

Bird records from the rural landscape of Igarapé-Açu municipality, Northeastern Pará

Registros de aves na paisagem rural do município de Igarapé-Açu, nordeste paraense

Stefan Hohnwald¹

Abstract: This paper reports on bird records from the little studied Bragantina region, in the densely populated Northeastern Amazon. This region was a center of human colonization in the last century, resulting in the nearly complete replacement of rainforests by a dynamic, mosaic-like rural landscape pattern. From February 1999 to January 2001, I surveyed birds at three sites: a 25-ha smallholding farm, and around two small lakes, in the municipality of Igarapé-Açu. Bird species were recorded along 36 days during an agricultural experiment. As would be expected, species lists from these sites show reduced bird diversity in comparison to primary forests. They also reveal a preponderance of robust, widespread generalists, such as *Crotophaga ani* (Linnaeus, 1758), *Ramphocelus carbo* (Pallas, 1764), and *Columbina passerina* (Linnaeus, 1758). However, endemic *Xipholena lamellipennis* (Lafresnaye, 1839), *Tachybaptus dominicus* (Linnaeus, 1766), and *Primolius maracana* (Vieillot, 1816) (high count of 34 at one time), were also observed. In all, 110 bird species (representing 95 genera and 40 families) are listed with information about abundance and habitat. More detailed surveys of this region are recommended, which should focus on gallery forests that might serve as refuges for some forest species.

Keywords: Amazon. Bragantina region. *Primolius maracana*. Secondary vegetation. Smallholding. *Xipholena lamellipennis*.

Resumo: O objetivo deste artigo é comunicar alguns registros de aves na Zona Bragantina, uma região densamente povoada, mas pouco estudada no nordeste paraense. Como esta região foi um centro de colonização no último século, florestas foram destruídas quase completamente e substituídas por uma paisagem rural, fragmentada e dinâmica. Espécies de aves foram registradas durante 36 dias, de fevereiro de 1999 até janeiro de 2001, numa pequena propriedade de 25 ha e em dois lagos pequenos durante o trabalho de campo de um experimento agrícola. As listas de espécies mostram, como esperada, uma reduzida diversidade em comparação com a mata primária e uma dominância de espécies resistentes e de ampla distribuição, e.g. *Crotophaga ani* (Linnaeus, 1758), *Ramphocelus carbo* (Pallas, 1764) e *Columbina passerina* (Linnaeus, 1758). Também foram encontradas as espécies endêmicas *Xipholena lamellipennis* (Lafresnaye, 1839), *Tachybaptus dominicus* (Linnaeus, 1766) e até 34 indivíduos de *Primolius maracana* (Vieillot, 1816) ao mesmo tempo. No total, 110 espécies foram listadas (95 gêneros, 40 famílias), com informações sobre abundância e habitat. Por causa do método usado, os resultados não dão uma imagem completa da comunidade de aves, mas recomenda-se fazer levantamentos mais detalhados na região, especialmente em igapós que poderiam agir como refúgios para algumas espécies florestais.

Palavras-chave: Amazônia. Zona Bragantina. *Primolius maracana*. Vegetação secundária. Pequena propriedade. *Xipholena lamellipennis*.

¹ Institute of Geography. Department of Landscape Ecology. Göttingen, Germany (shohnwa@gwdg.de).

INTRODUCTION

There are huge areas in Central and Western Amazonia, which are still in a 'primary' state, and which have never been visited by ornithologists (Oren & Albuquerque, 1991). Since these areas are still mainly forested, they are expected to be species-rich and might reasonably include species that are rare, endangered, endemic, or even new to science (e.g. Silva & Pimentel Neto, 1997; Pacheco *et al.*, 2007). Exploration of such areas is a logical priority for biologists, particularly those in the conservation community.

Conversely, rural landscapes in Amazonia have received little attention from ornithologists and birdwatchers. Densely settled rural landscapes, which contain a significantly reduced avifauna in comparison to primary forests, are typically dominated by widespread common invaders and well-known neotropical generalists, and hence, attract little attention from the ornithological and conservation biology societies. A case in point is provided by the Bragantina region of Northeastern Pará State. The region is delineated to the west and the east by respectively the cities of Castanhal and Bragança, and to the north and south by the Atlantic Ocean and the river Guamá. Biogeographically, it belongs to the drier easternmost frontier of the Amazon, usually referred to as the 'Belém'-area of endemism (Haffner, 1969; Bates *et al.*, 1998; Silva *et al.*, 2005). As the Bragantina region was a center of colonization during the last century, human population density increased to an extraordinary high level for the Amazon of 38.9 inhabitants km⁻² in 1996 (IBGE, 2008). From the beginning of the last century, forested areas were assigned to settlers along the railroad Belém-Bragança, who turned the land use of their lots into extensive and fallow-based agricultural use. As a consequence, the ancient natural vegetation, the evergreen tropical rain forest, was almost completely converted into agricultural lands (Egler, 1961; Metzger, 2002). Because the common agricultural systems are based on slash-and-burn activities, the sustainability is based on the forest fallows, which are nationally called 'capoeira', in Brazil (Denich, 1991). Thus, the region mainly consists of a mosaic of maize, bean and cassava fields, and

especially of extended capoeiras of various ages (Metzger, 2003). In the last decades, many of these areas were turned into more intensive agriculture. Capoeira fallows were shortened or completely replaced by permanent and semi-permanent land use systems like passion fruit, black pepper, or oil palm plantations (e.g. Silva *et al.*, 1998; IBGE, 2008; Metzger, 2002, 2003). Also, since the 1980s, cattle husbandry became popular and large areas, even on smallholdings, were turned into pastures, a process called 'pecuarização' of the Bragantina region (Serrão & Toledo, 1992). The municipality of Igarapé-Açu typifies the Bragantina region and is classified as a rural region of middle to high demographic density with a tessellated landscape structure of various land use types (Nepstad *et al.*, 1996; IBGE, 2008; Metzger, 2002; MMA, 2006). From the former rain forest, only small fragments remained, mainly as gallery forests along creeks (igapós), where no other use is possible. The climate of the region belongs to the humid warm tropics (Lauer *et al.*, 1996), with a mean annual temperature of 27.6 °C and an average yearly rainfall of 2.469 mm. The 'Marcelino' climate station in Igarapé-Açu (Embrapa), in comparison to Belém, shows a prolonged dry season, which lasts from July until January (Denich, 1991; Hohnwald, 2002).

While investigations into the avifauna of the Belém area have a long scientific history (Novaes & Lima, 1998), there is only some basic information about the avifauna of Pará State in general (Novaes, 1980; Oren & Henriques, 1994; Nepstad *et al.*, 1996) or the Bragantina region hinterland itself. However, one checklist includes major parts of adjacent areas east of Belém and gives an overview and an estimation of the abundance of species, but does not cover the whole region (Forrester, 1993). Detailed field observations were carried out in savannas, capoeiras, and mangroves in the municipality of Vigia (Novaes & Lima, 1992), which will be used as a reference in this study. There is no explicit publication concerning the avifauna of Igarapé-Açu itself. Therefore, the objective of this paper is to report the most important bird observations and to enhance the knowledge of the avifauna of an ornithologically poorly known region.



METHODS

STUDY SITES

A two-year stay during the bilateral German-Brazilian SHIFT (Studies of Human Impact on Forests and Floodplains in the Tropics) project in the rural landscape of Igarapé-Açu, provided the opportunity to note some bird observation data besides fieldwork on a typical smallholder property.

The main observation location was a 25 ha smallholding (1 lot) in the vicinity of the village Nova Olinda at 47° 30' 18.46" W / 1° 2' 54" S in the northeast of the municipality of Igarapé-Açu, at the 'estrada velha Igarapé-Açu – Maracanã' (= road PA-426), at km 9 (site 1). The land use of the smallholding shows the typical mosaic pattern of a smallholder farm (Figure 1) with fruit trees and garden like plantations around the house located next to the road. Behind that home garden, a rural mosaic of cassava fields of up to two hectares, passion fruit and pepper plantations, as well as one to five hectare *Brachiaria*-pastures can be found. Furthermore, it also incorporates several small two-to-13 years old capoeira vegetation (up to 10 m high), and an on average 15 m high mature igapó forest along the Pupuca creek, in the back of the lot. Because fields, pastures, and plantations were not clearly separated from each other there often were young capoeira hedgerows between the units. The location also included the experimental site of the SHIFT-Pecuária project, where a 3.2 ha pasture of *Brachiaria humidicola* (Rendle) Schweick. (quicuío-da-Amazônia) was planted (Figure 1). The experiment incorporated treatments with bushy components in the pastures, e.g. a grass-capoeira pasture in which up to 30% cover of the re-sprouting capoeira re-growth is tolerated, a bushy grass-legume pasture, and nine 100 m² capoeira islands (Hohnwald, 2002; Hohnwald *et al.*, 2006).

At site 1, birds were checked on 36 days: 21 days during the rainy season (six in 1999, seven in 2000, eight in 2001), and 15 days during the dry season (seven in 1999, eight in 2000), respectively. Observations were

carried out during the agricultural field work, which lasted usually from approximately 8:00 to 16:00 hours. For data calculation, some single bird observations from other days were added to the next respective daily checklist.

The second location was a small pond (site 2) at km 2 of the PA-426 road, at 47° 32' 03.52" W / 1° 06' 34.22" S. This pond reaches a maximum size of 500 m² during the rainy season in March, but regularly dries completely out during the dry season, usually from October until the end of January. Its borders are mainly covered by three to six year old capoeira vegetation, but cattle trampling also leads to open and sandy lake borders. Due to its small size and also due to lack of time this location was only shortly checked during ten days, usually some minutes around 7:30 and at 16:15 hours. Additionally, some single bird observations of up to 1 km distance from site 2 along the road were added to this checklist.

The third site is the lake at the southern border of the city of Igarapé-Açu at 47° 37' 13.60" W / 1° 08' 36.56" S (site 3). This lake was visited seven times, usually at around 17:30 until dusk. The lake is extensively covered with water hyacinths (*Eichhornia crassipes* (Mart.) Solms, Pontederiaceae) and its border consisted of up to three years old capoeira.

Besides these three locations, additional observations from Igarapé-Açu municipality are also included in this paper, giving scientific family and species names, locations, remarks, and observation dates. Some records of noteworthy species which occur in Table 1 are further specified in the text.

OBSERVATIONS AND DATA EVALUATION

All bird observations, including the single ones in the text, were recorded between March 1999 and January 2001 in the municipality of Igarapé-Açu. Records were made through visual observations using 7 x 50 mm-binoculars. Some species, e.g. the Rallidae, were mainly identified by their voices and are marked with a '(v)' in the table. For species determination, mainly Ridgely & Tudor (1989; 1994), Hilty & Brown (1986), and Novaes & Lima (1998) were used.





Figure 1. Aerial view to the south on the studied smallholding at Nova Olinda (site 1): the typical rural landscape mosaic of the Bragantina region can be seen which consists of cassava fields, pastures, gardens, and capoeira. Around the Pupuca creek (right hand) dense gallery forests (igapó) can be seen, which turn into approximately 13 years old capoeiras further left (e.g. broad forest stripe behind road). At the centre of the photo, the pasture experiment of the SHIFT-project with its six dark capoeira spots is visible. The road on the left hand is the 'estrada velha Igarapé-Açu – Maracanã, PA-426', at km 9. The road at the bottom is the travessa 9. Photo: Wickel & Vielhauer, 15 April 2000.

Daily checklists of site 1 were evaluated for abundance and frequency of each species. According to the frequency, species were categorized *sensu* Novaes & Lima (1992) namely as: abundant (present in > 80% of the days), common (61-80%), regular (41-60%), occasional (20-40%), and rare (< 20%). Bird records were also evaluated for wet (January-June) and dry season (July-December). Taxonomy follows Pacheco *et al.* (2007) and CBRO (2008), while assessment of species vulnerability follows Stattersfield & Capper (2000). The total species number is calculated by adding all species of Table 1 to the free-living species mentioned in the text.

RESULTS

In total, 110 bird species, belonging to 95 genera and 40 families were recorded. At site 1, 87 species, 76 genera, and 32 families were found (Table 1). Using the above cited abundance criteria, 19 species were considered abundant, 13 common, 19 regular, 19 occasional, and 17 rare. At site 2, there were 45 species, 43 genera, and 23 families, almost the same numbers as at site 3 (45, 38, 22), respectively.

None of the bird species found on any of the three sites is considered to be globally endangered, but *Primolius maracana*, found at site 1, is classified as 'vulnerable' (Stattersfield & Capper, 2000).

Table 1. Classification of the recorded bird species on a smallholding at Nova Olinda (site 1, Igarapé-Açu municipality) in five classes (A - abundant > 80% of the days, B - common 61-80%, C - regular 41-60%, D - occasional 20-40%, and E - rare < 20%, n = 36 days of observation). Habitat abbreviations: A = pasture, B = breeding on smallholding, C = capoeira (> 2 years old), E = experiment (grass-capoeira pasture), F = cassava fields, G = garden, H = hedgerows, young capoeira (≤ 2 years old), tall grasses, I = igapó forests, O = overflight, P = pepper fields. In the fourth column, the abundance of bird species of a capoeira in Vigia is listed, according to the same classes (A - E, Novaes & Lima, 1992). * = among the twenty most abundant capoeira species in Vigia. In the last two columns, the presence of species at site 2 and 3 is marked qualitatively. (v) = mainly identified by voice. Taxonomy follows CBRO (2008).

Scientific Name	Family	Site 1+habitat	Vigia	Site 2	Site 3
Continue					
class A: abundant					
<i>Crypturellus soui</i> (Hermann, 1783) (v)	Tinamidae	AEH	B	×	
<i>Cathartes aura</i> (Linnaeus, 1758)	Cathartidae	O	B	×	×
<i>Coragyps atratus</i> (Bechstein, 1793)	Cathartidae	BO	B*	×	×
<i>Laterallus viridis</i> (Statius Muller, 1776) (v)	Rallidae	AEH	B		
<i>Columbina passerina</i> (Linnaeus, 1758)	Columbidae	ABEFGHP	B	×	×
<i>Columbina talpacoti</i> (Temminck, 1811)	Columbidae	AIEFGHP	B*	×	×
<i>Primolius maracana</i> (Vieillot, 1816)	Psittacidae	FIO	B*		
<i>Crotophaga ani</i> (Linnaeus, 1758)	Cuculidae	ABCEFGHP	B	×	×
<i>Elaenia flavogaster</i> (Thunberg, 1822)	Tyrannidae	AEGHP	B*	×	×
<i>Pitangus sulphuratus</i> (Linnaeus, 1766)	Tyrannidae	ABEFGHIP	A	×	×
<i>Tyrannus melancholicus</i> (Vieillot, 1819)	Tyrannidae	ABCEFGHP	A	×	×
<i>Pheugopedius genibarbis</i> (Swainson, 1838) (v)	Troglodytidae	CHI	C	×	×
<i>Troglodytes musculus</i> (Naumann, 1823)	Troglodytidae	ABGHP	B	×	×
<i>Thraupis episcopus</i> (Linnaeus, 1766)	Thraupidae	ABCGI	B*	×	×
<i>Thraupis palmarum</i> (Wied, 1823)	Thraupidae	ABCEGI	B	×	×
<i>Ramphocelus carbo</i> (Pallas, 1764)	Thraupidae	BCEGHI	A*	×	×
<i>Sporophila minuta</i> (Linnaeus, 1758)	Emberizidae	AFHP	C*	×	×
<i>Sporophila nigricollis</i> (Vieillot, 1823)	Emberizidae	AFHP	C		×
<i>Volatinia jacarina</i> (Linnaeus, 1766)	Emberizidae	AHEF	B*	×	×
class B: common					
<i>Rupornis magnirostris</i> (Gmelin, 1788)	Accipitridae	ACEGIO	B	×	×
<i>Nyctidromus albicollis</i> (Gmelin, 1789) (v)	Caprimulgidae	AP	B	×	×
<i>Tachornis squamata</i> (Cassin, 1853)	Apodidae	AIO	C	×	×
<i>Chelidoptera tenebrosa</i> (Pallas, 1782)	Bucconidae	ACEI	C	×	
<i>Ramphastos tucanus</i> (Linnaeus, 1758) (v)	Ramphastidae	CI	C		
<i>Lathrotriccus euleri</i> (Cabanis, 1868) (v)	Tyrannidae	CEGH			
<i>Myiozetetes cayanensis</i> (Linnaeus, 1766)	Tyrannidae	ABCEGHI	A*		×
<i>Stelgidopteryx ruficollis</i> (Vieillot, 1817)	Hirundinidae	AEHOP	A*	×	×
<i>Turdus leucomelas</i> (Vieillot, 1818)	Turdidae	BCG	B	×	×
<i>Coereba flaveola</i> (Linnaeus, 1758)	Coerebidae	CGI	B*	×	×
<i>Tachyphonus rufus</i> (Boddaert, 1783)	Thraupidae	CEGHI	B*	×	×



Continue

Scientific Name	Family	Site 1+ habitat	Vigia	Site 2	Site 3
<i>Ammodramus aurifrons</i> (Spix, 1825) (v)	Emberizidae	ABEP	D		
<i>Saltator maximus</i> (Statius Muller, 1776)	Cardinalidae	CEI	C		X
class C: regular					
<i>Leucopternis albicollis</i> (Latham, 1790)	Accipitridae	CIO			
<i>Caracara plancus</i> (Miller, 1777)	Falconidae	AO		X	
<i>Milvago chimachima</i> (Vieillot, 1816)	Falconidae	AO	C	X	
<i>Vanellus chilensis</i> (Molina, 1782)	Charadriidae	ABP	C	X	X
<i>Leptotila rufaxilla</i> (Richard & Bernard, 1792)	Columbidae	FGHP	B		
<i>Playa cayana</i> (Linnaeus, 1766)	Cuculidae	CI	B	X	
<i>Tapera naevia</i> (Linnaeus, 1766) (v)	Cuculidae	AH	C	X	X
<i>Chaetura spinicaudus</i> (Temminck, 1839)	Apodidae	CIO	C		
<i>Todirostrum chrysocrotaphum</i> (Strickland, 1850)	Tyrannidae	CGI			
<i>Legatus leucophaius</i> (Vieillot, 1818)	Tyrannidae	CGEHI		X	X
<i>Manacus manacus</i> (Linnaeus, 1766) (v)	Pipridae	CI	A*		
<i>Progne chalybea</i> (Gmelin, 1789)	Hirundinidae	AEOP		X	X
<i>Hirundo rustica</i> (Linnaeus, 1758)	Hirundinidae	AEO	D	X	
<i>Schistochlamys melanopsis</i> (Latham, 1790)	Thraupidae	CEHI	C	X	X
<i>Ammodramus humeralis</i> (Bosc, 1792) (v)	Emberizidae	AHP	A*		
<i>Coryphospingus cucullatus</i> (Statius Muller, 1776)	Emberizidae	CEHI			
<i>Caryothraustes canadensis</i> (Linnaeus, 1766)	Cardinalidae	CEI	D		
<i>Cacicus cela</i> (Linnaeus, 1758)	Icteridae	GO	C	X	X
<i>Sturnella militaris</i> (Linnaeus, 1758)	Icteridae	ABEH	C	X	X
class D: occasional					
<i>Laterallus exilis</i> (Temminck, 1831) (v)	Rallidae	AH			
<i>Pionus menstruus</i> (Linnaeus, 1766)	Psittacidae	CIO	C		
<i>Amazona amazonica</i> (Linnaeus, 1766)	Psittacidae	CIO			
<i>Guira guira</i> (Gmelin, 1788)	Cuculidae	AEGH			
<i>Heliophryx auritus</i> (Gmelin, 1788)	Trochilidae	I	D		
<i>Dryocopus lineatus</i> (Linnaeus, 1766)	Picidae	CGI	D		
<i>Thamnophilus amazonicus</i> (Sclater, 1858)	Formicariidae	CH	C		
<i>Formicivora grisea</i> (Boddaert, 1783) (v)	Formicariidae	EFHI	C		
<i>Synallaxis albescens</i> (Temminck, 1823)	Furnariidae	FH			
<i>Synallaxis gujanensis</i> (Gmelin, 1789)	Furnariidae	FH	C		
<i>Phaeomyias murina</i> (Spix, 1825) (v)	Tyrannidae	CGH	D		
<i>Xipholena lamellipennis</i> (Lafresnaye, 1839)	Cotingidae	CI	D		
<i>Anthus lutescens</i> (Pucheran, 1855)	Motacillidae	ABP	C		
<i>Dacnis cayana</i> (Linnaeus, 1766)	Thraupidae	CGI	D		



Continue

Scientific Name	Family	Site 1+ habitat	Vigia	Site 2	Site 3
<i>Cyanerpes caeruleus</i> (Linnaeus, 1758)	Thraupidae	CGI	D		
<i>Cyanerpes cyaneus</i> (Linnaeus, 1766)	Thraupidae	CGI	D		
<i>Euphonia violacea</i> (Linnaeus, 1758)	Thraupidae	CGI	C*		
<i>Sporophila americana</i> (Gmelin, 1789)	Emberizidae	AP	A*		X
<i>Molothrus oryzivorus</i> (Gmelin, 1788)	Icteridae	AO			
class E: rare					
<i>Ardea alba</i> (Linnaeus, 1758)	Ardeidae	O			X
<i>Spizaetus tyrannus</i> (Wied, 1820)	Accipitridae	CO			
<i>Herpetotheres cachinnans</i> (Linnaeus, 1758)	Falconidae	AC			
<i>Panyptila cayennensis</i> (Gmelin, 1789)	Apodidae	AO	C		
<i>Amazilia versicolor</i> (Vieillot, 1818)	Trochilidae	GI			
<i>Trogon viridis</i> (Linnaeus, 1766)	Trogonidae	I	C		
<i>Pteroglossus aracari</i> (Linnaeus, 1758)	Ramphastidae	CI			
<i>Picumnus cirratus</i> (Temminck, 1825)	Picidae	C			
<i>Melanerpes cruentatus</i> (Boddaert, 1783)	Picidae	I			
<i>Thamnophilus palliatus</i> (Lichtenstein, 1823) (v)	Formicariidae	CFH	C		X
<i>Tyrannus savana</i> (Vieillot, 1808)	Tyrannidae	AO	D		
<i>Chiroxiphia pareola</i> (Linnaeus, 1766)	Pipridae	CI	D		
<i>Pipra rubrocapilla</i> (Temminck, 1821)	Pipridae	C	D		
<i>Tityra semifasciata</i> (Spix, 1825)	Tityridae	CIO			
<i>Ramphocaenus melanurus</i> (Vieillot, 1819)	Troglodytidae	CI			
<i>Chlorophanes spiza</i> (Linnaeus, 1758)	Thraupidae	C			
<i>Cacicus haemorrhous</i> (Linnaeus, 1766)	Icteridae	AO			
Species found only at site 2 and site 3					
<i>Tachybaptus dominicus</i> (Linnaeus, 1766)	Podicipedidae			X	
<i>Butorides striata</i> (Linnaeus, 1758)	Ardeidae			X	X
<i>Bubulcus ibis</i> (Linnaeus, 1758)	Ardeidae			X	
<i>Gampsonyx swainsonii</i> (Vigors, 1825)	Accipitridae			X	
<i>Heterospizias meridionalis</i> (Latham, 1790)	Accipitridae			X	
<i>Falco rufifigularis</i> (Daudin, 1800)	Falconidae			X	
<i>Porphyrio martinica</i> (Linnaeus, 1766)	Rallidae			X	
<i>Jacana jacana</i> (Linnaeus, 1766)	Jacanidae			X	X
<i>Megaceryle torquata</i> (Linnaeus, 1766)	Alcedinidae				X
<i>Chloroceryle amazona</i> (Latham, 1790)	Alcedinidae			X	
<i>Myiozetetes similis</i> (Spix, 1825)	Tyrannidae			X	X
<i>Cyclarhis gujanensis</i> (Gmelin, 1789)	Vireonidae				X
<i>Tachycineta albiventer</i> (Boddaert, 1783)	Hirundinidae				X



Scientific Name	Family	Site 1+habitat	Vigia	Conclusion	
				Site 2	Site 3
<i>Donacobius atricapilla</i> (Linnaeus, 1766)	Donacobiidae				X
<i>Turdus nudigenis</i> (Lafresnaye, 1848)	Turdidae				X
<i>Saltator coerulescens</i> (Vieillot, 1817)	Cardinalidae				X
<i>Geothlypis aequinoctialis</i> (Gmelin, 1789)	Parulidae				X

The only North-American migrants recorded were five individuals of *Hirundo rustica* noted on spring migration on 3, 9, and 22 January (two individuals), and 5 February 2001, which is much earlier than the record of 9 April from Vigia (Novaes & Lima, 1992).

Mixed flocks of over 40 individuals of *Sporophila minuta*, *Sporophila nigricollis*, *Sporophila americana*, and *Volatinia jacarina* were frequent around site 1 during the dry season, mainly feeding on cassava fields and pastures. Some of them might be inner-Brazilian migrants from semi-arid Northeastern Brazil. One mixed-species flock of five *Ramphocelus carbo*, three *Thraupis episcopus*, four *Saltator maximus*, and two *Schistochlamys melanopsis* were observed at site 1, on 27 September 2000.

Bird trapping takes place almost daily in Igarapé-Açu and a considerable number of birds are sold at local markets. The most often trapped species are usually good singers, such as *Sporophila minuta*, *Sporophila nigricollis*, *Turdus leucomelas*, *Euphonia violacea*, and *Amazona amazonica*, but also *Volatinia jacarina*, *Ramphocelus carbo*, and the non-residential *Paroaria dominicana* (Linnaeus, 1758), from Northeastern Brazil.

Some additional bird observations from the municipality of Igarapé-Açu and more detailed information about some noteworthy species are listed below:

Podicipedidae

Tachybaptus dominicus – Suspected of breeding at site 2 in 2000 and 2001.

Ardeidae

Bubulcus ibis – Ten individuals seen at km 21 of BR 316 (1° 18' 42.65" S / 47° 43' 26.20" W) on 21 September 2000.

Accipitridae

Leucopternis albicollis – One individual at site 1 defended its territory by attacking a *Herpetotheres cachinnans* on 18 May 1999.

Spizaetus tyrannus – One individual overflying capoeira at site 1 on 27 July 1999.

Falconidae

Caracara plancus – One individual at road PA-242 between Igarapé-Açu and São Luís do Pará on 15 May 1999.

Scolopacidae

Gallinago paraguayae (Vieillot, 1816) – One individual observed on a wet pasture at 1° 07' 16.77" S / 47° 34' 53.62" W on 14 March 2000.

Columbidae

Columbina passerina – A nest containing two white eggs was found in the middle of the grass-capoeira pasture treatment at site 1 on 11 April 2000. Another nest with two eggs was found on another grass-capoeira pasture replication in May 2001.

Columba livia (Gmelin, 1789) – This exotic species is a frequent breeder in the city centre of Igarapé-Açu, and was recorded throughout 1999-2001.

Psittacidae

Primolius maracana – Thirty-four individuals were observed feeding in a maize field at site 1 on 16 December 2000.

Cuculidae

Guira guira – Flocks of this species were frequently seen at the roads BR 316, PA-127, and PA-242 during 1999-2001.

Tytonidae

Tyto alba (Scopoli, 1769) – Breeding confirmed from the old market ruin in the centre of Igarapé-Açu, from 1999-2001.



Caprimulgidae

Nyctidromus albicollis – Pairs or individuals of this species were observed approximately every 0.7 km on the road PA-426, outside the small villages, after dusk on 10 March 1999. One individual was also observed in capoeira at the Cumarú settlement on 17 March 1999.

Trogonidae

Trogon viridis – One male individual in igapó forest at site 1 on 27 September 2000.

Ramphastidae

Ramphastos vitellinus (Lichtenstein, 1823) – Two individuals sighted at the road PA-127 at 1° 10' 30.05" S / 47° 39' 35.84" W on 14 January 2001.

Picidae

Picumnus cirratus – One female individual in capoeira at site 1 on 27 September 2000.

Cotingidae

Xipholena lamellipennis – Recorded on three occasions from site 1: one male passing from igapó to old capoeira on 28 March 2000; one female in the canopy of the igapó forest on 27 December 2000; and one male in the canopy of the igapó forest on 4 January 2001 (Figure 1).

Pipridae

Chiroxiphia pareola – One male (showing display) and one female in a capoeira (later igapó forest) at site one on 1 September 1999.

Pipra rubrocapilla – One individual in capoeira at site 1 on 22 September 1999.

Tityridae

Tityra semifasciata – One individual flying from capoeira to igapó forest at site on 29 June 2000.

Hirundinidae

Progne tapera (Vieillot, 1817) – A flock of five individuals was seen at km 6 PA-426 on 25 March 1999.

Poliptilidae

Ramphocaenus melanurus – Three individuals in a capoeira at site 1 on 22 September 2000.

Emberizidae

Ammodramus aurifrons – Successful breeding was confirmed on traditional pasture at site 1 on 8 January 2001.

Icteridae

Cacicus haemorrhous – Two individuals flying above pastures at site 1 on 15 January 2001.

Cacicus cela – Breeding colony was found in the centre of Nova Olinda village, at 1° 02' 09.76" S / 47° 29' 45.19" W on 21 September 2000.

Sturnella militaris – Frequent breeder on pastures, e.g. along BR 316, PA-127, PA-242, and PA-395 (1999-2001).

Passeridae

Passer domesticus (Linnaeus, 1758) – A common breeder in the city centre of Igarapé-Açu (1999-2001).

DISCUSSION

The records show the expected reduced bird diversity of rural landscapes (Christiansen & Pitter, 1997; Ribon *et al.*, 2003) in comparison to other forested Amazonian landscapes, especially with primary forests (Silva & Pimentel Neto, 1997; Pacheco *et al.*, 2007). Thus, the most frequently found bird species, e.g. *Crotophaga ani* (Figure 2), *Columbina passerina*, *Pitangus sulphuratus*, *Tyrannus melancholicus*, *Volatinia jacarina*, *Ramphocelus carbo*, and *Thraupis palmarum*, are generalists with a broad distribution in South America. In general, the results show the same species spectrum found by Novaes & Lima (1992) in the capoeiras, savannas and mangroves of Vigia. For instance, if compared with the twenty most abundant bird species of the capoeira (Novaes & Lima, 1992: Table 3), seven species are also found among the 'abundant' species in this study (Table 1). However, *Campylopterus largipennis* (Boddaert, 1783), *Myiobius barbatus* (Gmelin, 1789), and *Hylophilus semicinereus* (Sclater & Salvin, 1867) were not observed in Igarapé-Açu. On the other hand, there are *Lathrotriccus euleri*, *Leucopternis albicollis*, *Caracara plancus*, *Todirostrum chrysocrotaphum*, *Legatus leucophaeus*, *Coryphospingus cucullatus* which were not mentioned by Novaes & Lima (1992), although 'regularly' found in Igarapé-Açu (Table 1). These species might have been overlooked by Novaes & Lima (1992) probably just



Figure 2. Smooth-billed Ani (*Crotophaga ani*) is the most common character bird species of the mosaic-like rural landscape in Igarapé-Açu municipality.

due to their limited observation times. Also, *Crotophaga ani* and *Columbina passerina* seem to be much more common in Igarapé-Açu than in Vigia. The main differences can be explained by the different survey methods, slightly different habitats, e.g. pure capoeiras, savannas, mangroves in contrast to a rural landscape mosaic, and different study times.

Besides abundant neotropical generalists, there are some noteworthy observations in Igarapé-Açu, such as that of *Xipholena lamellipennis*, *Tityra semifasciata*, *Chiroxiphia pareola*, *Cacicus haemorrhous*, *Pipra rubrocapilla*, *Trogon viridis*, *Spizaetus tyrannus*, *Picumnus cirratus*, and *Ramphocaenus melanurus*. These observations indicate that the mosaic-like rural landscape might still host more rare

forest bird species than expected. The more so probably if major forest patches and tree islands would be protected (Nepstad *et al.*, 1996). As species conservation strategies should not just concentrate on protected areas alone, smallholders have a considerable responsibility for the conservation of the local avifauna. Compensation payments might be an option for farmers to help maintain larger forest patches on smallholdings.

Xipholena lamellipennis is classified as a rare to locally uncommon forest bird species, living in humid tropical forest canopies and at forest borders (Ridgely & Tudor, 1994). As this species is endemic to the Lower Amazon, south of the river Amazon (Ridgely & Tudor, 1994), its survival must be

seen as critical for the eastern half of its range to Maranhão is already densely settled and heavily deforested. However, as it was occasionally found in Vigia (Novaes & Lima, 1992) and the fact that both sexes have been observed at site 1 indicates that the species might be able to survive in forest islands of the Bragantina region. *Primolius maracana* is qualified as worldwide 'vulnerable' because of rapid decline in population due to exploitation, habitat loss, and degradation (Stattersfield & Capper, 2000; Snyder *et al.*, 2000). The isolated island population of Northeast Pará (Juniper & Parr, 1998; Stattersfield & Capper, 2000) must also be considered critical in that context. However, large flocks of up to 34 individuals and regular observations of pairs all around Igarapé-Açu municipality and other common observations within the Bragantina region (Novaes & Lima, 1992) suggests that the population is stable in the region. But, as the species is said to feed partly on maize and beans, some farmers regard them as a pest (personal interview with three farmers). On the other hand, there were no signs that *Primolius maracana* is hunted or trapped for cage-bird trading. The species also obviously like to feed on bacuri trees (*Platonia insignis* Mart., Clusiaceae), which can be frequently found on smallholdings.

Guira guira is declared as 'scarce' in the Belém hinterland (Forrester, 1993), which seems either a printing error, a rough underestimation, or it might have become more common in the region with increasing deforestation in the last decades. Based on permanent observations at the Embrapa Amazônia Oriental in Belém, but also along the roads between Belém and Castanhal (BR 316), between Castanhal and Igarapé-Açu, and within the municipality of Igarapé-Açu the species should be clearly declared as a normal 'resident'. However, it seems that *Guira guira* is more abundant around Belém than in Igarapé-Açu. Besides the character bird species *Crotophaga ani* of the rural landscape, the other member of the Cuculidae family *Tapera naevia* seems to be almost as abundant as *Guira guira* in the rural landscape of Igarapé-Açu.

Besides bats and monkeys, birds are the most important seed dispersers in the Neotropics and play a major

ecological role as facilitator species in the recolonization of capoeira tree species on degraded lands (Vieira *et al.*, 1994). As the capoeira is still the ecological basis of fallow-based agriculture on smallholdings (Denich, 1991), these species are also agronomically important for the rural Bragantina region. Fortunately, most seed-dispersing bird species such as *Ramphocelus carbo*, *Thraupis episcopus*, *Thraupis palmarum*, *Sporophila minuta*, *Sporophila nigricollis*, *Volatinia jacarina*, *Coereba flaveola*, *Tachyphonus rufus*, *Ammodramus aurifrons*, and *Saltator maximus* are still quite common in the rural landscape (Table 1; classes A-B) so that the capoeira recuperation abilities seem to be unlimited.

The innovative agro-silvo-pastoral system of a grass-capoeira pasture (Hohnwald, 2002; Hohnwald *et al.*, 2006) seems to offer attractive habitats for some rural bird species, e.g. *Crotophaga ani*, *Ramphocelus carbo*, and especially *Columbina passerina*, whose nests were found exactly in the middle of grass-capoeira pastures.

The presented bird observations were collected alongside field work of an agricultural field trial and thus surely will not be as complete as intensive mist-netting or other intense inventories. In many cases there was simply no time to track down bird vocalizations or other short appearances so that shy, rare, hidden or nocturnal species are probably underrepresented or overlooked in this study. This fact makes it also difficult to compare the results with other studies. However, an advantage of this study is that observations have been carried out over a rather long period of time, which often provides more accurate data than intensive studies for a short time (Bibby *et al.*, 1992).

However, many common species (Forrester, 1993) of the Northeastern Amazon were not observed in the study area and might simply have been overlooked, e.g. *Camptostoma obsoletum* (Temminck, 1824), *Empidonomus varius* (Vieillot, 1818), *Leptotila verreauxi* (Bonaparte, 1855), *Myiarchus tuberculifer* (d'Orbigny & Lafresnaye, 1837), *Tyrannulus elatus* (Latham, 1790), *Hylophilus pectoralis* (Sclater, 1866), *Pachyramphus rufus* (Boddaert, 1783), *Pteroglossus inscriptus* (Swainson, 1822), *Myiophobus*



fasciatus (Statius Muller, 1776), or *Brotogeris versicolurus* (Statius Muller, 1776).

Land use changes constantly take place in the rural landscape of the Bragantina region, following changing market prices of various products (Metzger, 2002; IBGE, 2008). As birds are specialized in their ecological niches, but also are able to quickly react to the environmental changes by simply flying to more suitable areas, the bird composition might be as dynamic as the changes in agro-ecosystems. Fortunately for bird life, most smallholder production systems are still extensively carried out and often based on capoeira fallows so that bird diversity stayed remarkably high in Igarapé-Açu. However, huge areas of the Eastern Amazon are already clear-cut and look worse than the investigated rural landscape. As deforestation of the Amazon continues, it is probable that a species-poor 'unattractive' bird community of generalist species will soon also be found in other parts of the Amazon, although in other bio-geographical zones these communities might contain slightly different species. Unfortunately, there are no local bird associations or even clubs, offering to publish annual bird reports and species lists, and usually infra-structure for international tourists or birdwatchers are lacking. Nevertheless, it should be interesting enough for scientists to observe which bird species keep pace with the dynamic land use changes in the Amazon.

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