Vascular plant checklist in an area of extreme biological importance: filling gaps in the Caparaó National Park-ES, Brazil

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Abstract: Regional floristic lists are essential for defining biodiversity conservation strategies and are key to assist in filling knowledge gaps. They aim to provide a data source for applying tools to reduce extinction rates and to conserve ecosystems. Herein we present the results of an inventory of vascular plants in a rainforest in the Caparaó National Park (CNP) and approach their implications for conservation and management of this protected area and the surrounding communities. We conducted botanical expeditions between the years 2012 and 2017 in a montane and upper-montane forest of the CNP. We found 361 species distributed in 78 families and 181 genera. The study area is home to new species for science that were recently described in other publications outside that location, and 4 new records for Espírito Santo State; also 43 species listed in different extinction threat categories (VU, EN and CR) and another 190 categorized with lesser concerns (LC and NT). The families with the highest species richness were: Melastomataceae (41 spp.), Lauraceae and Myrtaceae (30), Orchidaceae (26), Rubiaceae (24), and Asteraceae (20). Our results contribute to greater knowledge of the CNP flora, of the montane environments in Brazil and the vegetation of Espírito Santo state, in addition to demonstrate the importance of this protected area to the conservation Atlantic Forest biodiversity.

Keywords: Neotropical region, Atlantic Forest, nature conservation, endangered species, regional flora.

Checklist de plantas vasculares em uma área de extrema importância biológica: preenchendo lacunas no Parque Nacional do Caparaó-ES, Brasil

Resumo: As listas florísticas regionais são essenciais para definir estratégias de conservação da biodiversidade e importantes instrumentos para preencher lacunas de conhecimento. O objetivo foi fornecer uma base de dados para a conservação da biodiversidade e manejo do ecossistema. Realizamos expedientes botânicas entre os anos de 2012 e 2017 em uma floresta ombrófila densa no Parque Nacional Caparaó e abordamos suas implicações para a conservação e manejo desta área protegida e das comunidades do entorno. Foram encontradas 361 espécies distribuídas em 78 famílias e 181 gêneros. A área abriga novas espécies para ciência que foram recentemente descritas em outras publicações fora dessa localidade, e 4 novos registros para Espírito Santo; também 43 espécies listadas em diferentes categorias de ameaça de extinção (VU, EN, CR) e outras 190 categorizadas com menores preocupações (LC e NT). As famílias com maior riqueza de espécies foram: Melastomataceae (41 spp.), Lauraceae e Myrtaceae (30), Orchidaceae (26), Rubiaceae (24), e Asteraceae (20). Nossos resultados contribuem para um maior conhecimento da flora do Parque, de montanhas do Brasil e da vegetação do Espírito Santo, além de demonstrar a importância dessa área protegida para a conservação da biodiversidade da Mata Atlântica.

Palavras-chave: Região neotropical, Floresta Atlântica, conservação da natureza, espécies ameaçadas.
Introduction

Regional floristic listings consist of important tools for designing conservation plans and actions for different ecosystems, and forms the essential basis for biodiversity management, developing of regional flora projects, supporting knowledge expansion. Despite the need for cataloguing biological diversity globally, especially in biodiversity hotspots (Myers et al. 2000, Mittermeier et al. 2004), the number of large expeditions like those carried out in the past by great naturalists, for instance, von Martius, Saint Hilaire and more recently A.C. Brade, were considerably reduced (Christenhusz & Byng 2016) and there are no more. However, regional floristic surveys have been growing in the tropical region, enabling estimation of plant species richness in these tropical regions (Slik et al. 2015).

Brazil is the country that has the greatest plant richness in the world, with an estimated 34,459 species of vascular plants (BFG 2018). However, the state of knowledge on flora is still incipient in many regions of the country, as occurs in the Atlantic Forest, including protected areas (Lima et al. 2015, Zappi et al. 2016, Oliveira et al. 2017), which have the conservation of plant species among their goals. Despite this, many species of vascular plants are listed as “data deficient” (Sousa-Baena et al. 2014), compromising actions for their conservation.

The lack of floristic studies in forest remnants in Brazil, especially those in which the access is difficult, such as mountain areas, leads to a lack of data in estimating the richness, as well as the occurrence of species (Giulietti et al. 2009). Thus, the restricted knowledge on the distribution of species due to the low number of floristic inventories in some regions creates gaps and makes it harder to make decisions of public politics, since these studies work as tools for identifying potential places for the conservation, or even for establishing new strategies in areas already under protection regimes (IUCN 2017). Floristic inventories, in addition to generating information about the species composition of a certain area, also enable the feed a database that will serve as the basis for other taxonomic and ecologic studies, as well as studies on the restoration of degraded areas (Souza et al. 2009).

Given these justifications and for being recognized as an important Atlantic Forest remnant, as well as being in a priority area for conservation and having extremely high biological importance (Ministério do Meio Ambiente - MMA 2007), the efforts to know the flora in the Caparão National Park (CNP) has started with the pioneering study by Brade (1942) has been expanding over the last decade (Mazine & Souza 2008; Forster & Souza 2013, Couto et al. 2016, Machado et al. 2016, Zorzaneli et al 2016, Araujo et al. 2018, Campos et al. 2018), beyond fascicles published by the herbarium “Guido Pabst” (GFJP). Recently, the list of plants from CNP was made available on the digital platform “Catálogo de Plantas das Unidades de Conservação do Brasil” (https://catalogo-ucs-brasil.jbrj.gov.br/), where there are 1,789 species of 714 genera and 198 botanical families, of these, 1,292 are angiosperms, 37 lycophytes, 262 ferns and 198 are avascular plants (Carrijo et al. 2020).

Therefore, herein we present the results of a floristic inventory of vascular plants in a rainforest in the CNP and approach its implications for the handling and conservation of this protected area. Moreover, we collaborate to fill the knowledge gaps for mountain environments in Brazil. Our intent is to show that floristic listings of plant species are indispensable tools for biodiversity conservation and that they should be encouraged.

Materials and methods

1. Study area

The Caparão National Park (CNP) is a protected area located between Espírito Santo and Minas Gerais states (Figure 1), within the Serra da Mantiqueira mountain range (20º18’ - 20º37’S and 41º42’ - 41º52’W). The park has 31,853.12 ha area, with 79% of being within the state of Espirito Santo (ICMBio 2015). It is located in the Atlantic Forest domain and protects different vegetation formations, such as montane forests (Dense Ombrophilous Forest and Semi-deciduous Seasonal Forest), high-altitude grasslands, and inselbergs (IBGE 2012, ICMBIO 2015, Couto et al. 2016, Campos et al. 2018). The Dense Ombrophilous Forest are exclusive to the Espírito Santo state side of the Park.

The CNP surrounding areas consist mostly of agricultural and cattle ranching, with emphasis on coffee and cattle farming, as well as a recent growth in areas destined to silviculture. Activities with potential negative impacts for the CNP are performed in surrounding areas, i.e. the use of pesticides, irregular deforestation for expanding agricultural areas (ICMBIO 2015). We also highlight anthropogenic pressures that may cause ecological unbalance in the park, such as unauthorized hunting, illegal extraction of palm hearts (Euterpe edulis Mart.), and the occurrence of forest fires (personal observation).

Floristic expeditions were concentrated in the Santa Marta valley (central point in the sampling area: 20º29’27.7”S 41º45’15.6”W), located in the municipality of Ibitirama - ES. The valley has an elevation range from 870 and 2480 m (Figure 1). Vegetation types reported to the area are Montane and Upper Montane Dense Ombrophilous Forests, according to the classification by IBGE (2012). The weather in the Ibitirama municipality is defined as Cwb according to the Köppen classification, adapted to Brazil by Alvares et al. (2013), being characterized as humid subtropical with dry winters and mild summers, and the region has annual precipitation of 1,284 mm and average annual temperatures of 16.8 ºC.

The vegetation in the beginning of the valley at lower elevation has different forest succession stages due to its wood extraction past, also presenting exotic/invasive species (i.e. Eriobotrya japonica (Thunb.) Lindl.), representing one of the exotic species that exist inside the protected area (Field observation; not collected). The signs of anthropogenic activity are reduced throughout the valley, given that the vegetation is extremely preserved in the highest areas and with an observed great presence of epiphytes (personal observation).

1.2 Data collection

We performed botanic expeditions between 2012 and 2017 to collect specimens comprising all life forms in order to compose the floristic listing to the Santa Marta valley (CNP). We collected fertile plant samples along trails using the walk-over survey method (Filgueiras et al. 1994), as well as samples in plots, covering an elevation gradient of around 700 m (900-1,600 m). We identified the species through pertinent e.g. Wanderley et al. 2005, 2012, Melhem et al. 2007, Martins et al. 2009) and compared our materials to images available in virtual herbaria such as the Herbário Virtual - Reflora (http://reflora.jbrj.gov.br/reflora/herbarioVirtual/) and the Jabot (http://jabot.jbrj.gov.br/v2/consulta.php). Duplicates were sent to group experts at BHCB, CEPEC, HUFSJ, RB, SPSF, and UPCB...
Figure 1. Location map (a; b), relief representation (c), and pictures (d) of the Santa Marta valley, Caparaó National Park (PNC), Brazil. Photo: Araujo, E.A.
herbaria – acronyms according to Thiers (2019) – for confirmation of the species. We have incorporated the specimens in the collection of the VIES and CAP Herbaria. In addition, sterile materials from plot sampling were included in the listing. These were reviewed by experts in their respective families and deposited in a didactic collection of CAP Herbaria. The exotic / invasive species were disregarded in this study. We try to keep a distance from the collection points of any area of human interference and therefore we prioritize including only native species.

Botanical families were classified according to the system proposed by the Angiosperm Phylogeny Group (APG IV 2016) for angiosperms, The Pteridophyte Phylogeny Group (2016) for ferns and lycophytes, and Christenhusz et al. (2011) for gymnosperms. We confirmed name orthography, authorship and synonyms through consulting “Flora do Brasil” 2020 online (<http://floradobrasil.jbrj.gov.br/>), complementing it with data from the online platform of the Missouri Botanical Garden (http://www.tropicos.org) and The Plant List (http://www.theplantlist.org/).

Potentially threatened species were verified in the following lists: a) Red List of Espirito Santo state (Fraga et al. 2019); b) Red List of Flora of Brazil/CNC Flora (Martinelli & Moraes 2013; CNCFlora 2018); and c) The IUCN Red List of Threatened Species (IUCN 2017). New records of species from Espirito Santo state were compiled after the confirmation of group experts, as well as its verification in the database of the “Flora do Brasil” 2020 online (<http://floradobrasil.jbrj.gov.br/>) and Carrijo et al. (2020).

Results

We catalogued 361 species of vascular plants (Figure 2, Table 1) in the Santa Marta river valley, belonging to 78 botanical families (70 angiosperms and eight ferns and lycophytes), and 181 genera. The families with highest species richness were Melastomataceae (41 spp.) Lauraeaceae and Myrtaceae (30), Orchidaceae (26), Rubiaceae (24), Asteraceae (20), Piperaceae (15), Solanaceae (15) and Bromeliaceae (12), which altogether sum 59% of all compiled species. The most well represented genera regarding number of species were: Miconia (23 spp.), Ocotea (18), Myrcia (12), Psychotria (9), and Eugenia, Mikania, Peperomia, and Leandra (8).

We found 3 new records for the State of Espirito Santo: Alsophila salvini Hook. (Cyatheaceae); Pleroma foveolatum (Naudin) Triana; (Melastomataceae); Pilea hilariana Wedd. (Urticaceae), and three possible new species that are under investigation (Psychotria sp., Sloanea sp. and Solanum sp.), which are recent taxonomic discoveries and are being described.

Our results have also pointed out the existence of 43 species (12%) listed as threatened of extinction on The IUCN Red List of Threatened Species, in the Red Book of Brazilian Flora, and on the list of endangered flora species in the State of Espirito Santo (Table 1). The families that have the highest number of species categorized as threatened of extinction were: Myrtaceae (7 spp.), Lauraeaceae (6), Melastomataceae and Orchidaceae (5), Begoniaceae and Monimiaceae (4).

Based on our field observations during the inventory process, it was possible to notice a gradual change in the plant community throughout the valley (data on the ecology of plant communities are being published). To exemplify this differentiation, we observed some species occurring restrictedly at certain elevation, such as Alsophila setosa Kaulf., Capania ludowigii Sommer & Ferrucci, Euterpe edulis Mart. and Sorocela bonplandii (Baill.). W. C. Burger et al. that were only observed between approximately 1,100 m and 1,400 m of altitude, while species such as Baccharis oblongifolia (Ruiz & Pav.) Pers., Miconia longicuspis Cogn., M. molest Cogn., and Weinmannia pinnata L. only occurred in elevations above 1,400 m. Some species were observed throughout the whole sampled altitude range, e.g., Alchornea triplinervia (Spreng.) Müll.Arg., Cyathea atrorubescens Labiack P.E. et Matos F.B., Dendropanax cuneatus (DC.) Decne. & Planch., Myrica splendens (Sw.) DC., and Myrsine gardneriana A.DC. Species such as Bathysa australis (A.St-Hil.) K.Schum. and Leandra melastomoides Raddi mainly occurred in low elevations (1,000 m), especially in areas close to water streams. Maxillaria caparaoensis Brade is an endemic species to the CNP, with few sheets deposited in herbaria. Cyathea atrorubescens Labiack P.E. et Matos F.B. and Vochysia santaluciae M.C. Vianna & Fontella are endemic species of Espirito Santo, originally described for the Estação Biológica de Santa Lúcia in the Santa Teresa region.

Discussion

The new records for the state of Espirito Santo revealed in our study reflects the history of research efforts in certain places regarding the flora of the state (Carrijo et al. 2020, Dutra et al. 2015, Araújo et al. 2018), especially for montane environments. Our data show that the Santa Marta Valley houses 20.2% (361 species) of the vascular plants from CNP (Carrijo et al. 2020), in addition our list includes 88 species of local flora not yet documented, representing an increase of approximately 1%. These knowledge gaps make it harder to map the species and biodiversity distribution correctly, and makes delimitation of endemic areas imprecise, being one of the main obstacles to obtain actual understanding and to establish proper plans for biodiversity conservation (Hopkins 2007, Oliveira et al. 2016). Our findings are relevant for contributing to filling this knowledge gap about the flora in the state, in addition to helping to reduce the current lack of knowledge on the biodiversity in certain locations within Brazilian protected areas (Oliveira et al. 2017).

We have also registered the third known occurrence of Freziera atlantica Zorzanelli & Amorim (Pentaphylacaceae). This specie was described in 2016 with samples collected in the Papuã Mountains-BA and in the Valentin Mountains-ES (Zorzanelli et al. 2016), given that these mountains belong to the surrounding areas of the Caparaó Mountains. We have also included a species for the recently described science, Myrcia altomontana Sobral & Zorzanelli (Myrtaceae) (Sobral et al. 2017) in our list.

Plant communities of montane ecosystems usually present higher rates of endemism than ecosystems of lower elevations (Gentry 1995), which makes the diversity in these places more vulnerable to climate change due to the specialization degree developed by the species colonizing these environments (Eller et al. 2015, 2016). Expanding knowledge on montane environments has been increasingly important as a support to avoid species loss (Bertoncello et al. 2011).

This list was performed in an area defined by the Brazilian government as priority for the conservation and with extremely high biological importance (MMA 2007). It is one of the first listings for vascular plants in forests above 1000 m in Espirito Santo state. Our
Figure 2. Sample of the vascular plants diversity collected in the Santa Marta valley, Caparaó National Park. (a) *Psychotria bracteocardia* (DC.) Müll.Arg. (Rubiaceae); (b) *Clusia criuva* Cambess. (Clusiaceae); (c) *Aechmea coelestis* (K.Koch) E.Morren (Bromeliaceae); (d) *Psychotria nuda* (Cham. & Schltdl.) Wawra (Rubiaceae); (e) *Pleroma foveolatum* (Naudin) Triana (Melastomataceae); (f) *Scuticaria hadwenii* (Lindl.) Planch. (Orchidaceae); (g) *Schlumbergera cf. kautskyi* (Horobin & McMillan) N.P.Taylor (Cactaceae); (h) *Dryadella crenulata* (Pabst) Luer (Orchidaceae); (i) *Alstroemeria cunhae* Vell. (Alstroemeriaceae); (j) *Peperomia urocarpa* Fisch. & C.A.Mey. (Piperaceae); (k) *Nematanthus crassifolius* (Schott) Wichler (Gesneriaceae); (l) *Zygopetalum maxillare* Lod. (Orchidaceae); (m) *Billbergia ephemerae* E.Morren (Bromeliaceae); (n) *Maxillaria caparaoensis* Brade (Orchidaceae); (o) *Athenaea martiana* Sendtn. (Solanaceae); (p) *Zygopetalum mackayi* Hook. (Orchidaceae); (q) *Staurogyne anigozanthus* (Nees) Kuntze (Acanthaceae); (r) *Pitcairnia flammea* Lindl. (Bromeliaceae). Photos: Araujo, E.A.
Table 1. List of vascular plant species collected in the Santa Marta valley Caparaó National Park, organized by group and plant family, scored for category of threat (DD = Data Deficient; LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered). * New records for the State of Espírito Santo; ** Possible new species that are under investigation. The acronym CAP (Herbarium “Capixaba”), where sterile specimens were deposited in a didactic collection, does not have a voucher number. The other with voucher were all deposited in herbaria VIES and CAP.

| GROUP / Family / Species | Voucher | IUCN | CNCFlora | ES Red List |
|--------------------------|---------|------|----------|-------------|
| **ANGIOSPERMS**          |         |      |          |             |
| Acanthaceae              |         |      |          |             |
| Aphelandra longiflora (Lindl.) Profice | Dias 666; Zorzanelli 25 | LC | LC | |
| Mendoncia veloziana Mart. | Dias 612 | | | |
| Staurogyne anigozanthus (Nees) Kuntze | Araújo 154; Dias 747 | NT | EN | |
| **Alstroemeriaaceae**    |         |      |          |             |
| Alstroemeria cf. cunha Vell. | Dias 589, 720, 765 | | | |
| **Amaryllidaceae**       |         |      |          |             |
| Hippeastrum aulicum (Ker Gawl.) Herb. | Dias 727 | | NT | |
| **Annonaceae**           |         |      |          |             |
| Guatteria pohliana Schltdl. | Araújo 119, 202, 204, 221 | | NT | |
| **Aquifoliaceae**        |         |      |          |             |
| Ilex cf. chamaedryfolia Reissek | Araújo 254, 272 | | | |
| Ilex cf. dumosa Reissek | Araújo 265, 275 | | | |
| Ilex cf. theezans Mart. ex Reissek | Araújo 267 | | | |
| **Araliaceae**           |         |      |          |             |
| Anthurium gladifolium Schott | Dias 706 | | | |
| Anthurium scandens (Aubl.) Engl. subsp. scandens | Araújo 525 | | LC | |
| **Araceae**              |         |      |          |             |
| **Asteraceae**           |         |      |          |             |
| Austroeupatorium inulaefolium (Kunth) R.M.King & H.Rob. | Araújo 144; Zorzanelli 557 | | | |
| Baccharis oblongifolia (Ruiz & Pav.) Pers. | Araújo 490, 491 | | LC | |
| Bidens cf. segetum Mart. ex Colla | Dias 616 | | | |
| Cyrtocymura cf. scorpioides (Lam.) H.Rob. | Dias 755 | | | |
| Exostigma rivialare (Gardner) G.Sancho | Araújo 148 | | | |
| Mikania argyreiae DC. | Araújo 497 | | VU | LC |
| Mikania conferta Gardner | Dias 723 | | LC | |
| Mikania cf. hoffmanniana Dusén | Araújo 499 | | | |
| Mikania hirsutissima DC. | Araújo 146, 151 | | LC | |
| Mikania lanuginosa DC. | Araújo 205 | | LC | |
| Mikania lindbergii Baker | Dias 700 | | LC | |
| Mikania stylosa Gardner | Dias 702 | | LC | |
| Mikania trinervis Hook. & Arn. | Araújo 489 | | LC | |

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| Vascular Plants | Scientific Name | Author | Location | Status  |
|-----------------|-----------------|--------|----------|---------|
| Piptocarpha leprosa | (Less.) Baker | Araújo 173, 485 | | LC |
| Piptocarpha macropoda | (DC.) Baker | Araújo 174, 492; Campanharo 13 | | LC |
| Piptocarpha ramiflora | (Spreng.) Baker | Araújo 500, 501 | | LC |
| Verbesina cf. glabra | Hook. & Am. | Araújo 362 | | |
| Vernonanthura discolor | (Spreng.) H.Rob. | Araújo 494, 555; Pinto-Júnior 85 | | LC |
| Vernonanthura divaricata | (Spreng.) H.Rob. | Araújo 161, 560 | | LC |
| Vernonanthura phaeoneura | (Toledo) | Araújo 493 |

### Begoniaceae

| Begonia altamiroi | Brade | Araújo 283 | EN | DD |
| Begonia angularis | Raddi | Araújo 147 | LC | LC |
| Begonia convolvalacea | (Klotzsch) A.DC. | Zorzaneli 525 | | LC |
| Begonia digitata | Raddi | Dias 673; Zorzaneli 542 | | LC |
| Begonia cf. huegelii | (Klotzsch) A.DC. | Zorzaneli 524 |
| Begonia integrifolia | Spreng. | Araújo 145, 156; Zorzaneli 735 | | LC |
| Begonia valdensium | A.DC. | Zorzaneli 717 | | LC |

### Bromeliaceae

| Aechmea coelestis | (K.Koch) E.Morren | Dias 619; Araújo 239, 523 | LC |
| Aechmea lamarchei | Mez | Zorzaneli 740 | | LC |
| Billbergia euphemiae | E.Morren | Araújo 517; Zorzaneli 830 | | LC |
| Neoregelia farinosa | (Ule) L.B.Sm. | Araújo 518 | | VU |
| Nidularium antoineanum | Wawra | Zorzaneli 707 | | EN |
| Pitcairnia flammee | Lindl. | Araújo 573 | | LC |
| Quesnelia kautskyi | C.M.Vieira | Dias 771; Zorzaneli 556, 726 | | VU |
| Tillandsia gardneri | Lindl. | Araújo 550 | | LC |
| Vriesea carinata | Wawra | Araújo 524 | | LC |
| Vriesea heterostachys | (Baker) L.B.Sm. | Araújo 106; Dias 618, 732; Zorzaneli 706 | | LC |
| Vriesea paraibica | Wawra | Dias 617 | | VU |
| Vriesea ruschii | L.B. Sm. | Araújo 40 | | LC |

### Cactaceae

| Rhopalocereus elliptica | G.Lindb. ex K.Schum. | Zorzaneli 720 | LC | VU |
| Schlumbergera cf. kautskyi | (Horobin & McMillan) N.P.Taylor | Araújo 569 |

### Campanulaceae

| Lobelia thapsoides | Schott | Araújo 143 | | LC |
| Siphocampylus aff. longipedunculatus | Pohl | Araújo 155; Zorzaneli 725 |

### Cannaceae

| Canna cf. paniculata | Ruiz & Pav. | Zorzaneli 722 |

### Celastraceae

| Maytenus longifolia | Reiss. ex Loes. | Araújo 69 | | LC |
| Monteverdia cestrifolia | (Reissek) Biral | Araújo 76, 135 | | |
| Family             | Genus                          | Author(s)       | Location | Range  |
|--------------------|--------------------------------|-----------------|----------|--------|
| Monteverdia        | schummaniana (Loes.)           | Biral Araújo 33 |          | LC     |
| Chloranthaceae     |                                |                 |          |        |
| Hedyosmum          | brasiliense Mart. ex Miq.       | Araújo 51, 509; Campanharo 22 | LC |        |
| Clethraceae        |                                |                 |          |        |
| Clethra            | scabra Pers.                   | Campanharo 21; Dias 879 | LC | LC     |
| Clusiaceae         |                                |                 |          |        |
| Clusia             | arrudea Planch. & Triana ex    | Araújo 215      |          |        |
|                    | Engl.                          |                 |          |        |
|                    | organensis Planch. & Triana    | Araújo 130, 531; Dias 697 | LC | LC     |
|                    | Tovomitopsis saldanhae Engl.   | Dias 770        |          | CR     |
| Commelinaceae      |                                |                 |          |        |
| Dichorisandra      | hexandra (Aubl.)               | Araújo 60       |          | LC     |
|                    | C.B.Clarke                     |                 |          |        |
| Cunoniaceae        |                                |                 |          |        |
| Lamanonia          | ternata Vell.                  | Araújo 164, 563; Campanharo 16 | LC |        |
| Cyperaceae         |                                |                 |          |        |
| Scleria            | cf. panicoides Kunth           | Zorzaneli 520   |          |        |
| Dichapetalaceae    |                                |                 |          |        |
| Stephanopodium     | organense (Rizzini) Prance     | Araújo 541; Zorzaneli 554 |          |        |
| Elaeocarpaceae     |                                |                 |          |        |
| Sloanea            | hirsuta (Schott) Planch. ex    | Araújo 111, 570; Dias 842 | LC | LC     |
|                    | Benth.                         |                 |          |        |
|                    | sp.**                          | Araújo 213      |          |        |
| Ericaceae          |                                |                 |          |        |
| Gaylussacia        | cf. martii Meisn.              | Araújo 564      |          |        |
| Euphorbiaceae      |                                |                 |          |        |
| Alchornea          | triplinerva (Spreng.) Müll. Arg. | Campanharo 14, 25 | LC |        |
|                    | Croton salutaris Casar.        | Araújo 31, 32; Campanharo 15 | LC |        |
|                    | Tetrorchidium parvulum Müll. Arg. | Araújo 511; Zorzaneli 549 | DD |        |
| Fabaceae           |                                |                 |          |        |
| Chaetocalyx        | scandens (L.) Urb.             | Araújo 61       | LC       |        |
|                    | Copaifera trapezifolia Hayne   | Campanharo 18   | LC       |        |
|                    | Inga marginata Willd.          | Dias 668        | LC       |        |
|                    | Inga platyptera Benth.         | Araújo 559      | EN       | VU     |
|                    | Inga schinifolia Benth.        | Araújo 263, 466, 558 | EN |        |
|                    | Machaerium declinatum (Vell.) Stellfeld | Araújo 131 | LC |        |
|                    | Senna multijuga (Rich.) H.S.Irwin & Barneby | Araújo 15; Dias 667 | LC |        |
| Gentianaceae       |                                |                 |          |        |
| Macrocarpaea       | glaziovii Gilg                | Araújo 136; Zorzaneli 823 | VU |        |
| Senaea             | janeirensis Brade              | Araújo 522      | EN       |        |
| Gesneriaceae       |                                |                 |          |        |
### Vascular plant checklist in Caparaó National Park

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| Vascular Plant | Author | Collection Details | Critically Endangered (CR) | Endangered (EN) | Least Concern (LC) | Vulnerable (VU) | Data Deficient (DD) |
|----------------|--------|--------------------|-----------------------------|-----------------|--------------------|-----------------|--------------------|
| Nematanthus crassifolius | (Schott) Wiehler | Dias 748, 836; Zorzaneli 739, 821 | | | | | |
| Paliavana prasinata | (Ker Gawl.) Benth. Araújo 138; Dias 691 | | | | | | |
| Sinningia cooperi | (Paxton) Wiehler Araújo 568 | | | | | | |
| Sinningia magnifica | (Otto & A.Dietr.) Wiehler Dias 589B | | | | | | |
| Heliconiaceae | | | | | | | |
| Heliconia angusta | Vell. Zorzaneli 1587 | | | | | | |
| Hypoxidaceae | | | | | | | |
| Hypoxis decumbens | L. Dias 677 | | | | | | |
| Lauraceae | | | | | | | |
| Aitoua saligna | Meisn. CAP | LC | DD | |
| Cinnamomum glaziovii | (Mez) Kosterm. Dias 662 | | | | | | |
| Cinnamomum triplinerve | (Ruiz & Pav.) Kosterm. CAP | LC | | | | | |
| Endlicheria paniculata | (Spreng.) J.F.Macbr. CAP | | | | | | |
| Licaria bahiana | Kurz Araújo 376 | | | | | | |
| Nectandra aff. barbellata | Coe-Teix. | | | | | | |
| Nectandra aff. debilis | Mez CAP | | | | | | |
| Nectandra oppositifolia | Nees CAP | | | | | | |
| Nectandra psammophila | Nees CAP | EN | | | | | |
| Ocotea aciphylla | (Nees & Mart.) Mez Araújo 433 | | | | | | |
| Ocotea bicolor | Vattimo-Gil CAP | | | | | | |
| Ocotea cernua | (Nees) Mez CAP | | | | | | |
| Ocotea corymbosa | (Meisn.) Mez Araújo 217, 399 | DD | | | | | |
| Ocotea dispersa | (Nees & Mart.) Mez Araújo 424 | | | | | | |
| Ocotea floribunda | (Sw.) Mez CAP | | | | | | |
| Ocotea glaziovi | Mez CAP | | | | | | |
| Ocotea indecera | (Schott) Mez CAP | | | | | | |
| Ocotea leucoxylon | (Sw.) Laness. Araújo 428 | LC | | | | | |
| Ocotea longifolia | Kunth CAP | | | | | | |
| Ocotea aff. notata | (Nees & Mart.) Mez CAP | | | | | | |
| Ocotea aff. nunesiana | (Vattimo-Gil) J.B. Baitello CAP | | | | | | |
| Ocotea aff. mutans | (Nees) Mez CAP | | | | | | |
| Ocotea odorifera | (Vell.) Rohwer CAP | EN | | | | | |
| Ocotea silvestris | Vattimo-Gil CAP | | | | | | |
| Ocotea aff. spixiana | (Nees) Mez CAP | | | | | | |
| Ocotea sulcata | Vattimo-Gil CAP | | | | | | |
| Ocotea vaccinioideae | (Meisn.) Mez Araújo 383 | | | | | | |
| Persea aff. fusca | Mez CAP | | | | | | |
| Persea aff. willdenovii | Kosterm. CAP | | | | | | |
| Rhodostemonodaphne macrocalyx | (Meisn.) Rohwer ex Madriñán Araújo 389, 415 | | | | | | |
| Loranthaceae | | | | | | | |
| Struthanthus salicifolius | (Mart.) Mart. Araújo 253 | DD | | | | | |
| Malpighiaceae | | | | | | | |
| Heteropteryx aff. rubiginosa | A.Juss. Araújo 135 | | | | | | |
### Malvaceae

| Specie                                      | Author | Status |
|---------------------------------------------|--------|--------|
| *Triumfetta semitriloba* Jacq.              | Araújo; Zorzaneli | 743    |

### Marcgraviaeace

| Specie                                      | Author | Status |
|---------------------------------------------|--------|--------|
| *Marcgravia polyantha* Delpino              | Araújo 547 |  |

### Melastomataceae

| Specie                                      | Author | Status |
|---------------------------------------------|--------|--------|
| *Henriettea cf. glabra* (Vell.) PENNEYS, F.A. Michelangeli, Judd et Almeda | CAP |  |
| *Leandra acutiflora* (Naudin) Cogn.        | Dias 670 | DD |
| *Leandra amplexicaulis* DC.                | Araújo 288 | LC |
| *Leandra barbinervis* (Cham. ex Triana) Cogn. | Araújo 317 | DD |
| *Leandra fallax* (Cham.) Cogn.             | Araújo 42 | LC |
| *Leandra melastomoides* Raddi              | Araújo 18; Dias 592, 699 | LC |
| *Leandra multiplinervis* (Naudin) Cogn.    | Araújo 20 | DD |
| *Leandra quinquedentata* (DC.) Cogn.       | Araújo 233, 256, 350 | LC |
| *Leandra xanthostachya* Cogn.              | Araújo 289 | DD |
| *Meriania tetramera* Wurdack               | Araújo 346; Campanharo 8 | NT |
| *Miconia cf. atlantica* CADDAD & R. Goldenb. | CAP |  |
| *Miconia budleoides* Triana                | Araújo 349 | LC |
| *Miconia chartacea* Triana                 | Dias 739 | LC |
| *Miconia fasciculata* Gardner              | Araújo 327, 359; Dias 761 | LC |
| *Miconia flammea* Casar.                   | Araújo 234, 247, 250 | LC |
| *Miconia formosa* Cogn.                    | Araújo 331 | LC |
| *Miconia goldenbergiana* CADDAD            | CAP |  |
| *Miconia cf. hirtella* Cogn.               | Araújo 304 |  |
| *Miconia ibaguensis* (Bonpl.) Triana       | Araújo 59; Zorzaneli 518 | LC |
| *Miconia laevigata* (L.) D.DON              | Zorzaneli 1591 |  |
| *Miconia latecrenata* (DC.) Naudin         | Araújo 340 | LC |
| *Miconia aff. lepidota* DC.                | Araújo 123, 179 |  |
| *Miconia cf. paniculata* (DC.) Naudin      | Araújo 13, 231 | LC |
| *Miconia ligustroides* (DC.) Naudin        | Araújo 291 | DD |
| *Miconia longicuspis* Cogn.                | Araújo 77, 85, 229, 310 | NT |
| *Miconia molesta* Cogn.                    | Araújo 196, 218, 259 | LC |
| *Miconia aff. petroniana* Cogn. & Saldañha | CAP |  |
| *Miconia cf. polyandra* Gardner            | CAP |  |
| *Miconia pusilliflora* (DC.) Naudin        | Araújo 258, 352; Dias 675 | LC |
| *Miconia sellowiana* Naudin                | Araújo 158, 167, 187, 341, 356 | LC |
| *Miconia setosociliata* Cogn.              | Araújo 357, 372 | VU |
| *Miconia tristis* Spring                   | Araújo 128; Zorzaneli 550 | LC |
| *Miconia aff. valentinensis* Bacci & R.Goldenb. | Araújo 292 |  |
| *Ossaea angustifolia* (DC.) Triana          | Araújo 290 | LC |
| *Pleiochiton plepharodes* (DC.) Reginato et al. | Dias 593 | LC |
| *Pleroma arboeum* Gardner                  | Campanharo 24 | LC |
| *Pleroma fassinervium* Schrank et Mart. ex DC. | CAP |  |
### Vascular plant checklist in Caparaó National Park

#### Meliaceae

| Species                                      | Collector(s) | Conservation Status |
|----------------------------------------------|--------------|---------------------|
| Pleroma fothergillii (Schrank et Mat. ex DC.) Triana | Araújo 293   | LC                  |
| Pleroma foveolatum (Naudin) Triana*          | Araújo 262   |                    |
| Pleroma heteromallum D. Don (D.Don)          | Araújo 62    | LC                  |
| Tibouchina estrellensis (Raddi) Cogn.        | Dias 682     | LC                  |

#### Monimiaceae

| Species                                      | Collector(s) | Conservation Status |
|----------------------------------------------|--------------|---------------------|
| Trichilia elegans A.Juss.                   | Araújo 539   |                    |
| Trichilia hirta L.                          | Araújo 540   | LC                  |

#### Moraceae

| Species                                      | Collector(s) | Conservation Status |
|----------------------------------------------|--------------|---------------------|
| Sorocea bonplandii (Baill.) W.C.Burger et al.| Araújo 17    | LC                  |

#### Myrtaceae

| Species                                      | Collector(s) | Conservation Status |
|----------------------------------------------|--------------|---------------------|
| Blepharocalyx salicifolius (Kunth) O.Berg     | CAP          | LC                  |
| Calyptranthes brasiliensis Spreng.           | CAP          | LC                  |
| Calyptranthes pulchella DC.                  | CAP          | LC                  |
| Campomanesia cf. phaea (O.Berg) Landrum      | CAP          |                    |
| Eugenia cf. candelleana DC.                  | CAP          |                    |
| Eugenia cf. capitulifera O.Berg              | CAP          |                    |
| Eugenia involucrata DC.                     | CAP          | LC                  |
| Eugenia leonoraes Mattos                    | CAP          | EN                  |
| Eugenia nutans O.Berg                       | CAP          | LC                  |
| Eugenia cf. pisiformis Cambess.              | CAP          |                    |
| Eugenia ramboi D.Legrand                    | CAP          |                    |
| Eugenia cf. rostrata O.Berg                 | CAP          |                    |
| Marlierea cf. regeliana O.Berg               | CAP          |                    |
| Myrceugenia miersiana (Gardner) D.Legrand & Kausel | Dias 724   | NT                  |
| Myrcia altomontana Sobral & Zorzanei         | Dias 710     |                    |
| Myrcia bergiana O.Berg                      | Campanhoro 12| LC                 |
| Myrcia cf. bicolor Kiaersk.                 | CAP          |                    |
| Myrcia cf. coelosepala Kiaersk.             | CAP          |                    |
| Myrcia guianensis (Aubl.) DC.                | Dias 751     | LC                  |
| Myrcia hartwegiana (O.Berg) Kiaersk.         | Dias 754     | LC                  |
| Myrcia lineata (O.Berg) Nied.               | Araújo 375; Dias 753; Zorzanei 727 | VU EN |
| Myrcia cf. oligantha O.Berg                 | CAP          |                    |
continuation...

| Species                                      | Author(s)       | Status | Location |
|----------------------------------------------|-----------------|--------|----------|
| Myrcia pubipetala Miq.                       |                  | CAP    | LC       |
| Myrcia retorta Cambess.                      |                  | CAP    |          |
| Myrcia splendens (Sw.) DC.                   | Araújo 89, 557; Zorzaneli 552 | LC     |          |
| Myrcia subcordata DC.                        | Araújo 121, 201 |        |          |
| Myrciaria cf. floribunda (H.West ex Willld.) O.Berg |                  | CAP    |          |
| Pimenta pseudocaryophyllus (Gomes) Landrum   | Araújo 556      |        |          |
| Plinia rivularis (Cambess.) Rotman           | Araújo 505      | LC     |          |
| Siphoneuena dassii (Krug & Urb.)             | CAP             | LC     |          |
| Nyctaginaceae                                |                 |        |          |
| Guapira graciliflora (Mart. ex Schmidt)      | Dias 841        |        |          |
| Ochnaceae                                    |                 |        |          |
| Ouratea grandiflora (A.DC.) Engl.            | Araújo 214      |        |          |
| Ouratea parviflora (A.DC.) Baill.            | Araújo 190      |        |          |
| Ouratea vaccinioides (A.St.-Hil. & Tul.) Engl. | Araújo 513      |        |          |
| Onagraceae                                   |                 |        |          |
| Fuchsia regia (Vell.) Munz                    | Dias 590        | LC     | LC       |
| Orchidaceae                                  |                 |        |          |
| Anathallis sclerophylla (Lindl.) Pridgeon & M.W.Chase | Araújo 549     | LC     |          |
| Brasiliorchis cf. picta (Hook.) R.B.Singer et al. | Dias 768        |        |          |
| Brasiliorchis ubatubana (Hoehne) R.B.Singer et al. | Zorzaneli 532   | LC     |          |
| Cattleya cf. coccinea Lindl.                 | Dias 766        |        |          |
| Dryadella crenulata (Pabst) Luer             | Araújo 207      |        |          |
| Elleanthus brasiensis (Lindl.) Rchb.f.       | Dias 826        | LC     |          |
| Epidendrum paranaense Barb.Rodr.             | Araújo 84       | LC     | EN       |
| Epidendrum saxatile Lindl.                   | Dias 813        | LC     | LC       |
| Eurystyles actinosophila (Barb.Rodr.) Schlr. | Dias 686        | LC     |          |
| Gomesa forbesii (Hook.) M.W.Chase & N.H.Williams | Dias 820        | LC     |          |
| Gomesa cf. recurva R.Br.                     | Araújo 574      |        |          |
| Isochilus linearis (Jacq.) R.Br.             | Zorzaneli 523   | LC     |          |
| Maxillaria caparaoensis Brade                | Zorzaneli 546   | VU     |          |
| Pabstiella fusca (Lindl.) Chiron & Xim.      | Zorzaneli 834   | LC     |          |
| Bols.                                        |                 |        |          |
| Pabstiella pseudotrifida L. Kollmann & D. R. Couto | Dias 827        | EN     |          |
| Pabstiella punctatifolia (Barb.Rodr.) Luer   | Dias 821        | LC     |          |
| Pogoniopsis nidus-avis Rchb.f. & Warm.       | Dias 811        | VU     |          |
| Pogoniopsis schenckii Cogn.                 | Araújo 193      | LC     | VU       |
| Prescottia stachyodes (Sw.) Lindl.           | Dias 764        | LC     |          |
| Promenaea cf. xanthina (Lindl.) Lindl.       | Araújo 191; Dias 854 |        |          |
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### Prosthechea

- *Prosthechea cf. bulbosa* (Vell.) W.E.Higgins 672

### Scaphyglottis

- *Scaphyglottis modesta* (Rchb.f.) Schltr. Zorzanelli 540
- *Scuticaria hadwenii* (Lindl.) Planch. Araújo 244

### Zygopetalum

- *Zygopetalum maculatum* (Kunth) Garay Dias 767
- *Zygopetalum maxillare* Lodg. Araújo 575

### Passifloraceae

- *Passiflora mediterranea* Vell. Araújo 63
- *Passiflora aff. porophylla* Vell. Dias 828
- *Passiflora speciosa* Gardner Araújo 512, 551; Zorzanelli 544

### Pentaphylacaceae

- *Freziera atlantica* Zorzanelli & Amorim CAP CR

### Peraceae

- *Pera glabrata* (Schott) Poepp. ex Baill. Araújo 280, 545
- *Pera heteranthera* (Schrank) I.M.Johnst. Araújo 544

### Phyllanthaceae

- *Hyeronima alchorneoides* Allemão Campanharo 29

### Piperaceae

- *Peperomia alata* Ruiz & Pav. Dias 615, 685; Zorzanelli 521
- *Peperomia corcovadensis* Gardner Araújo 361; Zorzanelli 729
- *Peperomia choroniana* C.DC. Araújo 514
- *Peperomia mandioccana* Miq. Dias 728
- *Peperomia martiana* Miq. Dias 684
- *Peperomia tetraphylla* (G.Forst.) Hook. & Arn. Araújo 195, 237; Dias 824
- *Peperomia tetraphylla* var. valantoides (Miq.) Yunck. Dias 729
- *Peperomia urocarpa* Fisch. & C.A.Mey. Araújo 37; Dias 611; Zorzanelli 517
- *Piper aduncum* L. Zorzanelli 829
- *Piper eucalyptophyllum* C.DC. Dias 604
- *Piper cf. lhotzyanum* Kunth Araújo 58
- *Piper mollicomum* Kunth Araújo 516
- *Piper richardiifolium* Kunth Araújo 515; Dias 607
- *Piper strictifolium* D.Monteiro & E.F.Guim. Araújo 565
- *Piper tectoniifolium* Kunth Araújo 21

### Primulaceae

- *Cybianthus fuscus* Mart. CAP LC
- *Cybianthus cf. obovatus* (Mart.) Mart. ex Miq. CAP
- *Cybianthus peruvianus* (A.DC.) Miq. Araújo 118, 192, 487
- *Myrsine gardneriana* A.DC. Araújo 109, 159

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**Myrsine hermogenesii** (Jung-Mend. & Bernacci) M.F.Freitas & Kin.-Gouv.

**Proteaceae**

*Roupala consimilis* Mez ex Taub. Araújo 178, 530

**Quinaceae**

*Lacunaria crenata* (Tul.) A.C.Sm. Araújo 521

**Rhamnaceae**

*Reissekia smilacina* (Sm.) Steud. Araújo 64

**Rubiaceae**

*Amaioua intermedia* Mart. ex Schult. & Schult.f.

**Sabiaceae**

*Meliosma sellowii* Urb.

**Salicaceae**

*Stylogyne warmingii* Mez.
| Family          | Species Description                                      | Reference | Status |
|-----------------|----------------------------------------------------------|-----------|--------|
| Sapindaceae     | *Casearia arborea* (Rich.) Urb.                          | Araújo 542, 543 | LC     |
|                 | *Allophylus edulis* (A.St.-Hil. et al.) Hieron. ex Nied. | Araújo 72, 536, 537 | LC     |
|                 | *Allophylus racemosus* Sw.                               | Araújo 538 | LC     |
|                 | *Cupania ludowigii* Somner & Ferrucci                    | Araújo 535 | LC     |
|                 | *Paullinia carpopoda* Cambess.                           | Araújo 125 | LC     |
|                 | *Thinouia mucronata* Radlk.                              | Araújo 561 | LC     |
| Sapotaceae      | *Micropholis crassipedicellata* (Mart. & Eichler) Pierre | Araújo 211, 216 | NT     | LC     |
|                 | *Siparuna brasiliensis* (Spreng.) A.DC.                  | Zorzaneli 828 | LC     | LC     |
| Smilacaceae     | *Smilax staminea* Griseb.                                | Araújo 571 |        |
| Solanaceae      | *Athenaeae cuspidata* (Witasek) I.M.C.Rodrigues & Stehmann | Dias 750 |        |
|                 | *Athenaeae martiana* (Sendtn.) I.M.C.Rodrigues & Stehmann | Araújo 97, 120; Dias 749; Zorzaneli 831 |        |
|                 | *Athenaeae picta* (Mart.) I.M.C.Rodrigues & Stehmann.    | Zorzaneli 719 |        |
|                 | * Brunfelsia brasiliensis* (Spreng.) L.B.Sm. & Downs     | Araújo 189; Campanharo 27 | LC     |
|                 | *Capsicum mirabile* Mart.                                | Dias 713 |        |
|                 | *Cestrum bracteatum* Link & Otto                         | Dias 614, 692, 846; Zorzaneli 543 | LC     |
|                 | *Cestrum strigilatum* Ruiz & Pav.                        | Dias 769 | LC     |
|                 | *Cestrum subpulverulentum* Mart.                         | Dias 688 | LC     |
|                 | *Solanum campaniforme* Roem. & Schult.                   | Dias 663 | LC     |
|                 | *Solanum cinnamomeum* Sendtn.                            | Araújo 168,528; Campanharo 4; Dias 690 | NT     | LC     |
|                 | *Solanum didymum* Dunal                                  | Zorzaneli 528 |        |
|                 | *Solanum leucodendron* Sendtn.                           | Araújo 163, 175, 529 | NT     | LC     |
|                 | *Solanum pseudoquina* A.St.-Hil.                         | Campanharo 26 | LC     |
|                 | *Solanum swartzianum* Roem. & Schult.                    | Dias 722 | LC     |
|                 | *Solanum sp.* **                                       | Araújo 200 |        |
| Symplocaceae    | *Symplocos estrellensis* Casar.                          | Araújo 70, 132 |        |
| Theaceae        | *Laplacea fruticosa* (Schrad.) Kobuski                   | Araújo 532, 533 | LC     |        |
| Thymelaeaceae   | *Daphnopsis fasciculata* (Meisn.) Neving                 | Araújo 124 |        |
| Urticaceae      | *Pilea hilariana* Wedd.*                                 | Araújo 235 | NT     |
| Verbenaceae     | *Lantana camara* L.                                      | Zorzaneli 545 |        |
| Vitaceae        |                                                           |           |        |
| Name                          | Author(s)          | Location                  | Notes |
|-------------------------------|--------------------|---------------------------|-------|
| *Cissus cf. tinctoria* Mart.  | Araújo 65          |                           |       |
| **Vochysiaceae**              |                    |                           |       |
| *Vochysia angelica* M.C.Vianna & Fontella | Araújo 53          | EN                        | EN    |
| *Vochysia bifalcata* Warm.    | CAP                | DD                        |       |
| *Vochysia glazioviana* Warm.  | Araújo 519         |                           |       |
| *Vochysia cf. oppugnata* (Vell.) Warm. | CAP                |                           |       |
| *Vochysia santaluciae* M.C.Vianna & Fontella | Araújo 520          | EN                        | EN    |
| **Winteraceae**               |                    |                           |       |
| *Drimys brasiliensis* Miers  | Araújo 203, 223; Dias 736 | LC                       | LC    |
| **FERNS AND LYCOPHYTES**      |                    |                           |       |
| **Anemiaceae**                |                    |                           |       |
| *Anemia mandioccana* Raddi    | Araújo 27, 188; Dias 599; Zorzaneli 536 | LC |       |
| *Anemia phyllitidis* (L.) Sw. | Araújo 26          |                           | LC    |
| **Aspleniacae**               |                    |                           |       |
| *Asplenium gastonis* Fée      | Zorzaneli 733      |                           |       |
| *Asplenium cf. harpeodes* Kunze | Zorzaneli 515      |                           |       |
| *Asplenium scandicum* Kaulf.   | Araújo 572         |                           |       |
| **Blechnaceae**               |                    |                           |       |
| *Neoblechnum brasiliense* (Desv.) Gasper & V.A.O. Ditrich | Zorzaneli 736 | LC |       |
| **Cyatheaceae**               |                    |                           |       |
| *Alsophila salvini* Hook.*    | Araújo 502         | DD                        |       |
| *Alsophila setosa* Kaulf.     | Araújo 534, 552, 553 | LC                       |       |
| *Cyathea atrocastanea* Labiack P.E. et Matos F.B. | Araújo 94, 96, 186 | EN |       |
| *Cyathea corcovadensis* (Raddi) Domin | Araújo 29; Zorzaneli 553 | LC | LC    |
| *Cyathea delgadi* Sternb.     | Araújo 90, 100, 113 | LC                        |       |
| *Cyathea dichromatolepis* (Fée) Domin | Araújo 23, 25     | LC                        |       |
| *Cyathea phalerata* Mart.     | Araújo 114, 116, 186B | LC                   |       |
| *Cyathea rufa* (Fée) Lellinger | Araújo 171, 503, 504 | LC                        |       |
| **Dennstaedtiaceae**          |                    |                           |       |
| *Blotiella lindeniana* (Hook.) R.M.Tryon | Araújo 209          | LC                        | EN    |
| **Marattiaceae**              |                    |                           |       |
| *Eupodium kaufussii* (J.Sm.) J.Sm. | Araújo 22, 554; Zorzaneli 832 | LC |       |
| **Polypodiaceae**             |                    |                           |       |
| *Campyloneurum repens* (Aubl.) C.Presl | Zorzaneli 519      |                           |       |
| *Cochlidium punctatum* (Raddi) | Zorzaneli 715      | LC                        |       |
| L.E.Bishop                     | Zorzaneli 530      | LC                        |       |
| *Microgramma percussa* (Cav.) de la Sota | Zorzaneli 530      | LC                        |       |
| *Niphidium crassifolium* (L.) Lellinger | Araújo 16         | LC                        |       |
| *Pleopeltis hirsutissima* (Raddi) de la Sota | Zorzaneli 822      | LC                        |       |
| *Serpocaulon fraxinifolium* (Jacq.) A.R. Sm. | Araújo 137         |                           |       |
| **Pteridaceae**               |                    |                           |       |
| *Pteris splendens* Kaulf.     | Zorzaneli 534      | LC                        |       |

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results may thus contribute to real actions for the conservation of biodiversity in the park, given that listings are an important source of basic information for scientists and decision-makers (Ulloa Ulloa et al. 2017), in addition to providing relevant data for the “Flora do Espírito Santo” and “Catálogo de Plantas das Unidades de Conservação do Brasil” Projects (Dutra et al. 2015, Carrijo et al. 2020).

The CNP is one of the few large remnants in the Atlantic Forest, which thereby confers larger potential to keep high rates of biodiversity in relation to other smaller remnants, making it extremely important for species conservation (Oliveira et al. 2017). In a scenario in which protected areas within the Atlantic Forest are mostly small and disconnected (Joppa et al. 2008), our list demonstrates the importance of CNP for the conservation of species, since one of the great challenges for biodiversity conservation in Brazil is to create matrices of protected areas which are large enough for the actual conservation of biological diversity (Rylands & Brandon 2005).

We highlight herein the role played by the CNP in protecting species in montane environments of the Atlantic Forest, as shown in our study (Table 1). Protected areas are indeed the best strategy to reduce deforestation and the extinction of species in tropical regions (Joppa et al. 2008). For example, a recent study in Brazil has demonstrated that protected areas preserve a considerable share of known Brazilian biodiversity (Oliveira et al. 2017).

However, we have mentioned the need for conservation actions that can surpass the CNP limits and to which the importance of local communities, should be recognized to protect forest remnants and maintain the biodiversity in these areas. It is important to have a positive interaction between the protected area and its surrounding areas, since the maintenance of native vegetation close to it contributes to maintaining ecological processes and species richness in protected areas (DeFries et al. 2005). In certain occasions, pressure within the protected area’s limits reflect the ones happening in its surrounding areas (Laurance et al. 2012). Thus, affirmative actions taken with surrounding communities of the CNP are essential, aiming to reduce threats such as illegal hunting and extraction of native species, especially endangered ones (e.g. *E. edulis*).

The botanical families that have presented the highest richness in our study are also the most rich ones across the Atlantic Forest mountains (Amorim et al. 2009, Pifano et al. 2010, Coelho & Amorim 2014, Meireles et al. 2014, BFG 2018, Dutra et al. 2015, Zorzanelli et al. 2017). In addition to these families, the most representative genera (*Miconia* Meireles et al. 2014, BFG 2018, Dutra et al. 2015, Zorzanelli et al. 2017) and genera such as *E. edulis* and *M. edulis*)

List, and after that moment collective efforts must be made to protect these species. We suggest the adoption of the list of threatened species created by this study as a possibility to guide a better zoning of the park, subsidizing protection actions for the area as a whole.

Our results have indicated high diversity of vascular plants in the Santa Marta valley, municipality of Itiúbara, with presence of species threatened, new records, occurrence of possible new species and the presence of recently described species. These data contribute to the knowledge of the Caparaó National Park Flora, mainly for the Capixaba portion where further research to prospect biological data should be encouraged. Moreover, these results highlight the role played by protected areas, showing that they are an essential strategy for protecting diversity from to extinction threats. As such, the CNP plays an important role for species preservation in montane and upper montane forests in the Brazilian southeast and for biodiversity in the Atlantic rainforest, and efforts must be maintained to mitigate existing conflicts within the territorial limit of the protected area.

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**Author Contributions**

Eduardo Alves Araújo: Contribution to data collection; Contribution to data analysis and interpretation; Contribution to manuscript preparation.

Sustanis Horn Kunz: Substantial contribution in the concept and design of the study; Contribution to data collection; Contribution to critical revision, adding intellectual content.

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Conflicts of interest

The authors declares that they have no conflict of interest related to the publication of this manuscript.

Ethics

The authors declares that the research did not involve humans or clinical trials in this manuscript.

Data availability

The authors inform that all data are available in the SISBIO Database because it was carried out within a federal protected area (National Park).

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