

## Supplementary Materials

**Table S1.** Detail of environmental information taken across 26 transects (1 km long) in the páramo grassland ecosystem within protected areas and buffer zones of the Macizo del Cajas Biosphere Reserve, high-Andes of southern Ecuador. Columns 2-8 were used to calculate the principal components of transect habitat characteristics (see methods). Coordinates are UTM-WGS84.

**Tabla S1.** Detalle de la información ambiental tomada a través de 26 transectos (1 km de largo) en el ecosistema de páramo dentro de áreas protegidas y zonas de amortiguamiento de la Reserva de la Biósfera Macizo del Cajas, altos Andes del sur de Ecuador. Las columnas 2-8 se utilizaron para calcular los componentes principales de las características del hábitat de los transectos (véase métodos). Las coordenadas están en UTM-WGS84.

Zone and transect code	Páramo grassland (%)	Shrubby páramo (%)	Water bodies (%)	Rocky substrate (%)	Altered habitat (%)	Shannon vertical complexity	Shannon plant diversity	Easting	Northing	Elevation (m)
Protected areas										
DAP1	72.50	16.91	0	0.89	9.70	0.64	1.65	695812	9662417	3827
DAP2	74.21	14.38	1.10	0.01	10.30	0.74	1.81	695285	9662985	3781
DAP3	38.10	28.80	5.70	2.75	24.65	0.77	1.80	688877	9682149	3887
DAP4	34.33	26.47	0.20	6.73	32.27	1.33	2.23	692667	9692180	3778
DAP5	70.20	9.00	0.80	15.50	4.50	0.78	1.29	695167	9692328	4065
DAP6	62.50	14.00	0.70	10.40	12.40	0.84	2.15	698947	9690473	4027
DAP7	57.90	13.80	1.00	12.10	15.20	0.72	1.92	697794	9690201	3959
DAP8	81.80	6.00	4.50	2.90	4.80	0.30	1.51	698625	9689720	3883
DAP9	71.78	14.77	0	2.95	10.50	1.08	2.27	699432	9692667	3819
DAP10	87.83	7.92	2.80	1.45	0	0.84	1.91	699651	9693749	3909
DAP11	50.25	19.95	1.20	6.10	22.50	1.23	2.60	702602	9690558	3733
DAP12	54.90	14.05	2.15	4.70	24.20	1.19	2.03	692831	9679797	3835
DAP13	71.55	21.56	0.90	3.95	2.04	0.96	2.27	693751	9679431	3874
Buffer zones										
FAP1	86.52	10.43	0.60	0	2.45	0.79	0.81	697040	9664365	3791
FAP2	56.20	11.80	0	0.30	31.70	0.40	1.07	686210	9671264	3767
FAP3	44.60	7.50	0.25	2.95	44.70	0.77	1.37	687540	9673111	3708
FAP4	35.75	8.85	1.60	1.60	52.20	1.47	1.66	691781	9673440	3678
FAP5	66.20	24.30	0.10	1.10	8.30	0.77	1.74	696704	9660075	3770
FAP6	76.18	15.82	0	0.40	7.60	0.79	2.02	696227	9661332	3776
FAP7	74.40	18.30	0	0	7.30	1.14	1.95	696331	9659364	3668
FAP8	65.25	8.85	0.95	1.05	23.90	0.73	2.11	697201	9662009	3795
FAP9	62.60	17.60	0.60	5.90	13.30	0.92	2.32	698048	9661392	3688

FAP10	62.20	5.20	0	1.40	31.20	0.69	1.49	697426	9660806	3796
FAP11	60.60	20.10	0.10	2.20	17.00	0.99	1.40	698829	9663245	3633
FAP12	82.90	12.90	0	4.20	0	0.71	1.97	698494	9662684	3778
FAP13	73.25	7.99	0	0.56	18.20	0.99	2.19	692698	9677518	3893

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**Table S2.** Factor loadings of the first two components of the PCA of seven habitat measures in the páramo grassland ecosystem of the Macizo del Cajas Biosphere Reserve, high Andes of southern Ecuador.

**Table S2.** Cargas factoriales de los primeros dos componentes del PCA de siete medidas de hábitat en el ecosistema de páramo en la Reserva de la Biosfera Macizo del Cajas en los altos Andes al sur de Ecuador.

Habitat variable	PCI (33.7%)	PCII (21.7%)
Páramo grassland	0.579	0.309
Shrubby Paramo	-0.336	0.402
Water bodies	-0.023	-0.068
Rocky substrates	-0.147	0.219
Altered habitat	-0.433	-0.584
Vertical complexity of vegetation	-0.496	0.186
Plant diversity	-0.31	0.561

**Table S3.** List of bird species by trophic guild with their respective abundance recorded along 13 transects located within protected areas and 13 transects within buffer zones of the páramo grassland ecosystem of the Macizo del Cajas Biosphere Reserve, high-Andes of southern Ecuador. Scientific names follow the South American Classification Committee (Remsen et al. 2019).

**Tabla S3.** Lista de especies de aves por gremios tróficos y sus respectivas abundancias registradas a lo largo de 13 transectos ubicados dentro de áreas protegidas y 13 transectos dentro de zonas de amortiguamiento del ecosistema de páramo de la Reserva de la Biosfera Macizo del Cajas en los altos Andes al sur del Ecuador. Los nombres científicos siguen a South American Classification Committee (Remsen et al. 2019).

Trophic guilds	Abundance	
	Protected areas	Buffer zones
Arboreal and shrub bark-foliage gleaners		
<i>Asthenes flammulata</i>	234	272
<i>Leptasthenura andicola</i>	74	68
<i>Myioborus melanocephalus</i>	-	2
<i>Conirostrum binghami</i>	5	5
<i>Asthenes griseomurina</i>	1	-
<i>Scytalopus latrans</i>	-	2
<i>Synallaxis azarae</i>	-	6
<i>Xenodacnis parina</i>	78	20
Arboreal and shrub frugivores		
<i>Ampelion rubrocristatus</i>	3	-
<i>Anisognathus igniventris</i>	1	-
Arboreal and shrub sally-gleaners		
<i>Anairetes parulus</i>	15	6
<i>Cnemarchus erythropygius</i>	13	9
<i>Conirostrum cinereum</i>	9	6
<i>Mecocerculus leucophrys</i>	5	2
<i>Ochthoeca fumicolor</i>	40	86
Grass and shrub granivores		
<i>Spinus magellanicus</i>	21	4
<i>Catamenia homochroa</i>	9	18
<i>Catamenia inornata</i>	21	19
<i>Zonotrichia capensis</i>	6	-
Grass and shrub omnivores		
<i>Agriornis montanus</i>	21	83
<i>Anthus bogotensis</i>	36	167
<i>Cinclodes excelsior</i>	9	6
<i>Cinclodes fuscus</i>	246	118
<i>Gallinago jamesoni</i>	15	20
<i>Muscisaxicola alpinus</i>	20	10
<i>Geospizopsis unicolor</i>	150	136
<i>Turdus fuscater</i>	30	40
<i>Vanellus resplendens</i>	2	16
Grass and shrub raptors		
<i>Bubo virginianus</i>	-	1
<i>Buteo polyosoma</i>	1	-
<i>Falco femoralis</i>	1	-
<i>Falco peregrinus</i>	2	2
<i>Phalcoboenus carunculatus</i>	1	7
Grass perch gleaners		
<i>Calidris bairdii</i>	-	7
<i>Cistothorus platensis</i>	91	93
<i>Grallaria quitensis</i>	163	150

Shrub nectarivores		
<i>Aglaeactis cupripennis</i>	36	-
<i>Chalcostigma stanleyi</i>	70	28
<i>Diglossa humeralis</i>	12	6
<i>Lesbia victoriae</i>	-	7
<i>Metallura baroni</i>	17	13
<i>Oreotrochilus chimborazo</i>	23	19
Total species	36	35
Total individuals	1481	1454

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