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URBAN AFFORESTATION OF PADRE AMBRÓSIO SQUARE (JACAREPAGUÁ, RIO DE JANEIRO) AND ITS IMPORTANCE FOR BIRDLIFE.

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Research Article

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Abstract. Urban squares are important for the quality of life in cities, offering public spaces for leisure, recreation and interaction with nature. They also contribute to environmental balance by reducing temperatures, improving air quality and soil permeability, as well as harboring biodiversity. The aim of this study was to assess the importance of the tree planting in Padre Ambrósio Square in the municipality of Rio de Janeiro, its floristic composition and influence on local birdlife, as well as highlighting conflicts with urban elements arising from this tree planting. Sampling began in June 2017 until April 2025, totaling 600 hours over 100 months (6 hours/day). A total of 18 floristic species and 52 bird species in 27 families were recorded. Todirostrum poliocephalum, endemic to the Atlantic Forest, was the bird with the highest number of records.

Keywords — artificial intelligence; robotics; engineering education; research methods

1 Introduction

Knowledge of the composition of a region's avifauna helps to provide more information on maintaining biodiversity. On the other hand, the development of large cities results in an increase in anthropogenic impact on ecosystems, reducing and threatening important habitats. Due to the accelerated reduction of natural ecosystems, several studies have been carried out in an attempt to find the answer to the resilience of avifauna to the fragmentation of the Atlantic Rainforest [1, 2].

Thus, in highly degraded landscapes, the quality of the fragments can influence the persistence of organisms. These factors can have an effect on the structure of communities, determining the richness and diversity of the habitat. Categorizing species into functional groups such as trophic guild, geographic distribution, rarity status and occupancy in the strata helps us to understand how certain characteristics of bird species are associated with a reduction in habitat [3, 4].

Therefore, surveying fauna in squares is important for understanding the dynamics of urban ecosystems, identifying endangered or rare species and assessing the impact of human activities on fauna. It also allows us to propose actions for the conservation and management of fauna, promote environmental education and raise awareness of the importance of urban fauna [5].

In short, this study aimed to assess the importance of the afforestation of Padre Ambrósio Square, in the municipality of Rio de Janeiro, its floristic composition as well as analyzing the influence on the diversity of birds sampled, and also to identify conflicts with urban elements in this ecosystem.

2 Materials and Methods

2.1 Study area

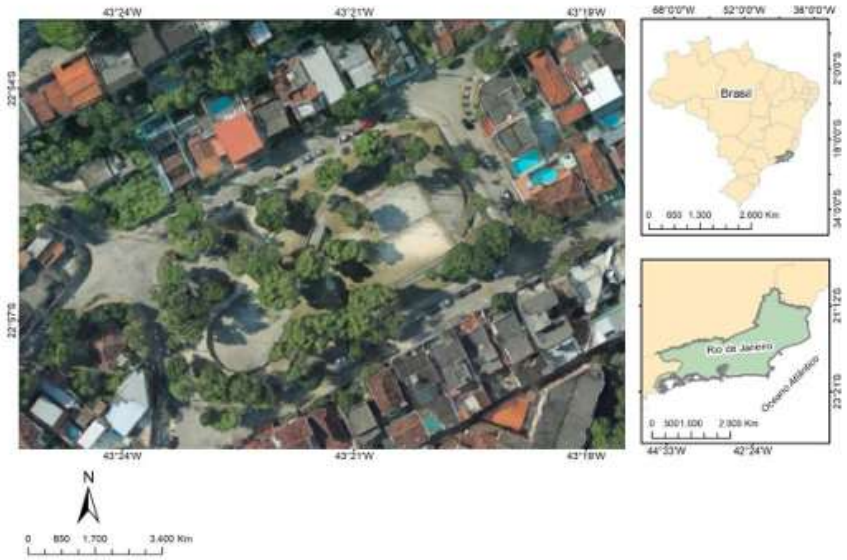
Located in Rio de Janeiro, RJ, Brazil, (22º 55' 17" S 43º 21'37" W), this square was chosen because of the diversity of birds in a small area of vegetation and human presence 24 hours a day. It was recognized by Rio de Janeiro City Hall as a public place on May 13, 1952 and regulated on September 14, 1973 under the name of Praça Padre Ambrósio, located in the XVI Administrative Region of Jacarepaguá. The square is located between Pouso Alto, Piatã, Bom Conselho and São Fidélis streets [6] and covers an area of 8,445 m^2 (Fig. 1).

The climate classification is Aw according to Köppen-Geiger [7], with an average temperature of around 23.6 °C and average rainfall of 1252 mm [8]. This park is used for walking and has sports facilities such as a sports court and skate park [6].

2.2 Floristic composition of Padre Ambrósio Square

The sensory inventory was carried out using spreadsheets to identify and account for tree species, classifying them as: E = Exotic introduced into a region, or N = Native to Brazil, and, as to their Plant Health: P = Parasitized, S = Healthy [9].

Figure 1: Location of Praça Padre Ambrósio in the municipality of Rio de Janeiro, RJ, Brazil.



Source: Author's own.

Conflicts with urban elements were also identified, such as overlapping electrical wires, building nests next to the electricity grid and mobile phone antenna and in holes in poles, electrocution and hunting of birds, death of chicks due to climate change, as well as nests built in places with high pedestrian traffic.

The trees were also analyzed according to the need for pruning: heavy pruning, light pruning, no pruning, presence of parasites and removal. Where heavy pruning consists of the removal of parts in urban conflict; light pruning, used for aesthetic maintenance of some elements of vegetation and the removal of those trees threatened with falling, dry or in an advanced stage of infestation by termites and/or other pests [9, 10].

2.3 Bird Data Collection

Sampling began in June 2017 to April 2025, with a duration of 8 years, covering the seasons, with monthly field activities. From 6 am to 9 am when the birds are most active and from 6 pm to 8 pm to sample nocturnal and crepuscular birds. The sampling effort totaled 600 hours per month (100 months), 6 hours per day. Observations and records were made using 20-180 x 100 binoculars, recorders, cameras and recorded on field sheets. The Avis Brasilis Field Guide [11] and the Xeno-Canto website [12] were used to identify the birds. No playback was used so as not to alter the birds' behavior.

Sampling was done through observation and listening via free transects, with no defined radius, where the observer walks along a previously selected trail at a constant speed, recording auditory and visual contact with the birds [13].

The taxonomic classification of the birds follows the Brazilian Committee of Ornithological Records [14]. The trophic guilds (GT) were based on the methodology of Motta-Júnior (1990), and grouped according to the main food item into: INS = insectivorous, when the diet consists of 3/4 insects and arthropods; ONI = omnivorous, diet consists

of insects, human food remains and fruit; FRU = frugivorous, 3/4 of the diet consists of fruit; GRAN = granivorous, diet consists of grains and seeds; NEC = nectarivores, diet composed mainly of nectar and some insects; CARN = carnivores, 3/4 of diet composed of live vertebrates; DET = detritivores, diet composed of decomposing organic matter; PISC = piscivores, diet composed of fish and aquatic invertebrates [15–19].

The occupation of the species in the plant strata was classified as: SL = ground, species that preferentially use the ground for foraging; IN = intermediate, species that use the understory for foraging; SU = upper, species that forage in and above the canopy; VR = vertical, species that forage vertically in the strata [15, 18, 20, 21].

The record of the endemic avifauna of the Atlantic Forest was based on studies by Vale (2018). The conservation status is in accordance with the official list of national endangered species, as well as the status of occurrence in the country, according to CBRO, in the following categories: BR = breeding resident or migrant; VI = non-breeding seasonal visitor; En = endemic species of Brazil; In = exotic or naturalized domestic species, introduced in Brazil [22]. In addition, the interactions between birds and urban elements were described, as well as the anthropogenic impacts caused to them [23].

Conflicts with urban elements were considered to be: nesting in urbanized environments outside of vegetation, anthropogenic actions such as hunting, being run over, and electrocutions.

3 Results

3.1 Floristic Survey

The floristic composition of Padre Ambrósio square: 80 individuals distributed in 18 species were identified (Table 1) where 25% Pachira aquatica (n = 20); 18% Terminalia catappa (n = 14); 1% Artocarpus heterophyllus; (n = 1); 15% Syzygium cumini (n = 12); 3% Mangifera indica (n = 2); 1% Pouteria caimito (n = 1); 3% Schinus terebinthifolius (n = 3); 5% Cocos nuicifera (n = 4); 3% Dypsis lutences (n = 2); 3% Ceiba speciosa (n = 2); 1% Artocarpus heterophyllus (n = 1); 4% Samanea inopinata (n = 3); 1% Malpighia emarginata (n = 1); 1% Hibiscus tiliaceus (n = 1); 1% Paubrasilia echinata (n = 1); 12% Senna siamea (n = 9); 1% Clitonia farchildiana (n = 1); 3% Ficus benjamina (n = 2).

When it came to assessing the phytosanity of the individuals in the square, it was possible to diagnose that 5% of the individuals in Praça Padre Ambrósio (n = 4) had their tops attacked by Santalaceae loranthaceae (bird's-foot grass), 1% Ceiba speciosa (n = 1) was dry and needed to be removed. 93% were healthy (n = 75).

With regard to conflicts with urban elements, 8% of the trees were found to have conflicts with electrical and telephone wiring (n = 7), with the potential to cause damage to the wiring.

Based on the observations in the square and the data examined throughout the qualitative analysis, it was found that 18% of the trees required light pruning (n = 15), mainly to improve the aesthetics of the trees; 81% did not require any type of maintenance and/or pruning.

Table 1 – Tree species recorded in Padre Ambrósio Square

Family	Species	Popular Name	Origin	Individuals
Bombacaceae	*Pachira aquatica* Aubl.	Malabar chestnut	N	20
Combretaceae	*Terminalia catappa* (L.) Lour.	Medium-sized evergreen	E	14
Moraceae	*Artocarpus heterophyllus* Lam.	Jackfruit	E	1
Moraceae	*Ficus benjamina* L., 1753	Weeping fig	E	2
Myrtaceae	*Syzygium cumini* (L.) Skeels	Cymose-paniculate	E	12
Malpighiaceae	*Malpighia emarginata* DC.	Barbados cherry	E	1
Anacardiaceae	*Mangifera indica* L.	Mango	E	2
Anacardiaceae	*Schinus terebinthifolius* Raddi	Terebinthifolius	N	3
Arecaceae	*Cocos nucifera* (L.)	Coconut palm	E	4
Arecaceae	*Dypsis lutescens* (H.Wendl.) Beentje & J.Dransf.	Areca palm	E	2
Malvaceae	*Hibiscus tiliaceus* L. (1753)	Sea hibiscus	E	1
Malvaceae	*Ceiba speciosa* (A.St.-Hil.)	Silk floss tree	N	2
Sapotaceae	*Pouteria caimito* (Ruiz & Pav.) Radlk. (1882)	Eggfruit	N	1
Fabaceae	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Kassod tree	E	9
Fabaceae	*Paubrasilia echinata* (Lam.) Gagnon, H.C.Lima & G.P.Lewis (2016)	Brazilwood	N	1
Fabaceae	*Clitonia farchildiana* R.A.Howard	Orchid Tree	N	1
Fabaceae	*Samanea inopinata* (Harms)	Samanea inopinata	N	3
Bignoniaceae	*Handroanthus heptaphyllus* (Vell.) Mattos (1970)	Pink trumpet tree	N	1

Source: Prepared by the author (2025). Abbreviations: N = Native; E = Exotic.

3.2 Birdlife Survey

We identified 52 species of birds distributed among 27 families, where: 25% (n = 13) are insectivores; 15% (n = 8) omnivores; 15% (n = 8) frugivores; 4% (n = 2) piscivores; 10% (n = 5) granivores; 19% (n = 10) carnivores and nectarivores; 6% (n = 3) and 1% (n = 1) detritivores. In the tree strata we found: 53% (n = 28) in the upper strata or canopy; 23% (n = 12) in the intermediate strata or understory; 17% (n = 9) foraging predominantly on the ground and 1% (n = 1) foraging vertically. The composition of the avifauna included the species Todirostrum poliocephalum, which is endemic to the Atlantic Forest. While 100% of the species sampled are resident (n = 52); 6% are exotic or domestic species, introduced into Brazil or neighboring countries (n = 3); 4% are endemic to Brazil (n = 2) and 1% are visitors from the south (n = 1) (Table 2).

Table 2 – List of recorded bird species.

Taxa	Popular Name	Conserv. Status	Trophic Guild	Residency Occurrence
Fregata magnificens Mathews, 1914	Magnificent Frigatebird	LC	PISC	VI
Ardea alba Linnaeus, 1758	White Egret	LC	PISC	BR
Coragyps atratus Bechstein, 1793	Black Vulture	LC	DET	BR
Rupornis magnirostris (Gmelin, 1788)	Roadside Hawk	LC	CARN	BR
Parabuteo unicinctus (Vigors, 1824)	Harris's Hawk (Red-shouldered)	LC	CARN	BR
Milvago chimachima (Vieillot, 1816)	Yellow-headed Caracara	LC	CARN	SU BR
Falco femoralis (Leach, 1820)	Aplomado Falcon	LC	CARN	BR
Caracara plancus (Miller, 1777)	Crested Caracara	LC	CARN	SU BR
Falco sparverius Linnaeus, 1758	American Kestrel	LC	CARN	SU BR
Megascops choliba (Vieillot, 1817)	Tropical Screech-Owl	LC	CARN	SU BR
Glaucidium brasilianum Leach, 1820	Ferruginous Pygmy-Owl	LC	CARN	SU BR
Asio clamator Leach, 1820	Striped Owl	LC	CARN	SU BR
Tyto furcata (Temminck, 1827)	American Barn Owl	LC	CARN	SB BR
Hydropsalis longirostris (Bonaparte, 1825)	Band-winged Nightjar	LC	CARN	SU BR
Columbina talpacoti (Temminck, 1811)	Ruddy Ground-Dove	LC	GRAN	SL BR
Patagioenas picazuro (Temminck, 1813)	Picazuro Pigeon	LC	GRAN	SL BR
Columba livia (Linnaeus, 1758)	Rock Pigeon	LC	GRAN	SL BR–IN
Amazona aestiva (Linnaeus, 1766)	Turquoise-fronted Parrot	LC	FRU	SU BR
Psittacara leucophthalmus (Statius Müller, 1776)	White-eyed Parakeet	LC	FRU	SU BR
Forpus xanthopterygius (Spix, 1824)	Blue-winged Parrotlet	LC	FRU	SU BR
Crotophaga ani Linnaeus, 1758	Smooth-billed Ani	LC	INS	IN BR
Piaya cayana (Linnaeus, 1766)	Squirrel Cuckoo	LC	INS	SU BR
Cyanocorax cyanopogon (Wied, 1821)	White-naped Jay	LC	ONI	IN BR–EN
Eupetomena macroura (Gmelin, 1788)	Swallow-tailed Hummingbird	LC	NEC	IN BR
Chionomesa fimbriata (Gmelin, 1788)	Glittering-throated Emerald	LC	NEC	IN BR
Picumnus cirratus Temminck, 1825	White-barred Piculet	LC	INS	VR BR
Thamnophilus palliatus (Lichtenstein, 1823)	Chestnut-backed Antshrike	LC	INS	IN BR
Todirostrum poliocephalum (Wied, 1831)	Gray-headed Tody-Flycatcher	LC–END	INS	IN BR–EN

Continued on the next page

Taxa	Popular Name	Conserv. Status	Trophic Guild	Residency Occurrence
Fluvicola nengeta (Linnaeus, 1766)	Masked Water-Tyrant	LC	INS	SL BR
Pitangus sulphuratus (Linnaeus, 1766)	Great Kiskadee	LC	ONI	SU BR
Megarynchus pitangua (Linnaeus, 1766)	Boat-billed Flycatcher	LC	INS	SU BR
Tyrannus melancholicus Vieillot, 1819	Tropical Kingbird	LC	INS	SU BR
Myiozetetes similis (Spix, 1825)	Social Flycatcher	LC	ONI	SU BR
Elaenia flavogaster (Thunberg, 1822)	Yellow-bellied Elaenia	LC	ONI	SU BR
Camptostoma obsoletum (Temminck, 1824)	Southern Beardless-Tyrannulet	LC	INS	SU BR
Pygochelidon cyanoleuca (Vieillot, 1817)	Blue-and-white Swallow	LC	INS	BR–VI (S)
Chaetura meridionalis Hellmayr, 1907	Sick's Swift	LC	INS	SU BR
Troglodytes musculus Naumann, 1823	Southern House Wren	LC	ONI	IN BR
Turdus rufiventris Vieillot, 1818	Rufous-bellied Thrush	LC	ONI	IN BR
Turdus leucomelas Vieillot, 1818	Pale-breasted Thrush	LC	ONI	IN BR
Mimus saturninus (Lichtenstein, 1823)	Chalk-browed Mockingbird	LC	ONI	SU BR
Coereba flaveola (Linnaeus, 1758)	Bananaquit	LC	NEC	IN BR
Thraupis sayaca (Linnaeus, 1766)	Sayaca Tanager	LC	FRU	IN BR
Thraupis palmarum (Wied, 1823)	Palm Tanager	LC	FRU	IN BR
Conirostrum speciosum (Temminck, 1824)	Chestnut-vented Conebill	LC	INS	SU BR
Sicalis flaveola (Linnaeus, 1766)	Saffron Finch	LC	GRAN	SL BR
Dacnis cayana (Linnaeus, 1766)	Blue Dacnis	LC	FRU	SU BR
Euphonia chlorotica (Linnaeus, 1766)	Purple-throated Euphonia	LC	FRU	SU BR
Euphonia violacea (Linnaeus, 1758)	Violaceous Euphonia	LC	FRU	SU BR
Estrilda astrild (Linnaeus, 1758)	Common Waxbill	LC	GRAN	SU BR–IN
Furnarius rufus (Gmelin, 1788)	Rufous Hornero	LC	INS	SL BR–IN
Passer domesticus (Linnaeus, 1758)	House Sparrow	LC	ONI	SL BR

Source: Prepared by the author (2025). Abbreviations: LC = Least Concern; END = Endemic; PISC = Piscivore; CARN = Carnivore; DET = Detritivore; FRU = Frugivore; INS = Insectivore; ONI = Omnivore; NEC = Nectarivore; GRAN = Granivore; BR = Resident; SU = Suburban/urban; SL = Semi-local; IN = Introduced; EN = Endemic; VI = Visitor; SB = Suburban; VR = Regular visitor.

3.3 Conflicts with Urban Elements

Some bird specimens in the study area use urban elements on the roads around the study area to build their nests, increasing the conflict.

While walking around the square, a Falco femoralis nest was recorded in February 2018 with 02 chicks hatching and parental care at the mobile phone antenna on the outskirts of Padre Ambrósio square. Parabuteo unicinctus nest on the mobile phone antenna, in parental care with 02 chicks, in October 2020. Dead Parabuteo unicinctus chick electrocuted on a lamppost on Pouso Alto street 23/12/2020. People hunting Columba livia in the square 25/03/2022. Death of Columbina talpacoti in Rua Bom Conselho 14/10/2023. Forpus xanthopterygius nest in hole in lamppost in Pouso Alto street 03/11/2023. On 02/02/2024, the death of a vulture, Coragyps atratus, was recorded in the transformer on Pouso Alto Street, which surrounds the square. Camptostoma obsoletum nest at 01/05/2025 with chicks, in Pachira aquatica, a very low tree located on the square's cycle path where many passers-by circulate.

During the 8 years of the survey, several domestic pigeons, Columba livia, were killed in the square, many of them run over or captured. As well as the conflict of Pitangus sulphuratus that nest in the transformer in Rua Bom Conselho, disarming the equipment, causing an interruption in the electricity supply, constantly being removed by technicians from the Light company and placed in trees in the square.

4 Discussion

4.1 Floristic Composition in the Square

The afforestation of urban areas is fundamental for local development, as they offer various benefits such as thermal comfort, improved air quality, reduced noise and visual pollution and also contribute to environmental conservation, with public squares being popular leisure spots [24]. In this study, Praça Padre Ambrósio has 18 species of trees, including native and exotic ones, totaling 80 individuals, contributing to the well-being of the population.

However, for the proper development of trees introduced into the urban environment, good management is required, including pruning and pest control, in order to ensure quality in the development of individuals and avoid conflicts with the environment [25], so it is necessary to properly manage the trees in the square under study that are parasitized by bird grass and in conflict with the electrical wiring.

4.2 Birdlife of Padre Ambrósio Square

Praça Padre Ambrósio is located in the same region as the Bosque da Freguesia Municipal Natural Park (PNMBM), 3.57 kilometers apart. This Conservation Unit has a diversity of 56 bird species, distributed in 27 families according to Corrêa (2024). The square under study has 52 species identified [26], possibly due to this proximity, showing the importance of the afforestation of public squares for avifauna since frugivorous birds depend on food throughout the year.

In Praça Padre Ambrósio, the distribution of botanical species provides diverse resources throughout the year and birds that are less sensitive to human presence do not miss the opportunity to forage [3].

Another common behavior that occurs in urban areas, such as the one we studied, is that visitors do not have adequate information on how to avoid impacts on local birdlife. Artificial feeding of fauna can alter behavioral and reproductive patterns, among other things. As can be seen with the Columba livia doves that were run over in the streets around the square due to the availability of food on the roads [27].

The results show that 4% of the birds in the square are endemic to Brazil and one species is endemic to the Atlantic Forest, so we should be aware that the main threats to Brazilian avifauna are habitat loss and fragmentation, capture, invasion of exotic species, pollution, anthropogenic disturbance due to urban growth and changes in the dynamics of native species. Of course, it is necessary to take care of these areas and environmental education is an important tool for conservation [19, 26, 28].

According to Ferreira (2013), birds are able to take advantage of urban elements for perching and observation, in the case of raptors, reproduction, as a tuim nest was recorded on the Pouso Alto street lamp. However, the electrocution of the young Parabuteo unicinctus and Coragyps atratus on the transformer shows that accidents happen to larger birds when they touch the tips of their wings to the power transmission phases, as do the nests of Pitangus sulphuratus on power transformers, causing problems such as power outages for the population and the death of the species [23, 29].

4.3 Conservertaion Proposals for Birdlife

According to the results of this study, here are some suggestions that could help conservation by reducing the impacts related to birdlife through birdwatching. Birdwatching raises awareness of nature and promotes local tourism. It can also provide benefits for the community's health and interaction with the environment.

This activity raises awareness, encourages environmental preservation and also contributes to the local economy, boosting tourism. In addition, birdwatching can bring health benefits, reducing stress and promoting a connection with the environment. On the other hand, birdwatching can be a valuable tool for environmental education, helping to identify and monitor species, as well as strengthening social ties by raising people's awareness of environmental preservation.

5 Conclusion

Based on the results obtained in this study, it was possible to conclude that the square has a good diversity of bird species when compared to the PNM Bosque da Freguesia Conservation Unit, which is 3.57 kilometers away. However, it is necessary to correctly manage the floristic composition in terms of conflicts with electrical and telephone wiring. It is also necessary to monitor the nests of Pitangus sulphuratus in the power transformers, with a view to ensuring the quality of the electricity service and caring for the bird species.

As this is an area located in an environment with strong anthropogenic pressure in its surroundings, the research carried out points to the need to plan and outline strategies that reconcile the use of space with the protection of bird species identified as birdwatching activities.

Competing Interests

The authors declare no competing interests.

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