

Supplementary Data

**One tree at a time: Restoring Landscape
Connectivity through Silvopastoral Systems in the
transformed amazon landscapes**

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Table S1. Landscapes unit's composition in the 2,214Km² analysis window

Landscapes Units	Description
Mountain Landscape	Conservation priority. High levels of diversity of fauna and flora species. This landscape is dominated by dense highland rainforest Landscape: it corresponds to the highest and most mountainous parts of the Amazon at the foot of the Andean region with slopes of 25-50%. Its forests have ecological and ecosystem characteristics of, fragmented woods, secondary vegetation and small agricultural areas.
Mountain foot Landscape	Transition between the Andes and the Amazon plain. Slightly wavy relief, with slopes >25%. Loamy-sandy and loamy-clay soils with good drainage and low fertility. Entisols, Inceptisols and Ultisols dominate. This landscape is dominated by clean pastures and recent oil palm monocultures.
Lowland Landscape (Lomerio)	Plain to wavy relief with slopes of 3-7% and 12-25%, drainage from imperfect to excessive. Soils formed by sedimentary rocks of the tertiary, moderately deep, well drained, clayey texture, low fertility, very acidic, low saturation base, low content of organic matter. Dominance of oxisols and ultisols. This landscape is dominated by pastures, mosaics of pastures with agriculture and secondary vegetation. The main economic activity is extensive livestock.
Floodplain Landscape	They are part of the floodplain of rivers that are born in the Andes mountain range. Flat relief, with slopes of 0-3%; they suffer occasional floods every 3 or 7 years. Clay soils with dominance of entisols and inceptisols with poor drainage; superficial and limited by the water-table; fertility is average. This landscape is dominated by agriculture and pastures.

Table S2. Landcover areas by landscape unit in the 2214Km² analysis window.

ID	Landcover/landuse	Lomerio Landscape				Flood Plain Landscape				Mountain foot Landscape				Mountain Landscape			
		2002		2018		2002		2018		2002		2018		2002		2018	
		Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
100	Riparian Forest	1373.25	1.13%	1208.13	0.99%	159.47	0.46%	184.09	0.53%	558.77	1.71%	388.35	1.19%	4.20	0.01%	4.20	0.01%
101	Dense Highland Forest	5962.46	4.90%	2137.17	1.76%	1260.39	3.61%	307.37	0.88%	1161.10	3.55%	149.14	0.46%	9363.92	31.24%	7592.14	25.33%
102	Heterogeneous Dense Flooded Forest	244.20	0.20%	173.69	0.14%	212.44	0.61%	251.71	0.72%		0.00%		0.00%	4396.79	14.67%	371.51	1.24%
103	Fragmented Forest with pastures and crops	328.12	0.27%	569.99	0.47%	140.06	0.40%	171.65	0.49%	0.00	0.00%	43.26	0.13%	2316.95	7.73%	3487.70	11.63%
104	Fragmented Forest with secondary vegetation	889.54	0.73%	673.93	0.55%	406.67	1.16%	377.68	1.08%	139.19	0.43%	74.35	0.23%		0.00%		0.00%
105	Hydrocarbon exploitation		0.00%		0.00%		0.00%	3.80	0.01%		0.00%	5.09	0.02%		0.00%		0.00%
106	Mosaic of crops, pastures and natural spaces	446.88	0.37%	442.66	0.36%	182.74	0.52%	200.15	0.57%	20.76	0.06%	103.80	0.32%	2241.09	7.48%	1454.98	4.85%
107	Mosaic of pastures with natural spaces	16996.89	13.97%	12941.21	10.63%	2979.84	8.53%	3365.39	9.64%	2832.51	8.65%	2276.45	6.95%	2318.11	7.73%	4172.69	13.92%
108	Mosaico de pastos y cultivos		0.00%	925.13	0.76%		0.00%	526.85	1.51%		0.00%	602.07	1.84%		0.00%		0.00%
109	Oil Palm		0.00%		0.00%		0.00%		0.00%		0.00%	551.96	1.69%		0.00%		0.00%
110	Weedy grasses	2979.92	2.45%	6517.14	5.36%	2119.28	6.07%	3804.58	10.90%	1281.02	3.91%	789.70	2.41%	1408.52	4.70%	476.32	1.59%
111	Clean Pastures	83125.80	68.31%	85282.56	70.08%	16736.83	47.93%	19882.05	56.94%	24490.63	74.80%	26092.65	79.69%	3602.66	12.02%	2892.96	9.65%
112	Rivers(50m)	6.52	0.01%	6.45	0.01%	3179.75	9.11%	2967.60	8.50%	97.52	0.30%	99.33	0.30%	297.83	0.99%	322.03	1.07%
113	Continuous urban	41.25	0.03%	41.26	0.03%	2.56	0.01%	3.01	0.01%	59.08	0.18%	102.60	0.31%	62.09	0.21%	74.58	0.25%
114	Bare and degraded land		0.00%		0.00%	34.73	0.10%		0.00%		0.00%		0.00%		0.00%		0.00%
115	Secondary or transition vegetation	8556.17	7.03%	10470.95	8.60%	3926.93	11.25%	2729.13	7.82%	2101.20	6.42%	1463.02	4.47%	3965.22	13.23%	9128.28	30.45%
116	Natural Sandy Areas		0.00%		0.00%	40.84	0.12%	94.47	0.27%		0.00%		0.00%		0.00%		0.00%
117	Natural Wetlands	734.21	0.60%	188.00	0.15%	3536.98	10.13%	49.97	0.14%	1.08	0.00%	1.08	0.00%		0.00%		0.00%
118	Burned Areas		0.00%	106.94	0.09%		0.00%		0.00%		0.00%		0.00%		0.00%		0.00%
Total		121,685.21	1.00	121,685.21	1.00	34,919.51	1.00	34,919.51	1.00	32,742.85	1.00	32,742.85	1.00	29,977.39	1.00	29,977.39	1.00

Table S3. Area-shape, Subdivision and Aggregation metrics results of Fragstat by landscape for 2002.

LU	LANDCOVER/LANDUSE	AREA-SHAPE				SUBDIVISION			AGGREGATION
		Total Area	Proportion	Largest Patch Index	Landscape Shape Index	Number of Patches	Patch Density	Effective Mesh Size	Euclidean Nearest Neighbor Distance
		TA	%	LPI	LSI	NP	PD	MESH	ENN_MN
FLOODPLAIN LANDSCAPE	Riparian Forest	161	0.50%	0.03	9.20	23	0.011	0.02	1.952
	Dense Highland Forest	1263	3.6%	0.08	9.84	33	0.015	0.49	998
	Dense Floodplain Forest	212	0.6%	0.08	2.32	4	0.002	0.16	1.571
	Fragmented Forest with Pastures and Crops	139	0.4%	0.04	3.48	2	0.001	0.05	11.736
	Fragmented Forest with Secondary Vegetation	408	1.2%	0.09	4.81	9	0.004	0.27	3.698
	Secondary Vegetation	3929	11.2%	0.22	13.89	52	0.024	3.95	706
LOWLAND LANDSCAPE	Riparian Forest	1371	1.1%	0.09	23.40	38	0.017	0.62	979
	Dense Highland Forest	5954	4.9%	0.10	24.71	117	0.053	2.27	868
	Dense Floodplain Forest	246	0.2%	0.10	3.32	4	0.002	0.24	2.865
	Fragmented Forest with Pastures and Crops	330	0.3%	0.08	5.25	8	0.004	0.20	5.697
	Fragmented Forest with Secondary Vegetation	888	0.7%	0.10	8.83	26	0.012	0.41	2.101
	Secondary Vegetation	8555	7.0%	0.33	29.94	154	0.070	8.12	648
	Natural Marshy Areas	733	0.6%	0.04	12.19	45	0.021	0.15	1.163
MOUNTAIN LANDSCAPE	Riparian Forest	4	0.0%	0.00	1.36	1	0.001	0.00	N/A
	Dense Highland Forest	9373	31.2%	1.74	7.30	11	0.005	133.88	205
	Fragmented Forest with Pastures and Crops	4401	14.7%	01.03	10.41	6	0.003	32.50	1.191
	Fragmented Forest with Secondary Vegetation	2316	7.7%	0.32	9.25	13	0.006	4.18	1.037
	Secondary Vegetation	3963	13.2%	0.46	11.61	17	0.008	10.08	662
MOUNTAIN FOOT LANDSCAPE	Riparian Forest	556	1.7%	0.07	13.09	16	0.007	0.23	757
	Dense Highland Forest	1159	3.5%	0.19	09.09	28	0.013	1.11	813
	Fragmented Forest with Pastures and Crops		0.0%						
	Fragmented Forest with Secondary Vegetation	140	0.4%	0.06	02.04	4	0.002	0.08	1.688
	Secondary Vegetation	2099	6.4%	0.16	12.14	44	0.020	1.40	787
	Natural Marshy Areas	1	0.0%	0.00	2.00	2	0.001	0.00	60

Table S4. Area-shape, Subdivision and Aggregation metrics results of Fragstat by landscape for 2018

LU	LANDCOVER/LANDUSE	AREA-SHAPE				SUBDIVISION			AGGREGATION
		Total Area	Proportion	Largest Patch Index	Landscape Shape Index	Number of Patches	Patch Density	Effective Mesh Size	Euclidean Nearest Neighbor Distance
		TA	%	LPI	LSI	NP	PD	MESH	ENN_MN
FLOODPLAIN LANDSCAPE	Riparian Forest	182.9	0.5%	0.03	10.11	15	0	0.04	3.227
	Dense Highland Forest	307.4	0.9%	0.07	4.21	5	0	0.17	3.742
	Dense Floodplain Forest	252.8	0.7%	0.06	3.73	6	0	0.09	1.411
	Fragmented Forest with Pastures And Crops	172.3	0.5%	0.03	5.66	5	0	0.04	12.668
	Fragmented Forest with Secondary Vegetation	378.9	1.1%	0.05	6.14	8	0	0.12	6.507
	Secondary Vegetation	2728.4	7.8%	0.11	18.82	90	0	01.07	541
LOWLAND LANDSCAPE	Riparian Forest	1207.2	1.0%	0.09	21.92	42	0	0.56	779
	Dense Highland Forest	2135.5	1.8%	0.05	14.10	49	0.022	0.56	1.579
	Dense Floodplain Forest	174.3	0.1%	0.06	2.26	3	0.001	0.09	4.323
	Fragmented Forest with Pastures and Crops	570.3	0.5%	0.03	10.33	21	0.01	0.10	2.425
	Fragmented Forest with Secondary Vegetation	672.0	0.6%	0.06	10.09	31	0.014	0.17	2.293
	Secondary Vegetation	10473.7	8.6%	0.38	39.64	223	0.102	7.99	461
	Natural Marshy Areas	188.0	0.2%	0.03	5.26	4	0.002	0.05	1.886
MOUNTAIN LANDSCAPE	Riparian Forest	4.3	0.0%	0.00	1.36	1	5.00E-04	0.00	N/A
	Dense Highland Forest	7590.3	25.3%	1.29	11.34	33	0.015	64.78	380
	Fragmented Forest with Pastures and Crops	371.0	1.2%	0.02	8.56	9	0.004	0.07	1.791
	Fragmented Forest with Secondary Vegetation	3492.1	11.6%	0.36	16.12	31	0.014	4.74	437
	Secondary Vegetation	9125.8	30.5%	01.01	31.58	81	0.037	45.31	121
MOUNTAIN FOOT LANDSCAPE	Riparian Forest	387.2	1.2%	0.06	11.34	7	0.003	0.13	1.581
	Dense Highland Forest	148.5	0.5%	0.04	5.26	11	0.005	0.04	968
	Fragmented Forest with Pastures and Crops	43.2	0.1%	0.01	3.14	5	0.002	0.00	2.195
	Fragmented Forest with Secondary Vegetation	74.8	0.2%	0.02	4.14	4	0.002	0.01	9.184
	Secondary Vegetation	1465.4	4.5%	0.05	16.14	63	0.029	0.36	542
	Natural Marshy Areas	1.1	0.0%	0.00	2.14	2	9.00E-04	0.00	60

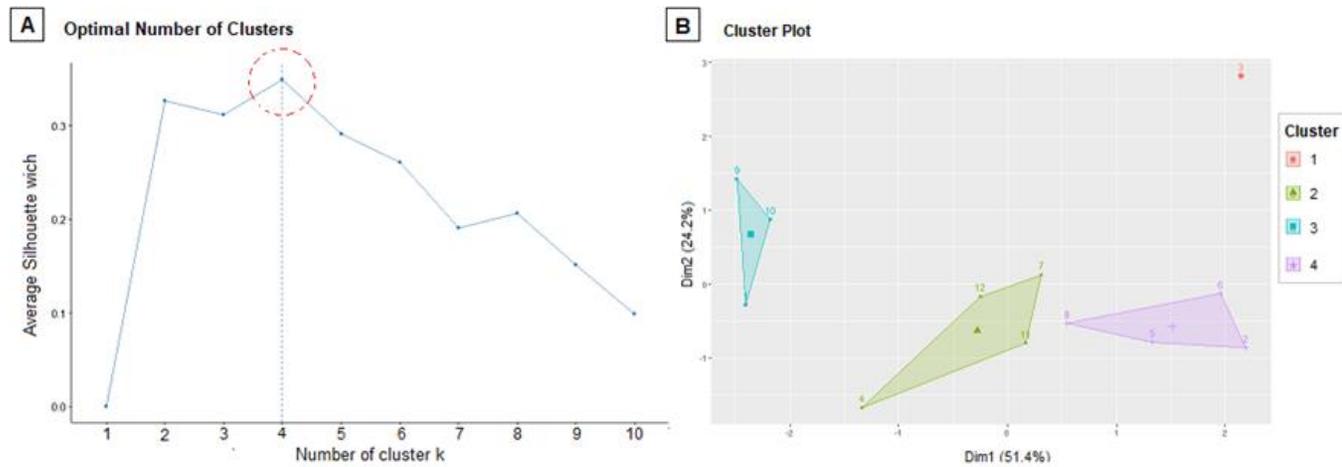


Figure S1. (A) Optimal number of clusters. Average of Silhouette value vs. Number of cluster (k). (B) K-Means clustering algorithm and Silhouette score.