



Avian community composition in an urban park in central São Paulo state, southeastern Brazil

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Abstract: Approximately one-fourth of São Paulo State birds is found in modified environments such as urban parks, however there are few studies about the avifauna of those ecosystems. In this sense, was aimed to accomplish the avian survey in an urban park of Rio Claro (São Paulo State, southeastern Brazil). As result, a relatively high richness was recorded (77 species) in comparison with other studies executed in urban areas, what can be associated to the largest variety of habitats and the proximity with forest fragments of the city. However, most of the recorded species have generalist habits, demonstrating to be necessary certain adaptation from birds to the conditions imposed by the urban ecosystem.

Key words: Birds, Rio Claro, urban area, generalist species.

Resumo: Composição da comunidade de aves em um parque urbano localizado na região central do Estado de São Paulo, sudeste do Brasil. Aproximadamente um quarto da ornitofauna paulista ocorre em ambientes modificados, entre os quais os parques urbanos, porém há poucos estudos sobre a avifauna desses ambientes. Neste sentido, objetivou-se realizar o levantamento da avifauna em um parque urbano de Rio Claro (SP). Como resultado, foi registrada uma riqueza relativamente elevada (77 espécies) em comparação com outros estudos executados em áreas urbanas, o que pode estar associado à maior variedade de habitats e à proximidade com fragmentos florestais do município. Porém, a maior parte das espécies registradas apresenta hábito generalista, demonstrando ser necessária certa adaptação da avifauna às condições impostas pelo ambiente urbano.

Palavras-chave: Aves, Rio Claro, área urbana, espécies generalistas.

INTRODUCTION

Space occupation is transforming in drastic ways natural environments all over the world as an answer to the human population fast growth. The intense environmental manipulation by human resulted, under the ecological point of view, in the development of an ecosystem with own characteristics - the urban ecosystem (GILBERT, 1989; FORATTINI, 1992; MARZLUFF & EWING, 2001). In those areas there was reduction of available natural resources for avifauna maintenance, only remaining small fragments of green areas as parks and squares (PRIMACK

& RODRIGUES, 2001). At the same time there was an increase of competition with exotic species, exposition to predators and parasites, besides the direct interference of human actions in species life areas (BRAWN *et al.*, 2001; MARZLUFF & EWING, 2001).

The occupation of urban areas seems to be a recent characteristic for a lot of wild bird species. Beyond those that acquired sinantropic habits, others are gradually invading the urban environment, on periphery of big cities and central squares. According to ARGEL-DE-OLIVEIRA (1995) almost one-fourth of São Paulo State birds

is found in modified environments as areas of agricultural use, reforestations, dams and inside cities; but still there are few information about the avifauna of those ecosystems. At this sense, this study aimed to accomplish the avifauna survey in an urban park of Rio Claro (São Paulo State) and to contribute for the knowledge of green areas importance for birds in urban zones.

MATERIAL AND METHODS

Study area

This study was conducted at Municipal Park of Lago Azul (22°23'25,7 "S and 47°33'48 "W), which is a green area inserted in Rio Claro urban zone, close to the downtown. The park total area is 11 ha, including a natural lake. It corresponds to a city tourist point, used by the local population for leisure and entertainment, receiving visitors daily. The vegetation is constituted of native and exotic species inserted in the area; therefore it is not a forest remainder. According to the Köppen's classification system, the area climate is Cwa, in other words, tropical with two defined seasons (TROPPEMAIR, 1992).

Methodology

Walks of approximately 4 hours a day of observation (3h in the morning and 1h at late afternoon) were done in pre-existent trails, between August 2006 and December 2007. The following months were not sampled: 11 and 12/2006, 06/2007. Records were obtained through observations with binoculars (10x25mm) and/or vocalizations, being used a field guide for species visual identification (FRISCH & FRISCH, 2005). Nomenclature and species taxonomic orders followed the patterns of Brazilian

Ornithological Records Committee (CBRO, 2007).

Using the obtained data was calculated the occurrence frequency (F.O.) of each observed species, which is given by the ratio of number of days that each species was recorded and the total visits number. Species were classified in the following occupation categories, in agreement with ARGEL-DE-OLIVEIRA (1995), MENDONÇA-LIMA & FONTANA (2000) and FRANCHIN *et al.* (2004): residents (F.O. $\geq 0,6$), probable residents ($0,6 > \text{F.O.} \geq 0,15$) and occasional or transitory species (F.O. $< 0,15$). Trophic guilds and feeding habitat definitions followed SICK (1997) and HÖFLING & CAMARGO (1999).

RESULTS AND DISCUSSION

Species richness

Seventy seven bird species were recorded in the Municipal Park of Lago Azul for a total of 128 hours of observations (Fig.1). The most representative family in relation to the richness was Tyrannidae, with 16 species, equaling 20.8% of the total, followed for the family Thraupidae with 7 species, corresponding to approximately 9.1% of the richness. The remaining 70.1% are represented by 54 species inserted in 30 families (Tab.1).

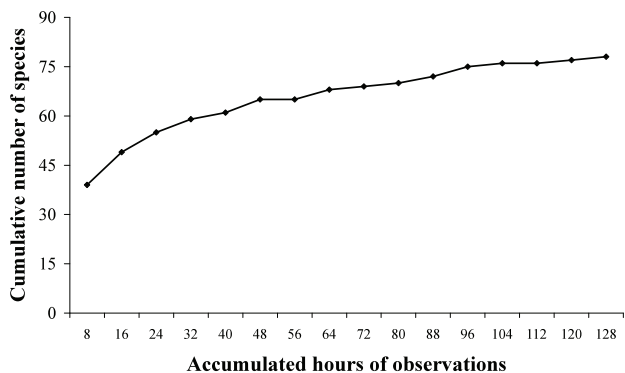


Figure 1 Cumulative species curve relative to the survey period.

GUSSONI (2007) in a preliminary survey recorded 62 species for the same place. In his listing there are 7 species that were not observed during the present study: *Milvago chimachima* Vieillot, 1816, *Aramides saracura* Spix, 1825, *Brotogeris chiriri* Vieillot, 1818, *Megascops choliba* Vieillot, 1817, *Aphantochroa cirrhochloris* Vieillot, 1818, *Elaenia chiriquensis* Lawrence, 1865 and *Myiozetetes similis* Spix, 1825. On the other hand, the present study presents 22 species that had not been recorded (Tab. 1).

In a bird survey accomplished by MATARAZZO-NEUBERGER (1995) in São Paulo (SP) squares and parks in areas between 1.5 and 84.3 ha (102.8 ha in the total) a total of 68 species were recorded for 517h of observations. A study accomplished in the Porto Alegre Country Club (RS) demonstrated the occurrence of 63 bird species in 47ha and 75h of accompaniment (MENDONÇA-LIMA & FONTANA, 2000). In sections of the Uberlândia urban area, TORGA *et al.* (2007) recorded 66 bird species in 144h of observations.

The obtained richness for the present study is a little higher, in spite of the smallest area size, what is probably related to the variety of habitats and resources in the Municipal Park of Lago Azul, where there are woods with many native and exotic fruitful trees (such as *Schinus terebinthifolius* Raddi, *Morus nigra* L., *Myrciaria cauliflora* Berg., *Cecropia pachystachya* Trec., *Eugenia uniflora* L., *Michelia champaca* L. and others) that provide food for a lot of bird species; lawn; natural lake and an artificial island in the lake with dense vegetation. Besides, forest fragments of the city can be working as a source of species.

Occupation categories

Most of the species is resident (n = 32; 41.5%),

followed by the occasional or transitory (n = 23; 29.9%) and probable residents (n = 22; 28.6%) (Tab.1). The largest number of resident species can be associated to the opportunities offered to birds with opportunistic habits, what makes possible their establishment in the urban environmental, such as abundant food resources, as well as observed by ARGEL-DE-OLIVEIRA (1995), HÖFLING & CAMARGO (1999) and FRANCHIN *et al.* (2004). Besides, urban parks can provide vegetable material (seeds, dry leaves, mosses and branches) for birds to build nests and trees as support, what is essential for the reproduction of many species, allowing them to inhabit those places (HÖFLING & CAMARGO, 1999).

The species *Phalacrocorax brasilianus* Gmelin, 1789, *Ardea alba* Linnaeus, 1758, *Egretta thula* Molina, 1782 and *Bubulcus ibis* Linnaeus, 1758 are very frequent for the lake and for the artificial island existent in the park, where they nesting. However, species amount that uses the lake could be larger if the margins vegetation would not get frequently removed, since there would be a support for other aquatic birds establish itself or to visit the place.

Trophic guilds

It was verified that 25 of the 77 observed species at the survey are omnivorous (32.4%), 22 insectivorous (28.6%), 16 carnivorous (20.8%), 5 nectivorous (6.5%), 5 frugivorous (6.5%), 3 granivorous (3.9%) and 1 detritivorous (1.3%) (Tab.1). In agreement with WILLIS (1979), environmental alterations can take to a tendency of increasing omnivorous birds and possibly less specialized insectivorous and a decrease of frugivorous and more specialized insectivorous. In relation to nectivorous birds, according to FRANCHIN *et al.* (2004), these are not usually found in urbanized places because they have quite specific alimentary demands. However,

Table 1. List of recorded bird species in the Municipal Park of Lago Azul, in central São Paulo State, followed by trophic guild, occurrence frequency (F.O.) and occupation category (C.O.).

SPECIES	GUILD	F.O.	C.O.
Anatidae			
<i>Dendrocygna viduata</i> (Linnaeus, 1766)	ONI	0,69	RES
<i>Cairina moschata</i> (Linnaeus, 1758) ^x	ONI	0,19	PR
Phalacrocoracidae			
<i>Phalacrocorax brasilianus</i> (Gmelin, 1789) ^N	CAR	1,00	RES
Anhingidae			
<i>Anhinga anhinga</i> (Linnaeus, 1766)	CAR	0,41	PR
Ardeidae			
<i>Nycticorax nycticorax</i> (Linnaeus, 1758) ^N	CAR	0,84	RES
<i>Butorides striata</i> (Linnaeus, 1758)	CAR	0,81	RES
<i>Ardea alba</i> Linnaeus, 1758 ^N	CAR	0,97	RES
<i>Ardea cocoi</i> Linnaeus, 1766	CAR	0,25	PR
<i>Bubulcus ibis</i> (Linnaeus, 1758) ^N	INS	0,94	RES
<i>Egretta thula</i> (Molina, 1782) ^N	CAR	1,00	RES
Cathartidae			
<i>Coragyps atratus</i> (Bechstein, 1793)	DET	0,59	RES
Accipitridae			
<i>Rupornis magnirostris</i> (Gmelin, 1788)	CAR	0,38	PR
<i>Buteo albicaudatus</i> Vieillot, 1816 ^x	CAR	0,06	OT
Falconidae			
<i>Caracara plancus</i> (Miller, 1777)	CAR	0,13	OT
<i>Falco sparverius</i> Linnaeus, 1758 ^x	CAR	0,06	OT
<i>Falco femoralis</i> Temminck, 1822 ^x	CAR	0,03	OT
Charadriidae			
<i>Vanellus chilensis</i> (Molina, 1782) ^N	ONI	0,75	RES
Columbidae			
<i>Columba livia</i> Gmelin, 1789	ONI	1,00	RES
<i>Patagioenas picazuro</i> (Temminck, 1813)	FRU	0,91	RES
<i>Columbina talpacoti</i> (Temminck, 1811) ^N	ONI	1,00	RES
<i>Zenaida auriculata</i> (Des Murs, 1847) ^N	FRU	1,00	RES
Psittacidae			
<i>Aratinga leucophthalma</i> (Statius Muller, 1776) ^x	FRU	0,06	OT
<i>Forpus xanthopterygius</i> (Spix, 1824)	FRU	0,06	OT
Cuculidae			
<i>Crotophaga ani</i> Linnaeus, 1758	INS	0,25	PR
<i>Guira guira</i> (Gmelin, 1788)	INS	0,06	OT
Strigidae			
<i>Athene cunicularia</i> (Molina, 1782) ^x	CAR	0,13	OT
Trochilidae			
<i>Eupetomena macroura</i> (Gmelin, 1788)	NEC	1,00	RES
<i>Florisuga fusca</i> (Vieillot, 1817) ^x	NEC	0,06	OT
<i>Chlorostilbon lucidus</i> (Shaw, 1812) ^x	NEC	0,41	PR
<i>Amazilia lactea</i> (Lesson, 1832)	NEC	0,41	PR
Alcedinidae			
<i>Megaceryle torquata</i> (Linnaeus, 1766)	CAR	0,28	PR
<i>Chloroceryle amazona</i> (Latham, 1790)	CAR	0,50	PR
<i>Chloroceryle americana</i> (Gmelin, 1788)	CAR	0,06	OT
Picidae			
<i>Colaptes melanochloros</i> (Gmelin, 1788) ^x	ONI	0,44	PR
<i>Colaptes campestris</i> (Vieillot, 1818)	INS	0,03	OT
Thamnophilidae			
<i>Thamnophilus doliatus</i> (Linnaeus, 1764) ^x	INS	0,06	OT
Dendrocolaptidae			
<i>Lepidocolaptes angustirostris</i> (Vieillot, 1818) ^x	INS	0,03	OT

Table 1. Continuation.

SPECIES	GUILD	F.O.	C.O.
Furnariidae			
<i>Furnarius rufus</i> (Gmelin, 1788) ^N	INS	0,97	RES
Tyrannidae			
<i>Todirostrum cinereum</i> (Linnaeus, 1766)	INS	0,91	RES
<i>Phyllomyias fasciatus</i> (Thunberg, 1822) ^x	INS	0,13	OT
<i>Elaenia flavogaster</i> (Thunberg, 1822) ^x	ONI	0,59	PR
<i>Elaenia spectabilis</i> Pelzeln, 1868	ONI	0,28	PR
<i>Camptostoma obsoletum</i> (Temminck, 1824)	INS	0,09	OT
<i>Serpophaga subcristata</i> (Vieillot, 1817)	INS	0,56	PR
<i>Pyrocephalus rubinus</i> (Boddaert, 1783) ^{*x}	INS	0,47	PR
<i>Fluvicola nengeta</i> (Linnaeus, 1766)	INS	0,94	RES
<i>Machetornis rixosa</i> (Vieillot, 1819)	INS	0,94	RES
<i>Pitangus sulphuratus</i> (Linnaeus, 1766) ^N	ONI	1,00	RES
<i>Myiodinastes maculatus</i> (Stadius Muller, 1776) ^x	ONI	0,06	OT
<i>Empidonomus varius</i> (Vieillot, 1818) ^N	ONI	0,47	PR
<i>Tyrannus melancholicus</i> Vieillot, 1819	INS	0,94	RES
<i>Tyrannus savana</i> Vieillot, 1808 [*]	INS	0,53	PR
<i>Myiarchus ferox</i> (Gmelin, 1789)	ONI	0,13	OT
<i>Myiarchus tyrannulus</i> (Stadius Muller, 1776) ^x	ONI	0,03	OT
Hirundinidae			
<i>Progne chalybea</i> (Gmelin, 1789)	INS	0,03	OT
<i>Pygochelidon cyanoleuca</i> (Vieillot, 1817)	INS	1,00	RES
<i>Stelgidopteryx ruficollis</i> (Vieillot, 1817)	INS	0,19	PR
Troglodytidae			
<i>Troglodytes musculus</i> Naumann, 1823 ^x	INS	0,38	PR
Turdidae			
<i>Turdus leucomelas</i> Vieillot, 1818	ONI	0,88	RES
<i>Turdus amaurochalinus</i> Cabanis, 1850 ^N	ONI	0,91	RES
Mimidae			
<i>Mimus saturninus</i> (Lichtenstein, 1823) ^N	ONI	0,91	RES
Coerebidae			
<i>Coereba flaveola</i> (Linnaeus, 1758) ^N	NEC	1,00	RES
Thraupidae			
<i>Nemosia pileata</i> (Boddaert, 1783)	INS	0,28	PR
<i>Thlypopsis sordida</i> (d'Orbigny & Lafresnaye, 1837)	ONI	0,59	PR
<i>Thraupis sayaca</i> (Linnaeus, 1766)	ONI	1,00	RES
<i>Thraupis palmarum</i> (Wied, 1823)	ONI	0,78	RES
<i>Tangara cayana</i> (Linnaeus, 1766)	ONI	0,75	RES
<i>Dacnis cayana</i> (Linnaeus, 1766)	ONI	0,03	OT
<i>Conirostrum speciosum</i> (Temminck, 1824) ^x	ONI	0,03	OT
Emberizidae			
<i>Zonotrichia capensis</i> (Stadius Muller, 1776)	GRA	0,94	RES
<i>Volatinia jacarina</i> (Linnaeus, 1766) ^x	GRA	0,16	PR
<i>Sporophila caerulea</i> (Vieillot, 1823) ^x	GRA	0,25	PR
Parulidae			
<i>Geothlypis aequinoctialis</i> (Gmelin, 1789) ^x	INS	0,03	OT
Icteridae			
<i>Icterus cayanensis</i> (Linnaeus, 1766) ^x	ONI	0,06	OT
<i>Molothrus bonariensis</i> (Gmelin, 1789)	ONI	0,88	RES
Fringillidae			
<i>Euphonia chlorotica</i> (Linnaeus, 1766)	FRU	0,75	RES
Passeridae			
<i>Passer domesticus</i> (Linnaeus, 1758)	ONI	1,00	RES

^N indicates species seen nesting in the park; ^{*} indicates migratory species, although they have been classified as probable resident (PR) from the frequency data; ^x indicates species not recorded by GUSSONI (2007) in preliminary survey; Guilds: detritivorous (DET), carnivorous(CAR), nectivorous (NEC), insectivorous (INS), frugivorous (FRU), granivorous (GRA) and omnivorous (ONI); Occupation categories: resident (RES), probable resident (PR) and occasional or transitory (OT).

MATARAZZO-NEUBERGER (1995) emphasizes that is possible to increase the number of nectarivorous and frugivorous species in urban parks through increase of vegetal heterogeneity and covering.

CONCLUSIONS

Although the studied area is deeply altered it has significant bird species richness in comparison with other green areas inserted in urban zones. However, frugivorous, nectarivorous and specialized insectivorous bird species are present in much reduced numbers, due to the low resources offer for those species groups, which have more restricted food niches, corresponding to the most prejudiced by the urban structure. Therefore, the knowledge about attractive vegetable species to the birds is extremely important because it can aid in fauna and flora management programs, contributing for a possible increase of bird species richness and for the own ecosystem conservation.

ACKNOWLEDGMENTS

We thank Dr. Álvaro Fernando de Almeida for the first author orientation in the first three months of this study development; Dr. Edwin O'Neil Willis to solve some first author's doubts; Parks and Gardens Department of Rio Claro City Hall and the administration and employees of the Municipal Park of Lago Azul; National Council for Scientific and Technological Development (CNPq) for research grant 133971/2007-4.

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Recebido: 09/09/2008

Revisado: 10/05/2010

Aceito: 01/06/2010

