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## Birdwatching at Cassorova Ecoparque, Brazil, between waterfalls and forest

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## **ABSTRACT**

This paper is both, a photographic summary with observational and scientific data compiled on the existing natural riches in the Cassorova Ecoparque, situated in the municipality of Brotas, State of São Paulo, Brazil. The scientific and touristic expedition was carried out in November 2022. The Park is inserted in a region comprising several square kilometers of preserved forests, a natural heritage of immeasurable environmental richness, and a true paradise for birdwatchers because the region has registered more than three hundred species of birds. The photos show some of the Park structures, the forest, the waterfalls, species of plants, and animals, in particular the main birds observed on our trip.

**Keywords:** Cassorova Ecoparque, Brotas, Brazil, forest, waterfall, birdwatching

## **INTRODUCTION**

The Cassorova Ecoparque is known for its natural beauty. Situated in the municipality of Brotas, State of São Paulo, Brazil, 220 km from the city of São Paulo, and 25 km from the city of Brotas (**Figure 1**). It is inserted in a region comprising several square kilometers of preserved forests, a natural heritage of immeasurable environmental richness, between the coordinates 22° and 23° S and 48° and 49° W, at an altitude of 660 m above sea level.

The Cassorova Ecoparque is owned and managed by the friendly couple Milena Baltieri and Fabio Ferreira. The original owners of the Cassorova farm was Irineu and Ana Baltieri, descendants of Italian immigrants, who settled in the Brotas mountain range, where they acquired the Cassorova farm for the development of low environmental impact farming activities. The Cassorova farm, now knowing as Cassorova Ecoparque, is considered an example of a tourist attraction by the way it was done, being one of the pioneers of the city's late 80s and upgraded in 1992, when the city hall began to catalog the city's main attractions [1].

The main objective of this scientific and touristic expedition, carried out in November 2022 was to discover the natural beauties of the Atlantic Forest biome and the structure existing in this Park, identifying, and photographing the beauties of nature accessible to our lens and the main plant and animal species that we were lucky to see.

Highlights within the Park include two exuberant waterfalls: Cachoeira Cassorova and Cachoeira dos Quatis. The Cassorova waterfall has a double drop and a total height of 60 m (**Photos 23-29, 36-39**). A suspension bridge crosses the valley between these two waterfalls and from there you can contemplate the Atlantic Forest that surrounds them (**Photos 9-13**). Numerous viewpoints throughout the Park provide stunning views. Along the trails that cross the forest and that are access to the waterfalls and natural pools, there are overlooks that provide particularly beautiful views which will surely be familiar to those who have seen images of the Park in magazines, sites, or on postcards (**Photos 21, 22**). The region is inserted in the Geomorphological province of Cuestas Basálticas, composed of remnants of volcanic rocks from the Mesozoic Era in sedimentary areas. Cuesta is a landform in which hills and hills have a non-symmetrical slope, that is, smooth on one side and steep on the other [2, 3].

Brotas's climate is classified as warm and temperate. The city of Brotas experiences a significant amount of rainfall, even during the month with historically low precipitation levels. The average annual rainfall is 1,760 mm. Most rainfall (rainy season) is seen in November, December, January, February, and March. According to Köppen's classification, this climate is classified as Cfa. The temperature here averages 21.2 °C. March is the sunniest month with an average of 288 hours of sunshine. The best time of year to visit Brotas is during the months of May, June, July, and August where you are most likely to experience good weather with pleasant average temperatures that fall between 20 and 26 °C.



**Figure 1.** Localization of the Cassorova Ecoparque, Brotas-SP, Brazil.

The Cassorova Ecoparque is located in the Jacaré Pepira River basin. This river is considered one of the few in the State of São Paulo free of pollution. The recovery and preservation of riparian forests make it a biodiversity reserve [4]. The Park includes a forest complex, along which there are trails that reach the foot of the waterfalls, natural pools, and streams. The trails meander along the hillside and are ideal for visitors to wander, explore, and take in the views. These trails are well maintained and safe, in flat areas, though in some areas you may find stairs or an incline, especially those that arrive at the foot of the waterfalls.

In general, however, the trails are not challenging and appropriate for a variety of ages and fitness levels (**Photos 15-20, 30-35**). In addition to all the natural attractions, where you can contemplate nature and practice adventure sports, such as zip lining, rafting, canyoning, and tree climbing, there is the possibility of staying overnight in the Park, in a hotel that offers you a peaceful rest in unique natural surroundings. In the colonial-style restaurant, overlooking an artificial lake and a paradisiacal view, you can enjoy a very sophisticated cuisine prepared with natural ingredients (**Photos 1-8**).

The predominant vegetation in the Park is the Seasonal Semideciduous Forest. In the surroundings, there are patches of Cerrado vegetation. Because of its central position in the South American continent, the Cerrado has extensive borders with other vegetation types, including The Seasonal Semideciduous Forest [5]. The contact of the Atlantic Forest biome with the Cerrado biome provides a great wealth of plant and animal species.

The Seasonal Semideciduous Forest is a vegetation type that belongs to the Atlantic Forest biome and is typical of central Brazil. It is composed of phanerophytes with leaf buds that are protected from drought by scales (cataphylls or hairs), having deciduous sclerophyllous or membranaceous adult leaves. The degree of deciduousness, i.e., leaf loss, is dependent on the intensity and duration of basically two reasons: minimum and maximum temperatures and water balance deficiency. Seasonal semideciduous forest occurs in a climate characterized by seasonality: a season of intense summer rains followed by a period of drought, with annual rainfall lower than 1,600 mm and regular drought in five to six months of each year, when the monthly total rainfall is less than 10 mm. The dominant species lose their leaves during the dry period as an adaptation to water stress. The canopy of seasonal forests is smaller than that of rainforests, as there is a lower density of trees, lianas, epiphytes, and palms (**Photos 40-47**).

The seasonal climate intensity is related to local variations, such as characteristics of the relief, water retention, and soil depth, which determine the trees' level of deciduousness during the dry season: this is the basic feature that differentiates between the types of seasonal forest in Brazil [6-11].

The percentage of arboreal vegetation in semideciduous forests that has total leaf loss is between 20 and 50% in the dry season. The average height of the tree layer varies between 15 and 25 m. Most trees are upright, with some individuals emerging. In the wet season, the cover provided by the canopy layer of the tallest trees is between 70 and 95%. Besides these aspects, these forests characterization occurs by the presence of some species such as, *Acacia polyphylla* (monjoleiro), *Alchornea glandulosa* (tapiá), *Anadenanthera colubrina* (angico-branco), *Andira fraxinifolia* (angelim), *Apuleia leiocarpa* (garapeira), *Aspidosperma discolor* (pau-pereira) *Aspidosperma subincanum* (guatambu), *Astronium graveolens* (guarità), *Cariniana estrellensis* (jequitibá-branco), *Cecropia pachystachya* (embaúba), *Cedrela fissilis* (cedro), *Ceiba speciosa* (paineira), *Centrolobium tomentosum* (araribá), *Copaifera langsdorffii* (copaíba), *Croton floribundus* (capixingui), *Croton urucurana* (sangra-d'água), *Dalbergia villosa* (caviúna), *Duguetia lanceolata* (pindaíba), *Enterolobium contortisiliquum* (tamboril), *Esenbeckia leiocarpa* (guarantã), *Ficus guaranitica* (figueira), *Gallesia integrifolia* (pau-d'alho), *Guarea macrophylla* (marinheiro), *Guarea guidonia* (carrapeta), *Guatteria nigrescens* (pindaíba-preta), *Guazuma ulmifolia* (mutambo), *Handroanthus serratifolius* (ipê-amarelo), *Hymenaea courbaril* (jatobá), *Inga affinis* (ingazeiro), *Jacaratia spinosa* (jaracatiá), *Syagrus romanzoffiana* (jerivá), *Matayba elaeagnoides* (camboatá), *Metrodorea nigra* (carrapateira), *Myrciaria floribunda* (cambuí), *Myroxylon peruiferum* (cabreúva), *Nectandra megapotamica* (canela-ferrugem), *Patagonula americana* (guaiuvira), *Pera glabrata* (tamanqueiro), *Tapirira*

*guianensis* (fruto-de-pombo), *Trichilia elegans* (catiguá), *Zanthoxylum rhoifolium* (mamica-de-porca), and *Zeyheria tuberculosa* (ipê-felpudo). In general, semideciduous forests occupy the slopes of interfluves between rivers, forming gradual transitions into gallery or riparian forests when close to waterways [12-35].

The forests of the Cassorova Ecoparque apart from representing habitats for such an abundance of forest flora are also home to various wildlife species. Being very well preserved, and nearly pristine, these ecosystems are crucial in nature and wildlife diversity preservation. There are many species of insects, like butterflies, moths, beetles, grasshoppers, bees, and dragonflies. Arriving on the scene around 300 million years ago, dragonflies were one of the first insects to inhabit this planet. They've had many millennia to perfect the art of hunting, flying, and living an extraordinary amount of time (for a bug anyway). They've even developed a knack for flying backward, which comes in handy when trying to catch flies and mosquitoes. Another interesting group is the amphibians, such as different species of toads, frogs, and tree frogs, living in different types of microenvironments, such as marshy areas, flooded areas on the shores of lakes and streams, temporary pools, litter from the forest, trunk cavities, branches of emerging vegetation, bromeliads, and anthropic areas [36-39].

Reptiles are represented by a good number of species, including lizards and snakes. The lizard *Salvator merianae* (**Photo 49**), known as “teiu” is the largest lizard found in Brazil, and can reach 1.4 m in total length. It has a wide distribution, occurring in several biomes. It has an omnivorous diet consisting of arthropods, small vertebrates, birds, rodents, amphibians, lizards, eggs, decaying animals, and fruits of different plants, and the ingestion of the fruits acts as a seed dispersal mechanism [40-42]. *Tropidurus torquatus* (**Photo 50**) is a medium-sized lizard, that lives mainly in open habitat types. It is mostly ground-dwelling, living in termite nests and on or under rocks and logs, eating invertebrates and plant material [43-46]. Among the serpents, the *Boa constrictor* stands out, known as “jiboia”, a species of large, non-venomous, heavy-bodied snake. It can reach about 4 m in length. Its coloring can vary greatly but are generally a brown, gray, or cream base color, patterned with brown or reddish-brown "saddles" that become more pronounced towards the tail. As semi-arboreal snakes, young boa constrictors may climb into trees and shrubs to forage; however, they become mostly terrestrial as they become older and heavier. Their prey includes a wide variety of small to medium-sized mammals and birds. The boa's powerful muscles allow it to exert a great deal of pressure, and the prey is typically killed within a few minutes [47-50].

The ornithofauna of the Brotas region is rich and diverse, comprising 327 bird species, according to the main avifauna website in Brazil, the Wikiaves [51]. Due to the preservation and the size of the forest habitats, most of these species occur on Cassorova Ecoparque, including species of tinamous and guans, several species of pigeons, cuculids, and hummingbirds, as well as nocturnal species, such as nightjars, owls and potoos, swamp and riverine species, such as herons and kingfisher, scavenger birds, such as vultures, several species of hawks, falcons, woodpeckers, swallows, parrots, and parakeets. The toucans are always frequent, as well as dozens of species of passerines, which are in the interior and on the edge of the forest, feeding on insects, seeds, and fruits (**Photos 51-132**).

At dusk, it is possible to observe couples and small groups of up to ten guans (*Penelope superciliaris*), in order to sleep, and in the morning, they move to deep gorges to feed, mainly in the trees. They consume fruits, insects, and vegetable matter. In the twilight hours, several species of birds circulate through the interior and edges of the forests. If you stay at the Cassorova Ecoparque hotel, you will be able to sleep to the sound of nocturnal birds, such as

owls, nightjars, and the mysterious great potoo (*Nyctibius griseus*) [52], known in Brazil as “urutau” or “mãe-da-lua” (literally mother of the moon, because he usually sings on full moon nights)... and when you wake up, you can hear the singing of the seriema (*Cariama cristata*) (**Photo 75**). The song has a quality described as "a cross between 'the serrated bark of a young dog and the clucking of turkeys'" and can be heard several kilometers away. Seriemas are wary, territorial, and diurnal birds. It usually walks on the ground and can easily run faster than a human in its habitat [53, 54].

Walking through the lawns of the Cassorova Ecoparque, the birdwatcher will be approached by the southern lapwing (*Vanellus chilensis*) and the burrowing owl (*Athene cunicularia*), with their warning calls that we are close to their nests built on the ground. The *Vanellus chilensis* (**Photo 61**), known in Brazil as “quero-quero” is a common bird in Brazil, but is widely distributed across South America. It inhabits grasslands and other open habitats, and it is known for a distinctive black, grey, and white coloration, a conspicuous vocalization, and both aggressive and territorial behaviors [55-58]. The *Athene cunicularia* (**Photo 69**) is known in Brazil as “coruja-buraqueira”. It gets its name because it lives in holes dug in the ground. Their diet consists basically of insects, mainly crickets, grasshoppers, beetles, wasps, and bees [59, 60].

The Park can be considered a paradise for hummingbirds, where more than a dozen species can be observed flying over the bushes surrounding the hotel's infrastructure, in search of flowers. During this process, they act as pollinators for many plant species, especially bromeliads, which are quite present in the Park. These small and charming birds of exuberant colors are called “beija-flores” (literally kissing the flowers) [61-72]. The most frequent species are *Phaethornis pretrei* (**Photo 57**), *Thalurania glaucopis* (**Photo 58**), *Aphantochroa cirrochloris* (**Photo 59**), *Eupetomena macroura*, and *Chionomesa lactea* (**Photo 60**).

Among the carnivores recorded in the Park are dozens of species of hawks and falcons. The record of these birds of prey testifies to the presence of relatively balanced ecosystems of great biological value. These species are at the top of the food chain, ensuring the balance of the different ecosystems they inhabit, eliminating sick and less viable individuals from countless species, and their prey, thus contributing to natural selection. The species *Milvago chimachima* (yellow-headed caracara) supplements its diet with palm fruits, and like *Caracara plancus* (southern caracara) (**Photo 76**), it has a semi-terrestrial habit and feeds on animals run over on roads or killed in pastures, and for this reason, they are commonly seen alongside vultures [73, 74]. Other very common birds of prey on the edges and interior of the forest in the Park are *Ictinia plumbea*, *Rupornis magnirostris*, and *Heterospizias meridionalis* (**Photo 68**).

The *Ictinia plumbea*, known as “sovi” and “gavião-pombo” (**Photo 67**), can be seen at the end of the afternoon flying over semi-open areas looking for flocks of ants, termites, and other insects flying, catching them with its claws and devouring them in mid-flight [75-82].

Hundreds of swallows of different species can be seen throughout the day, especially during the summer. They pursue winged insects flying in various flocks. Due to their feeding habits, swallows avoid cold zones and migrate north towards Ecuador during the southern winter, since disposable insects diminish during these periods. In Brazil, they are called “andorinhas” and the most common species in the Park are *Progne tapera* (**Photo 106**), and *Pygochelidon cyanoleuca* [83] (**Photo 105**).

A very important group of birds in the Park is the woodpeckers. Most species live in forests or woodland habitats, as *Dryocopus lineatus* (**Photo 72**), *Veniliornis passerinus*, and *Colaptes melanochloros* (**Photo 73**), but the *Colaptes campestris* (**Photo 74**) is terrestrial and

lives in open areas. The woodpeckers, called in Brasil “pica-pau”, are chiefly known for their characteristic behaviour. They mostly forage for insect prey on the trunks and branches of trees and often communicate by drumming with their beaks, producing a reverberatory sound that can be heard at some distance [84-88].

In the silence of the Park, one can often hear a toco toucan, also known as “tucano” (*Ramphastos toco*) (**Photo 71**) is the largest and probably the best-known species in the toucan family. It is always an attraction, with conspicuously contrasting plumage with a mainly black body, a white throat, chest, and upper tail coverts, and red under tail coverts. The most noticeable feature, however, is its huge bill, which measures from 15.8 to 23 cm in length, which is yellow-orange, tending to deeper reddish-orange on its lower sections and culmen, and with a black base and large spot on the tip. It looks heavy, but as in other toucans, it is relatively light because the inside largely is hollow. The toco toucan is one of the largest frugivorous birds of the canopy, even in continuous forests than in semi-opened habitats. It eats fruit using its bill to pluck them from trees, but also insects, frogs, small reptiles, small birds, and their eggs and nestlings [89-92].

Another attraction at the Cassorova Ecoparque is the presence of several parrots and parakeets species as *Amazona aestiva* (turquoise-fronted parrot), *Brotogeris chiriri* (yellow-chevroned parakeet) (**Photo 77**), *Forpus xanthopterygius* (blue-winged parrotlet) (**Photo 78**), and *Psittacara leucophthalmus* (white-eyed parakeet) (**Photo 79**). The diet of these birds consists of seeds, fruit, nectar, pollen, buds, and sometimes arthropods and other animal prey. The *Amazona aestiva* is popularly called the “papagaio-verdadeiro” (true parrot). It is a South American species of Amazon parrot and one of the most common Amazon parrots kept in captivity as a pet or companion parrot. It has a distinctive blue marking on its head just above its beak [93-100].

Most bird species present at Cassorova Ecoparque belong to the order of Passeriformes and make up different trophic guilds [101-103]. Among the many factors thought to contribute to the high bird species richness in the Park is the high diversity of habitat and microhabitat types, some of which are unique to tropical [104, 105] regions. The increase in structural complexity of the vegetation on various vertical levels makes new forms of occupancy of the [106] environment possible. The increase in the number of bird species is principally due to the increase of both the new food [107] guilds and the number of species in the existing guilds.

The great abundance of omnivores birds may be directly related to the abundant fruit resources [108]. Among the most common species of this guild that are observed in the Park are *Euphonia chlorotica* (**Photo 114**), *Dacnis cayana* (**Photo 121**), *Schistochlamys ruficapillus* (**Photo 130**), *Myiothlypis flaveola*, *Tachyphonus rufus* (**Photo 124**), *Thraupis sayaca* (**Photo 131**), *Thraupis palmarum* (**Photo 132**), *Stilpnia cayana*, *Ramphocelus carbo* (**Photo 125**), *Nemosia pileata* (**Photo 120**), *Pitangus sulphuratus*, *Turdus rufiventris* (**Photo 109**), *Turdus amaurochalinus* (**Photo 110**), *Turdus leucomelas* (**Photo 108**), *Turdus albicollis*, *Elaenia flavogaster* (**Photo 88**), *Elaenia spectabilis* (**Photo 89**), *Myiarchus swainsoni* (**Photo 90**), *Myiarchus ferox* (**Photo 91**), *Myiarchus tyrannulus* (**Photo 92**), and *Megarynchus pitangua* (**Photo 96**). *Pitangus sulphuratus*, known as “bem-te-vi” (**Photo 93**), is probably the most popular bird in Brazil. Its characteristic song enunciates the syllables “bem-te-vi”, which give the name to the species. Therefore, its popular name has an onomatopoeic origin. Unmistakable by the reddish color of the belly, the *Turdus rufiventris*, known as “sabiá-laranjeira” (**Photo 109**), is considered the national symbol bird of Brazil.



It lives in semi-open areas and forest edges. It sings until dawn during the mating period between September and December [109-115].

There are many species of songbirds present in the Park, as *Sporophila caeruleascens* (**Photo 126**), *Sporophila bouvreuil* (**Photo 127**), *Spinus magellanicus*, *Sicalis luteola* (**Photo 129**), *Sicalis flaveola*, *Ammodramus humeralis* (**Photo 115**), *Saltatricula atricollis* (**Photo 122**), *Mimus saturninus*, *Coryphospingus cucullatus*, *Molothrus bonariensis* (**Photo 117**), *Cyanoloxia brissonii*, and *Zonotrichia capensis*. These species generally frequent forest edges and open areas, such as lawns and pastures. The rufous-collared sparrow (*Zonotrichia capensis*), also known as “tico-tico” (**Photo 116**) is a constant presence in the garden around the Cassorova Ecoparque restaurant. It is one of the best known and most esteemed birds in Brazil. The hooded siskin (*Spinus magellanicus*), strikingly beautiful, also known as “pintassilgo” (**Photo 113**). The male of this species is yellow-and-olive with a black head. The saffron finch (*Sicalis flaveola*), also known as “canário-da-terra” (**Photo 128**), has a pleasant but repetitious song which, combined with their appearance, has led to them being kept as caged birds in many areas. The male is bright yellow with an orange crown. Typically nesting in cavities, the saffron finch makes use of sites such as abandoned of *Furnarius rufus* nests, bamboo branches and under house roofs. The chalk-browed mockingbird (*Mimus saturninus*), also known as “sabiá-do-campo” (**Photo 111**) is omnivorous, and it feeds on fruits, seeds, berries, insects, and other small vertebrates. Its song is loud, a varied series of notes, and trills, often sharp and penetrating. It often mimics other species including some raptors [116-125].

Due to the good conservation of the vegetation of the Park, is quite common to observe mixed-species flocks [126-131] and ant followers birds. Ant followers are birds that feed by following swarms of army ants and take prey flushed by those ants [132-135]. Some species of antshrike, as *Thamnophilus doliatus* (**Photo 80**), *Thamnophilus pelzelni* (**Photo 81**) and *Taraba major*, can be observed inside the forest. They are typically found as territorial pairs. They are insectivores which feed on ants and other arthropods at or near the ground. They sometimes follow columns of army ants and will take small lizards and berries.

Some species of birds are very popular in the Park, such as rufous hornero (*Furnarius rufus*), also known as “joão-de-barro” (**Photo 83**) feeds on insects and other arthropods obtained by foraging on the ground while walking, as well as the cattle tyrant (*Machetornis rixosa*) (**Photo 94**), and the tropical kingbird (*Tyrannus melancholicus*) (**Photo 98**), while the masked water-tyrant (*Fluvicola nengeta*) (**Photo 101**) prefers to capture insects by the lakeside. The nest of the rufous hornero is typical for the genus, a large thick clay "oven" placed on a tree, or manmade structures such as fenceposts, telephone poles or buildings [136-138] (**Photo 84**).

Among the naturally occurring mammal species in Cassorova Ecoparque and region are the maned wolf (*Chrysocyon brachyurus*), the cougar (*Puma concolor*), the jaguar (*Panthera onca*), the ocelot (*Leopardus pardalis*), the tiger cat (*Leopardus tigrinus*), the collared anteater (*Tamandua tetradactyla*), the red brocket (*Mazama americana*), the crab-eating fox (*Cerdocyon thous*), the coati (*Nasua nasua*), the nine-banded armadillo (*Dasypus novemcinctus*), the black-eared opossums (*Didelphis aurita*), the tayra (*Eira barbara*), the masked titi (*Callicebus personatus*), the hairy dwarf porcupine (*Coendou spinosus*), the paca (*Cuniculus paca*), the agouti (*Dasyprocta aguti*), and the raccoon (*Procyon cancrivorus*). Deforestation and road construction have inflicted negative effects on wildlife populations. Unfortunately, some of these species of mammals are constant victim of collisions by vehicles on the roads [139, 140] and predation by domestic dogs [141-143].

The maned wolf (*Chrysocyon brachyurus*), known in Brazil by the name "lobo-guará", is a large canine found in Argentina, Brazil, Bolivia, Peru, and Paraguay. Its markings resemble those of foxes, but it is neither a fox nor a wolf. It is the only species in the genus *Chrysocyon* (meaning "golden dog"). It is the largest canine in South America, weighing 20–30 kg and up to 110 cm at the withers. Its long, thin legs and dense reddish coat give it an unmistakable appearance. The maned wolf is an omnivorous animal, adapted to the open environments of the South American savanna, with an important role in the seed dispersal of fruits, especially the wolf apple (*Solanum lycocarpum*) [144-147].

The name of the maned wolf in the Guaraní language is "aguara guasu" (meaning "large fox"). The term lobo, "wolf", originates from the word *lupus* in Latin. This mammal lives in open and semi-open habitats, especially grasslands with scattered bushes and trees. The International Union for Conservation of Nature (IUCN) lists it as near threatened, while it is considered a vulnerable species by the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA). The maned wolf is a twilight animal. The species is likely to use open fields for foraging and more closed areas, such as riparian forests, to rest, especially on warmer days. Unlike most large canids, such as the gray wolf, the maned wolf is a solitary animal and does not form packs. The maned wolf is omnivorous, specializes in preying on small and medium-sized animals, including small mammals as rodents and rabbits, birds and their eggs, reptiles, and even fish, mollusks, and insects, but a large portion of its diet (more than 50%, according to some studies) is vegetable matter, including sugarcane, tubers, bulbs, roots, and fruit. Up to 301 food items have been recorded in the maned wolf's diet, including 116 plants and 178 animal species [148-157].

The cougar (*Puma concolor*), also known as the puma, mountain lion, and in Brazil as onça-parda and sussuarana, is a large cat native to the Americas, second only in size to the jaguar (*Panthera onca*). Its range spans from the Canada to the Amazon Rainforest and the southern Andes Mountains in Patagonia. It is an adaptable, generalist species, occurring in most American habitat. It prefers habitats with dense underbrush and rocky areas for stalking but also lives in open areas. The cougar is a solitary species, nocturnal and crepuscular, although daytime sightings do occur. It is an ambush predator, that pursues a wide variety of prey. Primary food sources are ungulates, particularly deer, but it also hunts smaller prey, such as rodents [158-160]. Cougars are territorial and live at low population densities. Individual home ranges depend on terrain, vegetation, and abundance of prey. It is reclusive and mostly avoids people. Fatal attacks on humans are rare. Intensive hunting following European colonization of the Americas and ongoing human development into cougar habitats has caused populations to decline in most parts of its historical range [161].

Cougars are important keystone species, linking numerous different species at many trophic levels. In a comprehensive literature review of more than 160 studies on cougar ecology, ecological interactions with 485 other species in cougar-inhabited ecosystems have been shown to involve different areas of interaction, ranging from the use of other species as food sources and prey, fear effects on potential prey, effects from carcass remains left behind, to competitive effects on other predator species in shared habitat [162-172]. One of the greatest threats to the survival of wild cats worldwide is the loss of habitats due to urban expansion and the agricultural matrix, and these disturbances are directly related to the decrease in the natural prey base and the increase in conflict with humans [173-176].

The jaguar (*Panthera onca*) is better known in Brazil as "onça-pintada". With a body length of up to 1.85 m and a weight of up to 158 kg, it is the largest cat species in the Americas

and the third largest in the world. Its distinctively marked coat features pale yellow to tan colored fur covered by spots that transition to rosettes on the sides, although a melanistic black coat appears in some individuals. It inhabits a variety of forested and open terrains, but its preferred habitat is tropical and subtropical moist broadleaf forest, wetlands, and wooded regions. It is adept at swimming and is largely a solitary, opportunistic, stalk-and-ambush apex predator. As a keystone species, it plays an important role in stabilizing ecosystems and in regulating prey populations [177-181].

The jaguar is an obligate carnivore and depends solely on flesh for its nutrient requirements. An analysis of studies documenting the diet of the jaguar revealed that its prey ranges in weight from 1 to 130 kg; it prefers prey weighing 45–85 kg, with the rodent capybara (*Hydrochoerus hydrochaeris*) and the pilosan giant anteater (*Myrmecophaga tridactyla*) being the most selected. When available, it also preys on marsh deer (*Blastocerus dichotomus*), collared anteater (*Tamandua tetradactyla*), collared peccary (*Tayassu pecari*) and agouti (*Dasyprocta* spp). In floodplains, jaguars opportunistically take reptiles such as turtles and caimans [182-192]. The jaguar is threatened by habitat loss, habitat fragmentation, poaching for trade with its body parts and killings in human–wildlife conflict situations, particularly with ranchers. For these reasons, the jaguar is considered a rare species in the Brotas region. The jaguar has featured prominently in the mythology of indigenous peoples of the Americas, including those of the Aztec and Maya civilizations. The word "jaguar" is possibly derived from the Tupi-Guarani word yaguara meaning 'wild beast that overcomes its prey at a bound' [193, 194].

The most common feline in the Brotas region is the ocelot (*Leopardus pardalis*), known in Brazil as “jaguatirica”. It is a medium-sized spotted wild cat that reaches 40–50 cm at the shoulders and weighs between 7 and 15.5 kg. The ocelot prefers areas close to water sources with dense vegetation cover and high prey availability. It is typically active during twilight and at night and tends to be solitary and territorial. During the daytime, it rests on trees, in dens below large trees or other cool, sheltered sites on the ground. It is agile in climbing and leaping, and escapes predators by jumping on trees. It is also an efficient swimmer [195-200]. An ocelot typically prefers hunting in areas with vegetation cover, avoiding open areas, especially on moonlit nights, so as not to be seen by the prey. As a carnivore, it preys on small terrestrial mammals such as rodents, rabbits, armadillos, opossums, fish, crustaceans, insects, reptiles, and birds. Primates prevail in the diet of ocelots in southeastern Brazil [201], and iguanas in a tropical deciduous forest in Mexico [202]. The composition of the diet varies by season.

The tiger cat (*Leopardus tigrinus*), also known as “gato-do-mato”, is considered an endangered species in the Brazilian territory, being more vulnerable in some regions. It is the smallest species of Brazilian feline, often confused with margay “gato-maracajá” (*Leopardus wiedii*). It has a size and body proportion similar to the domestic cat. It inhabits the Atlantic Forest, Cerrado, Pantanal, Campos do Sul and Amazon biomes. It feeds mainly on small mammals, birds, and reptiles. The ocelot (*Leopardus pardalis*) and the tiger cat (*Leopardus tigrinus*) are two species of small cats that occur in the Cerrado. It is primarily threatened by deforestation, fragmentation, roads, illegal trade (pets and fur), retaliatory killing by poultry farmers, and poaching. It is killed for its skin, which is highly prized and often sold or made into clothing [203-206].

Several scientific papers have revealed the significant effect of large carnivores' on the dynamics and balance of ecosystems. Their importance has been proved in the maintenance of biodiversity, limiting the spread of infectious diseases and alien species [207], but also in

securing the physical and chemical states of soil, water, and air [208]. Top predators, like the cougar, the jaguar, the ocelot, and the tiger cat have played and still have an important evolutionary role in the development and maintaining viable populations of their prey species.

The collared anteater (*Tamandua tetradactyla*), known in Brazil as “tamanduá-mirim”, is found in many habitats. It feeds on ants, termites, and bees. It’s very strong foreclaws can be used to break insect nests or to defend itself. The snout is long and decurved with an opening only as wide as the diameter of a stick, from which the tongue is protruded. This animal has poor vision, but its large ears indicate that hearing is an important sense [209, 210]. They sleep inside abandoned burrows, hollow trees, crevices or amidst vegetation. Their locomotion on the ground is relatively clumsy, and unlike the giant anteater, they are not able to run when on the ground. They are solitary, diurnal animals, presenting nocturnal behavior when in areas disturbed by humans. They usually shelter inside holes in tree trunks but may do so in burrows of *Euphractus sexcinctus*. Easy targets for hunters because they are slow, but in no way are they negative for humans and play key ecological roles. People being run over, habitat destruction and attacks by domestic animals further contribute to the reduction of anteater populations. The jaguar, the cougar and the ocelot are predators of this species [211-214].

The red brocket (*Mazama americana*), known in Brazil as “veado-mateiro”, is a species of brocket deer from forests in South America. Only the adult male has antlers, and these are small and spike-like. The red brocket browses on vegetation, mainly grasses and tender green roots, preferring fruit, and seeds when it is available. They are also known to feed on fungi. In extreme cases where fruit and fungi become scarce, it may eat stems, bark, petioles, leaves, and animal matter instead. It is generally solitary and stays in dense jungles [215-217]. It is one of the species that suffers the most pressure from predatory hunting and one of the main victims of attacks by domestic dogs [142, 218].

The crab-eating fox (*Cerdocyon thous*), known in Brazil as “cachorro-do-mato” (bushdog) and “raposa” (fox), is a species of medium-sized canid endemic to the central part of South America. Like South American foxes, which are in the genus *Lycalopex*, it is not closely related to true foxes. *Cerdocyon* comes from the Greek words kerdo (meaning fox) and kyon (dog) referring to the dog- and fox-like characteristics of this animal [219].

The crab-eating fox is predominantly greyish-brown, with areas of red on the face and legs, and black-tipped ears and tail. It has short, strong legs and its tail is long and bushy. It is a canid that ranges in savannas, woodlands, subtropical forests, prickly, shrubby thickets, and tropical savannas such as the caatinga, plains, and campo. The crab-eating fox creates monogamic teams for hunting; groups of several monogamic pairs may form during the reproductive season. It is nocturnal, with peaks of activity in the middle of the night and the early morning. It is an opportunist and an omnivore, preferring insects or meat from rodents and birds when available. Other foods readily consumed include eggs, fruit, crustaceans, insects, lizards, and carrion. The crab-eating fox contributes to the control of rodents and harmful insects [220-223].

The coatis (*Nasua nasua*) are diurnal animals with arboreal habits. They forage using their long mobile snouts, which are adapted to the investigation of cracks and holes. Coatis feed on small vertebrates, invertebrates, and fruit, but they can also ingest food waste discarded in deposits in urban regions that are close to the areas that they occupy. The coatis live together in groups. They are great tree climbers. Their long front claws can dig in and keep them secure when they're climbing up the tallest tree trunks. Coatis can move their long tail to balance themselves as they travel along narrow branches. A coati's ringed tail is almost as long as its

body. It usually holds its tail straight up as it walks, but the coati changes the position of that tail to help keep its balance when it moves along branches high in the treetops. They use their long nose, acute sense of smell, and bendable snout to sniff out food on the forest floor. Its tough snout can root through dirt or leaves to find insects, grubs, lizards, or fallen fruit for their next meal [224-229]. This interesting species gives its name to one of the two waterfalls on Cassorova Ecoparque, the “Cachoeira dos Quatis” (Coatis Waterfall).

The nine-banded armadillo (*Dasypus novemcinctus*), known in Brazil as "tatu-galinha", is the most widespread of the armadillos. It is a solitary, mainly nocturnal animal, found in many kinds of habitats, from mature and secondary rainforests to grassland and dry scrub. It is an insectivore, feeding chiefly on ants, termites, and other small invertebrates. They forage for meals by thrusting their snouts into loose soil and leaf litter and frantically digging in erratic patterns, stopping occasionally to dig up grubs, beetles (perhaps the main portion of this species' prey selection), ants, termites, grasshoppers, other insects, millipedes, centipedes, arachnids, worms, and other terrestrial invertebrates, which their sensitive noses can detect through 20 cm of soil. They supplement their diets with amphibians and small reptiles, especially in more wintery months when such prey tends to be more sluggish, and occasionally bird eggs and baby mammals. Carrion is also eaten, although perhaps the species is most attracted to the maggots borne by carcasses rather than the meat itself. Less than 10% of the diet of this species is composed by nonanimal matter, though fungi, tubers, fruits, and seeds are occasionally eaten [230-233].

The black-eared opossums (*Didelphis aurita*) is one of the main species of marsupials that occurs in the region of Brotas, where they are commonly known as “gambá” and “sarúê”. The species in the genus *Didelphis* are omnivorous and can be recognized by their prehensile tails and their tendency to feign death when cornered. Their food habits expose the different ecological roles these animals perform in the habitats in which they live. They are very important as seed disperser, to the forests renewal. The majority of consumed fruits by the opossums are from pioneer plant species, which is common in disturbed areas, in accordance with the opossum's opportunistic habits (the opossum consuming invertebrates, fruits and vertebrates). In this way, these species of marsupials play a fundamental ecological role in the recovery of degraded areas, as highly generalists species, can inhabit disturbed environments and then disperse seeds from pioneer plants, where the vegetation must be restored [234-239].

The tayra or honey-eater (*Eira barbara*), known as "papa-mel" or “irara” that comes from the junction of indigenous language terms tupis i'rá (honey) and ra (take), because honey is one of its favorites foods. Belonging to the Mustelidae family of carnivorous mammals such as otters, badgers, and giant river otters. It is a typically a forest specie, sheltering in tree hollows and trunks, and in burrows made by other animals. In Brazil, the tayra occurs in most of the territory, inhabiting mainly areas of dense forest in the Atlantic Forest, Amazon Forest, Cerrado, Caatinga and Pantanal biomes. It has a slender, elongated body with a long, hairy tail; feeds on fruits, honey, insects and small or medium-sized vertebrates. The species is very agile, which allows it to search for food both in the treetops and on the ground. The tayras are great climbers, often seen in treetops, and are known for swimming skillfully [240-242].

The masked titi (*Callicebus personatus*), known in the region of Brotas as “sauá”, is the main naturally occurring primate species in Cassorova Ecoparque. The species has a characteristic vocalization that allows its rapid presence in the environment. Titis are small primates, weighing from 800 to 1,300 g. It is an omnivorous species. Diet comprises mainly

fruit pulps, leaves, insects, and soft seeds. They form small, pair-bonded, territorial groups and are considered monogamous. The home range is between 10 to 12 ha [243-247].

The hairy dwarf porcupine (*Coendou spinosus*), known as “porco-espinho” and “ouriço”, is a rodent with arboreal habits, hence the importance of its prehensile tail. The thorns are modified hair, very rigid, which provide great defense against predators, such as domestic dogs, and in rural areas it is not uncommon to find dogs with their heads covered in thorns. More active at night, it spends the day resting in the treetops. It feeds on leaves, flowers, and fruits. During the day, buildings can be found in the tops of trees [248, 249].

The paca (*Cuniculus paca*) is a rodent nocturnal species, and preferentially lives in humid tropical forests, however it occurs in a variety of habitats, including mangroves, deciduous and semi-deciduous forests and usually seeks forested areas close to watercourses [250-252]. The paca is considered generalist in terms of diet and feeds mainly on fruits and flowers available throughout the seasons. The front teeth of pacas grow permanently and the animal wears them down by gnawing on wood or hard objects. They are considered dispersers of small seeds and predators of large seeds [253].

The name "agouti" is derived from either Guarani or Tupi, both South American indigenous languages, in which the name is written variously as agutí, agoutí, acutí, akuti and akuri. The Portuguese term for these animals, "cutia", is derived from this original naming [254]. The agouti (*Dasyprocta aguti*) is a rodent species found in forested and wooded areas in Central and South America. Their habitats include rainforests, savannas, and cultivated fields. They conceal themselves at night in hollow tree trunks or in burrows among roots. Active and graceful in their movements, their pace is either a kind of trot or a series of springs following one another so rapidly as to look like a gallop. They take readily to water, in which they swim well. When feeding, agoutis sit on their hind legs and hold food between their fore paws. They eat fallen fruit, leaves and roots, although they may sometimes climb trees to eat green fruit.

They are regarded as one of the few species, along with macaws, that can open Brazil nuts, mainly thanks to their strength and exceptionally sharp teeth [255].

The raccoon (*Procyon cancrivorus*) is known in Brazil as “guaxinim“, and “mão-pelada” (literally hand-naked). It is a species nocturnal and lonely. It has a wide distribution in South America, being found in all Brazilian biomes. They have a reputation for being clever and mischievous, their intelligence and dexterity equip them to survive in a wide range of environments and are one of the few medium-to-large-sized animals that have enlarged their range since human encroachment began. Raccoon hindfeet are plantigrade similar to those of humans and bears. Raccoons are sometimes considered nuisance. They are omnivores, eating several types of fruits, mollusks, diplopods, mollusks, crustaceans, crabs, insects, scorpions, fish, amphibians, reptiles (lizards and snakes), small mammals and birds. They have readily adapted to urban environments, as opossums and coatis, scavenging garbage bins and other food sources [256-260]. It lives preferably near water sources, such as marshes, rivers, mangroves, beaches, bays, and lagoons. It is a solitary, nocturnal and very shy animal, good climber, and swimmer. The most evident character of this species is the black mask that surrounds the eyes. The fingers are elongated and tapered. Its footprints are very characteristic and easy to identify. The tactile sense is well developed, and they use their hands regularly, similarly to monkeys: food is generally manipulated with the hands and then placed in the mouth [261, 262].

All photos presented in this report were realized by Fabio Rossano Dario and Cristina De Vincenzo, using a digital photo camera Canon PowerShot.

## CONCLUSIONS

Cassorova Ecoparque is one of the most interesting natural parks in the interior of the State of São Paulo, Brazil. It has a safe and modern infrastructure that guarantees visitors a pleasant walk along the trails, which meander along the hillside, reach the foot of beautiful waterfalls and are ideal for visitors to wander, explore, and take in the views. The predominant vegetation in the Park is the Seasonal Semideciduous Forest, that belongs to the Atlantic Forest biome. The preservation of riparian forest in the Park makes it a biodiversity reserve. The natural environments that make up the Park host a wide variety of plant and animal species. In addition to all the natural attractions, where you can contemplate nature and practice adventure sports, such as zip lining, rafting, canyoning and tree climbing, there is the possibility of staying overnight in the Park, in a hotel that offers you a peaceful rest in a unique natural surroundings. In the colonial-style restaurant, you can enjoy a very sophisticated cuisine prepared with natural ingredients. At any time of the year, dozens of bird species, out of more than three hundred recorded in the region, will be waiting for birdwatchers to be admired and photographed.

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**Photo 1.** The Cassorova Ecoparque is the main tourist attraction in the region of Brotas, a city in the interior of the State of São Paulo, Brazil.



**Photo 2.** Detail of the Cassorova Ecoparque garden.





**Photo 3.** The hotel offers you a peaceful rest in a unique natural surroundings.



**Photo 4.** In the colonial-style restaurant, you can enjoy a very sophisticated cuisine prepared with natural ingredients.



**Photo 5.** Detail of the lake, with the restaurant and hotel in the background.



**Photo 6.** Detail of the lake.



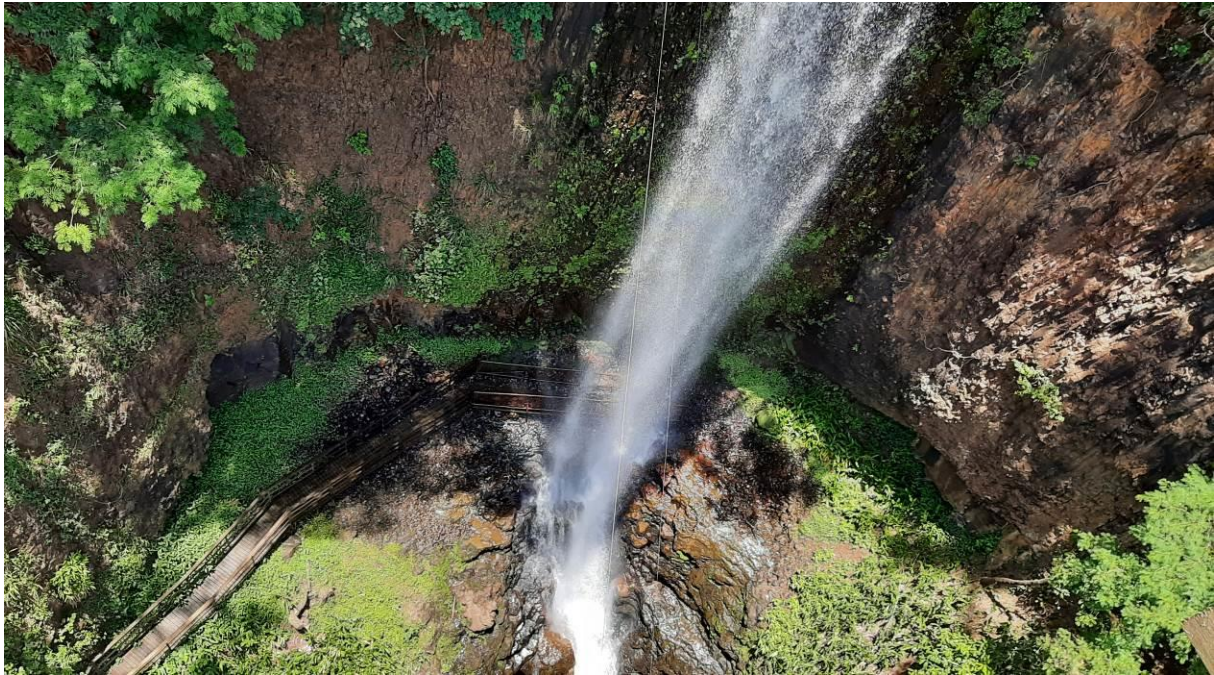
**Photo 7.** Detail of the birdwatching tower.



**Photo 8.** Detail of platforms installed in trees for tree climbing.



**Photo 9.** Suspension bridge crossing the valley between the waterfalls.



**Photo 10.** View of Cassorova waterfall from the suspension bridge.



**Photo 11.** Detail of the Semideciduous Seasonal Forest, of the Atlantic Forest biome.



**Photo 12.** View of the beginning of the fall of the Cassorova waterfall.



**Photo 13.** Detail of the suspension bridge crossing the valley between the waterfalls.



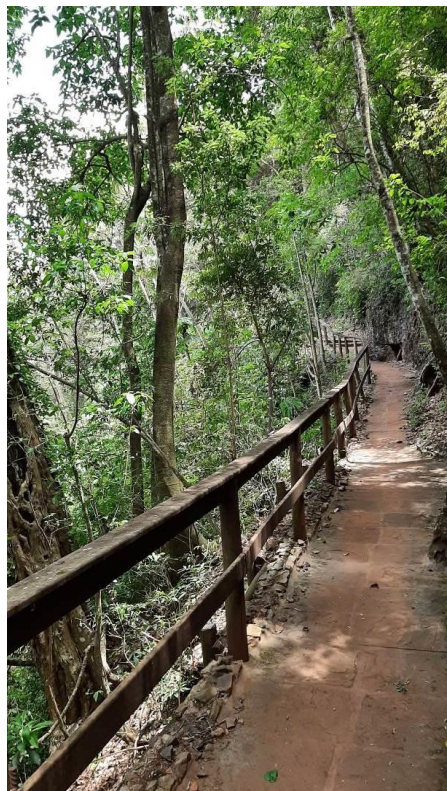
**Photo 14.** The Cassorova Ecoparque is known for its natural beauty.



**Photo 15.** The trails have many signposts, about the distance to walk and the degree of difficulty.



**Photo 16.** Signposts are distributed along the trails. They were made of wood and are in perfect harmony with the environment.

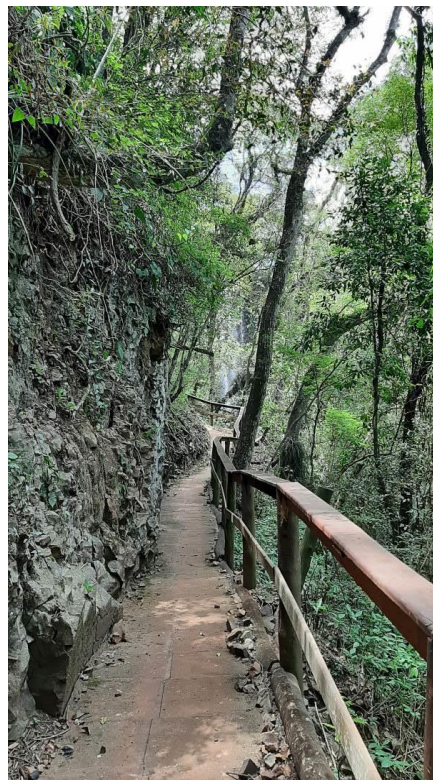


**Photo 17.** The trails cross the forest and provide particularly beautiful views.





**Photo 18.** The trails meander along the hillside, and are ideal for visitors to wander, explore, and take in the views.



**Photo 19.** The handrail, installed all the way along the trails, ensures the safety of walkers in dangerous areas.



**Photo 20.** These trails are well maintained and safe, in flat areas, though in some areas you may find stairs or an incline, especially those that arrive at the foot of the waterfalls.



**Photo 21.** Detail of the valley carved into the rocks.



**Photo 22.** Detail of the lush forest of the Atlantic Forest.



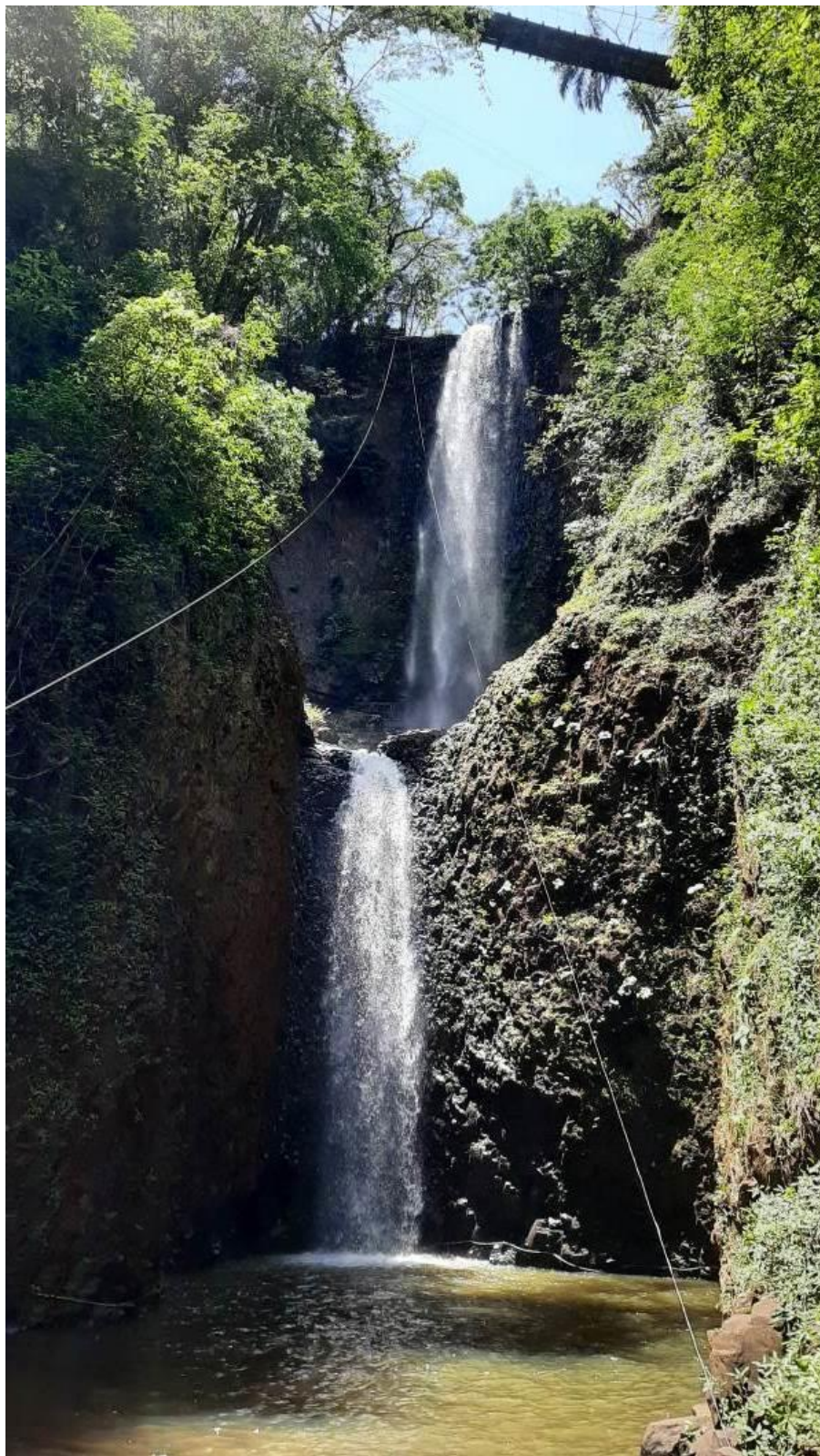
**Photo 23.** The Cassorova Ecoparque, and the integration of infrastructure and landscape.



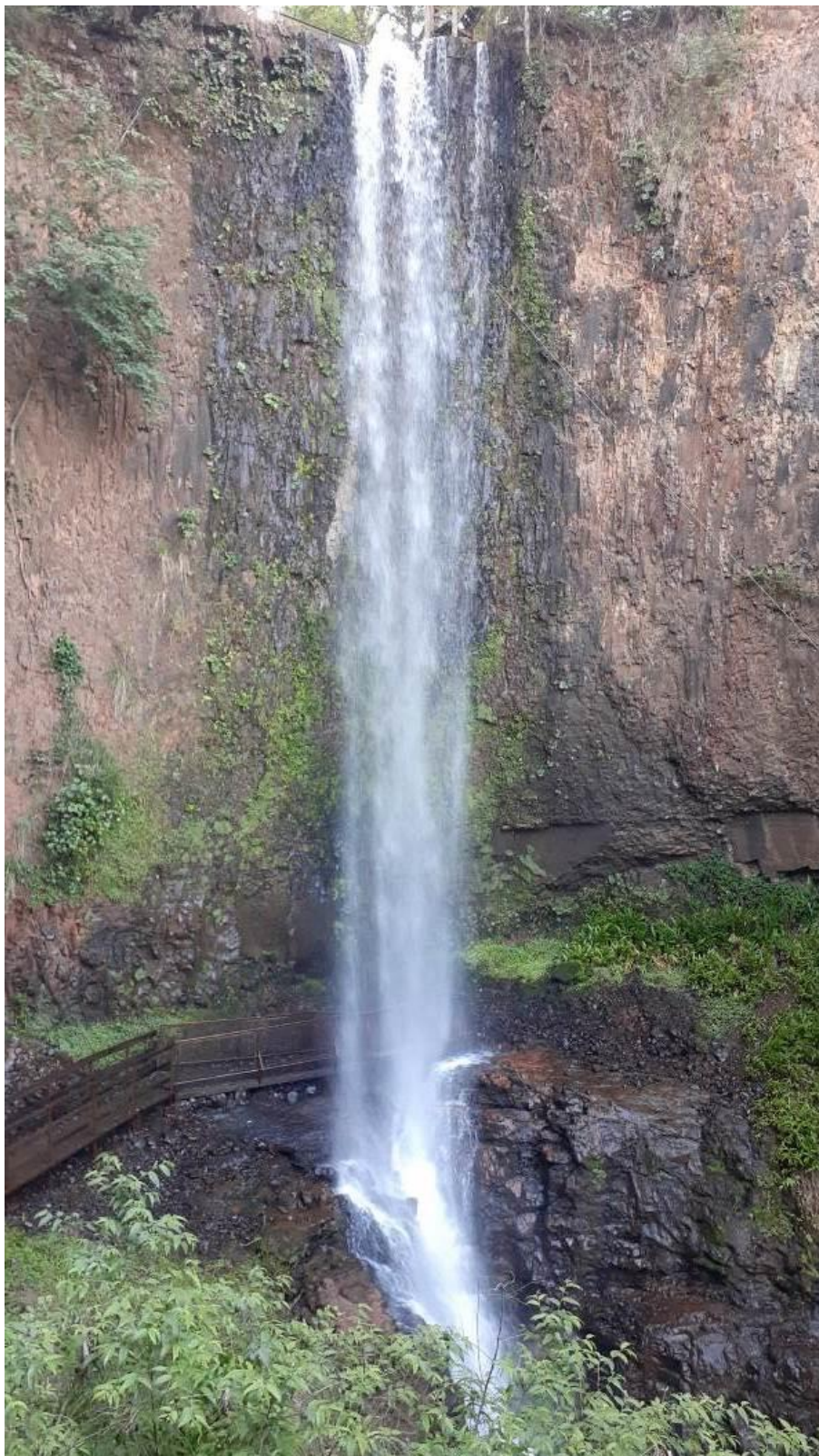
**Photo 24.** At the base of the Cassorova waterfall there is a natural pool, ideal for bathing in the waterfall and canyoning (rappelling down a waterfall).



**Photo 25.** A branch of the trail proposes a refreshing bath under the Cassorova waterfall.



**Photo 26.** The Cassorova waterfall has a double drop and a total height of 60 meters.



**Photo 27.** Detail of the first fall of the Cassorova waterfall.



**Photo 28.** The Cassorova waterfall is the main attraction of the Cassorova Ecoparque and it is considered one of the most beautiful in Brazil.

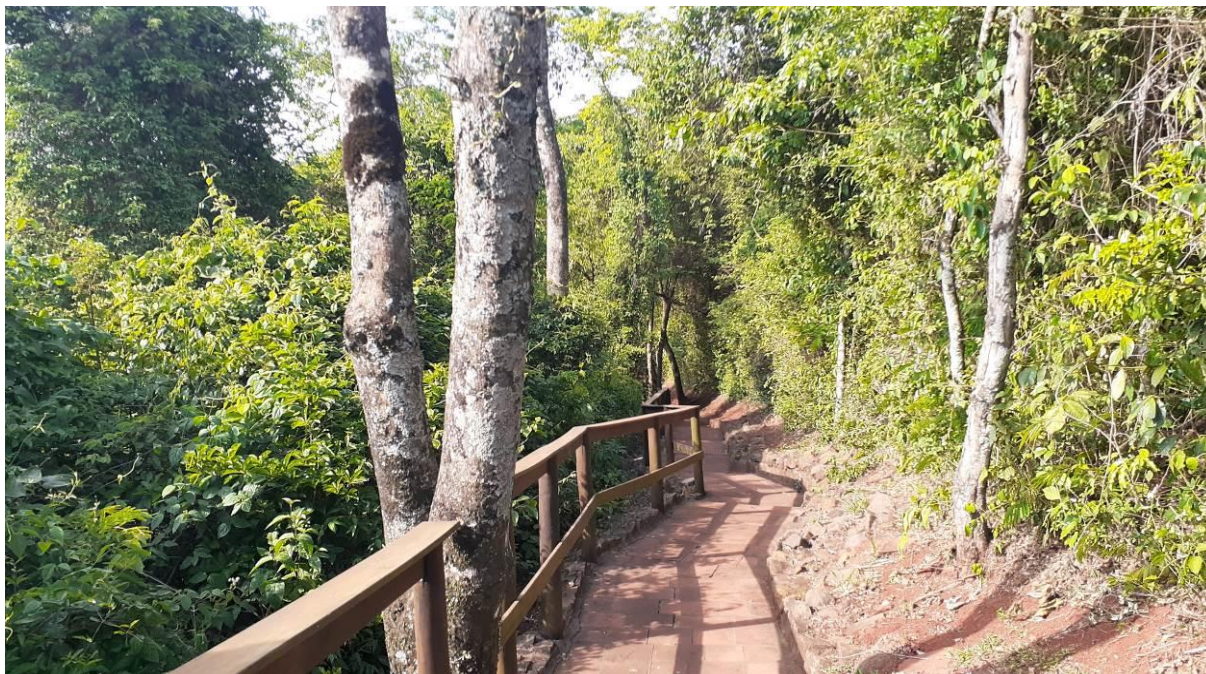


**Photo 29.** A branch of the trail proposes a refreshing bath under the Cassorova waterfall.



**Photo 30.** The Cassorova Ecoparque is peaceful and has many nice spots for meditation.





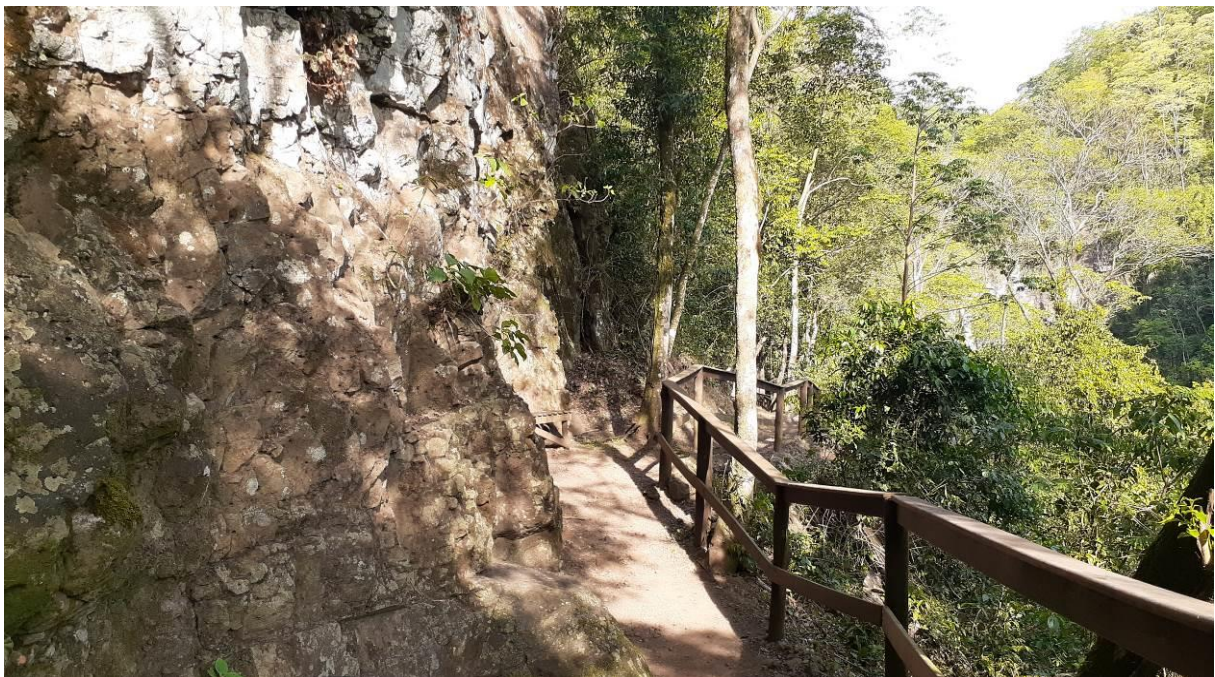
**Photo 31.** A trail following one the Quatis waterfall.



**Photo 32.** Detail of the trail that arrives at the foot of the Quatis waterfall.



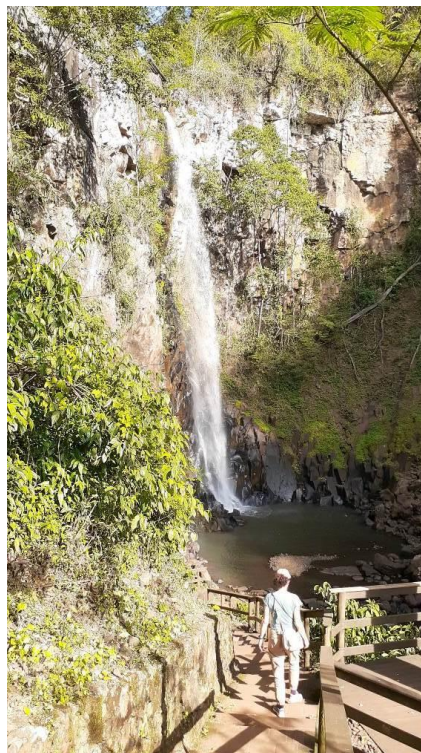
**Photo 33.** In general, the trails are not challenging and appropriate for a variety of ages and fitness levels.



**Photo 34.** The handrail ensures the safety of walkers in dangerous areas.



**Photo 35.** The great plant diversity creates a fascinating interplay of plant colors and structures. The waterfalls are surrounded by forests.



**Photo 36.** The Quatis waterfall, measuring 46 meters, is also a beautiful waterfall, with a natural pool and access via a light trail.



**Photo 37.** View of the Quatis waterfall and a natural pool.



**Photo 38.** View of the Quatis waterfall and the surrounding forest.



**Photo 39.** Detail of basaltic rock outcrop along the river.



**Photo 40.** Detail of the lush forest of the Atlantic Forest.



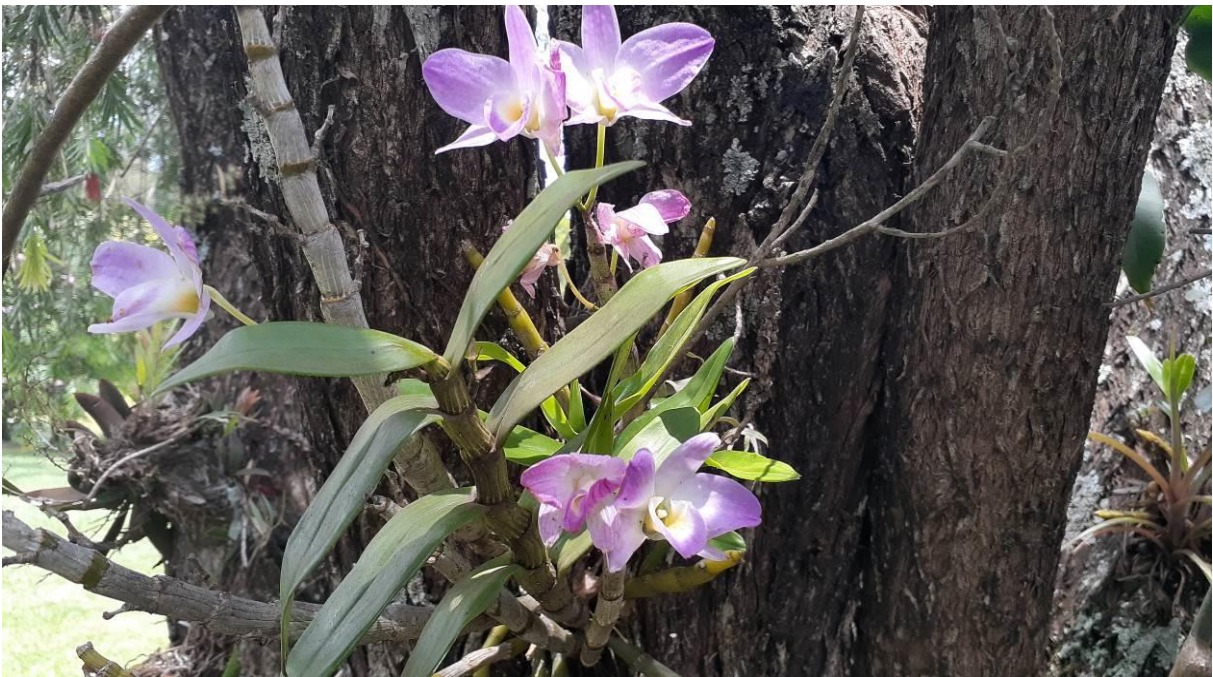
**Photo 41.** Detail of the Semideciduous Seasonal Forest, of the Atlantic Forest biome.



**Photo 42.** An amazing panoramic view from the Atlantic forest.



**Photo 43.** The forest is very rich in plant species, such as epiphytes.



**Photo 44.** Many species of orchids are associated mainly with larger trees and those located at the edge of the forest.



**Photo 45.** Detail for the “cipó-de-são-joão” (literally vine of Saint John) (*Pyrostegia venusta*), a very popular vine in the interior of the State of São Paulo.



**Photo 46.** The Park is very rich in diversity of plant species. Detail for this species of the Iridaceae family.





**Photo 47.** Detail of the flowers of *Oxalis*, also known as shamrock or sorrel.



**Photo 48.** Dragonflies can fly in any direction, including sideways and backward, which comes in handy when trying to catch flies and mosquitoes.



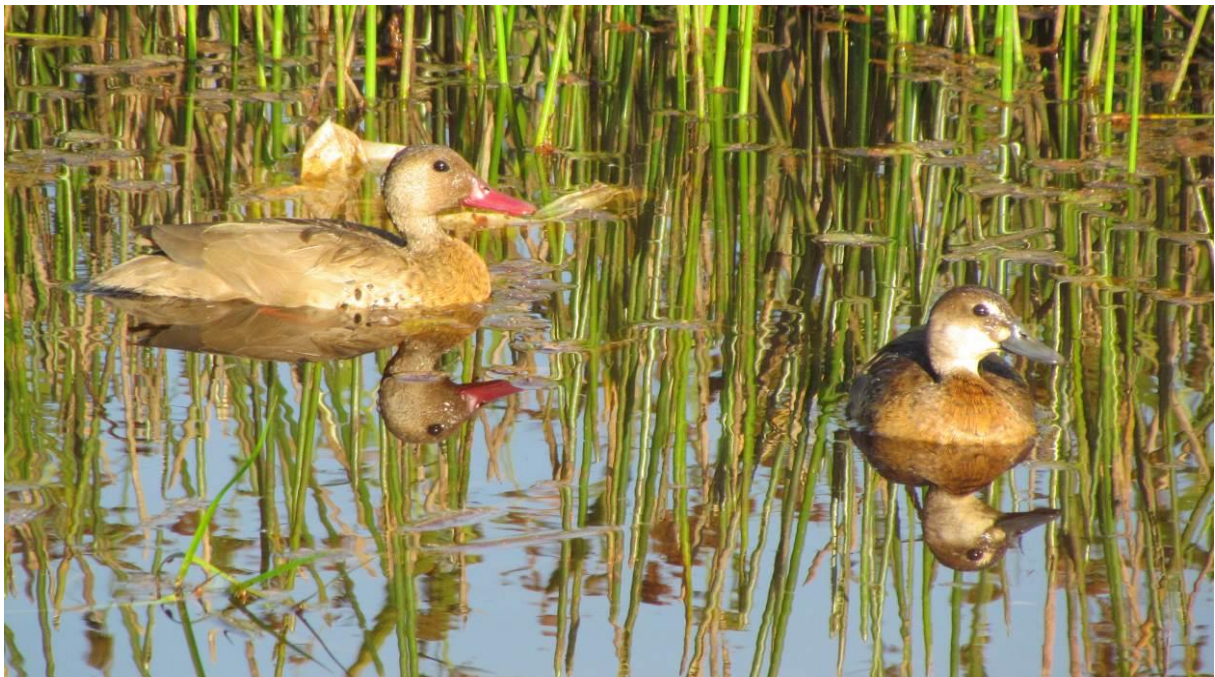
**Photo 49.** The lizard *Salvator merianae*, known as “teiu” is the largest lizard found in Brazil, and can reach 1.4 meters in total length.



**Photo 50.** *Tropidurus torquatus* is a medium-sized lizard, that lives mainly in open habitat types.



**Photo 51.** *Cairina moschata*, ♀, Anatidae (pato-do-mato; Muscovy Duck).



**Photo 52.** *Amazonetta brasiliensis*, ♂ & ♀, Anatidae (marreca-ananaí; Brazilian Teal).



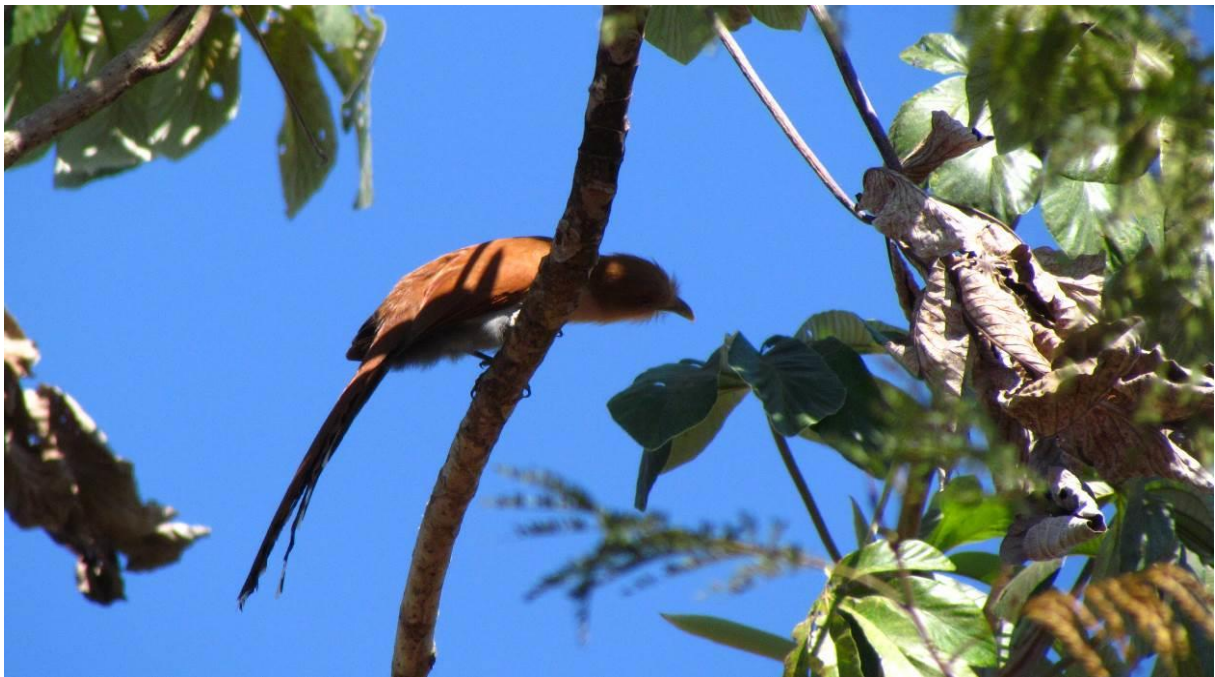
**Photo 53.** *Patagioenas picazuro*, Columbidae (asa-branca; Picazuro Pigeon).



**Photo 54.** *Columbina squammata*, Columbidae (fogo-apagou; Scaled Dove).



**Photo 55.** *Guira guira*, Cuculidae (anu-branco; Guira Cuckoo).



**Photo 56.** *Piaya cayana*, Cuculidae (alma-de-gato; Squirrel Cuckoo) perched on an embaúba branch (*Cecropia pachystachya*).



**Photo 57.** *Phaethornis pretrei*, hummingbird chick & its mother, Trochilidae (rabo-branco-acanelado; Planalto Hermit).



**Photo 58.** *Thalurania glaucopsis*, ♀, Trochilidae (beija-flor-de-fronte-violeta; Violet-capped Woodnymph).



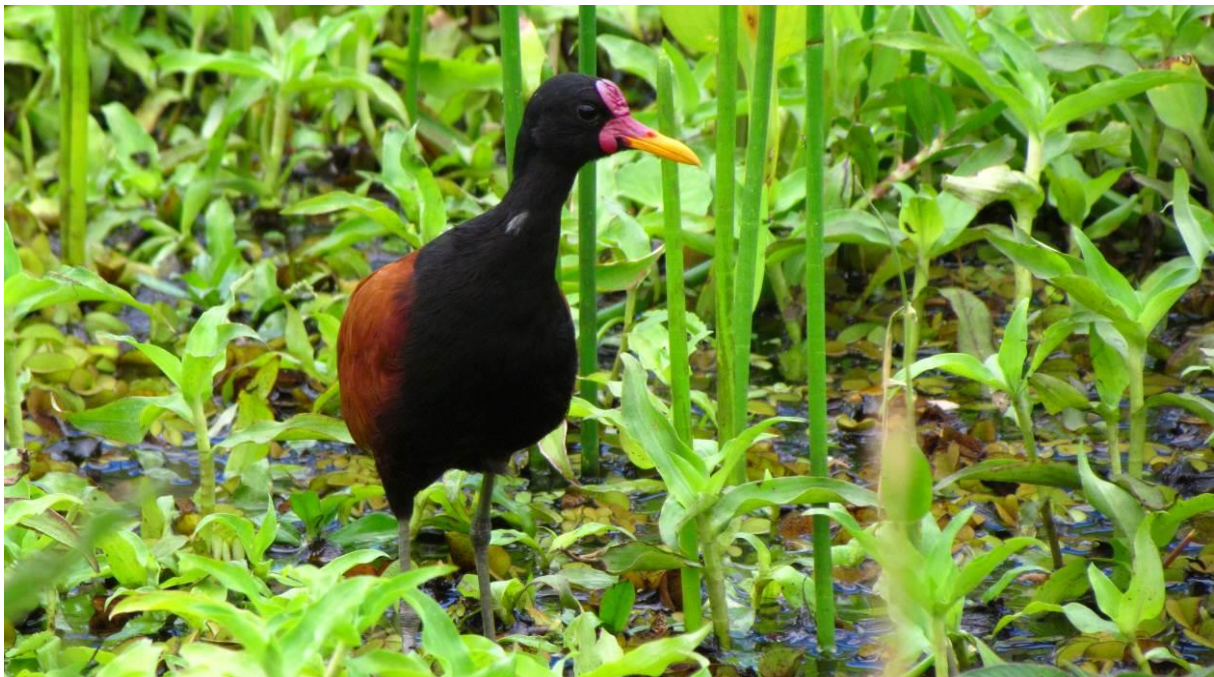
**Photo 59.** *Aphantochroa cirrochloris*, Trochilidae (beija-flor-cinza; Sombre Hummingbird).



**Photo 60.** *Chionomesa lactea*, Trochilidae (beija-flor-de-peito-azul; Sapphire-spangled Emerald).



**Photo 61.** *Vanellus chilensis*, Charadriidae (quero-quero; Southern Lapwing).



**Photo 62.** *Jacana jacana*, Jacanidae (jaçanã; Wattled Jacana).





**Photo 63.** *Butorides striata*, Ardeidae (socozinho; Striated Heron).



**Photo 64.** *Syrigma sibilatrix*, Ardeidae (maria-faceira; Whistling Heron).



**Photo 65.** *Theristicus caudatus*, Threskiornithidae (curicaca; Buff-necked Ibis).



**Photo 66.** *Coragyps atratus*, Cathartidae (urubu; Black Vulture).



**Photo 67.** *Ictinia plumbea*, Accipitridae (sovi; Plumbeous Kite).



**Photo 68.** *Heterospizias meridionalis*, Accipitridae (gavião-caboclo; Savanna Hawk).



**Photo 69.** *Athene cunicularia*, Strigidae (coruja-buraqueira; Burrowing Owl).



**Photo 70.** *Galbula ruficauda*, ♀, Galbulidae (ariramba ; Rufous-tailed Jacamar).



**Photo 71.** *Ramphastos toco*, Ramphastidae (tucano; Toco Toucan) resting on a cedro branch (*Cedrele fissilis*) in full fruition.



**Photo 72.** *Dryocopus lineatus*, ♂, Picidae (pica-pau-de-banda-branca; Lineated Woodpecker).



**Photo 73.** *Colaptes melanochloros*, ♀, Picidae (pica-pau-de-banda-branca; Lineated Woodpecker).



**Photo 74.** *Colaptes campestris*, Picidae (pica-pau-do-campo; Campo Flicker).



**Photo 75.** *Cariama cristata*, Cariamidae (Red-legged Seriema).



**Photo 76.** *Caracara plancus*, Falconidae (carcará; Southern Caracara).



**Photo 77.** *Brotogeris chiriri*, Psittacidae (periquito-de-encontro-amarelo; Yellow-chevroned Parakeet).



**Photo 78.** *Forpus xanthopterygius*, Psittacidae (tuim; Blue-winged Parrotlet) using an abandoned nest of *Furnarius rufus* as housing.





**Photo 79.** *Psittacara leucophthalmus*, Psittacidae (periquitão; White-eyed Parakeet).



**Photo 80.** *Thamnophilus doliatus*, ♂, Thamnophilidae (choca-barrada; Barred Antshrike).



**Photo 81.** *Thamnophilus pelzelni*, ♂, Thamnophilidae (choca-do-planalto; Planalto Slaty-Antshrike).



**Photo 82.** *Lepidocolaptes angustirostris*, Dendrocolaptidae (arapaçu-do-cerrado; Narrow-billed Woodcreeper).



**Photo 83.** *Furnarius rufus*, Furnariidae (joão-de-barro; Rufous Hornero).



**Photo 84.** This is *Furnarius rufus*' house. It builds its nest out of clay in the shape of oven, by mixing straw and dry dung with humid clay.



**Photo 85.** *Leptopogon amaurocephalus*, Rhynchocyclidae (cabeçudo; Sepia-capped Flycatcher).



**Photo 86.** *Todirostrum cinereum*, Rhynchocyclidae (ferreirinho-relógio; Common Tody-Flycatcher).



**Photo 87.** *Hirundinea ferruginea*, Tyrannidae (gibão-de-couro; Cliff Flycatcher).



**Photo 88.** *Elaenia flavogaster*, Tyrannidae (guaracava-de-barriga-amarela; Yellow-bellied Elaenia).



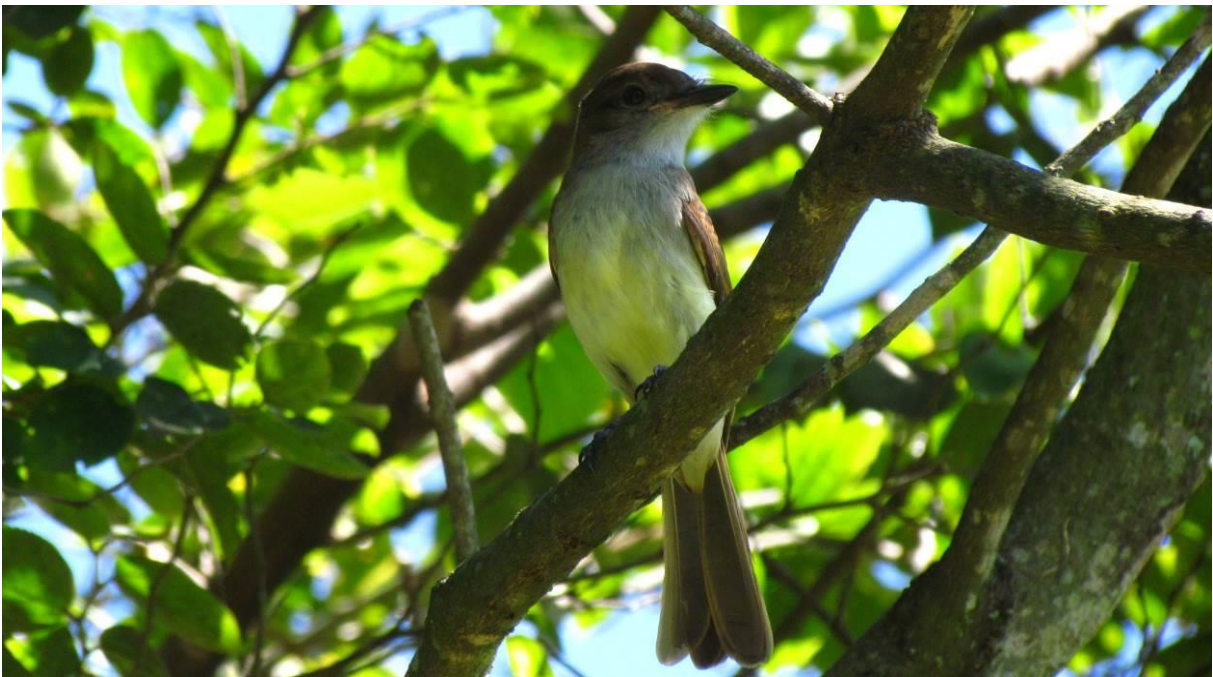
**Photo 89.** *Elaenia spectabilis*, Tyrannidae (guaracava-grande; Large Elaenia).



**Photo 90.** *Myiarchus swainsoni*, Tyrannidae (irré; Swainson's Flycatcher).



**Photo 91.** *Myiarchus ferox*, Tyrannidae (maria-cavaleira; Short-crested Flycatcher).



**Photo 92.** *Myiarchus tyrannulus*, Tyrannidae (maria-cavaleira-de-rabo-enferrujado; Brown-crested Flycatcher).



**Photo 93.** *Pitangus sulphuratus*, Tyrannidae (bem-te-vi; Great Kiskadee).



**Photo 94.** *Machetornis rixosa*, Tyrannidae (suiriri-cavaleiro; Cattle Tyrant).





**Photo 95.** *Myiodynastes maculatus*, Tyrannidae (bem-te-vi-rajado; Streaked Flycatcher).



**Photo 96.** *Megarynchus pitangua*, Tyrannidae (neinei; Boat-billed Flycatcher).



**Photo 97.** *Tyrannus albogularis*, Tyrannidae (suiriri-de-garganta-branca; White-throated Kingbird).



**Photo 98.** *Tyrannus melancholicus*, Tyrannidae (suiriri; Tropical Kingbird).



**Photo 99.** *Tyrannus savana*, ♂ & ♀, Tyrannidae (tesourinha; Fork-tailed Flycatcher).



**Photo 100.** *Empidonomus varius*, Tyrannidae (peitica; Variegated Flycatcher).



**Photo 101.** *Fluvicola nengeta*, Tyrannidae (lavadeira-mascarada; Masked Water-Tyrant).



**Photo 102.** *Satrapa icterophrys*, Tyrannidae (suiriri-pequeno; Yellow-browed Tyrant) resting on an embaúba leaf (*Cecropia pachystachya*).



**Photo 103.** *Knipolegus lophotes*, Tyrannidae (maria-preta-de-penacho; Crested Black-Tyrant).



**Photo 104.** *Xolmis velatus*, Tyrannidae (noivinha-branca; White-rumped Monjita).



**Photo 105.** *Pygochelidon cyanoleuca*, Hirundinidae (andorinha-pequena-de-casa; Blue-and-white Swallow).



**Photo 106.** *Progne tapera*, Hirundinidae (andorinha-do-campo; Brown-chested Martin).



**Photo 107.** *Troglodytes musculus*, Troglodytidae (corruíra; Southern House Wren).



**Photo 108.** *Turdus leucomelas*, Turdidae (sabiá-branco; Pale-breasted Thrush).



**Photo 109.** *Turdus rufiventris*, Turdidae (sabiá-laranjeira; Rufous-bellied Thrush).



**Photo 110.** *Turdus amaurochalinus*, Turdidae (sabiá-poca; Creamy-bellied Thrush).





**Photo 111.** *Mimus saturninus*, Mimidae (sabiá-do-campo; Chalk-browed Mockingbird).



**Photo 112.** *Passer domesticus*, Passeridae (pardal; House Sparrow). This exotic bird species was introduced in Brazil in the twentieth century.



**Photo 113.** *Spinus magellanicus*, ♂, Fringillidae (pintassilgo; Hooded Siskin) perched on an araucaria branch (*Araucaria angustifolia*).



**Photo 114.** *Euphonia chlorotica serrirostris*, ♂, Fringillidae (fim-fim; Purple-throated Euphonia) eating the fruits of a figueira (*Ficus* sp).



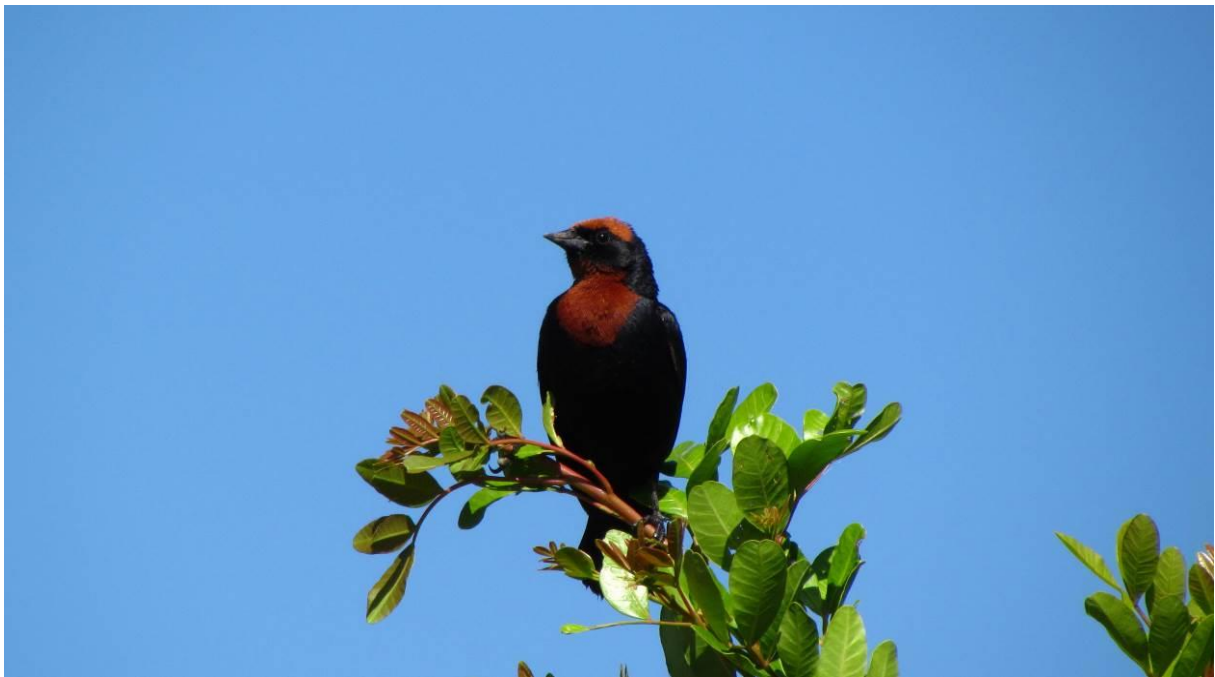
**Photo 115.** *Ammodramus humeralis*, Passerellidae (tico-tico-do-campo; Grassland Sparrow).



**Photo 116.** *Zonotrichia capensis*, Passerellidae (tico-tico; Rufous-collared Sparrow).



**Photo 117.** *Molothrus bonariensis*, Icteridae (chupim; Shiny Cowbird).



**Photo 118.** *Chrysomus ruficapillus*, ♂, Icteridae (garibaldi; Chestnut-capped Blackbird).



**Photo 119.** *Pseudoleistes guirahuro*, Icteridae (chopim-do-brejo; Yellow-rumped Marshbird).



**Photo 120.** *Nemosia pileata*, ♀, Thraupidae (saíra-de-chapéu-preto; Hooded Tanager).



**Photo 121.** *Dacnis cayana*, ♀, Thraupidae (saí-azul; Blue Dacnis).



**Photo 122.** *Saltatricula atricollis*, Thraupidae (batuqueiro; Black-throated Saltator).



**Photo 123.** *Volatinia jacarina*, ♂, Thraupidae (tiziú; Blue-black Grassquit).



**Photo 124.** *Tachyphonus rufus*, ♂, Thraupidae (pipira-preta; White-lined Tanager).



**Photo 125.** *Ramphocelus carbo*, ♂, Thraupidae (pipira-vermelha; Silver-beaked Tanager).



**Photo 126.** *Sporophila caerulescens*, ♀, Thraupidae (coleirinho; Double-collared Seedeater).





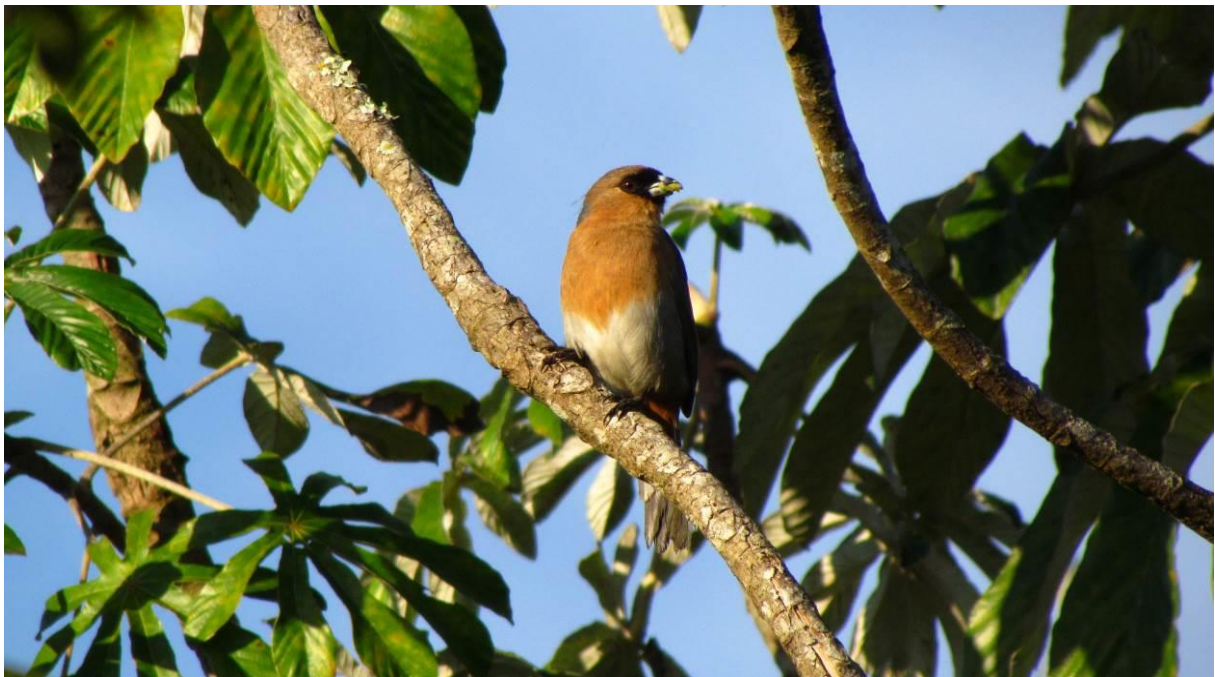
**Photo 127.** *Sporophila bouvreuil*, ♂, Thraupidae (caboclinho; Copper Seedeater).



**Photo 128.** *Sicalis flaveola*, ♂, Thraupidae (canário-da-terra; Saffron Finch).



**Photo 129.** *Sicalis luteola*, ♀, Thraupidae (tipio; Grassland Yellow-Finch).



**Photo 130.** *Schistochlamys ruficapillus*, Thraupidae (bico-de-veludo; Cinnamon Tanager).



**Photo 131.** *Thraupis sayaca*, Thraupidae (sanhaço-cinzento; Sayaca Tanager).



**Photo 132.** *Thraupis palmarum*, Thraupidae (sanhaço-do-coqueiro; Palm Tanager).