F	105	5363.0845	269.3376	63.44099	-2.533847845	0.01	-1.580598899	0.052	-0.8355445	0.214
Aus G	244	8839.7025	276.2995	38.1312	-3.44170407	0.001	-2.069264399	0.018	-3.7268671	0.001
Aus H	83	4641.1326	262.4734	67.89509	-2.420916602	0.013	-1.65874058	0.046	-1.0578295	0.146
Aus I	222	8465.0956	268.536	47.73769	-3.002078195	0.002	-2.46775673	0.006	-1.25083	0.097
Aus J	280	9595.0375	279.1566	41.83961	-3.552908866	0.001	-1.954194257	0.026	-2.211365	0.015
Aus K	305	10371.2188	264.4898	44.11211	-3.029361043	0.004	-3.277275217	0.001	-1.1653243	0.134
Aus L	103	5443.0938	332.5346	58.03701	-2.06975465	0.02	1.308457091	0.904	-1.68095	0.042
Aus M	54	3326.3021	302.0066	67.21104	-2.702794301	0.005	0.05575788	0.588	-1.9748142	0.015
Aus N	137	6523.8642	308.1103	60.2126	-2.071727055	0.014	0.181722339	0.571	-0.3461941	0.373
Aus O	219	8171.7187	278.7284	43.81638	-3.375500181	0.001	-1.790244729	0.038	-2.2971467	0.008
Aus P	250	9005.3079	273.2306	44.1674	-3.221807413	0.002	-2.394499266	0.011	-1.7717672	0.035
Aus Q	118	5739.0969	315.0579	49.28823	-2.604903788	0.004	0.431862904	0.679	-2.6511745	0.002
Aus R	57	4031.0078	308.0146	76.13253	-0.870117089	0.192	0.213203104	0.562	-1.2399306	0.117
Aus S	139	6550.4296	300.7055	59.01347	-2.069953641	0.02	-0.244653604	0.418	-0.4813128	0.319
Aus T	204	8720.4542	302.9841	49.07691	-1.128119667	0.126	-0.202329305	0.431	-1.1318226	0.132
Aus U	200	8553.6843	284.1813	54.93216	-1.295055269	0.1	-1.35524439	0.084	0.2126871	0.59
Aus V	108	5865.4132	288.3675	55.68599	-1.328466411	0.088	-0.748800009	0.234	-1.9514397	0.021
Aus W	111	5690.6005	305.4474	50.7045	-2.094705204	0.018	-0.001794314	0.518	-2.6260057	0.007
Aus X	59	4122.2729	293.9425	77.64933	-0.885388783	0.186	-0.321541994	0.418	-1.0976741	0.147
Aus Y	86	5100.3997	290.5777	54.0318	-1.295422206	0.101	-0.594677691	0.293	-2.6728259	0.002
AfrN I	195	7789.6117	283.3828	44.64887	-2.868364564	0.005	-1.322463719	0.086	-2.4779176	0.009
AfrN J	194	7431.5359	273.274	44.37773	-3.793918662	0.001	-1.892738037	0.024	-2.4819149	0.008
AfrN K	147	5947.8294	260.0836	47.45221	-4.444247974	0.001	-2.261395897	0.008	-2.5128978	0.003
AfrN L	186	7436.7438	267.955	47.48691	-3.205954541	0.003	-2.146225702	0.01	-1.8584736	0.031
AfrN M	50	3798.8109	333.284	84.96911	-0.620268864	0.257	0.959392315	0.814	-0.9583882	0.166
AfrN N	130	5342.0256	264.5221	43.65373	-4.654380405	0.001	-1.942649437	0.017	-3.6083248	0.001
AfrN O	79	4063.9896	245.5368	55.32935	-3.53084786	0.002	-2.155822356	0.013	-2.5463871	0.005
AfrN P	51	3461.997	237.5987	93.83971	-1.773190912	0.038	-2.016236959	0.012	-0.2098625	0.436
AfrN Q	148	6109.5573	254.1456	50.5721	-3.847363152	0.001	-2.790394258	0.001	-1.9117246	0.025
AfrN R	217	8372.0703	272.0461	44.45262	-2.795414466	0.001	-2.247415286	0.011	-2.2125748	0.007
AfrN S	265	9470.3233	284.5793	39.71903	-2.935256769	0.002	-1.538207665	0.055	-3.0666644	0.002
AfrN T	264	9863.7843	277.2675	47.75009	-2.048095427	0.02	-1.998705835	0.022	-0.5592576	0.3
AfrN U	112	6255.4717	264.8733	72.14043	-0.585305186	0.278	-1.731991081	0.027	0.6916287	0.76
AfrN V	226	8761.6387	290.9739	45.7137	-2.358759525	0.007	-0.989929131	0.173	-1.7599158	0.033
AfrN W	65	3749.8195	236.1516	71.40603	-2.872561841	0.004	-2.241755526	0.003	-1.4180898	0.081
AfrS A	176	7565.7764	271.6731	55.37961	-2.135782569	0.016	-1.89228017	0.024	-0.2893951	0.392
AfrS B	105	6249.0637	279.1271	79.48248	0.093389621	0.56	-1.10349181	0.137	1.4261649	0.921
AfrS C	332	11319.7027	294.1059	41.00957	-2.192256742	0.007	-1.001645016	0.166	-2.0132427	0.026
AfrS D	202	8322.196	294.6822	50.28999	-1.978713503	0.021	-0.72447868	0.226	-0.9381571	0.184
AfrS E	318	10896.4468	296.7353	41.19598	-2.494056545	0.005	-0.761002745	0.227	-2.1277638	0.017
AfrS F	240	9046.8677	273.288	47.42166	-2.522503912	0.004	-2.157707485	0.014	-1.0778047	0.143
AfrS G	236	8592.9763	266.6601	42.94205	-3.326705072	0.001	-2.611482635	0.004	-2.3109337	0.01
AfrS H	104	5719.8641	323.721	62.85771	-1.353391975	0.094	0.82147935	0.809	-0.9931177	0.158
AfrS I	223	8761.9871	309.2808	45.25252	-2.229473739	0.005	0.133567304	0.554	-1.9410118	0.019
AfrS J	291	10881.9656	291.2686	45.07747	-1.141884836	0.131	-1.135691497	0.134	-1.072318	0.139
AfrS K	176	7845.5361	266.4727	58.59365	-1.512190919	0.059	-2.261785484	0.009	0.46359	0.691
AfrS L	121	6087.0955	311.0165	46.51758	-1.911340151	0.038	0.276369103	0.643	-2.9829599	0.001
AfrS M	161	7275.4367	277.9772	52.86948	-1.887838138	0.025	-1.574878367	0.058	-1.1772745	0.106

Table S2. Rate model fitness comparison identified with *RPANDA*.

Description of model	Pure birth with constant speciation rate	Birth-death with a constant speciation rate and a constant speciation rate	Pure birth with exponential variation in speciation rate	Birth-death with exponential variation in speciation rate and constant extinction
Parameters in model	$\lambda = 0.05$	$\lambda = 0.06,$ $\mu = -0.0002$	$\lambda = 0.06,$ $\text{exp} = -0.009$	$\lambda = 0.06$ $\mu = -0.009$ $\text{exp} = -3.51$
Log-likelihood	-13,636.67	-13,530.37	-13,515.56	-13,515.56
AIC	27,275.34	27,064.74	27,035.13	27,037.13
	240.21	29.61	0	2

Δ AIC is the difference in AIC scores between each model and the overall best-fit model. Best model selected by AIC in bold.

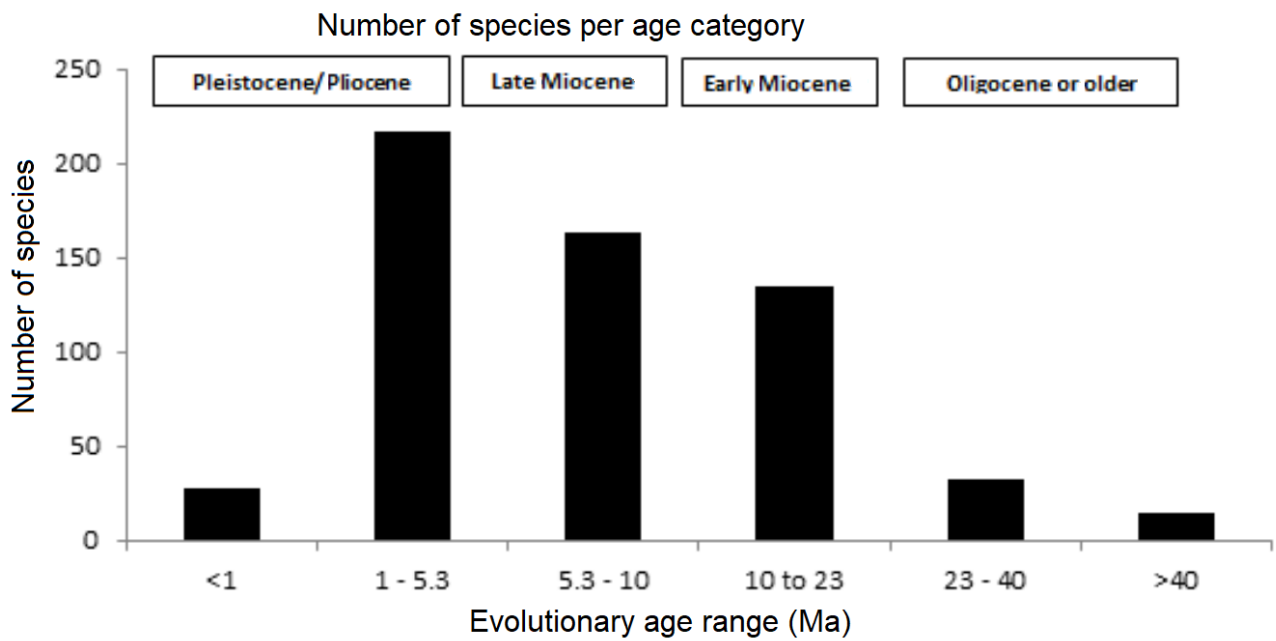


Fig S4. Species divergence age distribution for 560 macrophyte species. Evolutionary age ranges broadly correspond to geological epoch (range values: Ma): <1: recent Pleistocene; 1–5.3 early Pleistocene–Pliocene; 5.4–10 late Miocene; 10.1–23 early Miocene; 23–33.9 Oligocene; 33.9–56 Eocene; >56 Palaeocene or older

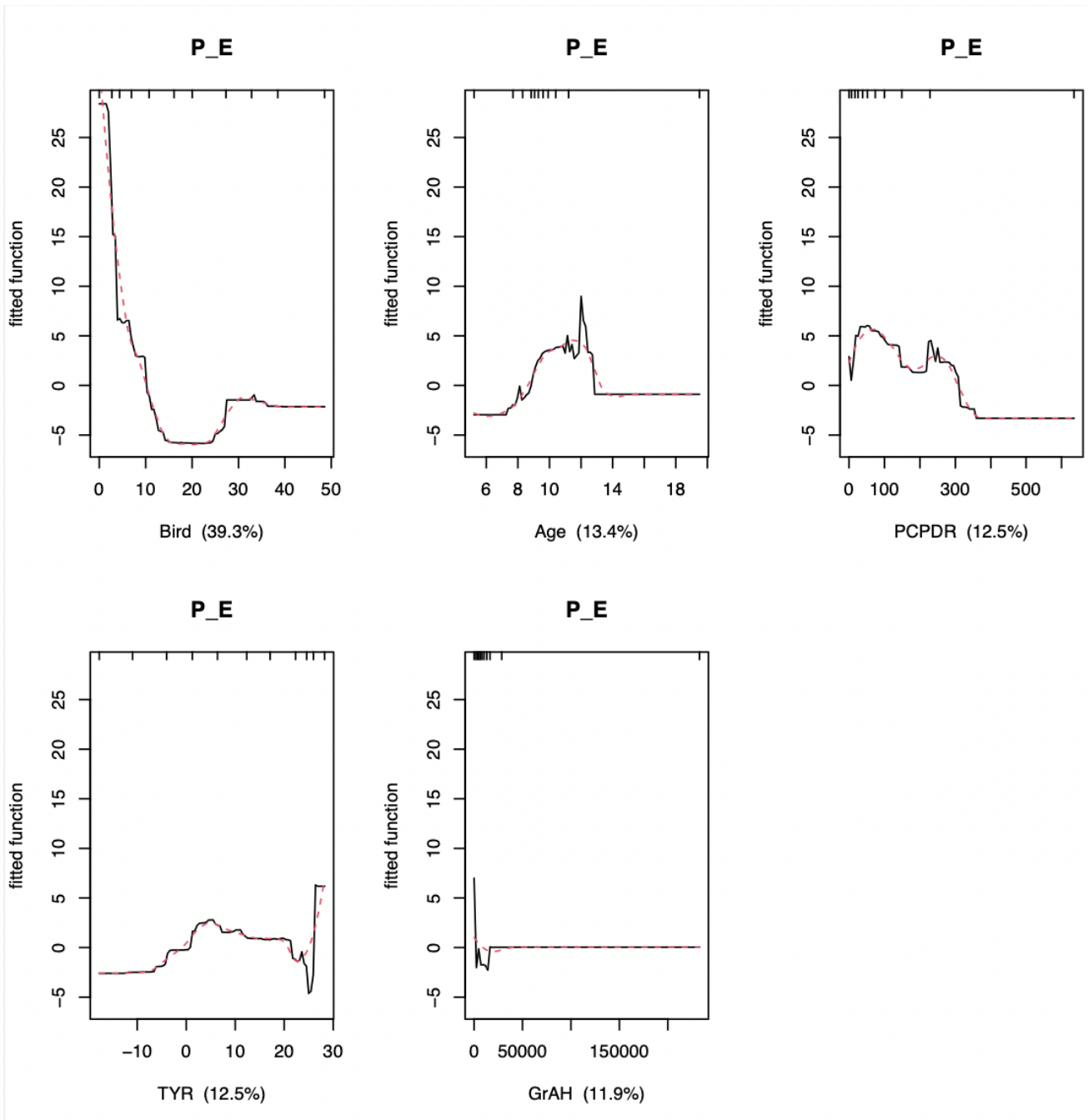


Fig. S5. BRT model of %*E* species (73% of the variance explained)

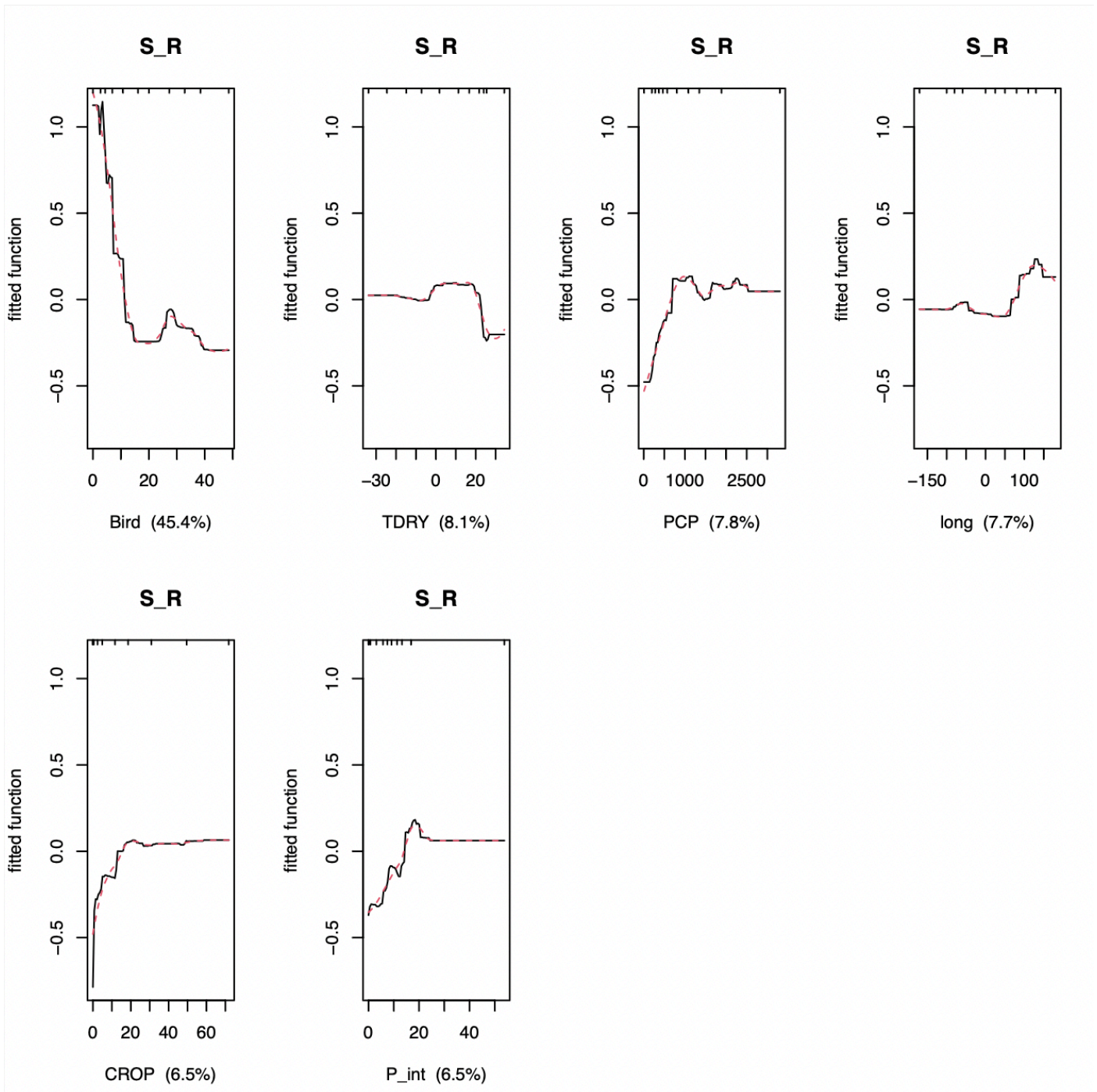


Fig. S6. BRT model of *R* species per grid cell (88% of the variance explained)

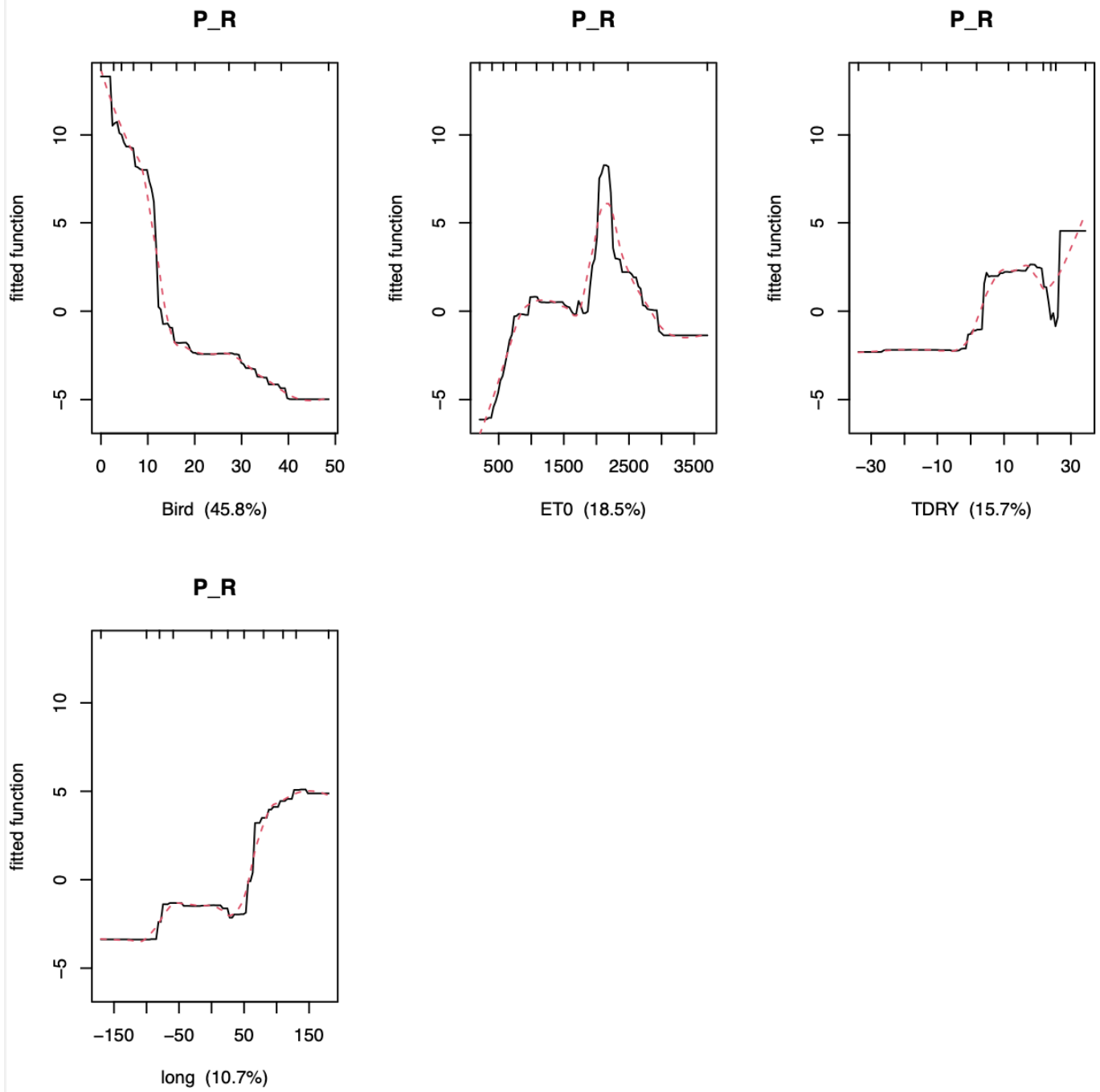


Fig. S7. BRT model %*R* species per grid cell (88% of the variance explained)

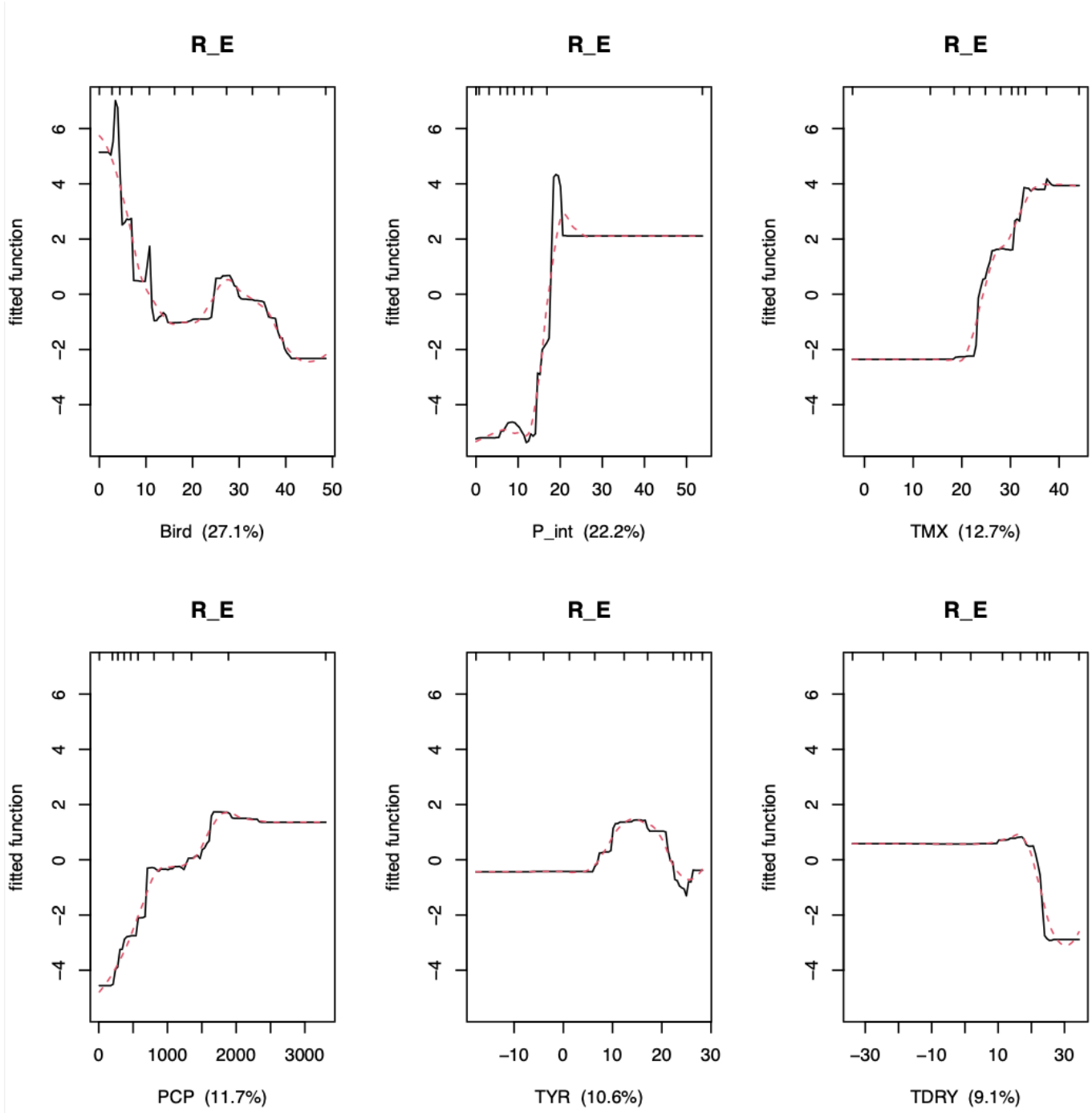


Fig. S8. BRT model %*RE* species per grid cell (78% of the variance explained)

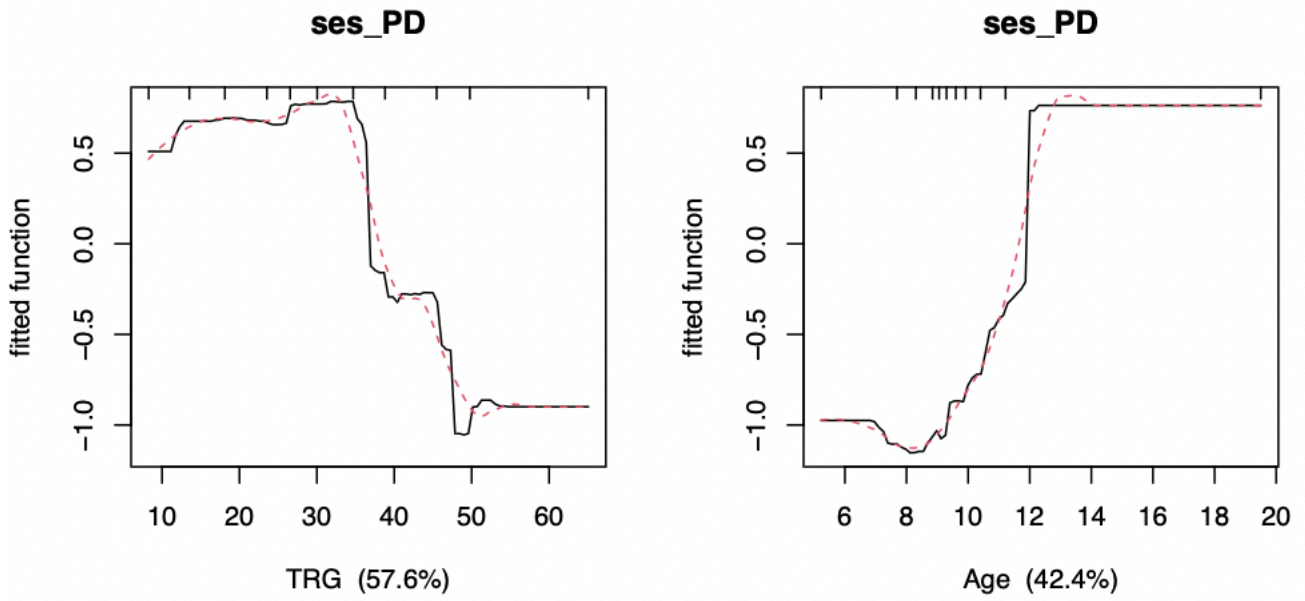


Fig. S9. BRT model Ses_PD species per grid cell (59% of the variance explained)

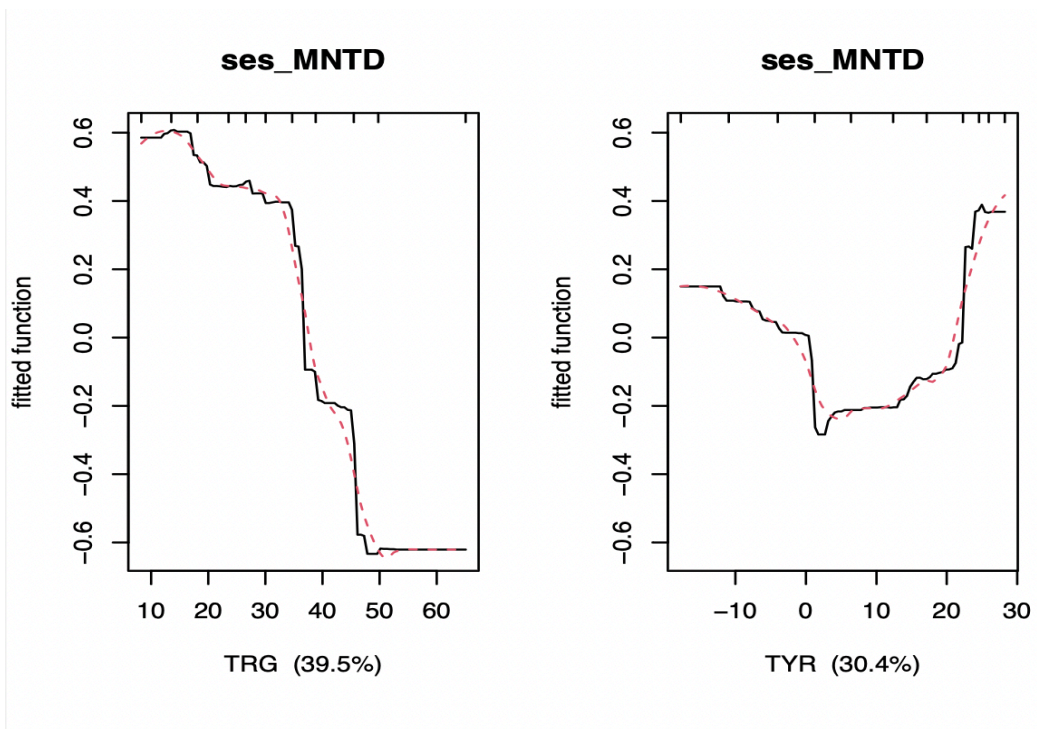


Fig. S10. BRT model Ses_MNTD species per grid cell (60% of the variance explained)

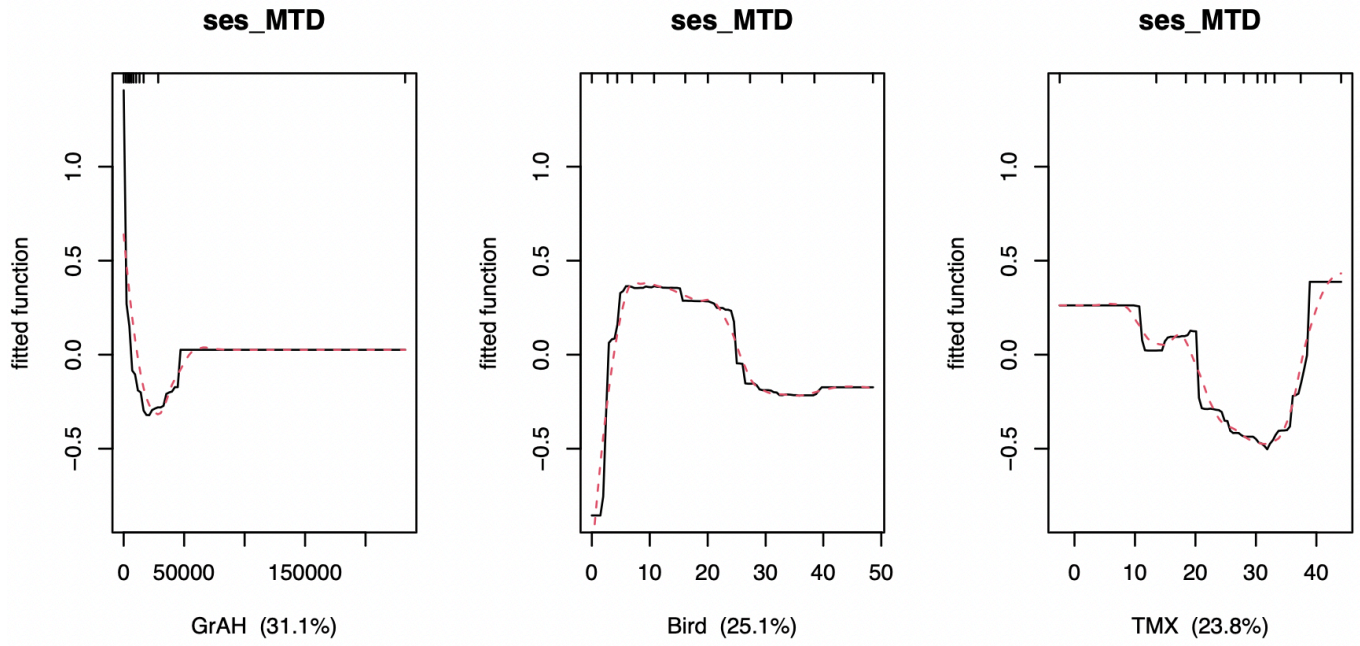


Fig. S11. BRT model Ses_MTD species per grid cell (55% of the variance explained)