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# Structure and floristic composition of flood plain forests in the Peruvian Amazon I. Overstorey

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**Abstract**

Three Peruvian flood plain forests adjacent to the Ucayali river were sampled using nine 1 ha permanent sample plots in which stems exceeding 10 cm DBH were identified and measured. These plots were measured four times during 1993-1997. Three plots were established in each of the three forest types high restinga, low restinga, and tahuampa, characterised in part by an annual inundation of one, two and four months per year, respectively. Stem density varied from 446 to 601 per hectare, and the basal area ranged between 20 and 29 $m^2$/ha. A total of 321 species were recorded in the nine hectare sample, with 88-141 species in each 1 ha plot. Species composition indicated a relatively low similarity between the forest types. Plots with the longest flooding contained the most species, expressed both as per unit area as well as per 1000 stems. The flood plain forests contained fewer tree species than adjacent non-flooded terra firme forest. Family importance values were calculated for each forest. In all three forests Leguminosae, Euphorbiaceae, Annonaceae and Lauraceae were important. The Moraceae family was conspicuous in both high restinga and low restinga. The Arecaceae and Meliaceae were notable in high restinga, as was Rubiaceae in low restinga. Lecythidaceae, Sapotaceae and Chrysobalanaceae exhibited relatively high values in the tahuampa forest. High species importance values were obtained for *Maquira coriacea, Guarea macrophylla, Terminalia oblonga, Spondias mombin, Ceiba pentandra, Hura crepitans, Eschweilera spp., Canipsiandra angustifolia, Pouteria spp., Licania micrantha, Parinari excelsa* and *Calycophyllum spruceanum*. Among the species of smaller stature, *Drypetes amazonica, Leonia glycicarpa, Theobroma cacao* and *Protium nodulosum* attained high values.

*Keywords:* Wetlands; Family importance value; Species importance value; Biodiversity; Species richness; Species evenness

## 1. Introduction

Although many quantitative ecological inventories have been undertaken in lowland Amazonian moist forests (e.g. Uhl and Murphy, 1981; Boom, 1986; Rankin-de-Merona et al., 1992; Valencia et al., 1994; and references in Table 1), their complexity and extent (approximately 613 million hectares; Eden, 1990) warrant further studies, in part because such data are a prerequisite for conservation and management (Hubbell and Foster, 1992; Hubbell, 1995; Whitmore, 1995).

The present study contributes basic data on floristic composition and structure of flood plain forests of the lower Rio Ucayali region in the Peruvian Amazon. Flood plain forests were selected for the study because they are of considerable socio-economic importance (e.g. Hiraoka, 1985; Phillips, 1993; Kvist et al., 2001a), and provide considerable amounts of timber harvested in the Amazon (Macedo and Anderson, 1993; Ros-Tonen, 1993; Barros and Uhl, 1995). The study forms part of a research project aiming to provide knowledge on ecological, socio-economic, and management aspects of Peruvian flood plain forests. Permanent sample plots provide the basis for floristic and structural studies, and for studies and models of forest dynamics. Trees identified within the plots also formed the basis for interviews with local informants about the use-values of different tree species on the flood plains (Kvist et al., 1995; Kvist et al., 2001 a,b).

Three permanent sample plots were established at each of three locations, representative of three flood plain forest types (Encarnacion, 1985; Encarnacion, 1993; Freitas, 1996a). To facilitate comparison with other studies, considerations in this paper are restricted to the overstorey, which in this case is defined as plant individuals equal to or larger than 10 cm diameter at breast height (DBH). The floristic composition and structure of the understorey in restinga forests is described by Nebel et al. (2001).

Table 1 summarises some of the existing floristic and structural data from Amazonian flood plain forests, and shows the considerable variability of these forests.

## 2. **Study area**

The study was undertaken in the northeastern Peruvian department of Loreto, part of the Amazonian lowland. Permanent sample plots were established in the zones of Braga-Supay and Lobillo, which are located approximately 10 km east of the municipal town of Jenaro Herrera ($4^{\circ}$55'S, $73^{\circ}$44'W). General aspects of the study area, including a key to flood plain vegetation types, are described by Kvist and Nebel (2001). Lopez and Freitas (1990) reported that the vegetation in the Braga-Supay and Lobillo zones was riverine forest associated with flood plain levees, while Lamotte (1990) described floristic composition and forest succession in relation to landscape forms on an island located in the Rio Ucayali close to the study area.

The vegetation studied at Braga-Supay was high and low restinga forest, while that at Lobillo was tahuampa forest (Kvist and Nebel, 2001). All the forests appeared to be undisturbed by humans, although trees of the most valuable commercial species may have been logged some decades ago. During high water, starting in September and peaking in April (Fig. 1), both sites are inundated by white water flowing in from the turbid Rio Ucayali.

The approximate level of the terrain within the three forest types is indicated in Fig. 1, where a relative scale contrasts topography with corresponding average, maximum and minimum monthly water levels in the Rio Ucayali at Jenaro Herrera from September 1987 to February 1997. During this period the average annual flooding in the high restinga, low restinga, and tahuampa sites was around one month, two months, and four months, respectively. The pattern of water level fluctuations at Jenaro Herrera resembles observations from the Amazon River at Iquitos (Kvist and Nebel, 2001). Junk (1989) and Irion et al. (1997) stress that in an ecological context unusually long periods of wetness or dryness are probably much more decisive than the average water fluctuations.

Soils at the three study sites were entisols (Andersen, 1995): on the high and low restinga Typic Hydraquents, and in the tahuampa forest Tropic Fluvaquent. They were characterised by little faunal activity in all horizons. An upper A horizon of 5-10 cm lay above a B horizon stretching down to approximately 150 cm. The B horizon had a high clay content (generally exceeding 50%), but the fraction of sandy material increased with depth. In two of the profiles a sudden change to almost pure sandy material was observed at approximately 100 cm depth, indicating that the particle size distribution is influenced by the river dynamics in the area. Table 2 shows results from analyses of horizons in the soil profiles of the three forests. These results are comparable to varzea soil properties reported from the Brazilian Amazon by Furch (1997).

**Table 1**. Summary of some botanical inventories in Amazonian wetland forests

| Source | Location and forest type | Sample size and shape | Min DBH or H (dl) | Lianas (±) | Basal area ($m^2$/ha) | Number of: Individuals absolute | Individuals per ha | Families | Genera | Species |
|---|---|---|---|---|---|---|---|---|---|---|
| Ayres (1995) | Mamiraua, restinga alta | 16 × 0.0625 ha, 25 m × 25 m or 10m × 62.5m | 10 cm | + | 49.8 | 580 | 580 | 35 | - | 135 |
| Ayres (1995) | Mamiraua, restinga baixa | 16 × 0.0625 ha, 25 m × 25 m or 10m × 625m | 10 cm | + | 32.6 | 416 | 416 | 35 | - | 109 |
| Ayres (1995) | Mamiraua, igapo | 1, - | 10 cm | + | 33.9 | 546 | 546 | 36 | - | 119 |
| Balslev et al. (1987) | Anangu, varzea | 1, 2100 m transect of 105 points | 10 cm | + | 35.5 | 420 | 420 | 44 | 92 | 149 |
| Black et al. (1950) | Belem, igapo[b] | 1, l00m × l00m | 10 cm | + | | 564 | 564 | 28 | 51 | 60 |
| Campbell et al. (1986) | Rio Xingu, varzea[c] | 0.5, 10m × 500m | 10 cm | - | 31.4 | 220 | 440 | 17 | 29 | 40 |
| Colonnello (1990) | Rio Orinoco, varzea | 4 × 0.05 ha, 10 m × 50 m | 2 m | + | - | 327 | 1308 | - | - | 34 |
| Foster (1990) | Cocha Cashu, varzea | 5 × 1 ha, 100 m × 100 m | 30 cm | - | | 66-86 | 66-86 | | | 7-42 |
| Freitas (1996a) | Braga-Supay, bosque ribereno | 8 × 1 ha, 100 m × 100 m | 10 cm | + | 24.1 | | 510 | 38 | 110 | 147 |
| Freitas (1996a) | Itahuaya, bosque latifoliado de restinga de tahuampa | 3 × l ha, 100 m × 100 m | 10 cm | + | 22.0 | - | 522 | 31 | 74 | 98 |
| Freitas (1996a) | Itahuaya, bosque latifoliado de | 3 × 1 ha, 100 m × 100 m | 10 cm | + | 24.5 | - | 517 | 33 | 94 | 123 |
| Freitas (1996a) | bajeal de tahuampa | 4 × 1 ha, 100 m × 100 m | 10 cm | + | 32.7 | - | 490 | 28 | 50 | 58 |
| | Itahuaya, palmeral de tahuampa | | | | | | | | | |
| Gentry (1988) | Yanamono, tahuampa | 10 × 0.01 ha, 2 m × 50 m | 2.5 cm | + | - | - | - | 51 | - | 163 |
| Gentry (1988) | Mishana, floodplain | 10 × 0.01 ha, 2 m × 50 m | 2.5 cm | + | - | - | - | 58 | - | 249 |
| Gentry (1988) | Mishana, tahuampa | 10 × 0.01 ha, 2 m × 50 m | 2.5 cm | + | - | | | 40 | | 168 |
| Keel and Prance (1979) | Rio Negro, igapo | 12 × 0.0 15 ha, 10 m × 15 m | 1 m | + | - | 1028 | 5711 | 18 | 34 | 54 |
| Klinge et al. (1989), unpublished [d] | Ilha de Marchantaria, varzea | | 10 cm | + | | - | 737 | - | - | |
| Pires and Koury (1959)[d] | Guama, varzea | 1 | ~8 cm | ? | - | - | - | - | - | 53 |
| Pires and Koury (1959)[e] | Guama, varzea | 3.8, 100 m × 380 m | 10 cm | ? | - | 1837 | 484 | 21 | 79 | 107 |
| Revilla (1989)[d] | Manaus, varzea | 15 × 1 ha, 100 m × 100 m | 5 cm | + | | 32411 | 2160 | >60 | - | 236 |
| Worbes (1983, 1986) | Ilha de Marchantaria, varzea | 0.21 | 5 cm | + | 60.0 | 167 | 795 | 22 | 31 | 33 |
| Worbes (1983, 1986) | Taruma mirim, igapo | 0.21 | 5 cm | + | 37.1 | 172 | 819 | 20 | - | 61 |
| This paper | Braga-Supay, high restinga | 3 × 1 ha, 100 m × 100 m | 10 cm | + | 24.7 | 1367 | 456 | 45 | - | 146 |
| This paper | Braga-Supay, low restinga | 3 × 1 ha, l00 m × l00 m | 10 cm | + | 22.6 | 1697 | 566 | 46 | - | 202 |
| This paper | Lobillo, tahuampa | 3 × 1 ha, 100 m × 100 m | 10 cm | + | 27.7 | 1560 | 520 | 49 | - | 195 |

[a] Forest type classification according to authors.
[b] According to Keel and Prance (1979) this forest was erroneously classified as igapo: the correct classification is varzea.
[c] According to Klinge et al. (1989) this forest was erroneously classified as varzea the right classification is igapo.
[d] Cited from Klinge et al. (1989).
[e] Cited from Campbell et al. (1986).

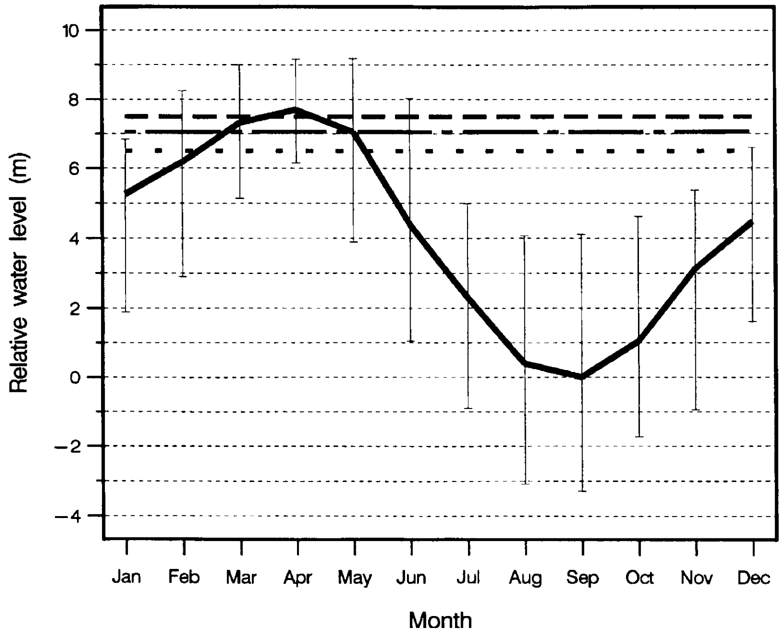


**Fig. 1**. Average (solid line), maximum and minimum monthly relative water levels in the Rio Ucayali at Jenaro Herrera (4°55'S, 73°44'W) during the period September 1987 to February 1997. The corresponding elevation is also shown for the forests of the high restinga (short dashes), the low restinga (long dashes) and the tahuampa (dotted).

## 3. Materials and methods

Between July and November 1993 nine 1 ha permanent sample plots were established. Six of these were located in the restinga forests at Braga-Supay, with three plots in the low, and three in the high restinga. Three plots were established in tahuampa forest at Lobillo.

Plots were 100 m x 100 m, except for one plot in the high restinga which was 80 m × 125 m to conform with the topography at the location. Trees and lianas bigger than 8.5 cm were numbered with aluminum tags and their coordinates and DBH were measured. We chose a girth limit well below that desired for our analyses (10 cm DBH) to ensure the availability of at least one prior measurement for all recruits. Many of the palms retained leaf bases, and the diameter of these trees could not be determined by direct measurement. In such cases, we used the average DBH of conspecific trees without leaf bases. The total and commercial bole heights were estimated for all trees. In addition crown position and crown form were evaluated according to Dawkins classification (Alder and Synnott, 1992).

All individuals were identified in the field during plot establishment. Voucher specimens were collected from individuals where a proper field identification could not be made (approximately 62% of the individuals represented). These specimens were identified at the Herbarium at the University of Aarhus (AAU) in Denmark. For most of the families and genera the specimens were sent to taxonomic specialists for identification. Individuals that died during the period from plot establishment to collection took place, where it has not yet been possible to make an identification, or where the voucher has been lost were recorded as unidentified at family, genera or species level. Doublets were collected from most of the individuals and deposited at the Centro de Investigaciones Jenaro Herrera, at the Herbarium Amazonense in Iquitos (AMAZ), and at the University of San Marcos in Lima (USM).

**Table 2**. Selected physical and chemical properties of soil profiles in high restinga, low restinga, and tahuampa[a]

| Depth (cm) | Horizon | pH $H_20$ | pH KCl | Organic C (%) | P (mixed acid method) (mg/kg) | NH$_4$0Ac extractable $Ca2^+$ (cmol+/kg) | NH$_4$0Ac extractable $Mg2^+$ (cmol+/kg) | NH$_4$0Ac extractable $K^+$ (cmol+/kg) | NH$_4$0Ac extractable $Na^+$ (cmol+/kg) | KCl extractable $A1^{3+}$ (cmol+/$k_g$) | ECEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| High restinga | | | | | | | | | | | |
| 5 | A | 5.2 | 4.3 | 3.17 | 14.48 | 16.72 | 3.25 | 0.30 | 0.34 | 0.30 | 20.91 |
| 17 | Bw | 5.6 | 4.1 | 0.73 | 30.02 | 14.79 | 3.33 | 0.26 | 0.26 | 0.48 | 19.11 |
| 45 | Bw | 5.5 | 3.8 | 0.41 | 28.49 | 14.35 | 5.08 | 0.29 | 0.33 | 1.49 | 21.54 |
| 93 | Bs | 5.5 | 3.9 | 0.34 | 40.82 | 12.57 | 5.32 | 0.40 | 0.23 | 1.12 | 19.64 |
| 118 | Bs2 | 6.1 | 4.7 | 0.19 | 188.44 | 2.04 | 0.73 | 0.07 | 0.07 | 0.25 | 3.14 |
| 180 | C | 6.3 | 5.0 | 0.17 | 178.19 | 2.59 | 0.66 | 0.05 | 0.07 | 0.22 | 3.58 |
| Low restinga | | | | | | | | | | | |
| 8 | A | 5.0 | 4.1 | 2.11 | 33.11 | 12.08 | 1.99 | 0.23 | 0.34 | 0.57 | 15.21 |
| 35 | Bs | 5.6 | 4.6 | 0.55 | 38.57 | 10.88 | 2.27 | 0.24 | 0.23 | 0.13 | 13.74 |
| 73 | Bs2 | 5.9 | 4.8 | 0.36 | 49.43 | 11.35 | 3.84 | 0.19 | 0.16 | 0.10 | 15.64 |
| 108 | Bs3 | 6.6 | 5.0 | 0.43 | 54.74 | 13.25 | 4.66 | 0.22 | 0.17 | 0.07 | 18.38 |
| 157 | Bs4 | 7.2 | 5.9 | 0.35 | 89.69 | 10.16 | 3.47 | 0.24 | 0.16 | 0.04 | 14.06 |
| 190 | C | 7.5 | 6.1 | 0.37 | 120.18 | 10.24 | 3.33 | 0.27 | 0.17 | 0.04 | 14.04 |
| Tahuampa | | | | | | | | | | | |
| 10 | A | 5.2 | 4.0 | 1.51 | 21.52 | 18.79 | 3.17 | 0.24 | 0.36 | 1.01 | 23.56 |
| 50 | Bg | 5.0 | 3.8 | 0.79 | 25.60 | 16.21 | 5.41 | 0.28 | 0.34 | 2.18 | 24.39 |
| 87 | Bt | 5.3 | 3.9 | 0.58 | 29.60 | 13.35 | 6.86 | 0.29 | 0.22 | 0.84 | 21.55 |
| 120 | Bw1 | 5.6 | 4.3 | 0.51 | 34.02 | 14.25 | 6.26 | 0.34 | 0.21 | 0.38 | 21.43 |
| 162 | Bw2 | 5.9 | 4.3 | 0.46 | 73.86 | 10.60 | 4.57 | 0.23 | 0.15 | 0.18 | 15.72 |
| 195 | C | 6.2 | 4.5 | 0.36 | 97.23 | 12.58 | 4.73 | 0.22 | 0.15 | 0.14 | 17.82 |

° Based on Andersen (1995).

Family importance value (FIV) and species importance value (SIV) were calculated for individual plots, forest types as well as for all plots together. FIV and SIV were calculated from the formulae below according to Mori et al. (1983) and Curtis and McIntosh (1950, 1951), respectively.

Relative diversity = 100 x (number of species of a family)/(total number of species of the sample)

Relative density = 100 x (number of individuals of a family)/(total number of individuals of the sample)

Relative dominance = 100 x (basal area of a family)/(total basal area of the sample)

FIV = relative diversity + relative density + relative dominance

Relative frequency = 100 x (number of sample units containing a species)/(sample units for all species of the sample)

Relative density = 100 x (number of individuals of a species)/(number of individuals of the sample)

Relative dominance = 100 x (basal area of a species)/(total basal area of the sample)

SIV = relative frequency + relative density + relative dominance

The number of sample units in which individuals of a species occur was used to calculate the relative frequency. In this study, the 1 ha plots were divided into 25 sample units. For unidentified specimens it was assumed that they were already represented in a sample unit, and consequently they did not count in the frequency calculations.

The similarity of forest types with regard to species composition was assessed using the Jaccard and Sorensen coefficients as described by Greig-Smith (1983) and Sorensen (1948). A coefficient of 1 means total similarity between communities.

Jaccard coefficient = (number of shared species)/(total number of species in community 1 and 2)

Sorensen coefficient = (2 x number of shared species)/(species of community 1+species of community 2)

## 4. Results

### *4.1. Density, basal area, species richness, and species evenness*

There was a considerable variation in stem number per hectare between the various 1 ha plots (446-601), with the highest density found in low restinga (Table 3). The distribution of diameters is illustrated in Fig. 2.

The highest basal area was almost 28 $m^2$/ha in the tahuampa forest, while there was approximately 24 $m^2$ /ha in the restinga forests. Fig. 3 shows the distribution of basal area by diameter classes. The height distribution of the individuals of each forest type is shown in Fig. 4.

**Table 3**. Number of families, number of species, number of individuals, and basal areas, for 1 ha plots, by forest types, and overall

| | Families | Species | | Individuals | | Basal area ($m^2$/ha) |
|---|---|---|---|---|---|---|
| | | Total | Trees | Total per ha | Trees per ha | |
| **High restinga** | 45 | 146 | 139 | 456 | 451 | 24.7 |
| Plot 1 | 35 | 88 | 86 | 469 | 466 | 25.0 |
| Plot 2 | 38 | 101 | 98 | 446 | 442 | 23.9 |
| Plot 3 | 41 | 101 | 97 | 452 | 446 | 25.3 |
| **Low restinga** | 46 | 202 | 181 | 566 | 556 | 22.6 |
| Plot 4 | 39 | 127 | 120 | 526 | 517 | 19.8 |
| Plot 5 | 38 | 141 | 131 | 601 | 589 | 23.7 |
| Plot 6 | 40 | 136 | 129 | 570 | 563 | 24.1 |
| **Tahuampa** | 49 | 195 | 173 | 520 | 503 | 27.7 |
| Plot 7 | 40 | 107 | 95 | 521 | 500 | 27.1 |
| Plot 8 | 38 | 115 | 109 | 507 | 497 | 28.8 |
| Plot 9 | 36 | 126 | 111 | 532 | 513 | 27.1 |
| **All plots** | 55 | 321 | 279 | 514 | 504 | 25.0 |

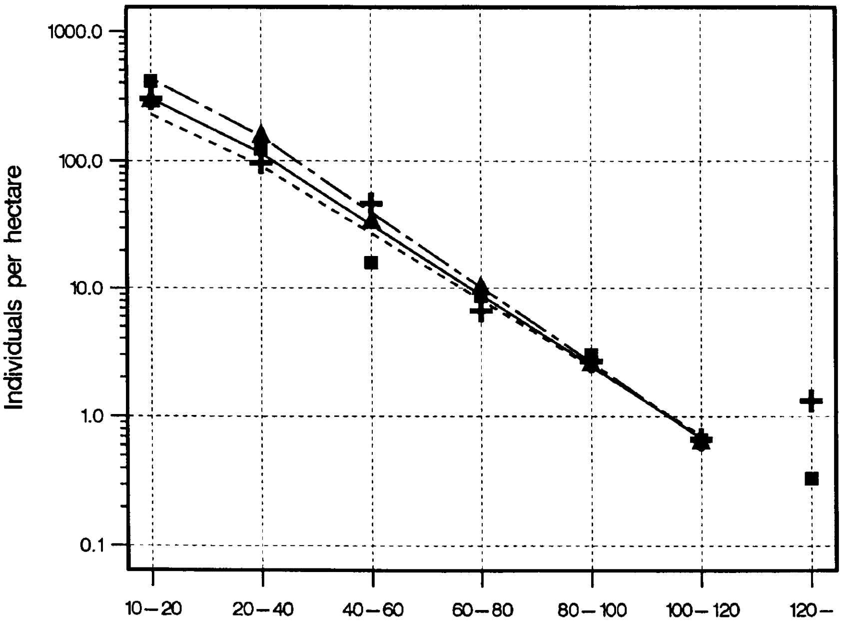


**Fig. 2**. Stand table showing stocking by diameter classes in high restinga (+), low restinga (■), and tahuampa (▲). No observations for tahuampa in the diameter class 120 cm. Regression lines calculated for density in DBH classes (excluding the diameter classes 10-20 and 120 cm). High restinga is represented by the solid line (*N* = exp(6.665939-0.064113 midpoint), $R^2$ = 0.98), low restinga by the short dashes (*N* = exp(6.337841-0.060681 midpoint), *R2* = 0.97), and tahuampa by the long dashes (*N* = exp(7.079567-0.067973 midpoint), $R^2$ = 1.00). Midpoints for formulae are DBH in cm.

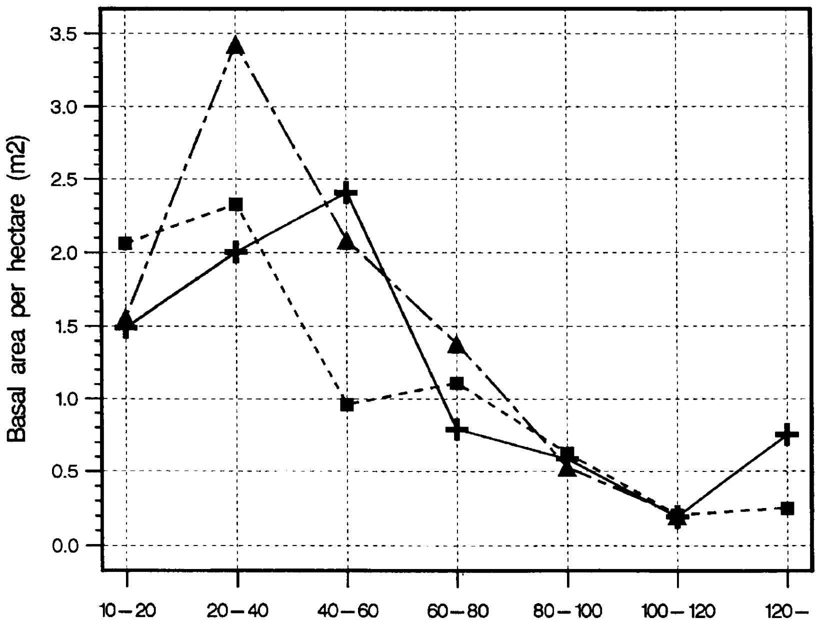


**Fig. 3**. Distribution of basal area by diameter classes in high restinga (+, solid line), low restinga (■, short dashes), and tahuampa (▲, long dashes). No observations for tahuampa in the diameter class 120 cm.

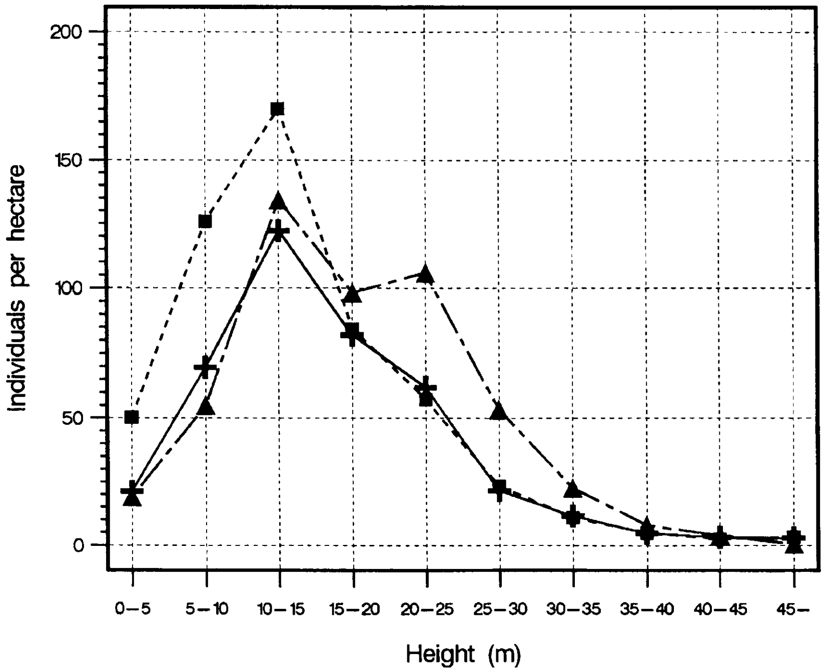


**Fig. 4**. Height class distribution of individuals in high restinga (+, solid line), low restinga (■, short dashes), and tahuampa (▲, long dashes).

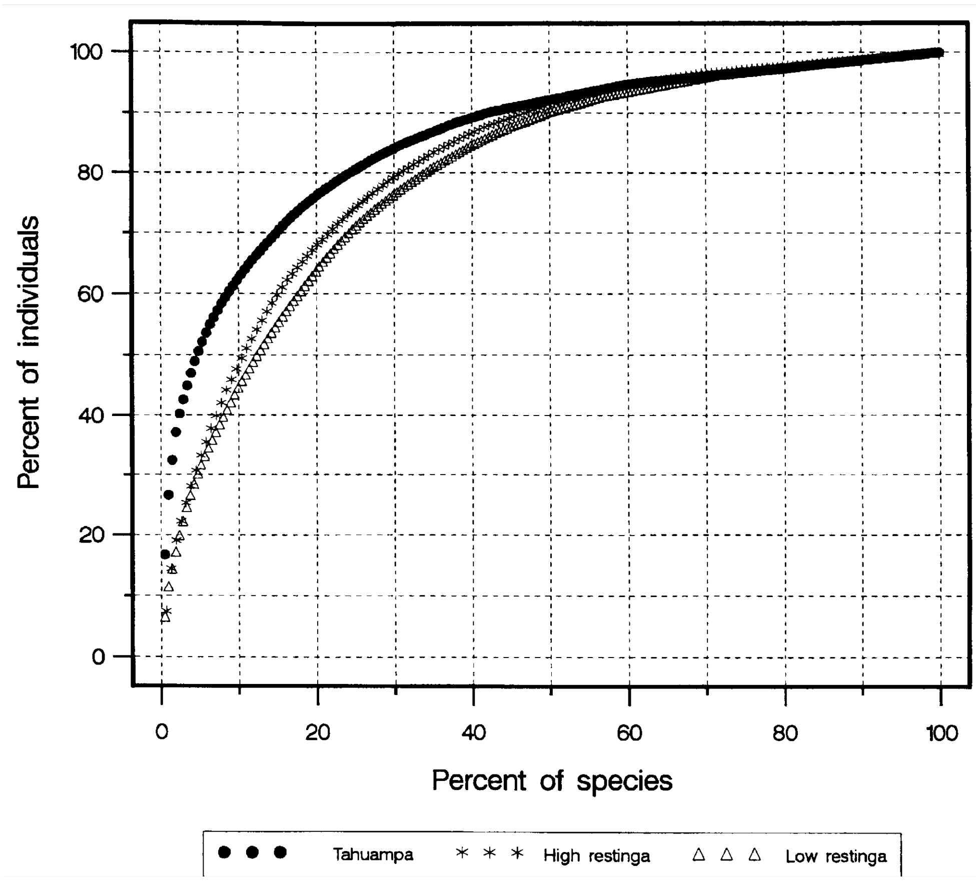


**Fig. 5.** Cumulative percentage of individuals as a function of the cumulative percentage of species, with data ordered by number of individuals per species.

**Table 4.** Number (top right) and percentages (bottom left) of species shared between pairs of 1 ha plots[a]

| | Plot | High restinga | | | Low restinga | | | Tahuampa | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| High restinga | 1 | (88) | 67 | 68 | 69 | 65 | 60 | 17 | 28 | 29 |
| | 2 | 55% | (101) | 68 | 68 | 66 | 56 | 16 | 29 | 25 |
| | 3 | 56% | 51% | (101) | 74 | 73 | 67 | 26 | 41 | 38 |
| Low restinga | 4 | 47% | 43% | 48% | (127) | 94 | 86 | 37 | 52 | 47 |
| | 5 | 40% | 38% | 43% | 54% | (141) | 95 | 42 | 57 | 54 |
| | 6 | 37% | 31% | 39% | 49% | 52% | (136) | 49 | 63 | 56 |
| Tahuampa | 7 | 10% | 8% | 14% | 19% | 20% | 25% | (107) | 71 | 66 |
| | 8 | 16% | 16% | 23% | 27% | 29% | 34% | 47% | (115) | 71 |
| | 9 | 16% | 12% | 20% | 23% | 25% | 27% | 40% | 42% | (126) |

[a] Actual species numbers in each plot are given in parentheses.

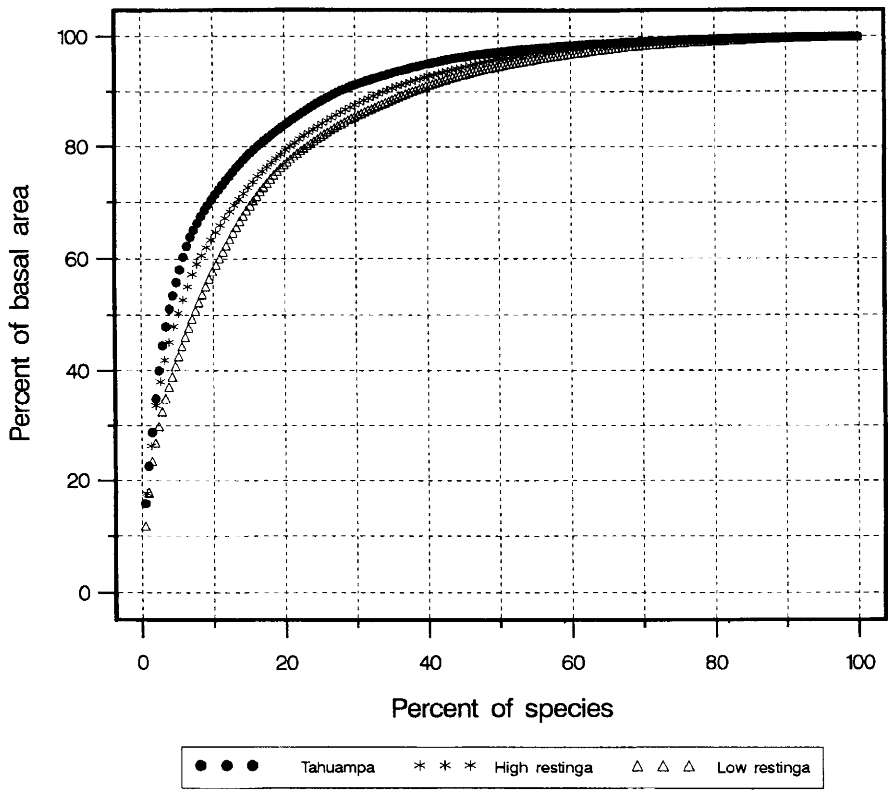


Fig. 6. Cumulative percentage of basal area as a function of the cumulative percentage of species, with data ordered by basal area per species.

Figs. 5 and 6 indicate the distribution of individuals and tree sizes by species. Species were ordered according to their share of individuals and basal area, so that species with the highest number of individuals or basal area were counted first. Thus, the species ranking differed in Figs. 5 and 6. In the tahuampa forest, a few *Eschweilera* species accounted for a high proportion of individuals and of basal area, reflecting the dominance of this genus in these forests. In all forest types, the plot of cumulative basal area (Fig. 6) curved more than the plot of tree numbers (Fig. 5), reflecting that the biggest trees comprised a few species, and that the smaller individuals contributed much of the biodiversity.

Non-overlapping 1 ha plots established in the same vicinity within any of the three forest types were likely to have only 40-60% of the species in common. It is likely that species saturation was not reached within sample areas of one hectare, although it may indicate that these forests were not well defined types (Table 4).

Table 5 shows that a considerable proportion of the total number of species identified in the study were present only within one forest type. The number of unique species was highest for the tahuampa. Fifty percent of all species recorded in this study were only found within one of the forest types.

Table 5 suggests that the typology adopted in this study was realistic, since around half of the species were found in only one of the forest types. Only 3% of the species were common to both high restinga and tahuampa, while 13-17% were shared between high and low restinga and between low restinga and tahuampa. This suggests that high restinga and tahuampa form floristic extremes. The Jaccard and Sorensen coefficients indicate a low similarity in terms of species evenness, with the lowest coefficient obtained for the high restinga and tahuampa.

**Table 5**. Distribution of species by forest type'

| | High restinga only | Low restinga only | Tahuampa only | High and low restinga | High restinga and tahuampa | Low restinga and tahuampa | All plots | Total |
|---|---|---|---|---|---|---|---|---|
| Number of species | 24 | 47 | 87 | 55 | 8 | 41 | 59 | 321 |
| Percentages of total species | 7 | 15 | 27 | 17 | 3 | 13 | 18 | 100 |
| Jaccard coefficient | - | - | - | 0.49 | 0.25 | 0.34 | - | - |
| Sorensen coefficient | - | - | - | 0.66 | 0.39 | 0.50 | - | - |

[a] Number and percentages indicate species confined to the specified type. Jaccard and Sorensen coefficients indicate similarity of the forest types.

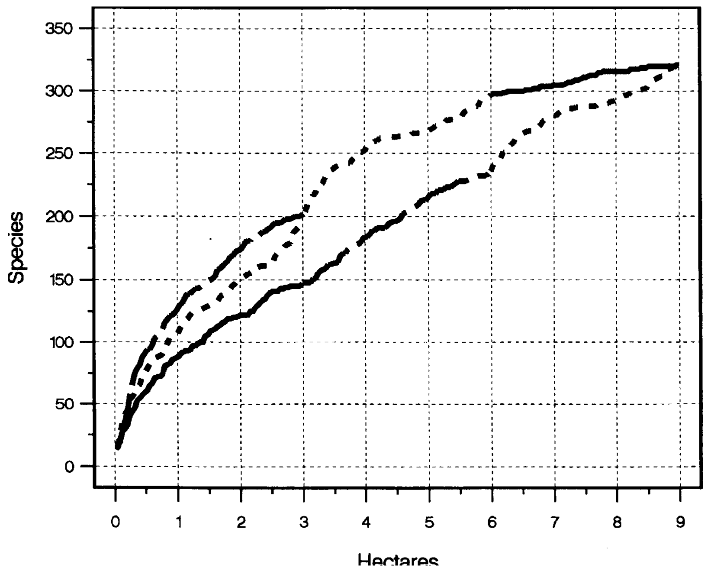


**Fig. 7**. Species-area curves for high restinga (solid), low restinga (dashed), and tahuampa (dotted) forests. Bottom extended curve (i.e. >3 ha) shows forests in the order high restinga, low restinga, and tahuampa. Upper extended curve shows forests in the order low restinga, tahuampa, and high restinga.

### *4.2. Species-density*

Species-area curves showing the number of species recorded for different sample areas are presented in Fig. 7 for each of the three forests as well as for the three forests combined. No asymptotic tendency was evident within the three ha assessed for the individual forest types (except perhaps for high restinga). There was some suggestion that the slope of all curves decreased at about 1 ha, but this may be an artifact of sampling since non-contiguous 1 ha plots were used. When data from all three forests were combined, a steady increase in the number of species was evident, except for kinks at three and six hectares where new forest types were introduced. The number of species present within a given area may be influenced by the stem density of that area, but in this study relatively similar curves were obtained from the plot of species versus stem number (Fig. 8). Figs. 7 and 8 revealed that the difference between forests in species richness could to some extent be explained by differences in stem density. However, for equal stem densities the highest species number was still found in low restinga and tahuampa.

*4.3. Importance values*

Table 6 illustrates the relative importance of families present in the study. Corresponding values for species were given in Appendix A.

**Table 6**. Relative density (Rel. den), relative diversity (Rel. div), relative dominance (Rel. dom) and resulting family importance values (FIV) for families present in the study area.

| | High restinga | | | | Low restinga | | | | Tahuampa | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rel. den | Rel. div | Rel. dom | FIV | Rel. den | Rel. div | Rel. dom | FIV | Rel. den | Rel. div | Rel. dom | FIV |
| Anacardiaceae | 1.17 | 1.36 | 2.42 | 4.95 | 0.94 | 1.48 | 1.77 | 4.19 | 0.13 | 1.02 | 0.40 | 1.55 |
| Annonaceae | 8.92 | 6.12 | 6.36 | 21.41 | 10.14 | 6.90 | 7.29 | 24.32 | 6.41 | 6.63 | 2.75 | 15.80 |
| Apocynaceae | 0.29 | 0.68 | 0.14 | 1.12 | 1.18 | 0.99 | 0.92 | 3.09 | 0.64 | 1.02 | 0.24 | 1.90 |
| Arecaceae | 9.44 | 2.72 | 18.56 | 30.72 | 2.83 | 1.97 | 2.29 | 7.08 | - | - | - | - |
| Bignoniaceae | 0.15 | 1.36 | 0.04 | 1.55 | 0.06 | 0.49 | 0.02 | 0.57 | - | - | - | - |
| Bombacaceae | 1.46 | 2.72 | 5.42 | 9.61 | 1.06 | 2.46 | 5.70 | 9.23 | 0.19 | 0.51 | 0.77 | 1.48 |
| Boraginaceae | 1.46 | 0.68 | 0.32 | 2.46 | 2.24 | 0.99 | 1.00 | 4.22 | 0.77 | 1.02 | 0.36 | 2.15 |
| Burseraceae | 2.12 | 0.68 | 0.63 | 3.43 | 0.82 | 0.49 | 0.26 | 1.58 | 0.06 | 0.51 | 0.02 | 0.60 |
| Caesalpiniaceae | 0.44 | 2.04 | 0.52 | 3.00 | 0.24 | 1.48 | 0.18 | 1.89 | 5.06 | 2.55 | 6.81 | 14.42 |
| Capparaceae | 0.51 | 0.68 | 0.11 | 1.30 | 0.12 | 0.49 | 0.03 | 0.64 | 0.06 | 0.51 | 0.01 | 0.59 |
| Caryocaraceae | | - | | - | - | - | - | - | 0.06 | 0.51 | 0.51 | 1.08 |
| Cecropiaceae | 5.71 | 3.40 | 4.59 | 13.69 | 10.55 | 3.94 | 11.11 | 25.60 | 6.67 | 2.55 | 6.01 | 15.22 |
| Celastraceae | 0.80 | 0.68 | 0.54 | 2.02 | 0.35 | 0.49 | 0.23 | 1.08 | - | - | - | - |
| Chrysobalanaceae | 1.02 | 3.40 | 0.42 | 4.84 | 1.83 | 2.96 | 4.09 | 8.87 | 5.90 | 5.10 | 12.25 | 23.25 |
| Clusiaceae | 0.29 | 1.36 | 0.11 | 1.76 | 1.12 | 0.99 | 0.61 | 2.71 | 0.45 | 1.02 | 0.23 | 1.69 |
| Combretaceae | 1.68 | 0.68 | 3.94 | 6.30 | 1.30 | 1.97 | 1.80 | 5.07 | 0.45 | 2.04 | 0.47 | 2.96 |
| Connaraceae | - | - | - | - | 0.06 | 0.49 | 0.01 | 0.57 | 0.06 | 0.51 | 0.01 | 0.58 |
| Convolvulariaceae | 0.15 | 1.36 | 0.03 | 1.53 | - | - | - | - | 0.32 | 1.02 | 0.08 | 1.42 |
| Dichapetalaceae | 0.07 | 0.68 | 0.03 | 0.78 | - | - | - | - | 3.08 | 0.51 | 2.41 | 6.00 |
| Dilleniaceae | 0.07 | 0.68 | 0.02 | 0.77 | 0.06 | 0.49 | 0.01 | 0.56 | 0.06 | 0.51 | 0.03 | 0.61 |
| Ebenaceae | 0.22 | 1.36 | 0.05 | 1.63 | 0.12 | 0.49 | 0.05 | 0.66 | 0.19 | 1.02 | 0.10 | 1.31 |
| Elaeocarpaceae | 0.88 | 0.68 | 0.37 | 1.92 | 1.12 | 1.48 | 1.91 | 4.51 | 0.83 | 2.55 | 1.81 | 5.20 |
| Euphorbiaceae | 10.31 | 4.76 | 7.53 | 22.61 | 10.90 | 3.45 | 7.08 | 21.43 | 5.51 | 3.57 | 4.95 | 14.04 |
| Fabaceae | 4.02 | 4.08 | 2.07 | 10.17 | 3.71 | 6.90 | 2.25 | 12.86 | 2.44 | 7.14 | 2.75 | 12.33 |
| Flacourtiaceae | 1.24 | 1.36 | 0.79 | 3.39 | 1.53 | 3.45 | 1.14 | 6.12 | 0.06 | 0.51 | 0.01 | 0.58 |
| Hippocrateaceae | - | - | - | - | - | - | - | - | 1.03 | 2.55 | 0.26 | 3.84 |
| Icacinaceae | 0.51 | 0.68 | 0.65 | 1.84 | 0.94 | 0.49 | 1.16 | 2.60 | 0.06 | 0.51 | 0.01 | 0.58 |
| Lacistemaceae | - | | - | - | - | - | - | - | 0.06 | 0.51 | 0.01 | 0.59 |
| Lauraceae | 2.19 | 4.76 | 0.90 | 7.85 | 4.42 | 6.40 | 2.53 | 13.35 | 1.92 | 6.12 | 0.76 | 8.80 |
| Lecythidaceae | 1.32 | 2.04 | 1.46 | 4.81 | 2.24 | 1.97 | 2.38 | 6.59 | 27.18 | 2.04 | 23.38 | 52.60 |
| Loganiaceae | - | - | - | - | - | - | - | - | 0.26 | 1.02 | 0.06 | 1.33 |
| Malpighiaceae | 0.07 | 0.68 | 0.01 | 0.76 | 0.29 | 0.49 | 0.23 | 1.02 | 0.19 | 1.02 | 0.08 | 1.29 |
| Melastomataceae | 0.22 | 1.36 | 0.04 | 1.62 | 2.89 | 1.48 | 1.16 | 5.53 | 0.32 | 1.02 | 0.16 | 1.51 |
| Meliaceae | 3.66 | 2.04 | 8.18 | 13.88 | 1.18 | 2.46 | 0.69 | 4.34 | 3.01 | 2.55 | 1.24 | 6.80 |
| Menispermaceae | 0.22 | 0.68 | 0.15 | 1.05 | 0.29 | 0.99 | 0.24 | 1.52 | 0.13 | 0.51 | 0.04 | 0.67 |
| Mimosaceae | 8.56 | 6.80 | 6.45 | 21.81 | 11.43 | 6.90 | 7.63 | 25.96 | 3.85 | 6.63 | 3.64 | 14.12 |
| Moraceae | 9.80 | 9.52 | 18.44 | 37.77 | 3.89 | 5.91 | 7.45 | 17.25 | 1.99 | 4.59 | 3.81 | 10.39 |
| Myristicaceae | 1.39 | 1.36 | 0.59 | 3.34 | 1.94 | 1.48 | 1.17 | 4.60 | 1.03 | 1.53 | 0.24 | 2.80 |
| Myrsinaceae | 0.07 | 0.68 | 0.01 | 0.77 | 0.06 | 0.49 | 0.01 | 0.56 | 0.06 | 0.51 | 0.01 | 0.58 |
| Myrtaceae | 1.54 | 4.08 | 0.72 | 6.34 | 2.95 | 5.91 | 1.25 | 10.11 | 1.99 | 7.14 | 0.91 | 10.04 |
| Nyctaginaceae | 0.07 | 0.68 | 0.01 | 0.77 | 0.29 | 0.49 | 0.10 | 0.88 | 0.06 | 0.51 | 0.01 | 0.58 |
| Ochnaceae | - | - | - | - | - | - | - | - | 0.45 | 0.51 | 0.21 | 1.16 |
| Olacaceae | 0.44 | 1.36 | 0.21 | 2.01 | 1.24 | 1.48 | 2.93 | 5.64 | 0.32 | 1.53 | 0.52 | 2.37 |
| Phytolaccaceae | - | - | - | - | - | - | - | - | 0.06 | 0.51 | 0.02 | 0.60 |
| Polygonaceae | 1.83 | 2.72 | 0.69 | 5.24 | 3.54 | 2.96 | 2.70 | 9.19 | 3.85 | 3.57 | 4.49 | 11.90 |
| Proteaceae | - | - | - | - | - | - | - | - | 0.13 | 0.51 | 0.02 | 0.66 |
| Quiinaceae | - | - | - | - | 0.06 | 0.49 | 0.01 | 0.56 | - | - | - | - |
| Rubiaceae | 2.34 | 4.76 | 1.27 | 8.38 | 3.01 | 3.94 | 12.72 | 19.67 | 1.09 | 2.04 | 1.49 | 4.62 |
| Sapindaceae | 0.44 | 2.04 | 0.08 | 2.56 | 1.30 | 2.96 | 1.46 | 5.71 | 1.03 | 1.53 | 0.57 | 3.13 |
| Sapotaceae | 4.10 | 3.40 | 2.29 | 9.79 | 3.01 | 3.45 | 2.05 | 8.50 | 9.29 | 6.12 | 12.00 | 27.42 |
| Simaroubaceae | - | - | - | - | 0.12 | 0.49 | 0.02 | 0.63 | - | - | - | - |
| Sterculiaceae | 2.78 | 1.36 | 1.13 | 5.27 | 0.77 | 0.99 | 0.25 | 2.01 | - | - | - | - |
| Tiliaceae | 0.59 | 2.72 | 0.38 | 3.69 | 0.77 | 1.48 | 1.06 | 3.30 | 0.90 | 1.02 | 2.37 | 4.29 |
| Violaceae | 5.12 | 1.36 | 1.09 | 7.57 | 0.94 | 0.99 | 0.28 | 2.20 | 0.13 | 1.02 | 0.03 | 1.18 |
| Vochysiaceae | 0.29 | 1.36 | 0.24 | 1.90 | 0.18 | 0.49 | 0.76 | 1.43 | 0.19 | 0.51 | 0.70 | 1.40 |

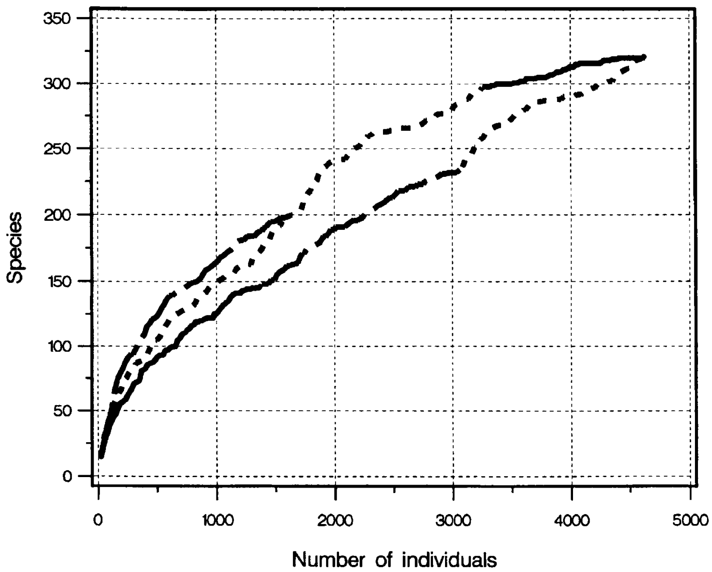

Fig. 8. Species-density curves for high restinga (solid), low restinga (dashed), and tahuampa (dotted) forests. Bottom extended curve (i.e. >3 ha) shows forests in the order high restinga, low restinga, and tahuampa. Upper extended curve shows forests in the order low restinga, tahuampa, and high restinga.

## 5. **Discussion**

### *5.1. Forest structure*

The density was highest in low restinga (566 per hectare) and lowest in the high restinga (456 per hectare). Comparable studies in other Amazonian flood plain forests provided data in the range 417737 (Table 1), consistent with the present study, and with other studies in a broader context (e.g. Brunig, 1983; Bongers et al., 1988; Brinson, 1990; Lieberman and Lieberman, 1994; Richards, 1996; Thomsen, 1997).

Contrary to this the basal area at Braga-Supay and Lobillo was somewhat lower than the values of more than 30 $m^2$/ha measured in various other Amazonian flood plain forests (Table 1) in Ecuador (Balslev et al., 1987) and Brazil (Worbes, 1983; Campbell et al., 1986; Worbes, 1986; Ayres, 1995). The flood plain forests of the present study were at the lower end of the common range presented by Brinson (1990) for riverine forests, and compared with his average of 37.8 $m^2$/ha. Similarly, our basal areas were consistent with those in non-flooded tropical rainforests (e.g. Brunig, 1983; Swaine et al., 1987; Bongers et al., 1988; Lieberman and Lieberman, 1994; Richards, 1996; Thomsen, 1997). The basal area distribution across diameter classes (Fig. 3) showed a decline in the higher diameter classes. This contrasted the observations for unlogged natural rain forests in Sarawak (Malaysia), where Korsgaard (1992) observed a close to constant share of basal area over 5 cm diameter classes in the range 10-60 cm. Assuming that a similar distribution could be present in the Braga-Supay and Lobillo flood plain forests, this may be an indication that the forests were still in a succession development, or that some of the large trees were removed.

The most abundant 10% of species accounted for approximately 50% of the individuals in the restinga forests and 60% in the tahuampa forest (Fig. 3). Similarly, the most dominant 10% of species accounted for 60 and 70% of the basal area, respectively. Comparable patterns were found by Balslev et al. (1987). It is worth noticing that in the tahuampa a few species accounted for more individuals and basal area than in the restinga forests in spite of a relatively high species number in this forest type.

The size distribution of individuals (Fig. 2) followed the reverse J-pattern, normally observed in natural forests (e.g. Brunig, 1983; Richards, 1996). In the higher diameter classes the tahuampa forest had a higher proportion of individuals than the restinga forests, and the distribution of basal area followed a similar pattern (Fig. 3).

The heights of the Braga-Supay and Lobillo forests were comparable to the Amazonian flood plain forests studied in Ecuador by Balslev et al. (1987), in Venezuela by Colonnello (1990), and in Peru by Freitas (1996a). In contrast to these results a study of a flood plain forest at Manaus showed that almost all trees were less than 30 m high (Campbell et al., 1986).

*5.2. Family importance value (FIV)*

Table 7 contrasts the FIVs for the ten most important families in a Brazilian varzea forest located close to Manaus (Campbell et al., 1986), in a varzea forest of the Ecuadorian Amazon (Balslev et al., 1987) and of the forests of this study.

The high restinga seemed to be characterised by the palms (FIV = 31), which were much less important in the low restinga, and were completely absent from the tahuampa (except for species smaller than the 10 cm DBH limit of this study). The high restinga was further characterised by a high value of the Meliaceae (FIV = 14). Sapotaceae (FIV = 14) and Chrysobalanaceae (FIV = 23) were abundant in the tahuampa. The low restinga had features in common with the high restinga and the tahuampa, apart from the abundance of Rubiaceae (FIV = 20).

Ecuadorian flood plain forests were rather similar in familial composition (Table 7); especially with the high restinga forest where seven of the ten most important families of both forests were shared and had comparable FIVs. The Brazilian flood plain forest seemed considerably different from the forests of this study as well as from the Ecuadorian flood plain forest (Table 7), as it was completely dominated by the families of Leguminosae, Violaceae, Tiliaceae, and Euphorbiaceae. However, studies by Worbes (1983, 1986, 1997) and Worbes et al. (1992) indicated that there is floristic variation among the flood plain forests of the central Amazon, as other families than the four leading mentioned by Campbell et al. (1986) were important in terms of diversity and density in igapo and varzea forests in the Manaus area.

Another study of three Brazilian flood plain forests at Tefe (Ayres, 1995) suggested that Leguminosae, Euphorbiaceae, Annonaceae, Lecythidaceae, and Moraceae were among the ten most abundant families. Lauraceae, Bombacaceae, and Meliaceae were much more prevalent in the forest less exposed to flooding, while Sapotaceae and Chrysobalanaceae became relatively more frequent in the forests flooded for a longer period. This pattern was much like that of the forests of Braga-Supay and Lobillo.

Gentry (1988) stated that Leguminosae is virtually always the most diverse family in neotropical and African lowland primary forests. Exceptions are neotropical forests on extremely rich soils where Moraceae becomes very species rich. Palm species also tend to be abundant on nutrient rich soils, whereas on poorer soils families like Burseraceae, Lauraceae, and Sapotaceae are more prevalent. The results from Braga-Supay and Lobillo were generally consistent with this pattern. However, the Moraceae added most to diversity at high restinga and became less species rich over low restinga and tahuampa. Conversely, the families of Lauraceae and Sapotaceae became increasingly species rich from high restinga over low restinga and tahuampa. All sites were nutrient rich (Table 2); consequently it appeared that the diversity verus fertility pattern observed by Gentry (1988) is related to inundation period in the Braga-Supay and Lobillo areas.

**Table 7**. Family importance values (FIV) for the 10 most important families in Amazonian flood plain forests of Brazil (Campbell et al., 1986), Ecuador (Balslev et al., 1987), and Peru (this paper)[a]

| Campbell et al. (1986) | | Balslev et al. (1987) | | This study (High restinga) | | This study (Low restinga) | | This study (Tahuampa) | |
|---|---|---|---|---|---|---|---|---|---|
| Family | FIV | Family | FIV | Family | FIV | Family | FIV | Family | FIV |
| Leguminosae | 121 | Arecaceae | 53 | Moraceae | 51 | Moraceae | 43 | Lecythidaceae | 53 |
| Violaceae | 44 | Moraceae | 44 | Leguminosae | 35 | Leguminosae | 41 | Leguminosae | 41 |
| Tiliaceae | 43 | Leguminosae | 24 | Arecaceae | 31 | Annonaceae | 24 | Sapotaceae | 27 |
| Euphorbiaceae | *15* | Bombacaceae | 20 | Euphorbiaceae | 23 | Euphorbiaceae | 21 | Moraceae | 26 |
| Lecythidaceae | 9 | Myristicaceae | 20 | Annonaceae | 21 | Rubiaceae | 20 | Chrysobalanaceae | 23 |
| Annonaceae | 7 | Rubiaceae | 15 | Meliaceae | 14 | Lauraceae | 13 | Annonaceae | 16 |
| Moraceae | 7 | Meliaceae | 12 | Sapotaceae | 10 | Myrtaceae | 10 | Euphorbiaceae | 14 |
| Sapotaceae | 7 | Euphorbiaceae | 8 | Bombacaceae | 10 | Bombacaceae | 9 | Polygonaceae | 12 |
| Meliaceae | 7 | Lecythidaceae | 8 | Rubiaceae | 8 | Polygonaceae | 9 | Myrtaceae | 10 |
| Polygonacaeae | 5 | Lauraceae | 7 | Lauraceae | 8 | Chrysobalanaceae | 9 | Lauraceae | 9 |

[a] Moraceae includes Cecropiaceae, while Leguminosae comprises the families Caesalpiniaceae, Fabaceae, and Mimosaceae.

Flood plain forests in Manu were floristically distinct from other neotropical lowland moist forests because of the relative absence of families like Lecythidaceae, Chrysobalanaceae, Vochysiaceea, and Burseraceae (Foster, 1990). We found a similar pattern, except that several species of Chrysobalanaceae were present, especially in the tahuampa forest, where the Lecythidaceae also dominated.

*5.3. Species importance value (SIV)*

In the high restinga, the large trees *Maquira coriacea, Guarea macrophylla, Terminalia oblonga, Spondias mombin, Ceiba pentandra,* and *Hura crepitans* were all notable and characterised by high relative dominance, especially when compared to their relative density (Appendix A). The palm species *Scheelea brachyclada* dominated the high restinga, which was remarkable for a monocotelydoneous species in the forests of this study. Some other notable species in the lower strata of the high restinga were *Drypetes amazonica, Leonia glycicarpa, Theobroma cacao, Protium nodulosum,* and several Annonaceae species. For most of the species the relative frequency was more or less equal to the relative density.

The tahuampa was dominated by *Eschweilera turbinata* and *Eschweilera parvifolia,* both of which had high relative densities. Some of the larger important trees in this forest were *Campsiandra angustifolia, Pouteria spp., Licania micrantha, Parinari excelsa,* and *Luehea cymulosa,* which all attained high relative dominances (cf. relative densities). These species tended to be confined to the tahuampa, and were associated with other important species such as *Tapura* sp., and *Duguetia spixiana,* which both had high relative densities. The species common to both tahuampa and high restinga included *M. coriacea* and *D. amazonica.*

The low restinga was characterised by the comparatively high importance values for *Calycophyllum spruceanum, Zygia juruana, Mouriri grandiflora, Alchornea schomburgkii,* and *Xylopia micans* (Table 8).

*5.4. Species richness and species evenness*

Amazonian flood plain forests normally contain fewer species than their non-inundated counterparts of the same region (Gentry, 1982, 1986; Campbell et al., 1986; Balslev et al., 1987; Junk, 1989; Dumont et al., 1990; Freitas, 1996a, 1996b; Worbes, 1997). The studies summarised in Table 1 also recorded relatively few species. In the present study we found it tempting to compare the occurrence of 279 tree species occurring in the nine 1 ha plots in Braga-Supay and Lobillo with the results from the Arboretum of Jenaro Herrera established nearby in nine hectare of non-flooded natural terra firme forest, where a total of 386 tree species with a diameter exceeding 10 cm DBH were recorded (Spichiger et al., 1989; Spichiger et al., 1990). Since the flood plain forest plots were located in three distinct habitats, the diversity may have contributed a relatively high component of species richness. This contention was supported by the number of species confined to one of the forest types (Table 5). The Arboretum of Jenaro Herrera was located on a more homogeneous site, so more comparable samples may indicate a greater difference in species numbers. Our results supported the general impression mentioned by other workers: that Amazonian flood plain forests are less species rich per unit area than adjacent terra firme forest. The stresses imposed by flooding (e.g. Gill, 1970; Crawford, 1982; Junk, 1989; Armstrong et al., 1994), are possible causes of the relatively lower species richness of flood plain forests (Brinson, 1990; Worbes, 1997). This would be in accordance with Richards (1969), who stated as a general rule that locations with relatively unfavourable growth conditions tend to be less species rich than those with more optimal conditions.

Ayres (1995) and Worbes (1997) mentioned that in general the species richness increases with: (1) succession, (2) decreasing fertility, and (3) decreasing flood stress. In the forests at Braga-Supay and Lobillo, located on sites with comparable soil fertility and flooded by water from the same river, the species richness increased with the length of the flooding period. The lowest species richness occurred on the high restinga. The diameter distribution and occurrence of large individuals of non-pioneer species suggested that the forests were not of recent origin. However, the high importance value of Cecropiaceae and the presence of larger C. *spruceanum* in the low restinga indicated that it was relatively young; at least as compared to the high restinga forest where C. *spruceanum* was absent, except as regeneration in large clearings. The high restinga appeared to be a later succession stage than low restinga. However, its lower species richness was at odds with the proposition of Ayres (1995) and Worbes (1997). Notwithstanding this example, other flood plain sites in the region with poor drainage do tend to be more species-poor (Freitas, 1996a).

**Table 8**. Species selected as characteristic of forests in this study and their species importance values (calculated for 1 ha plots).

| | High restinga | | | Low restinga | | | Tahuampa | | |
|---|---|---|---|---|---|---|---|---|---|
| | Plot 1 | Plot 2 | Plot 3 | Plot 4 | Plot 5 | Plot 6 | Plot 7 | Plot 8 | Plot 9 |
| **Species characteristic of all three forest types** | | | | | | | | | |
| *Drypetes amazonica* var. *peruviana* | 11.7 | 6.73 | 24.13 | 6.29 | 12.61 | 14.13 | 0.59 | 2.92 | 10.13 |
| *Inga stenoptera* | 1.97 | 2.74 | 6.97 | 8.3 | 5.68 | 2.08 | 1.77 | 3.47 | 4.3 |
| *Maquira coriacea* | 13.08 | 5.31 | 26.37 | 10.02 | 5.39 | 10.1 | - | 3.29 | 9.82 |
| *Pouteria reticulate* | 3.64 | 4.04 | 4.2 | 0.48 | 2.24 | 2.88 | 5.05 | 5.29 | 4.44 |
| **Species characteristic of restinga forests** | | | | | | | | | |
| *Spondias naombin* sens. Lat. | 3.96 | 1.19 | 10.23 | 4.04 | 4.78 | 1.64 | - | 0.76 | 1.41 |
| *Oxandra sphaerocarpa* | 5.47 | 2.65 | 8.3 | 4.68 | 9.27 | 4.3 | - | - | 0.52 |
| *Unonopsis floribunda* | 6.88 | 6.4 | 5.16 | 8.05 | 9.24 | 1.35 | - | - | 0.56 |
| *Xylopia* sp. 1 | 6.81 | 7.38 | 4.05 | 2.21 | 4.98 | 3.52 | - | - | - |
| *Ceiba pentandra* | - | 10.81 | 3.38 | - | 9.98 | - | - | 3.12 | - |
| *Cordia nodosa* | 4.99 | 3.89 | 1.72 | 3.77 | 5.32 | 2.41 | - | 0.53 | - |
| *Pourouma acuminata* | 4.2 | 4.03 | 7.96 | 11.35 | 3.64 | 4.82 | - | - | - |
| *Terminalia oblonga* | 9.27 | 9.19 | 4.21 | 4.48 | 3.85 | 1.58 | - | 0.63 | - |
| *Inga nobilis* | 7.74 | 5.29 | 2.09 | 8.59 | 5.08 | 2.45 | - | - | - |
| **Species characteristic of low restinga and tahuampa** | | | | | | | | | |
| *Eschweilera parvifo1ia* | 0.61 | 1.78 | 2.62 | 1.09 | 4.99 | 8.06 | 23.6 | 22.38 | 22.7'1 |
| **Species characteristic of high restinga** | | | | | | | | | |
| *Guatteria* sp. 1 | 5.57 | 4.07 | 2.74 | 1.07 | 2.36 | 1.57 | - | - | 0.49 |
| *Astrocaryum chonta* | 5.75 | 3.7 | 0.9 | 2.01 | 0.51 | - | - | - | - |
| *Scheelea brachyclada* | 39.76 | 35.14 | 17.91 | - | - | - | - | - | - |
| *Protium nodulosum* | 3.93 | 5.26 | 5.23 | 4.12 | 1.3 | 1.39 | - | - | 0.53 |
| *Pourouma cecropiifolia* | 4.76 | 11.07 | 1.99 | 1.36 | 3.27 | 0.53 | - | - | - |
| *Hura crepitans* | 7.75 | 1.14 | 3.63 | - | - | - | - | - | - |
| *Pterocarpus* sp. 1 | 6.45 | 11.96 | - | - | - | 0.92 | - | - | - |
| *Guarea macrophylla* | 9.82 | 11.59 | 16.94 | 1.31 | 1.33 | 1.52 | 1.11 | 1.34 | 5.56 |
| *Inga cinnamomea* | 4.23.. | 1.15 | 4.81 | 2.92 | 1.31 | 0.51 | - | | - |
| *Inga edulis* | 6.14 | 9.71. | 1.2 | 5.38 | 2.14 | - | - | - | - |
| *Sorocea steinbechii* | 2.48 | 4.39 | 3.76 | 0.97 | 2.43 | 2.31 | - | 0.54 | 0.51 |
| *Sarcaulus brasiliensis* ssp. *brasiliensis* | 3.49 | 6.05 | 7.8 | 3.44 | 1.96 | 2.04 | - | 0.66 | 5.29 |
| *Theohroma cacao* | 9.13 | 4.55 | 1.38 | 2.81 | 1.74 | - | - | - | - |
| *Leonia glycycarpa* | 110.1 | 5.47 | 11.78 | 0.52 | 2.19 | 3.54 | 0.56 | - | - |
| **Species characteristic of low restinga** | | | | | | | | | |
| *Xylopia inicans* | - | - | 1.25 | 5.61 | 4.22 | 3.04 | 0.72 | 1.72 | 0.99 |
| *Euterpe precatoria* | - | 0.6 | | 8.19 | 1.95 | 0.54 | - | - | - |
| *Cecropia membranacea* | 5.88 | 0.97 | | 4.61 | 7.64 | | - | - | - |
| *Licania britteniana* | 1.22 | 1.29 | 1.29 | 2.73 | 4.82 | 4.15 | - | 0.59 | 5.31 |
| *Sloanea guianensis* | 3.1 | 1.1 | 2.78 | 3.66 | 3.32 | 3.94 | - | 1.23 | 1.63 |
| *Alchornea schomburgkii* | - | - | 0.81 | 5.19 | 4.76 | 3.32 | 1.28 | 3.35 | - |
| *Croton cuneatus* | 1.76 | 1.25 | 4.53 | 6.46 | 5.03 | 9.13 | - | - | - |
| *Pterocarpus amazonum* | - | - | - | 3.95 | 2 | 3.3 | 1.25 | 1.72 | 2.17 |
| *Mouriri grendiflora* | - | - | 0.81 | 1.49 | 2.42 | 12.22 | - | 1.3 | 1.04 |
| *Inga vismiifolia* | - | - | - | 2.32 | 3.05 | 6,11 | 1.75 | 3.47 | 2.28 |
| *Zygia jurucma* | - | 0.62 | 1.15 | 8.49 | 5.43. | 6.59 | - | - | - |
| *Virola pavonis* | 1.92 | 0.67 | 2.71 | 2.16 | 3.16 | 3.61 | - | - | 1.12 |
| *Cathedra acuminata* | 0.61 | - | 0.58 | 2.59 | 5.17 | 3.29 | 0.79 | 0.78- | 1.25 |
| *Coccoloba* sp. 3 | 1.18 | - | - | 5.81. | 3.71 | 1.08 | - | 0.56 | 3.61 |
| *Triplaris amaricana* | 1.64 | 2.34 | 2.14 | 6.56 | 2.38 | 0.58 | 2.94 | 1.71 | - |
| *Calycophyllum spruceanum* | - | - | - | 4.66 | 11.52 | 22.99 | - | - | - |
| **Species characteristic of tahuampa** | | | | | | | | | |
| *Duguetia spixiana* | - | - | - | - | 2.93 | 4.67 | 7.52 | 3.85 | 4.91 |
| *Pseudoxandra polyphleba* | - | - | 0.67 | - | 1.36 | 0.52 | 1.37 | 4.93 | 3.22 |
| *Campsiandra angustifolia* | - | - | - | - | - | - | 11.6 | 12.59 | 20.48 |
| *Licania heteromorpha* var. *glabra* | - | - | - | - | - | - | 1.7 | 5.64 | 2.51 |
| *Licania micrantha* | 0.55 | 0.63 | - | - | - | - | 2.85 | 8.45 | 12.02 |
| *Parinari excelsa* | - | - | - | 2.69 | 1.81 | - | 7.71 | 13.73 | 1.16 |
| *Tapura* sp. | - | 0.59 | - | - | - | - | 4.35. | 6.89 | 12.8 |
| *Sapium glandulosum* | 4.39 | 1.82 | 2.31 | 3.42 | 2.79 | 1.04 | 3.65 | 4.26 | 7.92 |
| *Eschweilera turbinata* | 0.55 | - | 2.89 | 0.8 | 1.39 | 2.24 | 57.79 | 34.66 | 25.92 |
| *Coccoloba densifrons* | 1.24 | 1.13 | 2.34 | 1.56 | 2.8 | 3.91 | 4.11 | 6.2 | 1.01 |
| *Coccoloba* sp. 2 | - | - | - | - | - | - | 7.72 | 6.7 | 1.67 |
| *Pouteria procera* | - | - | - | 0.5 | 1.61 | 4.13 | 9.45 | 4,62 | 9.51 |
| *Pouteria* sp. 2 | - | 0.63 | - | - | - | 0.79 | 7.68 | 6.65 | 14.65 |
| *Luebea cymulosa* | - | - | 0.87 | 3.12 | 1.61 | 1.08 | 4.37 | 3.35 | 4.82 |

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**Appendix** A.

Relative density (Rel. den), relative frequency (Rel. fre), relative dominance (Rel. dom), and the resulting species importance values (SIV) for species present in high restinga, low restinga, tahuampa, and all forests. Using the totals given in the bottom of the columns it is possible to calculate absolute values for each species. Numbers after a species name refer to collections by J. Ruiz, L. Freitas, L.P. Kvist registered at AAU. An “N” after a number denotes a collection number by Nebel registered at AAU.

| | High restinga | | | | Low restinga | | | | Tahuampa | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV |
| Anacardiaceae | | | | | | | | | | | | |
| *Spondias mombin* L. 2278 | 1.17 | 1.57 | 2.42 | 5.15 | 0.77 | 1.05 | 1.64 | 3.45 | 0.13 | 0.2 | 0.4 | 0.73 |
| *Tapirira guianensis* Aublet 1659 | – | – | – | – | 0.18 | 0.24 | 0.12 | 0.54 | – | – | – | – |
| Annonaceae | | | | | | | | | | | | |
| *Anaxagorea* sp. 2474 | 0.8 | 1.08 | 0.2 | 2.08 | – | – | – | – | – | – | – | – |
| *Annona hypoglauca* C. Martius 5037 | – | – | – | – | 0.12 | 0.16 | 0.03 | 0.31 | 0.19 | 0.3 | 0.04 | 0.53 |
| *Annona* sp. 1 5369 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| *Crematosperma* sp. 8712 | – | – | – | – | 0.06 | 0.08 | 0.04 | 0.18 | – | – | – | – |
| *Duguetia odorata* (Diels) J F. Macbride 2461 | 0.15 | 0.2 | 0.04 | 0.38 | – | – | – | – | – | – | – | – |
| *Duguetia spixiana* C. Martius 5508 | – | – | – | – | 0.88 | 1.21 | 0.5 | 2.59 | 1.99 | 2.88 | 0.52 | 5.39 |
| *Guatteria inundata* C. Martius 5153 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| *Guatteria* sp. 1 2006 | 1.32 | 1.66 | 1.17 | 4.15 | 0.59 | 0.8 | 0.3 | 1.69 | 0.06 | 0.1 | 0.01 | 0.17 |
| *Guatteria* sp. 2 9335 | – | – | – | – | 0.12 | 0.16 | 0.04 | 0.32 | – | – | – | – |
| *Guatteria* sp. 3 5202 | – | – | – | – | 0.18 | 0.24 | 0.23 | 0.65 | 0.71 | 0.89 | 0.76 | 2.36 |
| *Malmea* sp. 6013 | 0.22 | 0.29 | 0.05 | 0.56 | 0.41 | 0.4 | 0.12 | 0.93 | 0.71 | 0.99 | 0.17 | 1.87 |
| *Oxandra sphaerocarpa* R. E. Fries 1579 | 2.12 | 2.25 | 1.09 | 5.46 | 2.36 | 2.09 | 1.7 | 6.15 | 0.06 | 0.1 | 0.02 | 0.18 |
| *Pseudoxandra polyphleba* (Diels) R. E. Fries 4085 | 0.07 | 0.1 | 0.05 | 0.22 | 0.24 | 0.32 | 0.1 | 0.65 | 1.15 | 1.69 | 0.35 | 3.2 |
| *Rollinia cuspidata* C. Martius 9266 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | – | – | – | – |
| *Unonopsis floribunda* Diels 1266 | 2.27 | 2.54 | 1.35 | 6.17 | 2.36 | 2.01 | 1.83 | 6.2 | 0.06 | 0.1 | 0.03 | 0.19 |
| *Unonopsis* sp. 5248 | – | – | – | – | 0.06 | 0.08 | 0.04 | 0.18 | 0.77 | 0.99 | 0.18 | 1.94 |
| *Xylopia micans* R. E. Fries 1165 | 0.15 | 0.2 | 0.07 | 0.41 | 1.3 | 1.69 | 1.25 | 4.23 | 0.26 | 0.4 | 0.49 | 1.14 |
| *Xylopia* sp. 1 2024 | 1.76 | 1.96 | 2.34 | 6.05 | 1.24 | 1.45 | 0.95 | 3.63 | – | – | – | – |
| *Xylopia* sp. 2 7178 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| Unidentified | 0.07 | 0 | 0.01 | 0.08 | 0.18 | 0 | 0.12 | 0.29 | 0.26 | 0 | 0.15 | 0.4 |
| Apocynaceae | | | | | | | | | | | | |
| *Aspidosperma rigidum* Rusby 9034 | – | – | – | – | 0.35 | 0.4 | 0.43 | 1.18 | – | – | – | – |
| *Aspidosperma* sp. 5493 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| *Himatanthus bracteatus* (A. DC.) Woodson 2048 | 0.29 | 0.29 | 0.14 | 0.73 | 0.82 | 0.88 | 0.49 | 2.2 | – | – | – | – |
| *Malouetia tamaquarina* (Aublet) A. DC. 5581 | – | – | – | – | – | – | – | – | 0.58 | 0.89 | 0.22 | 1.69 |
| Arecaceae | | | | | | | | | | | | |
| *Astrocaryum chonta* C. Martius | 1.46 | 1.27 | 0.73 | 3.47 | 0.29 | 0.32 | 0.19 | 0.8 | – | – | – | – |
| *Astrocaryum jauari* C. Martius | – | – | – | – | 0.82 | 0.64 | 1.13 | 2.6 | – | – | – | – |
| *Euterpe precatoria* C. Martius | 0.07 | 0.1 | 0.03 | 0.2 | 1.3 | 1.37 | 0.75 | 3.41 | – | – | – | – |
| *Scheelea brachyclada* Burret | 7.46 | 5.77 | 17.68 | 30.91 | – | – | – | – | – | – | – | – |
| *Socratea exorrhiza* (C. Martius) H. A. Wendland | 0.44 | 0.49 | 0.12 | 1.05 | 0.41 | 0.4 | 0.21 | 1.02 | – | – | – | – |
| Bignoniaceae | | | | | | | | | | | | |
| *Anemopaegma chrysanthum* Dugand 8626 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| *Mansoa standleyi* (Steyermark) A. Gentry 2392 | 0.07 | 0.1 | 0.03 | 0.2 | – | – | – | – | – | – | – | – |
| *Tanaecium* sp. 4306 | 0.07 | 0.1 | 0.01 | 0.18 | – | – | – | – | – | – | – | – |
| Bombacaceae | | | | | | | | | | | | |
| *Cciba pentandra* (L.) Gaertner | 0.15 | 0.2 | 4.29 | 4.63 | 0.06 | 0.08 | 3.35 | 3.49 | 0.19 | 0.1 | 0.78 | 1.07 |
| *Ceiba samauma* (C. Martius & Zuccarini) Schumann 5345 | 0.29 | 0.39 | 0.77 | 1.45 | 0.24 | 0.24 | 1.44 | 1.92 | – | – | – | – |
| *Matisia bracteolosa* Ducke 2277 | 0.73 | 0.88 | 0.14 | 1.76 | 0.18 | 0.24 | 0.06 | 0.48 | – | – | – | – |
| *Pachira aquatica* Aublet 4535 | 0.29 | 0.39 | 0.22 | 0.9 | 0.12 | 0.08 | 0.08 | 0.28 | – | – | – | – |
| *Pseudobombax munguba* (C. Martius & Zuccarini) Dugand 9018 | – | – | – | – | 0.47 | 0.32 | 0.74 | 1.53 | – | – | – | – |
| Boraginaceae | | | | | | | | | | | | |
| *Cordia lutea* Lamarck 5159 | – | – | – | – | 0.77 | 0.8 | 0.53 | 2.1 | 0.71 | 0.89 | 0.35 | 1.95 |
| *Cordia nodosa* Lamarck 3049 | 1.46 | 1.76 | 0.32 | 3.54 | 1.47 | 1.93 | 0.46 | 3.86 | 0.06 | 0.1 | 0.01 | 0.17 |
| Burseraceae | | | | | | | | | | | | |
| *Protium nodulosum* Swart 1090 | 2.12 | 2.05 | 0.63 | 4.81 | 0.82 | 1.13 | 0.26 | 2.21 | 0.06 | 0.1 | 0.02 | 0.19 |
| Caesalpiniaceae | | | | | | | | | | | | |
| *Bauhinia guianensis* Aublet 5530 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| *Bauhinia* sp. 1 1260 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| *Campsiandra angustifolia* (Bentham) Sandwith 5084 | – | – | – | – | – | – | – | – | 4.68 | 3.98 | 6.22 | 14.88 |
| *Crudia* sp. 1 3094 | 0.22 | 0.29 | 0.11 | 0.62 | – | – | – | – | – | – | – | – |
| *Crudia* sp. 2 2457 | 0.07 | 0.1 | 0.03 | 0.2 | – | – | – | – | – | – | – | – |
| *Cynometra* sp. 9060 | 0.15 | 0.2 | 0.38 | 0.72 | 0.06 | 0.08 | 0.03 | 0.17 | 0.13 | 0.2 | 0.03 | 0.35 |
| *Macrolobium acaciifolium* (Benth.) Benth. 9491 | – | – | – | – | 0.12 | 0.16 | 0.13 | 0.41 | 0.13 | 0.2 | 0.54 | 0.87 |
| *Tachigali* sp. 5624 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| Capparaceae | | | | | | | | | | | | |
| *Capparis sola* J. F. Macbride 3013 | 0.51 | 0.68 | 0.11 | 1.31 | 0.12 | 0.16 | 0.03 | 0.3 | – | – | – | – |
| *Crateva tapia* L. 5563 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| Caryocaraceae | | | | | | | | | | | | |
| *Caryocar microcarpum* Ducke 5479 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.51 | 0.67 |
| Cecropiaceae | | | | | | | | | | | | |
| *Cecropia ficifolia* Warburg ex Snethlage N907037 | 0.07 | 0.1 | 0.01 | 0.18 | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Cecropia latiloba* Miquel 5005 | – | – | – | – | 0.06 | 0.08 | 0.08 | 0.22 | 0.06 | 0.1 | 0.01 | 0.18 |
| *Cecropia litoralis* Snethlage | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.03 | 0.2 |
| *Cecropia membranacea* TrÄcul 1195 | 0.59 | 0.59 | 1.12 | 2.29 | 1.24 | 1.29 | 1.58 | 4.1 | – | – | – | – |
| *Cecropia* unidentified | 0.51 | 0 | 0.58 | 1.1 | 6.54 | 0 | 5.7 | 12.24 | 5.9 | 0 | 5.13 | 11.03 |
| *Coussapoa asperifolia* TrÄcul 8450 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.15 | – | – | – | – |

| | High restinga | | | | Low restinga | | | | Tahuampa | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV |
| *Coussapoa nitida* Miquel 5621 | – | – | – | – | – | – | – | – | 0.26 | 0.4 | 0.78 | 1.43 |
| *Coussapoa ovalifolia* TrÄcul 6023 | – | – | – | – | 0.06 | 0.08 | 0.14 | 0.28 | 0.13 | 0.2 | 0.04 | 0.37 |
| *Coussapoa trinervia* Spruce ex Mildbread 3120 | 0.07 | 0.1 | 0.01 | 0.18 | 0.06 | 0.08 | 0.06 | 0.2 | – | – | – | – |
| *Coussapoa villosa Poeppig &* Endlicher 8504 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| *Coussapoa* unidentified | 0.07 | 0 | 0.01 | 0.09 | 0.06 | 0 | 0.04 | 0.1 | 0.19 | 0 | 0.06 | 0.25 |
| *Pourouma acuminata* C. Martius ex Miquel 1356 | 1.76 | 1.86 | 1.8 | 5.42 | 1.71 | 1.61 | 3.06 | 6.38 | – | – | – | – |
| *Pourouma cecropiifolia* C. Martius 2014 | 2.63 | 2.25 | 1.04 | 5.93 | 0.71 | 0.64 | 0.4 | 1.75 | – | – | – | – |
| Celastraceae | | | | | | | | | | | | |
| *Maytenus macrocarpa* (R. & P.) Briquet 2408 | 0.8 | 0.88 | 0.54 | 2.22 | 0.35 | 0.48 | 0.23 | 1.07 | – | – | – | – |
| Chrysobalanaceae | | | | | | | | | | | | |
| *Couepia subcordata* Bentham 9400 | – | – | – | – | 0.24 | 0.32 | 0.26 | 0.82 | – | – | – | – |
| *Couepia* sp. 6389 | – | – | – | – | 0.12 | 0.16 | 0.07 | 0.35 | 0.45 | 0.7 | 0.33 | 1.47 |
| *Hirtella elongata* C. Martius & Zuccarini 7568 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| *Hirtella triandra* ssp. *triandra* Swartz 3243 | 0.15 | 0.1 | 0.07 | 0.32 | 0.18 | 0.24 | 0.07 | 0.49 | 0.06 | 0.1 | 0.2 | 0.37 |
| *Licania apetala* var. *aperta* (E. Meyer) Fritsch, (Bentham) Prance 7104 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.07 | 0.4 |
| *Licania britteniana* Fritsch 3088 | 0.44 | 0.59 | 0.24 | 1.27 | 0.65 | 0.88 | 2.4 | 3.93 | 0.58 | 0.6 | 0.83 | 2 |
| *Licania heteromorpha* var. glabra Bentham (C. Martius ex Hooker f.) Prance 7530 | – | – | – | – | – | – | – | – | 0.96 | 1.49 | 0.85 | 3.3 |
| *Licania macrocarpa* Cuatrecasas 2581 | 0.15 | 0.2 | 0.02 | 0.37 | – | – | – | – | – | – | – | – |
| *Licania micrantha* Miquel 5558 | 0.15 | 0.2 | 0.05 | 0.39 | – | – | – | – | 2.37 | 2.09 | 3.4 | 7.86 |
| *Licania octandra* ssp. pallida (Hooker f.) Prance 7040 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.07 | 0.4 |
| *Parinari excelsa* Sabine 6054 | – | – | – | – | 0.18 | 0.24 | 1.01 | 1.43 | 0.64 | 0.89 | 6.1 | 7.63 |
| *Parinari parilis* J. F. Macbride 1170 | 0.15 | 0.2 | 0.03 | 0.37 | 0.41 | 0.56 | 0.17 | 1.14 | 0.38 | 0.6 | 0.4 | 1.39 |
| Unidentified | – | – | – | – | 0.06 | 0 | 0.08 | 0.14 | 0.13 | 0 | 0.03 | 0.16 |
| Clusiaceae | | | | | | | | | | | | |
| *Calophyllum brasiliense* CambessÄdes 7639 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.14 | 0.47 |
| *Garcinia macrophylla* C. Martius 7349 | 0.07 | 0.1 | 0.01 | 0.18 | 1.06 | 1.13 | 0.59 | 2.77 | 0.32 | 0.5 | 0.09 | 0.9 |
| *Vismia angusta* Miquel 1298 | 0.22 | 0.2 | 0.1 | 0.51 | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| Combretaceae | | | | | | | | | | | | |
| *Buchenavia amazonia* Al–Mayah & Stace 6316 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.06 | 0.38 |
| *Combretum llewelynii* J. F. Macbride 8451 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| *Terminalia dichotoma* G. Meyer 5598 | – | – | – | – | 0.29 | 0.4 | 0.28 | 0.97 | 0.13 | 0.2 | 0.35 | 0.68 |
| *Terminalia oblonga* (Ruiz Lopez & Pavon) Steudel 2196 | 1.68 | 1.96 | 3.94 | 7.58 | 0.82 | 0.96 | 1.47 | 3.26 | 0.06 | 0.1 | 0.05 | 0.21 |
| *Thiloa* sp. 6111 | – | – | – | – | 0.12 | 0.16 | 0.02 | 0.3 | 0.13 | 0.2 | 0.02 | 0.35 |
| Connaraceae | | | | | | | | | | | | |
| *Rourea amazonica* Radlkofer 9535 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | 0.06 | 0.1 | 0.01 | 0.17 |
| Convolvulariaceae | | | | | | | | | | | | |
| *Dicranostyles* sp. 7153 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Maripa* sp. 1 3127 | 0.07 | 0.1 | 0.01 | 0.18 | – | – | – | – | – | – | – | – |
| *Maripa* sp. 2 5234 | 0.07 | 0.1 | 0.01 | 0.19 | – | – | – | – | 0.26 | 0.4 | 0.07 | 0.72 |
| Dichapetalaceae | | | | | | | | | | | | |
| *Tapura* sp. 5440 | 0.07 | 0.1 | 0.03 | 0.2 | – | – | – | – | 3.08 | 2.58 | 2.21 | 7.87 |
| Dilleniaceae | | | | | | | | | | | | |
| *Davilla nitida* (M. Vahl) Kubitzki 4108 | 0.07 | 0.1 | 0.02 | 0.19 | – | – | – | – | – | – | – | – |
| *Doliocarpus dentatus* (Aublet) Standley | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | – | – | – | – |
| *Tetracera* sp. 2 7461 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.03 | 0.2 |
| Ebenaceae | | | | | | | | | | | | |
| *Diospyros poeppigiana* A. DC. 5528 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.08 | 0.41 |
| *Diospyros* sp. 1 8716 | 0.15 | 0.2 | 0.03 | 0.38 | 0.12 | 0.16 | 0.05 | 0.33 | 0.06 | 0.1 | 0.01 | 0.17 |
| *Diospyros* sp. 2 4238 | 0.07 | 0.1 | 0.01 | 0.18 | – | – | – | – | – | – | – | – |
| Elaeocarpaceae | | | | | | | | | | | | |
| *Sloanea guianensis* (Aublet) Bentham 6443 | 0.88 | 1.08 | 0.37 | 2.32 | 0.94 | 1.13 | 1.49 | 3.55 | 0.32 | 0.5 | 0.16 | 0.98 |
| *Sloanea* sp. 1 7632 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.08 | 0.25 |
| *Sloanea* sp. 2 7201 | – | – | – | – | 0.06 | 0.08 | 0.09 | 0.23 | 0.13 | 0.2 | 0.49 | 0.82 |
| *Sloanea* sp. 3 6113 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Sloanea ternifolia* (Mocino & SessÄ ex DC.) Standley 5047 | – | – | – | – | 0.12 | 0.16 | 0.21 | 0.49 | 0.26 | 0.4 | 1.08 | 1.73 |
| Euphorbiaceae | | | | | | | | | | | | |
| *Alchornea schomburgkii* Klotzsch 6577 | 0.07 | 0.1 | 0.1 | 0.27 | 1.24 | 1.29 | 1.89 | 4.42 | 0.45 | 0.5 | 0.6 | 1.54 |
| *Amanoa nanayensis* W. F. Hayden 5512 | – | – | – | – | – | – | – | – | 0.51 | 0.8 | 0.22 | 1.53 |
| *Croton cuneatus* Klotzsch 3553 | 0.95 | 1.17 | 0.38 | 2.5 | 2.89 | 2.49 | 1.45 | 6.83 | – | – | – | – |
| *Discocarpus brasiliensis* Klotzsch 5166 | – | – | – | – | – | – | – | – | 0.71 | 0.99 | 0.2 | 1.9 |
| *Drypetes* amazonica var. *peruviana* J. F. Macbride 2228 | 6.95 | 4.01 | 3.23 | 14.19 | 4.95 | 3.54 | 2.66 | 11.15 | 1.54 | 1.49 | 1.61 | 4.64 |
| *Glycydendron amazonicum* Ducke 7625 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.16 | 0.49 |
| *Hura crepitans* L. 2137 | 0.88 | 0.98 | 2.38 | 4.23 | – | – | – | – | – | – | – | – |
| *Mabea nitida* Spruce ex Bentham 5327 | – | – | – | – | 0.41 | 0.48 | 0.27 | 1.16 | 0.71 | 0.89 | 0.23 | 1.83 |
| *Margaritaria nobilis* L. f. N909168 | – | – | – | – | 0.12 | 0.16 | 0.03 | 0.31 | – | – | – | – |

| | High restinga | | | | Low restinga | | | | Tahuampa | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV |
| *Sapium glandulosum* (L.) Morong 5342 | 0.88 | 1.08 | 0.89 | 2.85 | 0.94 | 1.05 | 0.41 | 2.4 | 1.47 | 1.89 | 1.95 | 5.31 |
| *Sapium marmierii* Huber 2211 | 0.51 | 0.59 | 0.42 | 1.52 | 0.35 | 0.4 | 0.38 | 1.13 | – | – | – | – |
| *Sapium* sp. | 0.07 | 0.1 | 0.17 | 0.34 | – | – | – | – | – | – | – | – |
| Fabaceae | | | | | | | | | | | | |
| *Andira inermis* (W. Wright) H. B. K. ex DC. 5239 | 0.15 | 0.2 | 0.05 | 0.39 | 0.47 | 0.64 | 0.56 | 1.67 | 0.38 | 0.6 | 0.68 | 1.67 |
| *Andira* sp. 1 7512 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.34 | 0.5 |
| *Andira* sp. 2 7440 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.03 | 0.2 |
| *Andira* sp. 3 7514 | – | – | – | – | 0.06 | 0.08 | 0.03 | 0.17 | 0.06 | 0.1 | 0.03 | 0.19 |
| *Lecointea amazonica* Ducke 6135 | – | – | – | – | – | – | – | – | 0.38 | 0.6 | 0.63 | 1.61 |
| *Machaerium arboreum* (Jacq.) Vogel 1535 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| *Machaerium inundatum* (Bentham) Ducke 5514 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| *Machaerium isadelphum* (E. Meyer) Amshoff 5498 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Machaerium quinata* (Aublet) Sandwith 9414 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | – | – | – | – |
| *Machaerium riparium* 9265 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | 0.06 | 0.1 | 0.04 | 0.2 |
| *Machaerium* sp. 1 8458 | – | – | – | – | 0.06 | 0.08 | 0.03 | 0.17 | – | – | – | – |
| *Machaerium* sp. 2 8661 | – | – | – | – | 0.06 | 0.08 | 0.03 | 0.17 | – | – | – | – |
| *Machaerium* sp. 3 8082 | – | – | – | – | 0.06 | 0.08 | 0.03 | 0.17 | – | – | – | – |
| *Ormosia* sp. 1 3404 | – | – | – | – | 0.18 | 0.24 | 0.05 | 0.47 | – | – | – | – |
| *Ormosia* sp. 2 6474 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.03 | 0.19 |
| *Ormosia* sp. 3 | 0.07 | 0.1 | 0.5 | 0.67 | – | – | – | – | – | – | – | – |
| *Platymiscium stipulare* Benth. 3382 | 0.51 | 0.68 | 0.51 | 1.71 | 0.29 | 0.4 | 0.27 | 0.97 | – | – | – | – |
| *Platymiscium ulei* Harms 4135 | 0.15 | 0.2 | 0.16 | 0.5 | – | – | – | – | – | – | – | – |
| *Pterocarpus amazonum* (C. Martius ex Bentham) Amshoff 7003 | – | – | – | – | 1.36 | 0.96 | 0.71 | 3.03 | 0.58 | 0.89 | 0.26 | 1.73 |
| *Pterocarpus* sp. 1 3172 | 3.07 | 2.25 | 0.83 | 6.15 | 0.12 | 0.16 | 0.03 | 0.3 | – | – | – | – |
| *Pterocarpus* sp. 2 8465 | – | – | – | – | 0.24 | 0.16 | 0.16 | 0.56 | 0.13 | 0.2 | 0.09 | 0.41 |
| *Swartzia cardiosperma* Spruce ex Bentham 1152 | – | – | – | – | 0.65 | 0.64 | 0.29 | 1.58 | 0.26 | 0.4 | 0.1 | 0.75 |
| *Swartzia simplex* (Swartz) Sprengel 1258 | 0.07 | 0.1 | 0.02 | 0.19 | – | – | – | – | – | – | – | – |
| *Swartzia* sp. 6121 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.13 | 0.29 |
| *Vatairea guianensis* Aublet 7152 | – | – | – | – | – | – | – | – | 0.19 | 0.3 | 0.38 | 0.87 |
| Flacourtiaceae | | | | | | | | | | | | |
| *Casearia aculeata* Jacquin 1187 | 0.22 | 0.2 | 0.06 | 0.47 | 0.35 | 0.48 | 0.09 | 0.92 | – | – | – | – |
| *Casearia arborea* (Richard) Urban 8431 | 1.02 | 1.17 | 0.73 | 2.93 | 0.71 | 0.72 | 0.53 | 1.96 | – | – | – | – |
| *Casearia sylvestris* Swartz 8320 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.15 | – | – | – | – |
| *Casearia* sp. 9333 | – | – | – | – | 0.06 | 0.08 | 0.03 | 0.17 | – | – | – | – |
| *Laetia corymbulosa* Spruce ex Bentham 9289 | – | – | – | – | 0.24 | 0.24 | 0.15 | 0.63 | – | – | – | – |
| *Laetia* sp. 1630 | – | – | – | – | 0.06 | 0.08 | 0.3 | 0.44 | – | – | – | – |
| *Xylosma* sp. 1 8569 | – | – | – | – | 0.06 | 0.08 | 0.03 | 0.16 | – | – | – | – |
| *Xylosma* sp. 2 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| Hippocrateaceae | | | | | | | | | | | | |
| *Cheiloclinium cognatum* (Miers) A. C. Smith 7544 | – | – | – | – | – | – | – | – | 0.13 | 0.1 | 0.04 | 0.27 |
| *Cheiloclinium klugii* A. C. Smith 5139 | – | – | – | – | – | – | – | – | 0.45 | 0.6 | 0.1 | 1.15 |
| *Cheiloclinium* sp. 1 7320 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.04 | 0.37 |
| *Cheiloclinium* sp. 2 7266 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| *Salacia impressifolia* (Miers) A. C. Smith 5332 | – | – | – | – | – | – | – | – | 0.19 | 0.3 | 0.05 | 0.54 |
| unidentified | – | – | – | – | – | – | – | – | 0.06 | 0 | 0.01 | 0.08 |
| Icacinaceae | | | | | | | | | | | | |
| *Calatola* sp. 5014 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Calatola venezuelana* Pittier 4328 | 0.51 | 0.68 | 0.65 | 1.84 | 0.94 | 0.88 | 1.16 | 2.99 | – | – | – | – |
| Lacistemaceae | | | | | | | | | | | | |
| *Lacistema aggregatum* (Berg.) Rusby 6423 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| Lauraceae | | | | | | | | | | | | |
| *Aniba guianensis* Aublet 9172 | – | – | – | – | 0.24 | 0.32 | 0.09 | 0.65 | – | – | – | – |
| *Aniba* sp. 1 1138 | 0.44 | 0.49 | 0.13 | 1.06 | 0.88 | 1.21 | 0.44 | 2.53 | 0.38 | 0.6 | 0.13 | 1.12 |
| *Aniba* sp. 2 8471 | – | – | – | – | 0.12 | 0.16 | 0.05 | 0.32 | – | – | – | – |
| *Aniba* sp. 3 7366 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.19 |
| *Cinnamomum napoense* H. van der Werff 9412 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| *Endlicheria formosa* A. C. Smith 2207 | 0.22 | 0.29 | 0.22 | 0.74 | 0.06 | 0.08 | 0.13 | 0.27 | 0.06 | 0.1 | 0.01 | 0.18 |
| *Endlicheria verticillata* Mez 9737 | – | – | – | – | 0.12 | 0.16 | 0.05 | 0.33 | – | – | – | – |
| *Licaria armeniaca* (Nees) Kostermans 5371 | – | – | – | – | – | – | – | – | 0.13 | 0.1 | 0.03 | 0.26 |
| *Nectandra cuneato–cordata* Mez 6537 | 0.44 | 0.29 | 0.28 | 1.01 | 0.53 | 0.56 | 0.44 | 1.53 | 0.26 | 0.4 | 0.07 | 0.73 |
| *Ocotea bofo* H. B. K. 7333 | – | – | – | – | – | – | – | – | 0.26 | 0.4 | 0.09 | 0.74 |
| *Ocotea cernua* (Nees) Mez 8437 | 0.15 | 0.2 | 0.04 | 0.38 | 0.47 | 0.4 | 0.33 | 1.21 | – | – | – | – |
| *Ocotea javitensis* 9056 | 0.15 | 0.2 | 0.05 | 0.39 | 0.53 | 0.72 | 0.18 | 1.43 | 0.06 | 0.1 | 0.02 | 0.18 |
| *Ocotea* sp. 1 7436 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.19 | 0.52 |
| *Ocotea* sp. 2 9196 | – | – | – | – | 0.18 | 0.24 | 0.1 | 0.51 | – | – | – | – |
| *Ocotea* sp. 3 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |

| | High restinga | | | | Low restinga | | | | Tahuampa | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV |
| *Pleurothyrium parviflorum* Ducke 1278 | 0.66 | 0.88 | 0.14 | 1.68 | 0.82 | 0.8 | 0.23 | 1.86 | – | – | – | – |
| Unidentified sp. 1 6399 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| Unidentified sp. 2 8601 | 0.07 | 0.1 | 0.02 | 0.19 | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| Unidentified sp. 3 6441 | – | – | – | – | 0.12 | 0.16 | 0.05 | 0.33 | 0.32 | 0.5 | 0.09 | 0.91 |
| Unidentified sp. 4 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.04 | 0.2 |
| Unidentified | 0.07 | 0 | 0.02 | 0.1 | 0.24 | 0 | 0.4 | 0.64 | 0.06 | 0 | 0.03 | 0.1 |
| Lecythidaceae | | | | | | | | | | | | |
| *Couroupita guianensis* Aublet 7369 | 0.29 | 0.39 | 1.04 | 1.73 | – | – | – | – | 0.26 | 0.4 | 0.43 | 1.08 |
| *Couroutari oligantha* A. C. Smith 6337 | – | – | – | – | 0.18 | 0.24 | 0.08 | 0.5 | 0.32 | 0.5 | 0.44 | 1.26 |
| *Eschweilera parvifolia* C. Martius ex A. DC. 5031 | 0.59 | 0.78 | 0.3 | 1.67 | 1.53 | 1.45 | 1.88 | 4.86 | 9.87 | 6.26 | 6.77 | 22.9 |
| *Eschweilera turbinata* (Berg) Niedenzu 5019 | 0.44 | 0.59 | 0.11 | 1.14 | 0.47 | 0.64 | 0.37 | 1.49 | 16.73 | 6.76 | 15.84 | 39.33 |
| *Gustavia augusta* L. 9734 | – | – | – | – | 0.06 | 0.08 | 0.04 | 0.18 | – | – | – | – |
| Loganiaceae | | | | | | | | | | | | |
| *Strychnos* sp. 1 5207 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.03 | 0.35 |
| *Strychnos* sp. 2 7334 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.03 | 0.36 |
| Malpighiaceae | | | | | | | | | | | | |
| *Byrsonima crispa* Adr. Jussieu 7338 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| *Byrsonima densa* (Poiret) DC. 9104 | 0.07 | 0.1 | 0.01 | 0.18 | 0.29 | 0.32 | 0.23 | 0.85 | 0.13 | 0.2 | 0.06 | 0.39 |
| Melastomataceae | | | | | | | | | | | | |
| *Miconia centrodesma* Wurdack 8097 | 0.07 | 0.1 | 0.02 | 0.19 | 0.18 | 0.24 | 0.06 | 0.47 | – | – | – | – |
| *Miconia splendens* (Swartz) Grisebach 4579 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | 0.06 | 0.1 | 0.02 | 0.19 |
| *Mouriri grandiflora* A. DC. 9273 | 0.15 | 0.1 | 0.02 | 0.27 | 2.65 | 1.69 | 1.09 | 5.43 | 0.26 | 0.4 | 0.14 | 0.8 |
| Meliaceae | | | | | | | | | | | | |
| *Cedrela odorata* L. 2066 | 0.51 | 0.68 | 0.57 | 1.77 | 0.18 | 0.24 | 0.11 | 0.53 | – | – | – | – |
| *Guarea macrophylla* Vahl 3230 | 2.78 | 2.64 | 7.37 | 12.79 | 0.47 | 0.64 | 0.34 | 1.45 | 1.15 | 1.29 | 0.28 | 2.73 |
| *Trichilia inaequilatea* Pennington 7021 | – | – | – | – | – | – | – | – | 0.9 | 1.29 | 0.51 | 2.7 |
| *Trichilia mazanensis* J. F. Macbride 6116 | – | – | – | – | – | – | – | – | 0.19 | 0.3 | 0.03 | 0.52 |
| *Trichilia pallida* Swartz 3449 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | – | – | – | – |
| *Trichilia pleeana* (Adr. Jussieu) C. DC. 6037 | 0.37 | 0.39 | 0.23 | 0.99 | 0.12 | 0.16 | 0.16 | 0.44 | 0.06 | 0.1 | 0.16 | 0.32 |
| *Trichilia rubra* C. DC. 7191 | – | – | – | – | 0.35 | 0.48 | 0.15 | 0.98 | 0.71 | 1.09 | 0.26 | 2.06 |
| Menispermaceae | | | | | | | | | | | | |
| *Anemospermum* sp. 8459 | 0.22 | 0.29 | 0.15 | 0.66 | 0.24 | 0.32 | 0.21 | 0.77 | – | – | – | – |
| Unidentified sp. 1 8660 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| Unidentified sp. 2 5316 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.04 | 0.36 |
| Mimosaceae | | | | | | | | | | | | |
| *Acacia kuhlmanii* Ducke 6575 | – | – | – | – | – | – | – | – | 0.19 | 0.2 | 0.05 | 0.44 |
| *Acacia macbredei* Britton & Rose ex J. F. Macbride 5214 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Albizia* sp. 7264 | 0.07 | 0.1 | 0.04 | 0.22 | – | – | – | – | 0.45 | 0.6 | 0.47 | 1.52 |
| *Inga bourgonii* (Aublet) DC. 5569 | – | – | – | – | 0.18 | 0.24 | 0.12 | 0.54 | 0.38 | 0.6 | 0.34 | 1.32 |
| *Inga cinnamomea* Spruce ex Bentham 1097 | 1.39 | 1.57 | 0.43 | 3.39 | 0.65 | 0.64 | 0.25 | 1.54 | – | – | – | – |
| *Inga edulis* C. Martius 1007 | 1.76 | 1.76 | 2.15 | 5.67 | 0.71 | 0.88 | 0.82 | 2.42 | – | – | – | – |
| *Inga nobilis* Willdenow 1180 | 2.12 | 1.96 | 0.99 | 5.06 | 2 | 1.93 | 1.36 | 5.29 | – | – | – | – |
| *Inga pavoniana* G. Don 4264 | 0.07 | 0.1 | 0.02 | 0.19 | – | – | – | – | 0.13 | 0.2 | 0.14 | 0.47 |
| *Inga psittacorum* L. Uribe 1515 | – | – | – | – | 0.24 | 0.32 | 0.21 | 0.77 | 0.06 | 0.1 | 0.01 | 0.18 |
| *Inga semialata* (Vell. Conc.) C. Martius 1002 | 0.8 | 0.88 | 0.52 | 2.21 | 0.41 | 0.48 | 0.32 | 1.22 | – | – | – | – |
| *Inga stenoptera* Bentham 1381 | 1.24 | 1.37 | 1.27 | 3.88 | 1.89 | 1.61 | 1.75 | 5.25 | 0.96 | 1.29 | 0.95 | 3.2 |
| *Inga tessmannii* Harms 1551 | 0.29 | 0.39 | 0.07 | 0.76 | 0.06 | 0.08 | 0.04 | 0.18 | 0.13 | 0.2 | 0.13 | 0.46 |
| *Inga vismiifolia* Poeppig 5242 | – | – | – | – | 1.36 | 1.37 | 1.15 | 3.87 | 0.64 | 0.89 | 0.98 | 2.51 |
| *Inga* unidentified | 0.29 | 0 | 0.41 | 0.7 | 0.06 | 0 | 0.03 | 0.09 | 0.13 | 0 | 0.05 | 0.18 |
| *Stryphnodendron* sp. 5001 | – | – | – | – | 0.06 | 0.08 | 0.14 | 0.28 | 0.06 | 0.1 | 0.02 | 0.18 |
| *Zygia cauliflora* (Willdenow) Pittier 3234 | 0.29 | 0.29 | 0.46 | 1.05 | 0.53 | 0.48 | 0.24 | 1.25 | – | – | – | – |
| *Zygia divaricata* aff. (Bentham) Pittier 7627 | – | – | – | – | 0.12 | 0.16 | 0.03 | 0.31 | 0.45 | 0.7 | 0.46 | 1.61 |
| *Zygia inaequalis* (H. & B. ex Willd.) Pittier 8148 | – | – | – | – | 0.35 | 0.32 | 0.09 | 0.77 | 0.06 | 0.1 | 0.02 | 0.18 |
| *Zygia juruana* (Harms) L. Rico 1467 | 0.22 | 0.29 | 0.07 | 0.59 | 2.83 | 2.89 | 1.03 | 6.75 | – | – | – | – |
| *Zygia unifoliolata* (Bentham) Pittier 5105 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.02 | 0.35 |
| Moraceae | | | | | | | | | | | | |
| *Batocarpus amazonicus* (Ducke) Fosberg 8630 | 0.29 | 0.39 | 0.24 | 0.92 | 0.12 | 0.16 | 0.29 | 0.57 | 0.13 | 0.2 | 0.12 | 0.45 |
| *Brosimum guianensis* 7573 | 0.07 | 0.1 | 0.01 | 0.19 | 0.18 | 0.24 | 0.19 | 0.61 | 0.06 | 0.1 | 0.04 | 0.2 |
| *Brosimum lactescens* S. Moore 4097 | 0.22 | 0.29 | 1.4 | 1.92 | 0.35 | 0.48 | 0.35 | 1.19 | 0.32 | 0.5 | 0.9 | 1.72 |
| *Brosimum potabile* Ducke 7546 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.21 | 0.38 |
| *Clarisia biflora* R. & P. 1049 | 0.66 | 0.68 | 0.56 | 1.9 | 0.18 | 0.24 | 0.1 | 0.52 | – | – | – | – |
| *Ficus boliviana* C. C. Berg 2455 | 0.07 | 0.1 | 2.79 | 2.96 | – | – | – | – | – | – | – | – |
| *Ficus coboffima* Standley | – | – | – | – | 0.12 | 0.08 | 0.03 | 0.23 | 0.06 | 0.1 | 0.01 | 0.18 |
| *Ficus killipii* Standley 4167 | 0.66 | 0.78 | 1.32 | 2.76 | 0.06 | 0.08 | 0.3 | 0.44 | – | – | – | – |
| *Ficus maxima* Miller N217296 | 0.73 | 0.68 | 0.29 | 1.7 | 0.12 | 0.16 | 0.12 | 0.4 | – | – | – | – |
| *Ficus pallida* M. Vahl 3195 | 0.07 | 0.1 | 1.53 | 1.7 | – | – | – | – | – | – | – | – |
| *Ficus schultesii* Dugand 3383 | 0.07 | 0.1 | 0.79 | 0.97 | 0.06 | 0.08 | 0.04 | 0.18 | – | – | – | – |
| *Ficus trigona* L. f. | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| *Ficus ypoilophlebia* Dugand | 0.07 | 0.1 | 0.02 | 0.19 | – | – | – | – | – | – | – | – |
| *Ficus* unidentified | 0.22 | 0 | 0.07 | 0.29 | 0.12 | 0 | 0.09 | 0.21 | – | – | – | – |
| *Maquira coriacea* (Karsten) C. C. Berg 2018 | 3.15 | 3.23 | 8.68 | 15.05 | 1.24 | 1.61 | 6.02 | 8.86 | 0.9 | 1.09 | 2.41 | 4.4 |
| *Perebea longipedunculata* C. C. Berg 1217 | 1.02 | 1.17 | 0.2 | 2.4 | 0.47 | 0.48 | 0.13 | 1.08 | – | – | – | – |
| *Pseudolmedia rigida* (Klotzsch & Karsten) Cuatrecasas 5229 | – | – | – | – | – | – | – | – | 0.26 | 0.4 | 0.04 | 0.7 |

| | High restinga | | | | Low restinga | | | | Tahuampa | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV |
| *Sorocea steinbachii* C. C. Berg 1141 | 1.54 | 1.66 | 0.34 | 3.54 | 0.77 | 0.96 | 0.2 | 1.93 | 0.13 | 0.2 | 0.03 | 0.36 |
| *Trophis racemosa* (L.) Urban 2106 | 0.95 | 0.98 | 0.2 | 2.13 | 0.12 | 0.16 | 0.03 | 0.31 | – | – | – | – |
| Myristicaceae | | | | | | | | | | | | |
| *Iryanthera juruensis* Warburg 7467 | – | – | – | – | 0.29 | 0.4 | 0.07 | 0.77 | 0.83 | 1.19 | 0.17 | 2.2 |
| *Virola elongata* (Bentham) Warburg 6500 | 0.66 | 0.78 | 0.35 | 1.79 | 0.59 | 0.64 | 0.28 | 1.51 | 0.06 | 0.1 | 0.01 | 0.17 |
| *Virola pavonis* (A. DC.) A. C. Smith 8454 | 0.73 | 0.78 | 0.24 | 1.76 | 1.06 | 1.13 | 0.82 | 3 | 0.13 | 0.2 | 0.06 | 0.39 |
| Myrsinaceae | | | | | | | | | | | | |
| *Stylogyne* sp. 3463 | 0.07 | 0.1 | 0.01 | 0.19 | 0.06 | 0.08 | 0.01 | 0.15 | 0.06 | 0.1 | 0.01 | 0.17 |
| Myrtaceae | | | | | | | | | | | | |
| *Calyptranthes* sp. 9388 | 0.29 | 0.39 | 0.26 | 0.95 | 0.41 | 0.48 | 0.32 | 1.21 | – | – | – | – |
| *Eugenia egensis* DC. 7398 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| *Eugenia heterochroma* Diels 6156 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.18 |
| *Eugenia lambertiana* DC. 7065 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.03 | 0.36 |
| *Eugenia marowijensis* Miquel 2351 | 0.44 | 0.59 | 0.11 | 1.14 | 0.35 | 0.48 | 0.09 | 0.92 | – | – | – | – |
| *Eugenia muricata* DC. 1091 | 0.15 | 0.2 | 0.06 | 0.4 | 0.35 | 0.32 | 0.14 | 0.81 | – | – | – | – |
| *Eugenia ochrophloea* Diels 4347 | 0.29 | 0.39 | 0.17 | 0.85 | 0.41 | 0.56 | 0.12 | 1.1 | 0.38 | 0.6 | 0.1 | 1.08 |
| *Eugenia patens* Poiret N109216 | – | – | – | – | 0.06 | 0.08 | 0.03 | 0.17 | – | – | – | – |
| *Eugenia* sp. 1 7214 | – | – | – | – | – | – | – | – | 0.19 | 0.2 | 0.08 | 0.47 |
| *Eugenia* sp. 2 1190 | – | – | – | – | 0.29 | 0.32 | 0.12 | 0.73 | – | – | – | – |
| *Eugenia* sp. 3 4517 | 0.29 | 0.29 | 0.09 | 0.68 | 0.24 | 0.32 | 0.08 | 0.64 | – | – | – | – |
| *Eugenia* sp. 4 9045 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | – | – | – | – |
| *Eugenia* sp. 5 6338 | – | – | – | – | – | – | – | – | 0.32 | 0.5 | 0.08 | 0.9 |
| *Eugenia* sp. 6 5503 | – | – | – | – | 0.06 | 0.08 | 0.11 | 0.25 | 0.06 | 0.1 | 0.19 | 0.36 |
| *Marlierea subulata* McVaugh 7519 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Myrcia* sp. 1 7356 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.18 |
| *Myrcia* sp. 2 7052 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.08 | 0.4 |
| *Myrcia* sp. 3 7050 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.06 | 0.22 |
| *Myrcia* sp. 4 9368 | – | – | – | – | 0.12 | 0.08 | 0.03 | 0.23 | – | – | – | – |
| *Myrcia* sp. 5 7347 | 0.07 | 0.1 | 0.02 | 0.19 | 0.47 | 0.56 | 0.17 | 1.2 | – | – | – | – |
| Myrcia sp. 6 7372 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.04 | 0.21 |
| *Myrcia* sp. 7 8299 | – | – | – | – | 0.12 | 0.16 | 0.03 | 0.31 | – | – | – | – |
| Myrcia sp. 8 7096 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.05 | 0.22 |
| *Myrciaria floribunda* (West ex Willdenow) O. Berg 7045 | – | – | – | – | – | – | – | – | 0.26 | 0.3 | 0.12 | 0.67 |
| Unidentified | – | – | – | – | – | – | – | – | 0.06 | 0 | 0.03 | 0.09 |
| Nyctaginaceae | | | | | | | | | | | | |
| *Neea floribunda* Diels 8667 | – | – | – | – | 0.29 | 0.32 | 0.1 | 0.71 | 0.06 | 0.1 | 0.01 | 0.17 |
| *Neea* sp. 9089 | 0.07 | 0.1 | 0.01 | 0.18 | – | – | – | – | – | – | – | – |
| Ochnaceae | | | | | | | | | | | | |
| *Ouratea* sp. 5256 | – | – | – | – | – | – | – | – | 0.45 | 0.7 | 0.21 | 1.35 |
| Olacaceae | | | | | | | | | | | | |
| *Cathedra acuminata* (Bentham) Miers 7397 | 0.15 | 0.2 | 0.05 | 0.4 | 0.71 | 0.96 | 2.04 | 3.72 | 0.19 | 0.3 | 0.44 | 0.93 |
| *Heisteria spruceana* Engler 5599 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | 0.06 | 0.1 | 0.01 | 0.18 |
| *Minquartia guianensis* Aublet 2223 | 0.29 | 0.39 | 0.16 | 0.84 | 0.47 | 0.64 | 0.86 | 1.97 | 0.06 | 0.1 | 0.06 | 0.22 |
| Phytolaccaceae | | | | | | | | | | | | |
| *Seguieria* sp. 5301 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.02 | 0.19 |
| Polygonaceae | | | | | | | | | | | | |
| *Coccoloba densifrons* C. Martius ex Meissner 5274 | 0.59 | 0.78 | 0.2 | 1.57 | 1.06 | 1.29 | 0.43 | 2.78 | 1.15 | 1.39 | 1.23 | 3.77 |
| *Coccoloba lehmannii* Lindau 9006 | – | – | – | – | 0.12 | 0.16 | 0.04 | 0.32 | 0.06 | 0.1 | 0.01 | 0.18 |
| *Coccoloba mollis* Casaretto 2019 | 0.22 | 0.29 | 0.06 | 0.58 | 0.12 | 0.08 | 0.03 | 0.23 | – | – | – | – |
| *Coccoloba peruviana* Lindau | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.01 | 0.17 |
| *Coccoloba* sp. 1 8010 | – | – | – | – | 0.06 | 0.08 | 0.26 | 0.4 | – | – | – | – |
| *Coccoloba* sp. 2 5329 | – | – | – | – | – | – | – | – | 1.35 | 1.79 | 2.2 | 5.34 |
| *Coccoloba* sp. 3 9042 | 0.15 | 0.2 | 0.05 | 0.39 | 1 | 1.29 | 1.15 | 3.44 | 0.32 | 0.4 | 0.69 | 1.41 |
| *Ruprechtia tangarana* Standley 6209 | – | – | – | – | – | – | – | – | 0.38 | 0.6 | 0.16 | 1.14 |
| *Triplaris amaricana* L. 2122 | 0.88 | 0.78 | 0.38 | 2.04 | 1.18 | 1.13 | 0.76 | 3.07 | 0.51 | 0.8 | 0.2 | 1.51 |
| Proteaceae | | | | | | | | | | | | |
| *Roupala* sp. 5353 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.02 | 0.35 |
| Quiinaceae | | | | | | | | | | | | |
| *Quiina* sp. 8398 | – | – | – | – | 0.06 | 0.08 | 0.01 | 0.15 | – | – | – | – |
| Rubiaceae | | | | | | | | | | | | |
| *Borojoa* sp. 1 1552 | 0.66 | 0.68 | 0.2 | 1.54 | 0.35 | 0.32 | 0.12 | 0.8 | – | – | – | – |
| *Borojoa* sp. 2 | 0.07 | 0.1 | 0.2 | 0.38 | – | – | – | – | – | – | – | – |
| *Calycophyllum spruceanum* (Bentham) Hooker f. ex Schumann 8449 | – | – | – | – | 0.88 | 0.8 | 11.81 | 13.5 | – | – | – | – |
| *Chomelia barbellata* Standley 1416 | 0.37 | 0.39 | 0.13 | 0.88 | 1.12 | 1.29 | 0.5 | 2.9 | – | – | – | – |
| *Duroia duckei* Huber 6069 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.12 | 0.28 |
| *Genipa americana* L. 5077 | 0.07 | 0.1 | 0.44 | 0.61 | – | – | – | – | 0.51 | 0.8 | 0.82 | 2.13 |
| *Psychotria marginata* Swartz 1246 | 0.07 | 0.1 | 0.02 | 0.19 | 0.12 | 0.16 | 0.03 | 0.31 | – | – | – | – |
| *Psychotria remota* Bentham 1365 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.16 | – | – | – | – |
| *Randia armata* (Swartz) DC. 8457 | 0.95 | 1.17 | 0.26 | 2.39 | 0.24 | 0.32 | 0.08 | 0.63 | – | – | – | – |
| *Simira* sp. 9731 | 0.07 | 0.1 | 0.02 | 0.19 | 0.12 | 0.16 | 0.07 | 0.35 | 0.38 | 0.6 | 0.53 | 1.51 |
| *Uncaria guianensis* (Aublet) Gmelin 5120 | – | – | – | – | – | – | – | – | 0.13 | 0.2 | 0.02 | 0.35 |
| *Uncaria tomentosa* (Willdenow ex Roemer & Schultes) DC. 1012 | – | – | – | – | 0.12 | 0.08 | 0.03 | 0.23 | – | – | – | – |
| unidentified | 0.07 | 0 | 0.02 | 0.09 | – | – | – | – | – | – | – | – |

| | High restinga | | | | Low restinga | | | | Tahuampa | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV | Rel. den | Rel. fre | Rel. dom | SIV |
| Sapindaceae | | | | | | | | | | | | |
| *Allophylus* sp. 1 6454 | – | – | – | – | 0.24 | 0.32 | 0.17 | 0.72 | 0.13 | 0.2 | 0.03 | 0.36 |
| *Allophylus* sp. 2 3478 | 0.07 | 0.1 | 0.01 | 0.18 | – | – | – | – | – | – | – | – |
| *Cupania latifolia* H. B. K. 1507 | – | – | – | – | 0.77 | 0.96 | 1.11 | 2.84 | 0.06 | 0.1 | 0.01 | 0.17 |
| *Cupania* sp. | – | – | – | – | 0.06 | 0.08 | 0.08 | 0.22 | – | – | – | – |
| *Paullinia alata* (R. & P.) Don 3285 | 0.29 | 0.39 | 0.05 | 0.73 | 0.06 | 0.08 | 0.01 | 0.15 | – | – | – | – |
| *Paullinia elegans* CambessÄdes 6272 | – | – | – | – | 0.06 | 0.08 | 0.02 | 0.15 | – | – | – | – |
| Unidentified sp. 5548 | 0.07 | 0.1 | 0.02 | 0.19 | 0.12 | 0.16 | 0.06 | 0.34 | 0.83 | 1.19 | 0.53 | 2.56 |
| Sapotaceae | | | | | | | | | | | | |
| *Chrysophyllum argenteum* ssp. *Auratum* (Miquel) Pennington 5295 | – | – | – | – | 0.29 | 0.32 | 0.08 | 0.7 | 0.71 | 0.99 | 0.41 | 2.1 |
| *Chrysophyllum* sp. 1 3282 | 0.07 | 0.1 | 0.18 | 0.36 | 0.24 | 0.32 | 0.11 | 0.67 | 0.06 | 0.1 | 0.31 | 0.47 |
| *Elaeoluma glabrescens* (C. Martius & Eichler) Aubréville 5168 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.03 | 0.19 |
| *Pouteria cuspidata* ssp. *Cuspidata* (A. DC.) Baehni 6332 | – | – | – | – | – | – | – | – | 0.26 | 0.4 | 0.15 | 0.81 |
| *Pouteria cuspidata* ssp. *Dura* (Eyma) Pennington 5128 | 0.07 | 0.1 | 0.02 | 0.19 | 0.06 | 0.08 | 0.02 | 0.16 | 0.38 | 0.6 | 0.2 | 1.18 |
| *Pouteria glomerata* ssp. *Glomerata* (Miquel) Radlkofer 5048 | – | – | – | – | – | – | – | – | 0.26 | 0.4 | 0.06 | 0.71 |
| *Pouteria gomphiifolia* (C. Martius) Radlkofer 5169 | – | – | – | – | – | – | – | – | 0.51 | 0.7 | 1.21 | 2.42 |
| *Pouteria procera* (C. Martius) Pennington 7145 | – | – | – | – | 0.47 | 0.64 | 0.99 | 2.1 | 2.31 | 2.39 | 3.16 | 7.85 |
| *Pouteria reticulata* (Engler) Eyma 2004 | 1.54 | 1.66 | 0.76 | 3.96 | 0.82 | 0.8 | 0.27 | 1.9 | 1.67 | 2.09 | 1.18 | 4.94 |
| *Pouteria* sp. 1 5036 | – | – | – | – | – | – | – | – | 0.06 | 0.1 | 0.19 | 0.35 |
| *Pouteria* sp. 2 7076 | 0.07 | 0.1 | 0.04 | 0.21 | 0.12 | 0.08 | 0.07 | 0.27 | 2.05 | 2.98 | 4.51 | 9.55 |
| *Sarcaulus brasiliensis* ssp. *Brasiliensis* (A. DC.) Eyma 2336 | 2.27 | 2.25 | 1.23 | 5.75 | 0.94 | 1.13 | 0.38 | 2.44 | 0.9 | 0.7 | 0.44 | 2.04 |
| Unidentified | 0.07 | 0 | 0.04 | 0.11 | 0.06 | 0 | 0.08 | 0.14 | 0.06 | 0 | 0.04 | 0.11 |
| Simaroubaceae | | | | | | | | | | | | |
| *Simaba orinocensis* H.B.K. N409099 | – | – | – | – | 0.12 | 0.16 | 0.02 | 0.3 | – | – | – | – |
| Sterculiaceae | | | | | | | | | | | | |
| *Sterculia* sp. 3492 | 0.22 | 0.29 | 0.5 | 1.02 | 0.12 | 0.16 | 0.05 | 0.33 | – | – | – | – |
| *Theobroma cacao* L. 2016 | 2.56 | 1.86 | 0.63 | 5.05 | 0.65 | 0.64 | 0.2 | 1.49 | – | – | – | – |
| Tiliaceae | | | | | | | | | | | | |
| *Apeiba aspera* Aublet 3016 | 0.37 | 0.29 | 0.18 | 0.83 | 0.06 | 0.08 | 0.06 | 0.19 | – | – | – | – |
| *Apeiba* sp. 3331 | 0.07 | 0.1 | 0.08 | 0.25 | – | – | – | – | – | – | – | – |
| *Luehea cymulosa* Spruce ex Bentham 7084 | 0.07 | 0.1 | 0.12 | 0.29 | 0.41 | 0.56 | 0.88 | 1.86 | 0.77 | 1.09 | 2.33 | 4.2 |
| *Vasivaea* sp. 6556 | 0.07 | 0.1 | 0.01 | 0.18 | 0.29 | 0.4 | 0.11 | 0.81 | 0.13 | 0.2 | 0.04 | 0.37 |
| Violaceae | | | | | | | | | | | | |
| *Gloeospermum equatoriense* Hekking 2168 | 0.44 | 0.49 | 0.08 | 1.01 | 0.06 | 0.08 | 0.01 | 0.15 | 0.06 | 0.1 | 0.01 | 0.18 |
| *Leonia glycycarpa* Ruiz Lúpez & Pavún 2027 | 4.68 | 3.42 | 1 | 9.11 | 0.88 | 0.96 | 0.26 | 2.11 | 0.06 | 0.1 | 0.02 | 0.18 |
| Vochysiaceae | | | | | | | | | | | | |
| *Vochysia venulosa* Warming 9546 | 0.22 | 0.29 | 0.07 | 0.59 | 0.12 | 0.16 | 0.04 | 0.32 | – | – | – | – |
| *Vochysia* sp. 1 6395 | – | – | – | – | – | – | – | – | 0.19 | 0.3 | 0.7 | 1.19 |
| *Vochysia* sp. 2 3246 | 0.07 | 0.1 | 0.17 | 0.34 | – | – | – | – | – | – | – | – |
| *Vochysia* unidentified | – | – | – | – | 0.06 | 0 | 0.72 | 0.78 | – | – | – | – |
| Total absolute values | 1367 | 1022 | 74.1 | | 1697 | 1244 | 68.0 | | 1560 | 1006 | 82.9 | |