Check List 2007: 3(2)
ISSN: 1809-127X

LISTS OF SPECIES

Fish, Machado River basin, Cacoal urban area, state of Rondônia, Brazil.

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Abstract
The Pirarara and Tamarupa rivers are two urban tributaries of the Machado River in Cacoal municipality, state of Rondônia (RO), Brazil. Here we report a list of species of fishes from urban areas of Cacoal, being the first ichthyological study in this region. Field work at Cacoal was carried out from November 2004 until July 2005, using gill nets, casting nets, and long lines. Two hundred and twenty-two specimens were collected, and are distributed in 48 species, 14 families and 4 orders. The most representative order was Characiformes, with seven families and 23 species, followed by Siluriformes, with three families and 20 species.

Introduction

The Pirarara and Tamarupa rivers are two urban tributaries of the Machado River in Cacoal municipality, state of Rondônia, Brazil. When compared to southern and southeastern regions, relatively few studies on fishes were published in the Amazon, especially in the Rondônia State (e.g. Santos 1987; Barthem 2001). Among the causes that may be restraining the occurrence of certain fish species in urbanized environment, we have the removal of riparian forest, effluent discharges, channel alteration and introduction of exotics species (e.g. Barthem 2001; Oliveira and Bennemann 2005). Here we report a list of species of fishes from urban areas of Cacoal (RO), being the first study of the kind in the region.

Materials and methods

The survey of the fishes was carried out in the Pirarara and Tamarupa rivers, affluents of the Machado River, city of Cacoal (11º26'S, 61º26'W), state of Rondônia, Brazil (Figure 1). The region was covered by tropical rainforests ("Amazônia" *sensu* Ab'Saber 1977), but during the 1980s the greatest human occupation of RO along the BR-364 highway caused progressive deforestation (Vanzolini 1986; Kemper 2002).

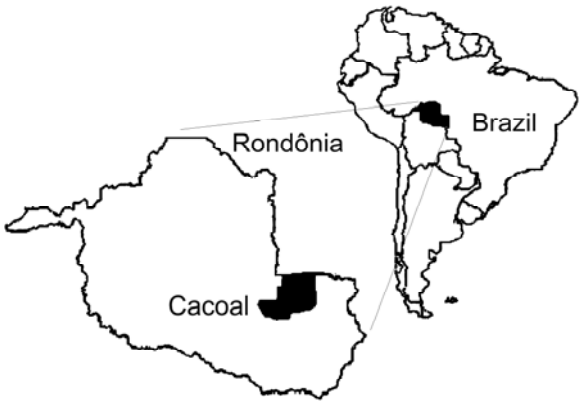

Figure 1. South America, showing the situation of state of Rondônia and Cacoal municipality.

Field work at Cacoal was made from November 2004 until July 2005, using gill nets, casting nets, and long lines. The identification of species followed Eigenmann (1917; 1921), Pearson (1924), Lauzane and Loubens (1989) and Lima et al. (2005). Classification of species is presented according to Reis et al. (2003) except Serrasalmidae, considered as subfamily of Characidae in that study. Voucher specimens were deposited in the fish collection of Museu de Zoologia (MZUEL), Departamento de Biologia Animal e Vegetal, Centro de Ciências Biológicas, Universidade Estadual de Londrina (UEL), state of Paraná, Brazil.

Results and discussion

Two hundred and twenty-two specimens were collected, and are distributed in four orders, 14 families and 48 species (Table 1). The most representative order was Characiformes, with seven families and 23 species, followed by Siluriformes, with three families and 20 species.

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Table 1. Species captured in the Pirarara and Tamarupa rivers, city of Cacoal (RO, Brazil).

Order/ Family/ Species	Pirarara	Tamarupa
Order Characiformes		
Family Parondontidae		
Parodon buckleyi Boulenger, 1887	-	+
Family Curimatidae		
Cyphocharax spiluropsis (Eigenmann & Eigenmann, 1889)	+	+
Steindachnerina argentea (Gill, 1858)	-	+
Steindachnerina fasciata (Vari & Géry, 1985)	+	+
Steindachnerina leucisca (Günther, 1868)	+	-
Family Prochilodontidae		
Prochilodus nigricans Agassiz, 1829	-	+
Family Anostomidae		
Leporinus friderici (Bloch, 1794)	-	+
Leporinus granti Eigenmann, 1912	+	+
Leporinus sp**.**	+	-
Family Characidae		
Astyanax aff. *bimaculatus* (Linnaeus, 1781)	+	+
Astyanax sp.	+	+
Brachychalcinus retrospina Boulenger, 1892	+	+
Brycon melanopterus (Cope, 1872)	+	+
Bryconops cf. *caudimaculatus* (Günther, 1864)	+	-
Cynopotamus cf. *amazonus* (Günther, 1868)	+	+
Charax sp.	-	+
Creagrutus anary Fowler, 1913	-	+
Moenkhausia spiluropsis (Günther, 1869)	-	+
Tetragonopterus argenteus Cuvier, 1816	+	+
Family Serrasalmidae		
Serrasalmus humeralis Valenciennes, 1850	+	+
Serrasalmus rhombeus (Linnaeus, 1766)	+	+
Family Acestrorhynchidae		
Acestrorhynchus falcatus (Bloch, 1794*)*	-	+
Family Erythrinidae		
Hoplias malabaricus (Bloch, 1794)	-	+
Order Siluriformes		
Family Callichthyidae		
Megalechis personata (Ranzani, 1841)	-	+
Family Loricariidae		
Ancistrus sp.1	-	+
Ancistrus sp.2	-	+
Ancistrus sp.3	+	+
Ancistrus sp.4	+	+
Hypostomus aff. *cochliodon* Kner, 1854	+	+
Hypostomus sp.1	+	+
Hypostomus sp.2	-	+
Hypostomus sp.3	+	+
Loricaria sp.	+	+
Rineloricaria sp.1	+	-
Rineloricaria sp.2	-	+
Sturisoma cf. *nigrorostrum* Fowler, 1940	+	+
Peckoltia aff. a*renaria* (Eigenman & Allen, 1942)	+	+

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Family Heptapteridae		
Pimelodella sp.1	+	+
Pimelodella sp.2	+	-
Pimelodella sp.3	+	+
Rhamdia quelen (Quoy & Gaimard, 1824)	-	+
Family Pimelodidae		
Pimelodus aff. *albofasciatus* Mees, 1974	+	+
Pimelodus ornatus Kner, 1858	-	+
Order Gymnotiformes		
Family Gymnotidae		
Gymnotus cf. *carapo* Linnaeus, 1758	-	+
Order Perciformes		
Family Cichlidae		
Cichlasoma boliviense Kullander, 1983	+	+
Satanoperca cf. *papaterra* (Heckel, 1840)	+	+
Crenicichla johana Heckel, 1840	-	+
Crenicichla sp.	+	+
Total richness	30	43

Few fish surveys were conducted in the rio Madeira basin, but studies made in the rio Mamoré basin revealed 280 (Lauzanne and Loubens 1985) to 329 species (Sarmiento 2000). In the protected area of Río Beni, Sarmiento (2000) found 211 species. Therefore, the number of species observed in this study is a small parcel of the total richness of species in the basin. Maybe it is consequence of small size of sampled rivers, habitat degradation by organic pollution of their waters, and like in other Amazon regions (Barthem 2001), by marginal deforestation.

Tamarupa river had the major number of species (43), or 89.6 % of the total collected species (= 48). Although the differences in composition of species between Pirarara and Tamarupa rivers, the number of orders were quite similar (Pirarara had missing only Gymnotiformes).

From the total of species, 89.6 % in Tamarupa and 92.9% in Pirarara were from the orders Characiformes and Siluriformes, a common tendency in Neotropical rivers (Lowe-McConnell 1999) (Table 2).

Table 2. Proportions of species per Order in Tamarupa and Pirarara rivers, and general (Tamarupa + Pirarara).

Ordem	Tamarupa	%	Pirarara	%	General (Tamarupa + Pirarara)	%
Characiformes	20	46,5	14	50	23	47,9
Siluriformes	18	41,9	12	42,9	20	41,7
Gymnotiformes	1	2,3	0	0	1	2,1
Perciformes	4	9,3	2	7,1	4	8,3
Total	43	100	28	100	48	100

The richest group of species was Loricariidae in both rivers, maybe in consequence of deforestation and effluent discharge that allow more illumination and organic matter to algae growth. The diet of Loricariidae species is constituted mainly by algae that are grazed from rock beds. Another group benefited by the input of organic matter is the detritivorous Curimatidae and Prochilodontidae. These rivers are depleted of native vegetation in the shores and polluted by cesspool and varied materials that are discarded to the riverbeds, affecting the local ichthyofauna.

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Several species have widespread distribution in the Amazon basin. The species *Tetragonopterus argenteus* for instance, is also presented in Tocantins, Mearim and Paraná-Paraguai rivers basins. The species of *Hoplias* is tentatively identified as *H. malabaricus* that, in fact, represent a complex of species collected in all hydrographic basins of the Neotropical region above La Plata basin. Other species with large distribution in the Amazon basin are: *Steindachnerina leucisca*, *Prochilodus nigricans*, *Leporinus friderici*, *Astyanax* aff. *bimaculatus*, *Brycon melanopterus*, *Serrasalmus humeralis*, *S. rhombeus*, *Acestrorhyncus falcatus* and *Rhamdia quelen*. In the other hand, *Parodon buckleyi* has a restricted area of distribution, occurring only in the headwaters of Napo/Ucayali and Madeira/ Mamoré rivers (Pavanelli pers. com.). *Steindachnerina fasciata* and *Creagrutus anary* have type-locality in Madeira River.

Seventeen species can be new (*Leporinus* sp., *Astyanax* sp., *Charax* sp., *Ancistrus* sp1 to 4, *Hypostomus* sp1 to 3, *Loricaria* sp., *Rineloricaria* sp.1 and 2, *Pimelodella* sp.1 to 3, *Crenicichla* sp.), but only a more profound study, with revision of species in each genus, can confirm this suspicion.

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Received October 2006
Accepted April 2007
Published online April 2007