



Fish diversity of Sangha River (Right bank of Congo River) Congo Brazzaville

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Abstract

The ichthyofauna of right bank of Congo basin is few known but presently investigations are in hand. It aimed at doing inventory of different rivers of Congo Brazzaville. Fishes are caught in the Sangha River at Ouessouing gillnets, cast nets and landing nets. Some species were purchased from fishermen, 157 species of fishes, belonging to 68 genus, 24 families and 12 orders were identified. The order Characiformes is the richest in species (28%). The Mormyridae has the highest species richness (15.48%). This preliminary study which shows an important specific richness must be completed by other studies along of the Sangha River and tributaries until the confluence with Congo River.

Keywords: Ichthyofauna, Species richness, Characiformes, Mormyridae, Sangha River, Congo

Introduction

Biodiversity on a global scale is currently undergoing profound changes caused by multiple factors including: climate change, deforestation, pollution of soil, water and the atmosphere, overexploitation of animal and plant species, construction of dams and introductions of non-native species. The same is true of aquatic ecosystems, starting from freshwater. Any conservation strategy requires knowledge of native animal and plant species and their interactions with

their surrounding environment. The ichthyofauna of the right bank of the Congo Basin is very poorly known. The rare information available is the in-depth systematic work of Teugels and Guegan, 1994. A few fragmentary studies, mostly old, were carried out by Pellegrin (1930a, 1930b), on fish from the Alima and Sangha, Daget and Stauch rivers (1963) studied fish from the right bank of the Middle Congo. Later, Laraque et al. (1996) explored Likouala aux Herbes

and Lac Télé; Akenzet and Mayet (2000) explored the Likouala Mossaka River; Sullivan et al. (2002) recorded the fish of the Mambili River within the Odzala National Park. Preliminary studies were made on a few rivers on the right bank of the Congo Basin: bank of Pool Malébo; Mamonekene (2006) on Likouala aux Herbes River; Mady-Goma Dirat (2008) on the right Ibala Zamba (2010) on Léfini River; Akenzet et Mayet (2000) on Likouala Mossaka River; Olabi-Obath (2013) on the Tsiémé River; Mady-Goma Dirat (2013) on the right bank of Pool Malebo; Mikia (2013) on the Djiri River; Tsoumou (2014) on Mfilou River, Tsoumou (2018) on the Djoué River.

The prospecting was carried out on the Sangha River, a tributary of the Congo River. Sampling was done on the Sangha River in Ouessou in November - December 2006, then in August 2015. Two stations were chosen at the edge of Sangha River. The station 1 (the market station) is located: $1^{\circ}37'23''$ latitude Nord and $16^{\circ}3'24''$ longitude Est. The station 2 is located: $1^{\circ}37'1''$ latitude Nord and $16^{\circ}3'35''$ de longitude Est.

Location of study area

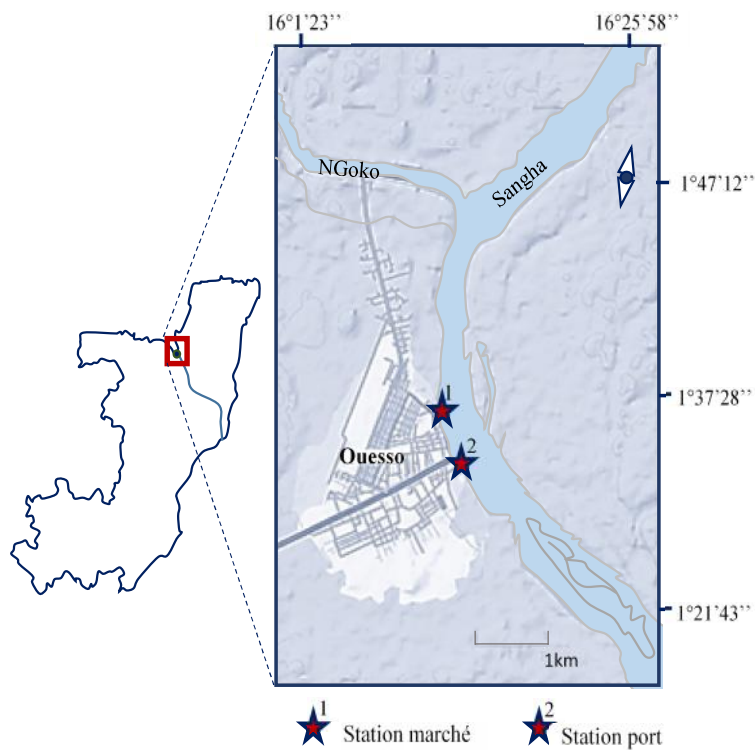


Figure 1 : Location of study area



Materials and Methods

Sampling and species identification

Two sampling campaigns were carried out for one week in November-December 2006. The fish were caught using the following gear: gillnets, cast nets and landing nets. Fish from traditional artisanal fishing were purchased from fishermen to complete the collection. The specific identification was made using classic works such as: Poll, 1939, 1967; Levêque et al., 1990,1992; Sullivan et al., 2002; Mbega and Teugels, 2003; the fish were preserved in 70° alcohol after fixation with 10% formalin.

Diversification index

The diversification index (Id) = SN/FN, where SN is the species number and the families number (Whitfield (1994; Sanogo, 1999). If Id > 2, the family is diversified; if Id < 2, the family is not diversified.

Results and Discussion

The preliminary study of the Sangha River identified 1103 fish comprising 155 species grouped into 68 genera, 24 families and 12 orders (Table 1).

Table 1: Specific composition

Orders	Family	Genus		Species			
Protoptérimorphes	Protopteridae	Protopterus	1	<i>Protopterus dolloi</i>			
Polyptérimorphes	Polypteidae	Polypterus	2	<i>Polypterus palmas palmas</i>			
			3	<i>Polypterus palmas congicus</i>			
			4	<i>Polypterus sp.</i>			
			5	<i>Pellonula leonensis</i>			
Clupéiformes	Clupeidae	Pellonula	6	<i>Pellonula vorax</i>			
			7	<i>Odaxothrissa ansorgi</i>			
			8	<i>Pomatothrissa sp.</i>			
			9	<i>Heterotis niloticus</i>			
Ostéoglossiformes	Arapaidae	Heterotis	9	<i>Heterotis niloticus</i>			
	Pantodontidae	Pantodon	10	<i>Pantodon buchholzi</i>			
		Notopteridae	Papyrocranus	11	<i>Papyrocranus congoensis</i>		
	Mormyridae		Xenomystus	12	<i>Xenomystus nigri</i>		
		Gnathonemus		13	<i>Gnathonemus petersii</i>		
			14	<i>Gnathonemus sp.</i>			
		Genyomys	15	<i>Genyomys donnyi</i>			
		Hippopotamyrus	16	<i>Hippopotamyrus weeksi</i>			
		Marcusenius	Marcusenius	17	<i>Marcusenius fritellii</i>		
				18	<i>Marcusenius moorii</i>		
				19	<i>Marcusenius kutuensis</i>		
				20	<i>Marcusenius monteiri</i>		
				21	<i>Marcusenius greshoffi</i>		
				22	<i>Marcusenius sp.</i>		
				Mormyrops	Mormyrops	23	<i>Mormyrops anguilloides</i>
						24	<i>Mormyrops deliciosus</i>
		25	<i>Mormyrops nigricans</i>				
		26	<i>Mormyrops sirenoïdes</i>				
		Mormyrus	Mormyrus	27	<i>Mormyrus caballus</i>		
				28	<i>Petrocephalus adspersus</i>		
				29	<i>Petrocephalus ballayi</i>		
				30	<i>Petrocephalus bane ansorgi</i>		
				31	<i>Petrocephalus chrysti</i>		
	32			<i>Petrocephalus microphthalmus</i>			
	33			<i>Petrocephalus sauvagii</i>			
	34			<i>Petrocephalus simus</i>			
	35			<i>Petrocephalus sp.</i>			
	36			<i>Stomatorhinus puncticulatus</i>			

Characiformes	Hepsetidae	Hepsetus	37	<i>Hepsetus odoe</i>	
	Alestidae	Alestes	38	<i>Alestes liebrechtsii</i>	
			39	<i>Alestes sp</i>	
			Alestopetersius	40	<i>Alestopetersius caudalis</i>
		41		<i>Alestopetersius hilgendorphi</i>	
		42		<i>Alestopetersius nigropterus</i>	
		43		<i>Bathyaethiops caudomaculatus</i>	
		Brachypetersius	44	<i>Brachypetersius altus</i>	
		Brycinus	45	<i>Brycinus comptus</i>	
			46	<i>Brycinus imberi</i>	
			47	<i>Brycinus kingslayae</i>	
			48	<i>Brycinus longipinnis</i>	
			49	<i>Brycinus macrolepidotus</i>	
			50	<i>Brycinus poptae</i>	
			51	<i>Brycinus bimaculatus</i>	
			Bryconaethiops	52	<i>Bryconathiops boulengeri</i>
				53	<i>Bryconathiops microstoma</i>
		54		<i>Bryconathiops yxeusi</i>	
		Hydrocynus	55	<i>Hydrocynus goliath</i>	
			56	<i>Hydrocynus forskalii</i>	
		Micralestes	57	<i>Micralestes stormsi</i>	
	Phenacogrammus	58	<i>Phenacogrammus interruptus</i>		
	Distichodontidae	Distichodus	59	<i>Distichodus affinis</i>	
			60	<i>Distichodus atroventralis</i>	
			61	<i>Distichodus decemaculatus</i>	
			62	<i>Distichodus noboli</i>	
			63	<i>Distichodus notospilus</i>	
			64	<i>Distichodus fasciolatus</i>	
			65	<i>Distichodus sp</i>	
			66	<i>Distichodus maculatus</i>	
			67	<i>Distichodus lussosso</i>	
			68	<i>Distichodus sexfasciatus</i>	
			69	<i>Distichodus rostratus</i>	
			Eugnathichtys	70	<i>Eugnathichtys macroterolepis</i>
			Ichtyoborus	71	<i>Ichtyoborus ornatus</i>
		Mesoborus	72	<i>Mesoborus crocodilus</i>	
		Microstomach	73	<i>M. bashfordeani</i>	
		Nannocharax	74	<i>Nannocharax gracilis</i>	
			75	<i>Nannocharax sp</i>	
		Phago	76	<i>Phago boulengeri</i>	
		Xenocharax	77	<i>Xenocharax spirilus</i>	
Citharinidae		Citharinus	78	<i>Citharinus gibbosus</i>	
	79		<i>Citharinus congicus</i>		
Cypriniformes	Cyprinidae	Barbus	80	<i>Enteromius holotaenia</i>	
			81	<i>Enteromius pleuropholis</i>	
			82	<i>Enteromius sp1</i>	
			83	<i>Enteromius sp2</i>	
		Leptocypris	84	<i>Leptocypris sp</i>	
			85	<i>Leptocypris lujae</i>	
		Raiamas	86	<i>Raiamas chrysti</i>	
		Labeo	87	<i>Labeo lineatus</i>	
			88	<i>Labeo nasus</i>	
			89	<i>Labeo velifer</i>	
			90	<i>Labeo weeksi</i>	
			91	<i>Labeo sp1</i>	
92	<i>Labeo sp2</i>				

Siluriformes	Claroteidae	Auchenoglanis	93	<i>Auchenoglanis occidentalis</i>
		Chrysichthys	94	<i>Chrysichthys ornatus</i>
			95	<i>Chrysichthys punctatus</i>
			96	<i>Chrysichthys longibarbis</i>
			97	<i>Parauchenoglanis punctatus</i>
	Schilbeidae	Parailia	98	<i>Parailia congica</i>
		Pareutropius	99	<i>Pareutropius debauwi</i>
			100	<i>Pareutropius. sp</i>
		Schilbe	101	<i>Shilbe marmoratus</i>
			102	<i>Shilbe grenfelli</i>
	Amphilidae	Belonoglanis	103	<i>Belonoglanis tenuis</i>
	Clariidae	Channallabes	104	<i>Channallabes apus</i>
		Clariallabes	105	<i>Clariallabes sp.</i>
		Clarias	106	<i>Clarias buthupogon</i>
			107	<i>Clarias gariepinus</i>
			108	<i>Clarias sp</i>
	Heterobranchus	109	<i>Heterobranchus longifilis</i>	
	Malapteruridae	Malapterurus	110	<i>Malapterurus microstoma</i>
			111	<i>Malapterurus electricus</i>
			112	<i>Malapterurus beninensis</i>
	Mockokidae	Synodontis	113	<i>Synodontis acanthomias</i>
			114	<i>Synodontis angelicus</i>
			115	<i>Synodontis alberti</i>
			116	<i>Synodontis caudalis</i>
			117	<i>Synodontis congicus</i>
			118	<i>Synodontis contractus</i>
			119	<i>Synodontis flavitaeniatus</i>
120			<i>Synodontis nigriventris</i>	
121			<i>Synodontis notatus</i>	
122			<i>Synodontis nummifer</i>	
123			<i>Synodontis sp1</i>	
124			<i>Synodontis sp2</i>	
Synbranchiformes	Mastacembelidae	Mastacembelus	127	<i>Mastacembelus sp₁</i>
			128	<i>Mastacembelus sp₂</i>
Cyprinodontiformes	Aplocheleidae	Aphysemion	129	<i>Aphysemion sp</i>
		Epiplatys	130	<i>Epiplatys sexfasciatus</i>
Labriformes	Cichlidae	Hemichromis	131	<i>Hemichromis bimaculatus</i>
			132	<i>Hemichromis fasciatus</i>
			133	<i>Hemichromis elongatus</i>
		Heterochromis	134	<i>Heterochromis multidentis</i>
		Limbochromis	135	<i>Limbochromis sp</i>
		Nannochromis	136	<i>Nannochromis sp</i>
		Pelmatochromis	137	<i>Pelmatochromis nigrifasciatus</i>
		Sarotherodon	138	<i>Sarotherodon sp</i>
			139	<i>Coptodon bilineata</i>
			140	<i>Coptodon tholloni</i>
			141	<i>Coptodon zilli</i>
			142	<i>Coptodon sp1</i>
			143	<i>Coptodon sp2</i>
			144	<i>Coptodon sp3</i>
		Tylochromis	145	<i>Tylochromis lateralis</i>
146	<i>Tylochromis praecox</i>			
147	<i>Tylochromis trewavasae</i>			

Anabantiformes	Channidae	Parachanna	148	<i>Parachanna insignis</i>
			149	<i>Parachanna obscura</i>
	Anabantidae	Ctenopoma	150	<i>Ctenopoma acutirostre</i>
			151	<i>Ctenopoma kingsleyae</i>
			152	<i>Ctenopoma nanum</i>
			153	<i>Ctenopoma nebulosum</i>
			154	<i>Ctenopoma ocellatum</i>
	Microctenopoma	155	<i>Microctenopoma fasciolatum</i>	
Tétraodontiformes	Tetraodontidae	Tetraodon	156	<i>Tetraodon miurus</i>
			157	<i>Tetraodon mbu</i>

Specific richness of orders

The specific distribution of orders in the Sangha shows that five orders dominate the collection (Figure 2): Characiformes (28%), Siluriformes (20%), Osteoglossiformes (18%), Perciformes (currently formed by Labriformes; 11% and Anabantiformes; 5%) and Cypriniformes (8%). The preliminary Mambili River fish inventory conducted by Sullivan et al. 2002 made it possible to collect 159 species belonging to 77 genera 28 families and 12 orders. The family difference can be explained by the fact that in Sangha River three fishing techniques (gill nets, cast nets and dip nets) were used for a very short period, while in

Mambili River, several fishing techniques were used (gill nets, beach seines, dip nets, lines, traps, emptying) for one month. The same orders dominate as shown by several studies carried out in the tributaries of the right bank of the Congo River: Akenzet et Mayet (2000) on Likouala Mossaka River; Sullivan *et al.* (2002) on Mambili River; Mady-Goma Dirat (2006) on the right bank of Pool Malébo; Mamonekene (2006) on Likouala aux Herbes River; Ibala Zamba (2010) on Léfini River; Olabi-Obath (2013) on the Tsiémé River; Mady-Goma Dirat (2013) on the right bank of Pool Malebo; Mikia (2013) on the Djiri River; Tsoumou (2014) on Mfilou River; Tsoumou (2018) on the Djoué River.

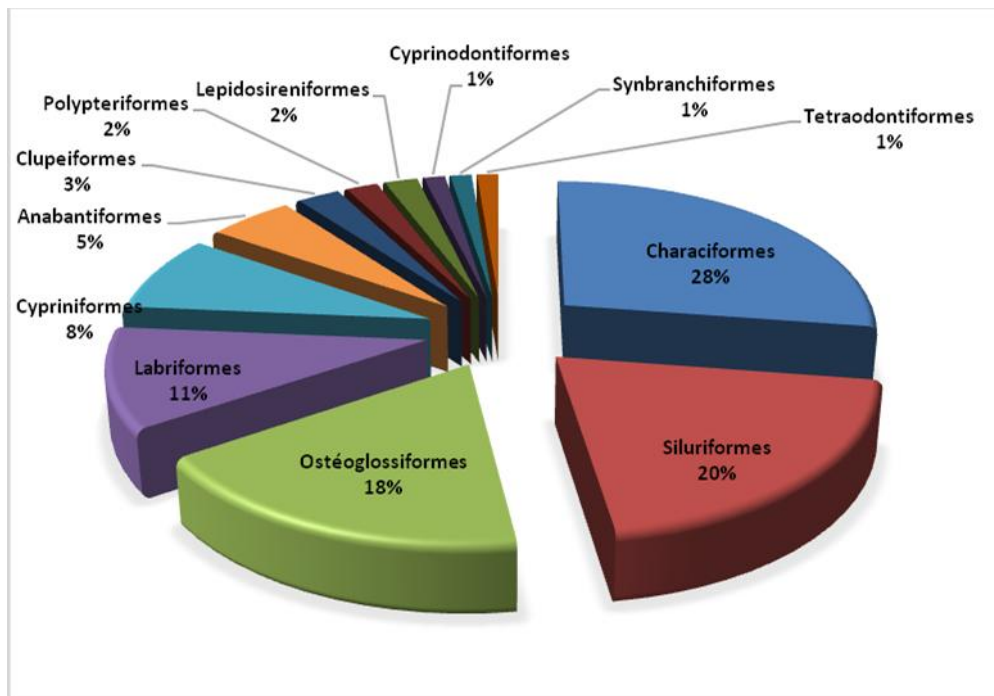


Figure 2: Proportional representation of the specific richness of orders

Specific richness of families

The specific proportional representation by family (figure 3) shows that the Mormyridae is the richest family with 24 species (15%), followed by the Distichodontidae (14%), the Cichlidae (12%), the Alestidae (11%), Cyprinidae (8%), Mochokidae (8%), Clariidae, and Anabantidae (4%), Claroteidae, Schilbeidae and Clupeidae (3%). Three families (Protopteridae, Polypteridae and Malapteruridae) have 2 species (1.78%). All other families (Notopteridae, Citharinidae, Mastacembellidae, Aplocheleidae, Tetraodontidae Channidae, Arapaidae, Pantodontidae, Hepsetidae, Amphiliidae) are only represented by one species (1%). For the entire Congo Basin, Teugels and Guegan (1994) showed that 6

families clearly predominate (Cyprinidae: 16.6%, Mormyridae: 16.3% and Cichlidae: 13.1%), followed by Mochokidae (8.7%), Alestidae (7%) and Distichodontidae (6.8%). These families still dominate the collections in varying proportions: Akenzet et Mayet (2000) on the Likouala Mossaka River; Sullivan et al. (2002) on the Mambili River; Mamonékéné (2006) on the Likouala aux Herbes River; Mady-Goma Dirat et al. (2006) on the Alima River; Ibalá Zamba (2010) on the Léfini River; Olabi-Obath et al. (2013); Mady-Goma Dirat et al. (2013) on the Pool Malebo; Mikia et al. (2013) on the Djiri River, Mady-Goma Dirat et al. (2015) on the Komo River; Tsoumou et al. (2014) on the Mfilou River; Tsoumou (2018) on the Djoué River.

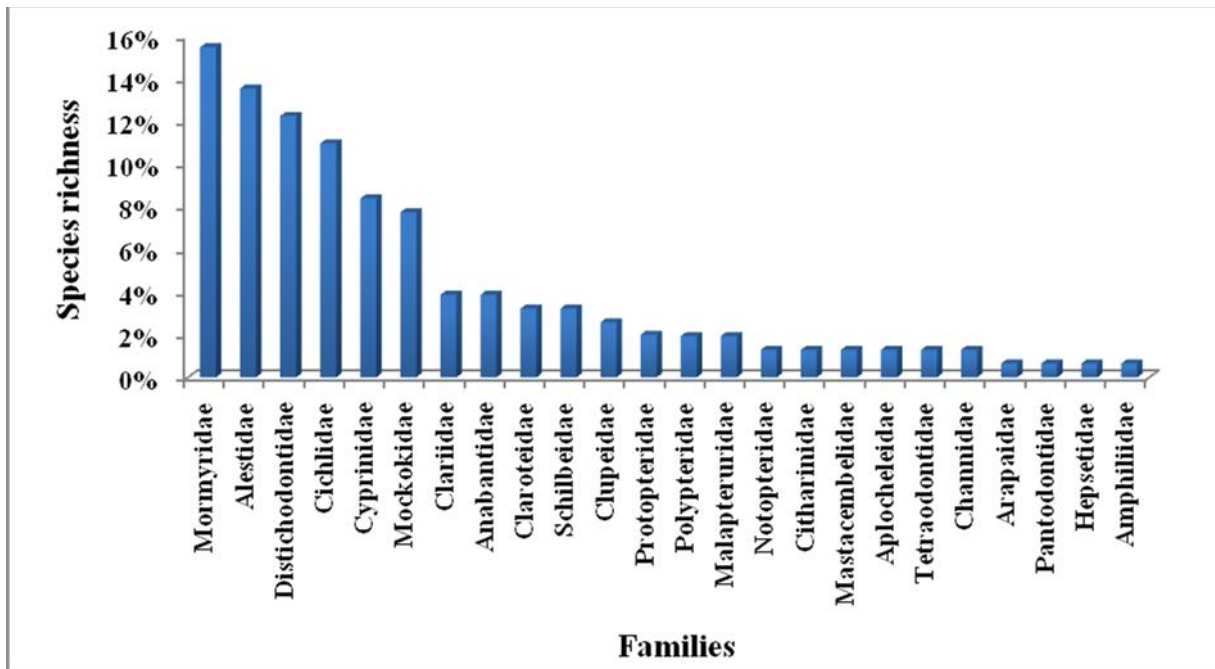


Figure 3: Proportional representation of the specific richness of families

Diversification index

The diversification index is equal to 6.54, this value greater than 2, indicates a very high diversity.

Conclusion

The study of the Sangha River ichthyofauna showed very high specific richness and diversification index. The Characiformes and the

Siluriformes represent the most representative orders; Mormyridae and Alestidae are the two families that dominate the collection. This study must be deepened by additional inventories over a longer period, using several fishing techniques and creating several stations up to the confluence of the Congo River. Surveys taking into account the hydrological seasons will make it possible to better describe the ichthyofauna of the Sangha River.


Acknowledgments

The authors are grateful to Mr. Lilen Paty Dartevelin Boukama, PhD student, Faculty of Sciences and Techniques, University Marien NGOUABI for the realization of the study area map.

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<p style="text-align: center;">DOI:10.22192/ijarbs.2023.10.10.010</p>	

How to cite this article:

Mady-Goma Dirat I., Mikia M., Tsoumou A., Olabi Obath D.B.C. and Banga Mboko H. (2023). Fish diversity of Sangha River (Right bank of Congo River) Congo Brazzaville. *Int. J. Adv. Res. Biol. Sci.* 10(10): 104-112.

DOI: <http://dx.doi.org/10.22192/ijarbs.2023.10.10.010>