Biodivers Conserv (2007) 16:3111–3128
DOI 10.1007/s10531-007-9166-6

ORIGINAL PAPER

A hot-point within a hot-spot: a high diversity site in Brazil's Atlantic Forest

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Received: 28 August 2006 / Accepted: 19 February 2007 / Published online: 31 May 2007

Abstract The Brazilian Atlantic Forest is considered one of the world's most important sites for biodiversity conservation, and within this biome there are regions with differing levels of species richness, species composition, and endemism. The present study was undertaken in southern Bahia, Brazil, and employed a standardized sampling method to compare the density of arboreal species in this region with other areas throughout the world known for their high tree species density. A total of 144 tree species with DBH > 4.8 cm were sampled within a 0.1 ha plot of old-growth forest (OGF), and these data were then compared with 22 other world sites that had been sampled using the same methodology and likewise demonstrated high densities of arboreal species. Only one site of ombrophilous forest in Colombia demonstrated a higher tree species density (148 spp. in 0.1 ha) than was encountered in southern Bahia. Other areas of Brazil, including other Atlantic Forest sites, showed significantly inferior tree species densities. These results indicate that this region of southern Bahia has one of the greatest numbers of tree species in Brazil and in the world. These results, associated with the high levels of endemism there, indicate the high biological importance of this region. It is therefore fundamental

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that efforts aimed at halting the degradation of these forests be linked to programs that will increase our knowledge of the species found there as well as the ecological and evolutionary processes that originated these unique forests.

Keywords Brazilian Atlantic Forest · Biodiversity · Southern Bahia · Tree species density

Abbreviations

PESC	Serra do Conduru State Park
OGF	Old-growth forest
OLF	Old logged forest
RLF	Recently logged forest

Introduction

The Brazilian Atlantic Forest is considered a priority area for world biodiversity conservation efforts ("Hotspots", according to Mittermeier et al. 2004; Myers et al. 2000) for three major reasons: its high species richness, its high levels of endemism, and the ever increasing anthropogenic threats to this limited and fragmented biome. However, the Atlantic Forest biome is quite heterogeneous, demonstrating variable floristic composition (Oliveira-Filho and Fontes 2000) and differing phyto-physiognomies throughout its distribution, with diverse climatic conditions, topography and geomorphology, as well as soils of differing geological origins throughout its range (Scudeller et al. 2001; Tabarelli et al. 2005). As a result of this heterogeneity, some regions within this biome deserve special attention as potential priority areas, and could be considered "hot-points" within a global "hotspot".

Previous studies have demonstrated that southern Bahia is an area of extremely high biological importance due to its high levels of species richness (Thomas et al. in press; Amorim et al. 2005) and its high degree of endemism (Thomas et al. 1998). Some authors consider it one of the principal centers of endemism, and a potential center of diversity for some major groups of plants (Soderstrom and Calderón 1974; Mori et al. 1983a; Gentry 1992). Nonetheless, the identification of forest areas in Brazil (and throughout the world) that embrace the largest numbers of species and degrees of endemism is complicated because of different sampling methods and scales of analysis. In an attempt to overcome this difficulty, Gentry (1982) proposed a method for rapidly sampling forest areas that has been used in many regions throughout the world. These surveys were compiled by Phillips and Miller (2002) and the data have been made available in a digital format (http://www.mobot.org/MOBOT/Research/gentry/data.shtml). Although these data represent only a small sampling, and is limited in its ability to represent the structure of a forest as a whole, these surveys allow for initial comparison of species density among forest sites. Comparisons based on species density can be useful in defining priority areas for conservation purposes (Gotelli and Colwell 2001), for they measure the number of species that can be found within a specified area. While the number of species is not the only parameter that should be considered in defining priority areas, it can be a useful tool for elaborating conservation strategies when accompanied by information concerning the biological importance of the species present.

A survey of the tree species in three sites located in a forested area in southern Bahia is reported here. These surveys employed the methodology proposed by Gentry (1982), and the species densities observed in the southern Bahia Atlantic Forest were compared with data available for other regions in the world, including other sites in Brazil. The results of the present study, together with other information previously gathered in the region, will be discussed in terms of the global patterns of species richness distribution.

Methods

Study area

The present study was undertaken in the Serra do Conduru State Park (PESC), occupying adjoining parts of the municipalities of Uruçuca, Itacaré, and Ilhéus, in southern Bahia State, Brazil (14°20′–14°30′ S; 39°02′–39°08′ W). The PESC occupies an area of 9,275 ha, and is composed of a mosaic of forests in different phases of regeneration, including patches of old-growth forest (Fig. 1). The regional climate is classified as Af in the system of Köppen, being warm and humid, without well-defined dry season. The average monthly temperature is 24°C, with the warmest months being from November until March, and the coldest from July to August. The relative humidity is often above 80%, and the annual rainfall is well distributed throughout the year (Asmar and Andrade 1977; Sá et al. 1982). The average annual rainfall in the region of the PESC ranges from 1800 mm to 2200 mm (Landau 2003). The local geology is dominated by Pre-Cambrian crystalline rocks, covered in some areas by Tertiary–Quaternary sediments. There are a number of different soil types present within the study area, including yellow and red–yellow latosols, yellow and red–yellow podzols, as well as alluvial and sandy sections (Governo do Estado da Bahia 1998). The altitude at the PESC ranges from 60 m to 500 m above sea level (asl).

The predominant vegetation in the region of the PESC is dense sub-montane ombrophilous forest, according to the Brazilian vegetation classification system (IBGE 1992), or tropical moist forest following the Holdridge life zones classification (Hartshorn 1991). These forests have an uniform canopy more than 25 m tall, with few emergent individuals, many epiphytes, large lianas, and a dense sub-canopy (Jardim 2003).

Vegetation sampling

Survey plots were laid out in three different areas within the PESC, following the procedures of Gentry (1982). In the original procedure of this author, ten 2 m × 50 m transects are laid out either uniformly or at random, for a total sampling area of 0.1 ha, and all included woody plants with a diameter at breast height (DBH) > 2.5 cm are sampled within these transects. In the present study, however, only arboreal species with a DBH > 4.8 cm (circumference > 15 cm) were counted. The transects were aligned parallel to each other, and separated one from another by a distance of 20 m. The DBH and estimated heights of all sampled individuals were noted. Botanical collections were made for a large majority of the trees, the only exceptions being very common species that could be readily identified in the field. Voucher material was deposited at the CEPEC herbarium and the species were classified in families according to the APG II system (APG 2003).

The three areas surveyed differed in terms of their successional stages (Fig. 1), and the landscape mosaic in which they are inserted, being:

> Old-growth forest (OGF)—Area of original vegetation in its best state of conservation, without any indication of recent disturbance. This area is located in the southern portion of the PESC (14°29’60’ ’S and 39°06’54” W), at an altitude of ~250 m asl.

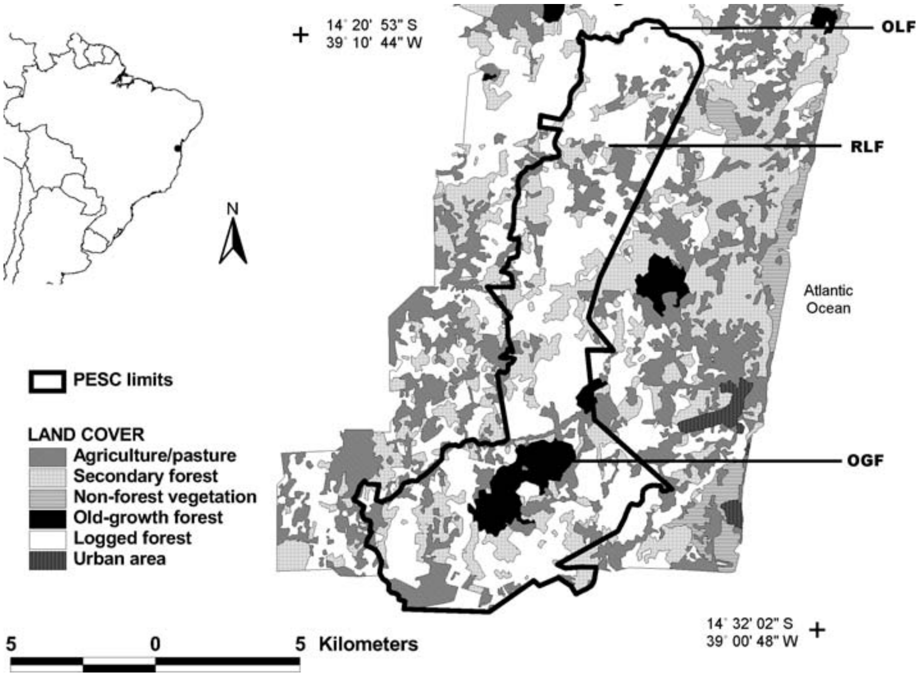

Fig. 1 Land cover in the Serra do Conduru State Park (PESC), Bahia, Brazil, and the location of the three areas surveyed: Old-growth forest (OGF), Recently logged forest (RLF) and Old logged forest (OLF)

Old logged forest (OLF)—Area that had been logged in the past (ca. 30 years ago), but remained surrounded by large forest blocks (which also had been lightly disturbed) and is distant from pasture or agricultural lands. This area is located in the northern portion of the PESC (14°21’05” S and 39°03’55” W) at an altitude of 130 m asl.

Recently logged forest (RLF)—Area that had recently (1–2 years) been logged and that is surrounded by small forest fragments in different successional stages, or by small areas of pasture or agricultural lands. This area is located in the central portion of the PESC (14°23’12” S and 39°04’45” W), at an altitude of 130 m asl.

Other global sites

A data base containing all of the available surveys undertaken using the methodology developed by Gentry (1982) has been made available in a digital format by the Missouri Botanical Garden. This information was used to compare the results of the present study with data from the 22 sites demonstrating the highest species richness in the world (Phillips and Miller 2002), as well as with other Brazilian sites.

However, as described above, the sampling performed in the present study differed from that originally proposed by Gentry (1982), as we sampled neither trees smaller than 4.8 cm DBH nor woody lianas. Therefore, in order to permit comparisons, all plants with a DBH < 4.8 cm were eliminated from the original data of the other world sites, and the values for species richness and relative abundance of each species were then recalculated.

Table 1 General description of the three areas surveyed in the Serra do Conduru State Park, Bahia, Brazil

	Old-growth forest (OGF)	Old logged forest (OLF)	Recently logged forest (RLF)
Number of individuals	254	263	253
Number of species	144	137	134
Number of families	41	36	41
Similarity with OGF	–	–	–
Similarity with OLF	0.377	–	–
Similarity with RLF	0.338	0.458	–
Most abundant species	*Helicostylis tomentosa*	*Pausandra morisiana*	*Eriotheca macrophylla*
	Euterpe edulis	*Euterpe edulis*	*Guapira nitida*
	Eriotheca macrophylla	Euphorbiaceae sp. 1	*Psychotria schlechtendaliana*
	Ecclinusa ramiflora	*Cupania* sp. 1	*Euterpe edulis*
	Sorocea guilleminiana	*Guapira opposita*	*Miconia mirabilis*
	Pouteria sp. 3	*Rudgea* sp. 1	*Swartzia reticulata*
	Coussarea contracta	*Eriotheca macrophylla*	*Rinorea guianensis*
	Brosimum guianense	*Rinorea guianensis*	*Ecclinusa ramiflora*
	Aptandra tubicina	*Garcinia gardneriana*	*Henriettea succosa*
		Manilkara maxima	*Eschweilera mattos-silvae*
			Guapira opposita

The similarity values refer to the Sorensen index for species presence/absence

In order to compare species density (the number of species per unit area) between the different sites, the calculated values for absolute richness were ranked, as the sampling parameters and the sampling areas (1,000 m^2) were equivalent for all sites.

Results

The three areas in southern Bahia analyzed in the present study all demonstrated high species density levels (Table 1). A total of 144 species were sampled in the old-growth forest (OGF) area, and even the area that had recently been logged (RLF) demonstrated a high density of tree species (134 spp.). The three areas together (0.3 ha) contained 283 different arboreal species (Appendix 1).

The two areas that had been submitted to more recent disturbance (OLF and RLF) showed the greatest similarity in species composition, although a large number of species were found to occur only in one or the other site. These two sites are situated relatively close to one another (Table 1; Fig. 1).

Euterpe edulis (Arecaceae) and *Eriotheca macrophylla* (Malvaceae) were among the most abundant in all three areas surveyed (Table 1). Other species such as *Ecclinusa ramiflora* (Sapotaceae), *Brosimum guianense* (Moraceae), and *Helicostylis tomentosa* (Moraceae) were also encountered in all three areas, but with greatly varying abundances in any given site. On the other hand, some very abundant species were almost exclusive to a single area, such as *Pausandra morisiana* (Euphorbiaceae) and *Manilkara maxima* (Sapotaceae) in the OLF, and *Pouteria* sp 3 (Sapotaceae) in the OGF. A complete list of the species encountered in the three areas is presented in Appendix 1.

Of the 142 species sampled in the PESC for which there is information available on their geographical distribution, 51.4% are endemic to the Brazilian Atlantic Forest, and 26.1% are restricted to the forests of southern Bahia and the adjacent State of Espírito Santo, a region denominated as “Central Corridor of the Atlantic Forest”. A total of 18.3% of these species have a disjunct distribution with the Amazon forest (Appendix 1).

Table 2 Numbers of individuals and tree species with DBH > 4.8 cm in different localities throughout the world, sampling according to the method proposed by Gentry (1982)

Code	Country	Latitude	Longitude	PPT	Individuals	Species	%Identsp
22 sites highlighted in Phillips and Miller 2002) and the three areas surveyed in this study							
CALIMA	Colombia	03 55′ S	77 00′ W	7470	230	148	58.1
OGFCONDU	*Brazil*	*14 30′ S*	*39 06′ W*	*2000*	*253*	*144*	*69.4*
MISHNFL	Peru	03 47′ S	73 30′ W	3100	233	141	68.8
OLFCONDU	*Brazil*	*14 21′ S*	*39 03′ W*	*2000*	*263*	*137*	*74.5*
SEMENGOH	Malaysia	01 50′ N	110 05′ E	4167	235	136	85.3
RLFCONDU	*Brazil*	*14 23′ S*	*39 04′ W*	*2000*	*253*	*134*	*77.6*
ALLPAHUA	Peru	03 57′ S	73 25′ W	3000	166	133	56.4
ARARACUA	Colombia	00 25′ S	72 20′ W	3250	287	133	21.1
CONSTANC	Peru	04 15′ S	72 45′ W	3100	179	132	23.5
TUTUNEND	Colombia	05 46′ N	76 35′ W	9000	244	132	72.7
NOSYMANG	Madagascar	15 30′ S	49 46’ E	4000	356	129	30.2
JENAROHE	Peru	04 55′ S	73 45’ W	2520	175	127	48
CANDAMO	Peru	13 30′ S	69 50′ W	6760	213	126	34.1
LINHARES	Brazil	19 18′ S	40 04′ W	1400	216	125	42.4
DUCKE	Brazil	03 00′ S	59 58′ W	2200	186	123	52.8
PERINET	Madagascar	18 55′ S	48 25′ E	1200	399	121	11.6
JATUNSAC	Ecuador	01 04′ S	77 36′ W	4100	189	115	83.5
VARIRATA	Papua New Guinea	09 30′ S	147 30′ E	1000	216	111	14.4
YANAM2	Peru	03 26′ S	72 51′ W	3100	134	110	76.4
RIOTAVAR	Peru	13 21′ S	69 40′ W	6760	158	105	35.2
YANAM1	Peru	03 26′ S	72 51′ W	3100	135	105	76.2
INDIANA	Peru	03 31′ S	73 04’ W	3100	156	101	60.4
RIOMANSO	Colombia	07 30′ S	76 05′ W	4000	179	96	36.5
PASOH30	Malaysia	03 00′ N	102 20′ E	2054	130	92	97.8
PASOH40	Malaysia	03 00′ N	102 20′ E	2054	128	90	96.7
Other sites in the Brazilian Atlantic Forest							
CARLOSBO	Brazil	24 15′ S	46 56′ W	3100	290	98	34.7
CAMORIN	Brazil	22 56′ S	43 22′ W	1500	176	83	45.8
BORACEIA	Brazil	23 23′ S	46 00′ W	3500	258	79	38

CODE—Codes for the name of the sites highlighted in Phillips and Miller (2002); PPT—Average annual precipitation; %Identsp - Percentage of taxa identified to the species level

The area of old-growth forest (OGF) in the PESC showed the second greatest tree species density in the world (144 species in 0.1 ha), being surpassed only by the tropical wet forest in the Bajo Calima region in Colombia (148 species). All three areas of the PESC were found to be ranked among the sites with the highest tree species density in the world (Table 2). Sites from other regions in Brazil that were ranked among the top 22 in the world showed lower species densities: Linhares (125 spp.) and Ducke (123 spp.) (Table 2). Other Atlantic Forest sites (excluding Linhares) had considerably lower tree species totals, varying from 79 to 98 species (Table 2).

A high percentage of taxa from the three sampling areas was identified to the species level (69.4–77.6%), indicating a high degree of precision for the numbers presented here (Table 2).

Discussion

This is the first study comparing the density of tree species in the Brazilian Atlantic Forest with other high diversity areas of the world employing a standardized comparative data base. Although the employed methodology (Gentry 1982) is based on a small sampling area, the standardized data sets allow for full comparisons among a wide variety of forests. In the present study, this comparison gives further evidence that the Atlantic Forest in southern Bahia has one of the highest tree species densities in the world.

In spite of the relatively small sizes of the areas surveyed here, these results are supported by an earlier study (Thomas et al. in press) that examined 1 ha of a forest area (between 5 km and 10 km from the sites described here) and identified 405 arboreal species and 53 liana species with DBH > 5 cm. In spite of the difficulty of a direct comparison due to the differences in sampling techniques used, these results serve to confirm the very high numbers of tree species observed in the region. Additionally, all three sites surveyed within the PESC showed a high species density, large numbers of families, and high numbers of individuals. In spite of the different levels of disturbance observed and the small size of samples, these three areas could almost be considered as "replicates", and the similar high levels of diversity verified, provide an additional evidence of a high regional woody plant diversity. It is especially relevant that the area with the highest species density (OGF) was the area without evidence of recent disturbance, discounting the possibility that the high density of species encountered might be related to a disturbance regime.

Another interesting characteristic of the three areas analyzed is the relatively low floristic similarity among them, as each site shows a large number of exclusive species (OGF = 74 spp.; OLF = 52 spp.; RLF = 55 spp.). This suggests that further sampling would increase the number of species present in the area as a whole. It is worth noting that the second most abundant species in the study carried out by Thomas et al. (in press), *Almeidea coerulea* St.Hill. ex G. Don (family Rutaceae, with 65 individuals collected within 1 ha), was not found in any of the areas sampled in the present study, although they are located less than 10 km away. This suggests the presence of species with very limited spatial distributions, or with very small local populations, and indicates the need for studies that could elucidate the factors that determine these distribution patterns. The determining factors of the rarity of species can vary according to the spatial scale utilized (Rabinowitz et al. 1986), and in the present study, may include adaptations to certain habitats determined by topography, soil type, or drainage (Hubbell and Foster 1986). On a regional scale, species that are considered rare in a given locality may be abundant in others, and an area in which a species appears to be rare may simply be at the edge of its natural distribution range. In order to conserve species demonstrating this type of distribution, it is necessary to protect their centers of dispersal (Hubbell and Foster 1986). Additionally, many of the rare species in the region are also endemic, and deserve special attention.

The high species richness of trees in southern Bahia is clearly associated with the high density of individuals encountered in those forests. A study conducted by Mori et al. (1983b) indicated that this high density of individuals is a typical characteristic of OGF in the region. As such, in order to understand the factors that result in the high species richness of the forests of southern Bahia, it is also necessary to identify the factors that cause the high density of individuals observed there. Coomes and Grubb (2000) have suggested that the tendency to have high densities of individuals with thin trunks is due to root competition in environments with readily available ground water but soils that have a poor nutrient content. Ter Steege et al. (2003), in their analysis of a number of sites in the Amazon region, encountered a strong relationship between the density of individual trees and high levels of regular rainfall throughout the year. Similar environmental conditions observed in the survey region of the present study (i.e. high rainfall distributed evenly throughout the year and soils that are relatively poor in nutrients) support the suggestion that these factors are pivotal in determining the forest structure.

A high density of individuals, however, is not always associated with high species richness (Ter Steege et al. 2003; Currie et al. 2004), as large variations in the number of species at sites with similar numbers of individuals were seen at the sites analyzed in this study. All four areas which showed larger numbers of individuals than the OGF had smaller numbers of species. The PERINET site, which had the largest number of individuals (399) actually demonstrated a comparatively low number of species (121).

When species richness was plotted against the number of individuals through mean species accumulation curves (Gotelli and Colwell 2001), it could be seen that the OGF demonstrated proportionally greater numbers of species than the four sites with larger numbers of individuals. Visual inspection of the mean species accumulation curves also revealed that eight sites with lesser numbers of individuals showed proportionally larger numbers of species than the OGF. However, the statistical significance of these analyses has not been obtained, suggesting caution in the interpretation of these results in light of two methodological problems. The first problem arises during the comparisons of the 25 sites, in which the tests should be made only after correcting for degrees of freedom. This would result, however, in confidence intervals so wide that only extreme differences would be observed. A second problem is, that without a sufficiently large sample size it would not be possible to distinguish different patterns of richness in these types of analysis, as the curves tend to converge when only a small number of individuals is considered (Gotelli and Colwell 2001). For these reasons the results of these analyses are not explicitly presented here, although the rough data utilized in this study can be obtained from the authors upon request.

In spite of the importance of understanding the relationships between the number of species and the number of individuals, principally for the elaboration of models that attempt to explain the species diversity observed in a given forest location, simple data on species density are valuable for identifying priority areas for conservation efforts (Gotelli and Colwell 2001).

Independent of its exact position in the world ranking using any given method of analysis, it is clear that forests in southern Bahia are very important for the conservation of world tree species biodiversity. The high species density observed there is extremely significant in itself, and additional characteristics increase even more the biological importance of the area. These include high levels of endemism (see Appendix 1; Thomas et al. 1998, 2003) and the existence of local sites of diversity for groups belonging to the families Annonaceae (e.g. *Duguetia* and *Hornschuchia*), Araceae, Arecaceae (e.g. *Bactris* and *Geonoma*), Bromeliaceae (several genera), Burseraceae, Chrysobalanaceae, Erythroxylaceae, Fabaceae (e.g. *Inga* sect. *Affonsea*, *Swartzia*), Malpighiaceae (e.g. *Heteropterys* and *Stigmaphyllon*), Malvaceae (e.g. *Pavonia*), Myrtaceae, Poaceae (Anomochloideae, Bambusoideae), Rutaceae (Galipeineae), and Sapotaceae (e.g. *Manilkara*).

In addition to our knowledge of the local flora obtained through floristic surveys, there is also the need for studies that will advance our understanding of the evolutionary and ecological processes that determine the elevated species richness of the region. Among the many hypotheses put forward to explain the patterns of species richness observed throughout the world (Wright 2002, Leigh et al. 2004), some appear readily applicable to southern Bahia.

The abiotic conditions present in the study region are commonly associated with great species richness in other areas, including its location at only 15° of latitude below the equator on relatively poor soils (latosols and podzols), low altitude (a maximum of 500 m asl in the region around the PESC), and generally warm temperatures (average of 24°C) throughout the year (Givnish 1999). Although rainfall in the region (between 1800 mm year^{-1} and

2200 mm year^{-1}) is not quite as high as that observed in other sites with large biodiversity, the absence of significant seasonal variations, which is considered crucial in the other studies (Gentry 1988; Wright 1992; Clinebell et al. 1995; Givnish 1999; Phillips and Miller 2002; Ter Steege et al. 2003), would appear to be the factor most strongly associated with the high species density observed in southern Bahia.

In relation to the role of disturbance in controlling the number of species present at a given site (Connell 1978; Sheil and Burslem 2003), it must be noted that only natural tree fall gaps could be considered an important factor in the study area. There are no records of tropical storms in the region, nor is this relatively flat area subject to landslides. A recent study undertaken in another conservation area (Una Biological Reserve) located about 150 km from the PESC site reported that the local disturbance regime was limited to small natural tree fall gaps (Martini 2002).

In terms of biological factors (see reviews in Rohde 1992, Wright 2002; Leigh et al. 2004), there are no published records reporting the influence of pathogens or predators on trees in the region, nor any studies that have examined the dynamics of arboreal communities, mortality, or growth rates under different environmental or biotic conditions. As a result of the lack of any long-term studies of the trees in these forests, there is no information concerning intra- or interspecific competition among these plants.

Finally, in regards to biogeographical factors, some studies have suggested that the Atlantic Coastal Forest was historically in contact with other South American forests, resulting in a rich flora formed from autochtones and aloctones elements of this biome (Andrade-Lima 1982; Silva and Casteleti 2003). As an example, a particularly well defined group of trees has a disjunct distribution between Amazonia and the southern Bahia forests (see Appendix 1; Mori et al. 1981; Thomas et al. 1998). Well known cases of disjunction between Amazonia and the southern Bahia forests, such as *Anthodiscus amazonicus* Gleason & A. C. Sm. (Caryocaraceae) and *Parkia pendula* (Willd.) Benth. ex Walp. (Fabaceae), have been supplemented by new records in the region, such as *Glycydendron amazonicum* Ducke (Euphorbiaceae), *Ocotea percurrens* (Lauraceae), *Roucheria punctata* (Ducke) Ducke (Linaceae), *Byrsonima fanshawei* W. R. Anderson (Malpighiaceae), *Anomospermum reticulatum*, and *Orthomene schomburgkii* (Miers) Barneby & Krukoff (Menispermaceae), *Graffenrieda intermedia* Triana (Melastomataceae), and *Siparuna glycycarpa* (Ducke) Renner & Hausner (Siparunaceae). Additionally, South America as a whole has experienced long geological periods without major catastrophic events that might cause mass extinctions, which argues for a long and stable time frame to form and maintain species.

Species composition and diversity in any given region are known to result from numerous processes acting at different scales (Ricklefs and Schluter 1993, Ricklefs 2004) and the identification of the most important process will depend on an extensive knowledge of the local diversity. This knowledge can only be obtained through detailed long-term studies aimed to examine the relationships between the biota and the physical environment, aspects of plant–animal interactions, and the phylogenetic relationships of the species present in those communities. In the region around southern Bahia, these in-depth studies are only incipient, and will require coordinated research efforts to become a reality.

Unfortunately, southern Bahia has been experiencing a long-term economic crisis, which has resulted in the degradation of many of its remaining forested areas (Alger and Caldas 1994; Saatchi et al. 2001). Even though logging is technically illegal in the region, forest destruction continues piecemeal as the local population attempts to enlarge their agricultural areas (and their income), often advancing into conservation areas existent in the region. In the specific case of the Serra do Conduru State Park (PESC), where the present work was undertaken, there are still a number of land-holders tending their farms as a result of the long lag period between the creation of the reserve and the payment of the property owners there.

This continual loss of forest cover becomes even more alarming as our knowledge of the remaining regional flora and fauna grows. Every year, new species are found and described (for amphibians, see Cruz et al. 2003; Caramaschi and Pimenta 2003), including a new bird genus (Pacheco et al. 1996) described in the last decade. In regards to the flora, some examples of recently described species collected in the PESC include: *Diplopterys carvalhoi* (Anderson and Davis, 2006), *Schwartzia geniculatiflora* (Giraldo-Cañas and Fiaschi 2005), *Hypolytrum jardimii* (Alves et al. 2002), *Diospyros scottmori*, and *D. ubaitaba* (Wallnofer 2005). Other interesting examples include a new species from the family Phyllanthaceae (*Discocarpus pedicellatus*) that is actually one of the most abundant tree species in a forest reserve in the region (Fiaschi and Cordeiro 2005; Amorim et al. 2005), as well as *Physeterostemon*, a new genus of the family Melastomataceae, with two species (*P. fiaschii* and *P. jardimii*) endemic to the rainforests of southern Bahia (Goldenberg and Amorim 2006).

In spite of the fact that the biological importance of these forests has been already recognized in earlier works (Mori et al. 1983a, 1983b; Gentry 1992, Thomas et al. 1998), the current efforts in order to conserve them or improve the knowledge of their structure and dynamics has not yet been enough. As such, the present study should serve to reinforce the importance of this region, with the intention of stimulating new conservation initiatives and new research efforts. Given the unique characteristics of this region, the results of these efforts will certainly contribute to enhance the understanding of the patterns of distribution of species richness at local and global scales.

Acknowledgments

We thank the Instituto de Estudos Sócio-ambientais do Sul da Bahia (IESB) for providing logistic support during the course of this project; the World Bank for financial resources used (managed by the MMA - Projeto Corredores Ecológicos and SEMARH-BA); the CEPEC Herbarium for providing access to their collections; the National Geographic Society-USA (DEB 7785-05), National Science Foundation-USA (DEB 0516233) and Beneficia Foundation - U.S.A., for sponsoring the Northeastern Atlantic Forest Project that had provided field work support; the Universidade Estadual de Santa Cruz for its support of the researchers AMZM and AMA; the State of São Paulo Research Foundation (FAPESP) within the BIOTA/FAPESP - The Biodiversity Virtual Institute Program (grant no. 04/09554-0) for the grant to AMZM; the Integrative Life Sciences PhD. program (VCU) and CNPq for financial support to PF; Alwyn H. Gentry, the Missouri Botanical Garden, and the numerous collectors who assisted Gentry or otherwise contributed data for specific sites; and others who aided this study through support in the field (Evandro Costa Guimarães) and in the identification of some botanical material (Clara Sampaio and Jomar G. Jardim).

Appendix 1

Endemism level of the species sampled in three areas in the Serra do Conduru State Park Brazil

Family	Species	Endemism level	OGF	OLF	RLF	TOT
Achariaceae	*Carpotroche brasiliensis* Endl.	EEB	1			1
Anacardiaceae	*Tapirira guianensis* Aubl.	WSA	1		1	2
Annonaceae	*Annona salzmannii* A. DC.	EBA			1	1
Annonaceae	*Guatteria blanchetiana* R.E.Fr.	X	1			1
Annonaceae	*Guatteria candolleana* Schltdl.	EEB	1			1
Annonaceae	*Guatteria* sp. 1	X	1			1
Annonaceae	*Xylopia* sp. 1	X		1		1
Annonaceae	*Xylopia* sp. 2	X			1	1
Annonaceae	Annonaceae sp. 1	X			1	1
Annonaceae	Annonaceae sp. 2	X			1	1
Apocynaceae	*Aspidosperma discolor* A. DC.	WSA	3	4		7
Apocynaceae	*Aspidosperma thomasii* Marc.-Ferr.	EBA		4		4
Apocynaceae	*Himatanthus bracteatus* (A.DC.) Woodson	WSA			3	3
Apocynaceae	*Lacmellea aculeata* (Ducke) Monach.	DAA	2			2
Apocynaceae	*Rauwolfia bahiensis* A. DC.	EBA	2			2
Apocynaceae	*Tabernaemontana flavicans* Willd. ex Roem. & Schult.	X		1		1
Araliaceae	*Schefflera morototoni* (Aubl.) Maguire, Steyerm. & Frodin	WSA	1			1
Arecaceae	*Euterpe edulis* Mart.	EEB	14	9	6	29
Asteraceae	*Vernonanthura diffusa* (Less.) H.Rob.	EEB			4	4
Bignoniaceae	*Tabebuia cassinoides* DC.	EEB		1	1	2
Boraginaceae	*Cordia ecalyculata* Vell.	WSA	2	1		3
Boraginaceae	*Cordia magnoliaefolia* Cham.	DAA	1	3	2	6
Boraginaceae	*Cordia nodosa* Lam.	WSA	1			1
Boraginaceae	*Cordia* sp. 1	X	1			1
Burseraceae	*Protium aracouchini* (Aubl.) Marchand	WSA	1	2	2	5
Burseraceae	*Protium icicariba* var. *talmonii* Daly	EBA	3	4	1	8
Burseraceae	*Protium* sp. 1	X		1	2	3
Burseraceae	*Protium warmingianum* Marchand	EEB	3	2	1	6
Burseraceae	*Tetragastris catuaba* Soares da Cunha	EEB		1		1
Celastraceae	*Cheiloclinium cognatum* (Miers) A.C.Sm.	WSA	3		1	4
Celastraceae	*Maytenus distichophylla* Mart. ex Reiss.	X		1	3	4
Chrysobalanaceae	*Couepia belemii* Prance	EBA		1		1
Chrysobalanaceae	*Couepia bondarii* Prance	EBA		1		1
Chrysobalanaceae	*Couepia pernambucensis* Prance	EEB	1			1
Chrysobalanaceae	*Hirtella triandra* Sw.	WSA	1			1
Chrysobalanaceae	*Licania belemii* Prance	EBA		2	3	5
Chrysobalanaceae	*Licania kunthiana* Hook. f.	WSA		1		1
Chrysobalanaceae	*Licania lamentanda* Prance	EBA	1	1		2
Chrysobalanaceae	*Licania littoralis* Warm.	EEB	2	1		3
Chrysobalanaceae	*Parinari alvimii* Prance	EBA		1		1
Chrysobalanaceae	*Stephanopodium blanchetianum* Baill.	EEB		3	1	4
Chrysobalanaceae	*Stephanopodium magnifolium* Prance	EBA	1	2		3
Chrysobalanaceae	*Stephanopodium* sp. 1	X		2		2
Chrysobalanaceae	Chrysobalanaceae sp. 1	X		1		1
Chrysobalanaceae	Chrysobalanaceae sp. 2	X			1	1
Clusiaceae	*Clusia palmicida* Rich. ex Planch. & Triana	X	1			1

Appendix 1 continued

Family	Species	Endemism level	OGF	OLF	RLF	TOT
Clusiaceae	*Garcinia gardneriana* (Planch. & Triana) Zappi	WSA		5		5
Clusiaceae	*Garcinia macrophylla* Mart.	X	3		2	5
Clusiaceae	*Kielmeyera itacarensis* N.Saddi	EBA	3			3
Clusiaceae	*Tovomita choisyana* Planch. & Triana	X		3	2	5
Clusiaceae	*Tovomita mangle* G. Mariz	EEB		2		2
Clusiaceae	*Vismia ferruginea* Humb., Bonpl. & Kunth	X			1	1
Combretaceae	*Buchenavia capitata* Eichl.	X	1			1
Cyatheaceae	*Cyathea corcovadensis* Domin	X		1		1
Ebenaceae	*Diospyros guatterioides* A.C.Sm.	X			1	1
Ebenaceae	*Diospyros* sp. 1	X	1			1
Ebenaceae	*Diospyros* sp. 2	X			1	1
Elaeocarpaceae	*Sloanea guianensis* Benth.	WSA	1			1
Elaeocarpaceae	*Sloanea* sp. 1	X	1	1		2
Erythroxylaceae	*Erythroxylum* cf. *citrifolium* A. St.-Hil.	WSA		1		1
Euphorbiaceae	*Actinostemon appendiculatus* Jabl.	EEB			1	1
Euphorbiaceae	*Actinostemon concolor* (Spreng.) Müll.Arg.	EEB			2	2
Euphorbiaceae	*Glycydendron amazonicum* Ducke	DAA		1	2	3
Euphorbiaceae	*Mabea piriri* Aubl.	WSA	2	1		3
Euphorbiaceae	*Pausandra morisiana* Radlk.	EEB		11		11
Euphorbiaceae	*Pogonophora schomburgkiana* Miers ex Benth.	WSA		1		1
Euphorbiaceae	Euphorbiaceae sp. 1	X	1	6	3	10
Fabaceae	*Abarema cochliacarpos* (Gomes) Barneby & J.W. Grimes	X		1		1
Fabaceae	*Andira fraxinifolia* Benth.	EEB	1		1	2
Fabaceae	*Andira legalis* (Vell.) Toledo	X			1	1
Fabaceae	*Andira nitida* Mart. ex Benth.	EEB			1	1
Fabaceae	*Andira* sp. 1	X	1			1
Fabaceae	*Arapatiella psilophylla* (Harms) R.S. Cowan	EBA		2		2
Fabaceae	*Balizia pedicellaris* (DC.) Barneby & J.W. Grimes	DAA	1		1	2
Fabaceae	*Copaifera lucens* Dwyer	X	1	1	1	3
Fabaceae	*Exostyles venusta* Schott ex Spreng.	EEB	1			1
Fabaceae	*Harleyodendron unifoliatum* R.S.Cowan	EBA			1	1
Fabaceae	*Inga blanchetiana* Benth.	EBA			1	1
Fabaceae	*Inga capitata* Desv.	DAA		2		2
Fabaceae	*Inga* cf. *laurina* (Sw.) Willd.	WSA			1	1
Fabaceae	*Inga* sp. 1	X			1	1
Fabaceae	*Inga* sp. 2	X	1			1
Fabaceae	*Inga tenuis* (Vell.) Mart.	EEB		1		1
Fabaceae	*Macrolobium latifolium* Vog.	EBA		1	4	5
Fabaceae	*Parkia pendula* Benth. ex Walp.	DAA			1	1
Fabaceae	*Peltogyne pauciflora* Benth.	X		2	2	4
Fabaceae	*Pterocarpus rohrii* Vahl	X	1			1
Fabaceae	*Sclerolobium densiflorum* Benth.	EEB			1	1
Fabaceae	*Stryphnodendron pulcherrimum* Hochr.	EBA			1	1
Fabaceae	*Swartzia apetala* Raddi var. *blanchetii* (Benth.) R.S. Cowan	EBA	1	2	1	4
Fabaceae	*Swartzia myrtifolia* Sm. var. *elegans* (Schott) R.S. Cowan	EEB		1		1
Fabaceae	*Swartzia reticulata* Ducke	DAA		1	6	7
Fabaceae	*Swartzia simplex* Spreng.	WSA	2	1		3

Appendix 1 continued

Family	Species	Endemism level	OGF	OLF	RLF	TOT
Fabaceae	*Zollernia magnifica* A.M. Carvalho & Barneby	EBA	1	2		3
Fabaceae	*Zollernia modesta* A.M. Carvalho & Barneby	EBA		1	1	2
Fabaceae	Fabaceae sp. 1	X			3	3
Fabaceae	Fabaceae sp. 2	X	1			1
Fabaceae	Fabaceae sp. 3	X		1		1
Humiriaceae	*Humiriastrum* sp. 1	X	2			2
Lacistemataceae	*Lacistema robustum* Schnizl.	EEB		2	1	3
Lauraceae	*Aniba intermedia* (Meisn.) Mez	EBA	3			3
Lauraceae	*Ocotea* cf. *blanchetii* (Meisn.) Mez	X			1	1
Lauraceae	*Ocotea* cf. *glauca* (Nees & Mart.) Mez	X		4		4
Lauraceae	*Ocotea indecora* Schott ex Meisn.	EEB		1		1
Lauraceae	*Ocotea percurrens* Vicentini	DAA	1		1	2
Lauraceae	*Ocotea* sp. 1	X		1		1
Lauraceae	*Ocotea* sp. 2	X		1		1
Lauraceae	*Persea caesia* Meisn.	X	3			3
Lauraceae	Lauraceae sp. 1	X		1		1
Lauraceae	Lauraceae sp. 2	X	1			1
Lauraceae	Lauraceae sp. 3	X			1	1
Lauraceae	Lauraceae sp. 4	X	1			1
Lecythidaceae	*Eschweilera mattos-silvae* S.A. Mori	EBA		1	5	6
Lecythidaceae	*Eschweilera ovata* Mart. ex Miers	DAA	3	1	2	6
Lecythidaceae	*Lecythis lurida* (Miers) S.A. Mori	DAA	1	3	2	6
Lecythidaceae	*Lecythis pisonis* Cambess.	DAA		1	2	3
Loganiaceae	*Strychnos romeu-belemii* Prance	EBA			1	1
Malvaceae	*Eriotheca globosa* (Aubl.) A. Robyns	X		2	3	5
Malvaceae	*Eriotheca macrophylla* (K. Schum.) A. Robyns	WSA	6	5	13	24
Malvaceae	*Sterculia excelsa* Mart.	DAA	1			1
Melastomataceae	*Henriettea succosa* (Aubl.) DC.	WSA	1	1	5	7
Melastomataceae	*Miconia hypoleuca* Triana	WSA	1			1
Melastomataceae	*Miconia lurida* (Miers) S.A. Mori	EEB			2	2
Melastomataceae	*Miconia mirabilis* (Aubl.) L.O. Williams	WSA		1	6	7
Melastomataceae	*Miconia prasina* (Sw.) DC.	WSA	3			3
Melastomataceae	*Miconia pyrifolia* Naudin	DAA	1			1
Melastomataceae	*Mouriri regeliana* Cogn.	EBA	3	1	2	6
Melastomataceae	Melastomataceae sp. 1	X	1			1
Meliaceae	*Guarea blanchetii* C. DC.	EBA	2	1	1	4
Meliaceae	*Guarea guidonia* (L.) Sleumer	WSA	1	1		2
Meliaceae	*Guarea kunthiana* A. Juss.	WSA			1	1
Meliaceae	*Trichilia lepidota* Mart.	WSA		2		2
Meliaceae	*Trichilia ramalhoi* Rizzini	EBA		1	2	3
Moraceae	*Brosimum guianense* Huber ex Ducke	DAA	4	3	1	8
Moraceae	*Brosimum rubescens* Taub.	DAA	1	1	2	4
Moraceae	*Ficus gomelleira* Kunth & Bouche	X			1	1
Moraceae	*Helicostylis tomentosa* (Poepp. & Endl.) Rusby	DAA	21	1	3	25
Moraceae	*Sorocea guilleminiana* Gaud.	WSA	5	1		6
Moraceae	*Sorocea hilarii* Gaud.	EEB	1			1
Myristicaceae	*Virola gardneri* Warb.	EEB	3	2	1	6
Myristicaceae	*Virola officinalis* Warb.	EBA	2	1	1	4
Myrsinaceae	*Cybianthus* cf. *densiflorus* Miq.	X	1			1
Myrtaceae	*Calyptranthes grandifolia* O. Berg	X	1	1		2
Myrtaceae	*Eugenia* cf. *ayacuchae* Steyerm.	X	1		2	3

Appendix 1 continued

Family	Species	Endemism level	OGF	OLF	RLF	TOT
Myrtaceae	*Eugenia* cf. *longifolia* DC.	X	1			1
Myrtaceae	*Eugenia* cf. *magnifica* Spring. ex Mart.	X		1	2	3
Myrtaceae	*Eugenia* cf. *pruniformis* Cambess.	X	1	1		2
Myrtaceae	*Eugenia* cf. *rostrata* O. Berg	X	3			3
Myrtaceae	*Eugenia itacarensis* Mattos	EBA	1		2	3
Myrtaceae	*Eugenia mandiocensis* O. Berg	X	2	1		3
Myrtaceae	*Eugenia* sp. 1	X	1			1
Myrtaceae	*Eugenia* sp. 2	X		1	3	4
Myrtaceae	*Eugenia* sp. 3	X	1			1
Myrtaceae	*Eugenia* sp. 4	X			1	1
Myrtaceae	*Eugenia* sp. 5	X		1		1
Myrtaceae	*Eugenia* sp. 6	X		1		1
Myrtaceae	*Eugenia* sp. 7	X	1			1
Myrtaceae	*Eugenia* sp. 8	X	1			1
Myrtaceae	*Gomidesia fenzliana* O. Berg	X			1	1
Myrtaceae	*Gomidesia langsdorffii* O. Berg	X	1	1		2
Myrtaceae	*Gomidesia* sp. 1	X	2	3		5
Myrtaceae	*Gomidesia* sp. 2	X		1		1
Myrtaceae	*Marlierea* cf. *schottiana* O. Berg	X	1			1
Myrtaceae	*Marlierea tomentosa* Cambess.	X	2	2	3	7
Myrtaceae	*Myrcia acuminatissima* O. Berg	WSA			1	1
Myrtaceae	*Myrcia bicolor* Kiaersk.	X	2			2
Myrtaceae	*Myrcia* cf. *fallax* DC.	WSA	1			1
Myrtaceae	*Myrcia* cf. *gigantea* O. Berg	X			1	1
Myrtaceae	*Myrcia* cf. *multiflora* DC.	X		2		2
Myrtaceae	*Myrcia pubiflora* DC.	X			1	1
Myrtaceae	*Myrcia* sp. 1	X	1	3		4
Myrtaceae	*Myrcia* sp. 2	X		2		2
Myrtaceae	*Myrcia* sp. 3	X	1			1
Myrtaceae	*Myrcia* sp. 4	X			4	4
Myrtaceae	*Myrcia* sp. 5	X	1		1	2
Myrtaceae	*Myrcia* sp. 6	X	1			1
Myrtaceae	*Myrcia* sp. 7	X		1		1
Myrtaceae	*Myrcia* sp. 8	X	1			1
Myrtaceae	Myrtaceae sp. 1	X		1		1
Myrtaceae	Myrtaceae sp. 2	X	1			1
Myrtaceae	Myrtaceae sp. 3	X	1			1
Myrtaceae	Myrtaceae sp. 4	X	2		1	3
Myrtaceae	Myrtaceae sp. 5	X		1		1
Myrtaceae	Myrtaceae sp. 6	X			1	1
Myrtaceae	Myrtaceae sp. 7	X		2		2
Myrtaceae	Myrtaceae sp. 8	X		1		1
Myrtaceae	Myrtaceae sp. 9	X		4		4
Myrtaceae	Myrtaceae sp. 10	X	1			1
Myrtaceae	Myrtaceae sp. 11	X		1		1
Myrtaceae	Myrtaceae sp. 12	X			1	1
Myrtaceae	Myrtaceae sp. 13	X	1	1	1	3
Myrtaceae	Myrtaceae sp. 14	X		1		1
Myrtaceae	Myrtaceae sp. 15	X	1	1		2
Myrtaceae	Myrtaceae sp. 16	X	1			1
Myrtaceae	Myrtaceae sp. 17	X			2	2
Myrtaceae	Myrtaceae sp. 18	X	1			1
Myrtaceae	Myrtaceae sp. 19	X	2		1	3
Myrtaceae	Myrtaceae sp. 20	X		1		1

Appendix 1 continued

Family	Species	Endemism level	OGF	OLF	RLF	TOT
Myrtaceae	Myrtaceae sp. 21	X	1			1
Myrtaceae	Myrtaceae sp. 22	X			1	1
Myrtaceae	Myrtaceae sp. 23	X	1			1
Nyctaginaceae	*Guapira laxiflora* (Choisy) Lundell	EBA			1	1
Nyctaginaceae	*Guapira nitida* (Mart. ex J.A. Schmidt.) Lundell	X	2	4	8	14
Nyctaginaceae	*Guapira opposita* (Vell.) Reitz	WSA		6	4	10
Nyctaginaceae	*Neea floribunda* Poepp. & Endl.	WSA		1		1
Ochnaceae	*Elvasia tricarpellata* Sastre	EBA		2	1	3
Ochnaceae	*Ouratea gigantophylla* Sastre	EBA	1			1
Ochnaceae	*Ouratea* sp. 1	X	1			1
Olacaceae	*Aptandra tubicina* Benth. ex Miers	DAA	4		1	5
Olacaceae	*Heisteria* sp. 1	X		1	1	2
Phyllanthaceae	*Amanoa guianensis* Aubl.	WSA		3	2	5
Phyllanthaceae	*Margaritaria nobilis* L.f.	WSA		2	1	3
Picramniaceae	*Picramnia glazioviana* Engl.	EEB		1		1
Polygonaceae	*Coccoloba ilheensis* Wedd.	DAA			2	2
Polygonaceae	Polygonaceae sp. 1	X	1			1
Putrangivaceae	*Drypetes* cf. *sessiliflora* Allem.	EEB		2	2	4
Quiinaceae	*Quiina glaziovii* Engl.	EEB	1			1
Rubiaceae	*Alseis floribunda* Schott	WSA			1	1
Rubiaceae	*Cordiera bahiensis* C. Persson & P. G. Delprete	X	1	2	1	4
Rubiaceae	*Coussarea contracta* (Walp.) Benth. & Hook. ex Müll.Arg.	X	4	1	2	7
Rubiaceae	*Faramea monantha* Müll.Arg.	X			1	1
Rubiaceae	*Faramea* sp. 1	X		2		2
Rubiaceae	*Malanea macrophylla* Bartl.	WSA		1		1
Rubiaceae	*Psychotria mapourioides* DC.	WSA			1	1
Rubiaceae	*Psychotria schlechtendaliana* Müll. Arg.	X		3	8	11
Rubiaceae	*Psychotria vellosiana* Benth.	X	1			1
Rubiaceae	*Randia armata* (Sw.) DC.	WSA		2	1	3
Rubiaceae	*Rudgea crassifolia* Zappi & E. Lucas	X	1	2		3
Rubiaceae	*Rudgea* sp. 1	X		6		6
Rubiaceae	*Rudgea* sp. 2	X			1	1
Rubiaceae	*Simira* sp. 1	X	3		1	4
Rutaceae	*Esenbeckia leiocarpa* Engl.	X			1	1
Rutaceae	*Hortia brasiliana* Vand ex DC.	EEB	1			1
Rutaceae	*Pilocarpus riedelianus* Engl.	EEB			3	3
Rutaceae	*Zanthoxylum* sp. 1	X		1		1
Salicaceae	*Banara kuhlmannii* (Sleumer) Sleumer	EBA	1			1
Salicaceae	*Casearia bahiensis* Sleumer	EEB		1		1
Salicaceae	*Casearia commersoniana* Cambess.	WSA		2	2	4
Salicaceae	*Casearia oblongifolia* Cambess.	EEB			1	1
Sapindaceae	*Allophylus* cf. *membranifolius* Radlk.	X			1	1
Sapindaceae	*Cupania racemosa* Radlk.	X		1	1	2
Sapindaceae	*Cupania* cf. *scrobiculata* Rich.	X			1	1
Sapindaceae	*Cupania* sp. 1	X	1	6		7
Sapindaceae	*Talisia cupularis* Radlk.	DAA	1			1
Sapotaceae	*Chrysophyllum gonocarpum* (Mart. & Eichl.) Engl.	WSA	2			2
Sapotaceae	*Diplöon cuspidatum* (Hoehne) Cronquist	WSA	1	1	1	3
Sapotaceae	*Ecclinusa ramiflora* Mart.	WSA	6	3	5	14
Sapotaceae	*Manilkara longifolia* (A. DC.) Dubard	EBA		1		1
Sapotaceae	*Manilkara maxima* T.D. Penn.	EBA		5		5

Appendix 1 continued

Family	Species	Endemism level	OGF	OLF	RLF	TOT
Sapotaceae	*Manilkara* sp. 1	X			1	1
Sapotaceae	*Micropholis compta* Pierre ex Glaz.	EEB	1		1	2
Sapotaceae	*Micropholis guyanensis* Pierre	WSA	2	1	1	4
Sapotaceae	*Pouteria bilocularis* (H.J.P. Winkl.) Baehni	DAA	1	1		2
Sapotaceae	*Pouteria butyrocarpa* (Kuhlm.) T.D. Penn.	EBA	1			1
Sapotaceae	*Pouteria* cf. *bangii* (Rusby) T.D. Penn.	DAA	1	1		2
Sapotaceae	*Pouteria cuspidata* (A. DC.) Baehni	DAA		1	2	3
Sapotaceae	*Pouteria procera* (Mart.) T.D. Penn.	DAA		4	1	5
Sapotaceae	*Pouteria* cf. reticulata (Engl.) Eyma	EEB	1			1
Sapotaceae	*Pouteria* sp. 1	X	1			1
Sapotaceae	*Pouteria* sp. 2	X		3	1	4
Sapotaceae	*Pouteria* sp. 3	X	5			5
Sapotaceae	*Pouteria* sp. 4	X			1	1
Sapotaceae	*Pouteria* sp. 5	X	1			1
Sapotaceae	*Pouteria* sp. 6	X	1			1
Sapotaceae	*Pouteria* sp. 7	X	1			1
Sapotaceae	*Pradosia lactescens* (Vell.) Radlk.	EEB	1			1
Sapotaceae	*Pradosia* cf. *subverticillata* Ducke	X	1	1		2
Sapotaceae	Unidentified	X			1	1
Simaroubaceae	*Simaba floribunda* A. St.-Hil.	X	1			1
Siparunaceae	*Siparuna guianensis* Aubl.	WSA	1			1
Solanaceae	*Brunfelsia clandestina* Plowman	EBA			1	1
Urticaceae	*Coussapoa pachyphylla* R.W.A.P. Akkermans & C.C. Berg.	EBA	1			1
Urticaceae	*Pourouma guianensis* Aubl. subsp. guianensis	DAA	3		1	4
Urticaceae	*Pourouma mollis* Trec.	DAA	1			1
Urticaceae	*Pourouma velutina* Mart. ex Miq.	DAA	2	1	3	6
Verbenaceae	*Vitex orinocensis* Humb., Bonpl. & Kunth	X			1	1
Violaceae	*Paypayrola blanchetiana* Tul.	EEB	1	3	4	8
Violaceae	*Rinorea guianensis* Aubl.	WSA	1	5	5	11
Vochysiaceae	*Qualea* sp. 1	X	1		1	2
Vochysiaceae	*Vochysia riedeliana* Stafleu	EBA	2		1	3
Vochysiaceae	*Vochysia* sp. 1	X	1			1
Unidentified	Unidentified	X			1	1
	Total		254	263	253	770

Family classification is according to APG II (2003) Sites: Old-growth forest (OGF); Old logged forest (OLF) Recently logged forest (RLF). Endemism level: endemic to a restrict region (Bahia and Espírito Santo states) within Brazilian Atlantic Forest (EBA); Endemic to Eastern Brazil (Atlantic Forest) (EEB); Widespread South America (WSA); Disjunct between Atlantic Forest and Amazonia (DAA); Unclassified (X)

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