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Source: A Rapid Biological Assessment of the Kwamalasamutu region, Southwestern Suriname: 118

Published By: Conservation International

URL: https://doi.org/10.1896/054.063.0111

Chapter 8

Fishes of the Sipaliwini and Kutari Rivers, Suriname

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SUMMARY

Forty-three sites near three camps along the Sipaliwini and Kutari rivers, Suriname were sampled between August 19 and September 5, 2010. We recorded 99 species of fishes. This diversity is high compared to the rest of the world, but is typical for the Guiana Shield. We collected eight species of fishes potentially new to science, including a large catfish with spines along the body and a small catfish that lives in sand-bottomed creeks. Two species are new records for Suriname. We collected 57 species at Kutari (Site 1), 60 species at Sipaliwini (Site 2), and 63 species at Werehpai (Site 3). This is remarkably consistent, with no significant difference in diversity among camps. However, we did not necessarily find the same species at each camp. Creek assemblages were similar among the three sites. Many young fishes were found in flooded forests, even if the adults lived in rivers or other habitats. Overall, large top-level predators were uncommon. The region is exhibiting the first stages of overfishing. Many fishes still occur in the Sipaliwini area, but there is a need to assess fishing pressure and implement management plans.

INTRODUCTION

Fishes are a critical source of protein in the Kwamalasamutu region. They are a common component of many meals. To further emphasize the importance of fishes to the people living in the area, some regional geographic names are even based on local fish. For example, 'sipali' means stingray and 'wini' means river/water in Carib, of which the Trio language is part. In other words, Sipaliwini can be translated 'river of stingrays' (Boven 2006).

Despite the importance of fishes in the indigenous culture, relatively few species are routinely eaten. Most species are small and often ignored by people, but they are actually an important part of the aquatic ecosystem. Smaller fishes forage on aquatic insects and serve as prey for larger fishes, caiman, and birds. Fish diversity reflects the health of the river systems.

There is a modest amount of published information concerning the fishes of the region. Most fish surveys in the watershed are well to the north in the Corantijn proper (e.g., Vari 1982). Some fish collections have been made near regional airstrips, such as those at Kwamalasamutu and the Sipaliwini Savanna. These specimens were then used as the basis for species descriptions (e.g. Gery 1961) or reviews of specific taxonomic groups (e.g. cichlids by Kullander and Nijssen 1989). Ouboter and Mol (1993) reported 75 species in the Curuni/Sipaliwini basin, a much larger area than was surveyed during this expedition. Any other information is unpublished. To our knowledge, there have been no prior scientific fish collections in the Kutari River or Wioemi Creek. This expedition was the first, and will serve as a baseline for subsequent aquatic biodiversity studies.

STUDY SITES AND METHODS

Forty-three sites near the three camps were sampled between August 19 and September 5, 2010. Fishes were collected with a 3-meter fine-mesh seine, 5-meter seine, dip nets, 30-meter trammel net, 40-meter experimental gillnet, and hook and line. We also talked extensively with our Trio guides about their knowledge of local fishes, and to discern what they were catching during the expedition. Every habitat was sampled with as many methods as practical in order to rapidly assess the diversity of the region and maximize the number of species observations. Rocks in rapids were scraped. Submerged logs were cut open. Leaf litter was searched. Seines were pulled through patches of vegetation, as well as over sandy beaches. Dip nets were dragged through flooded tree branches. Canoes were used to travel extensively upstream and downstream from the camps. We also walked through the forest to survey creeks and swamps. Most individuals were released, but representative specimens were preserved in 4% formalin and later transferred to 70% ethanol for long-term storage at the National Zoological Collection of Suriname in Paramaribo and The Field Museum in Chicago, USA.

The Kutari River at Site 1 was approximately 40 meters wide and meandered extensively. There was a significant flood plain, and much of the vegetation along the river was submerged during the time of the expedition. No rocks, rapids, or beaches were apparent due to the high water levels. Current was fast flowing. Creeks were usually sampled well inside the forest and distant from the main channel of the Kutari River. No people were seen, but there were scattered abandoned campsites along the river.

The Sipaliwini River at Site 2 was approximately 75 meters wide and the primary river channel was relatively straight. Large boulders were common, and rapids were present, although most were still submerged during the time of the expedition. Aquatic plants grew on rocks in the rapids. Islands and sand beaches were beginning to emerge as the river level dropped. A few people were observed fishing, using gillnets and hook and line. Creeks were usually sampled near their confluence with the Sipaliwini River.

The Sipaliwini River at Site 3 (Werehpai), downstream from Site 2, was very similar. The river was larger at this site, approximately 150 meters wide, and eddies and bays were also larger. There were several adjacent swamps. The morphology of the creeks in the forest was similar to the other two sites. Wioemi Creek is better described as a small river, almost as large as the Kutari and very similar geomorphologically. Many people were observed fishing in this area, since it is closer than the other two sites to the town of Kwamalasamutu.

RESULTS AND DISCUSSION

We recorded 99 species of fishes (Appendix). This is typical for the interior of Suriname and nearby parts of the Guiana Shield; for example, the Coppename RAP recorded 112 species (Mol et al. 2006), the Eastern Kanuku Mountains RAP recorded 113 species (Mol 2002), and a similar rapid assessment of the upper Essequibo River yielded 110 species (P.W. Willink et al. *unpublished data*). This diversity is high compared to the rest of the world, but is typical for the Guiana Shield.

The species accumulation curve for the expedition is showing signs of reaching an asymptote (Fig. 1). After collection station #23, far fewer novel species were recorded during the remainder of the survey. Exceptions were stations #33–34 that were in rapids. We had not surveyed many rapids prior to these stations, so they added several species to our cumulative list. But after this point, we had sampled essentially all available habitats in the area under study. There are still many species in the region that we probably did not collect due to the high water and seasonal effects. More surveys need to be done at different times of the year.

We collected eight species of fishes potentially new to science, including a large catfish *Pterodoras* aff. *granulosus* with spines along the body and a small catfish *Imparfinis* aff. *stictonotus* that lives in sand-bottomed creeks. The other potentially new species are *Pseudacanthicus* sp., *Hypostomus* aff. *taphorni*, *Eigenmannia* sp. 1, *Eigenmannia* sp. 2, *Astyanax* sp., and *Moenkhausia* aff. *georgiae*. The two *Eigenmannia* species were initially recognized on a previous RAP in the Coppename River (Willink and Sidlauskas 2006), and appear to be more widely distributed throughout Suriname's interior than originally thought. This number of new species is typical for Neotropical rivers that have not been well surveyed by fish biologists.

Two species, *Ituglanis gracilior* and *Hemigrammus orthus*, were new records for the country of Suriname. They were previously only found in Guyana to the west (Vari et al. 2009). We encountered some species of fishes known only from the Sipaliwini River and nearby drainages (e.g., *Corydoras sipaliwini* and *Crenicichla sipaliwini*). Other species, such

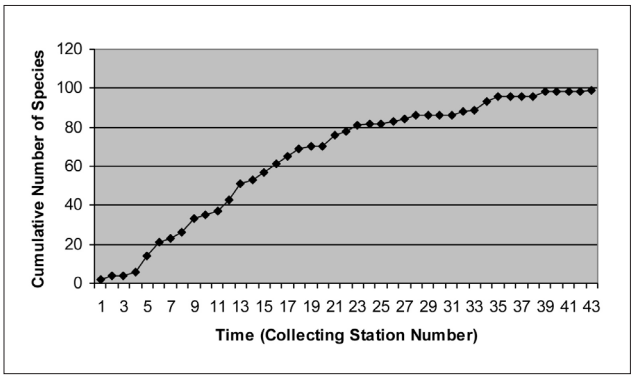

Figure 1. Species accumulation curve for fishes collected in the Kutari and Sipaliwini Rivers, Suriname, August 19 to September 5, 2010.

as *Moenkhausia collettii* and *Hoplias malabaricus*, are widespread throughout the Guianas and much of South America.

We collected 57 species at Kutari (Site 1), 60 species at Sipaliwini (Site 2), and 63 species at Werehpai (Site 3) (Appendix). This is remarkably consistent, with no significant difference in diversity among sites. However, we did not necessarily find the same species at each site. For example, *Hoplias aimara* was most common in the meandering flooded Kutari River. Knifefish diversity was higher in the Kutari as well. In comparison, at Site 2 the Sipaliwini River had more rapids and flowing water, and this was even more the case at Site 3. Piranhas and larger catfishes were more common at these sites. Tucunaré (*Cichla ocellaris*) and large characids were also present.

Wioemi Creek was similar in geomorphology to the Kutari River. Both had numerous meanders and S-curves in the main channel. Banks were relatively low and generally covered with flooded shrubs because of the high water levels. Large sections of the adjacent forest were flooded as well.

Wioemi Creek and the Kutari River are also similar in species composition. We only sampled four localities in Wioemi Creek, and recorded 23 species. This is not rigorous enough to make any meaningful statistical comparisons. But of the 23 species, 16 were shared with Kutari, 13 with Sipaliwini, and 8 with Werephai. Also, six species (*Hemigrammus orthus*, *Hyphessobrycon rosaceus*, *Odontostilbe gracilis*, *Phenacogaster carteri*, *Melanocharacidium dispilomma*, and *Otocinclus mariae*) were found exclusively in the Kutari River and Wioemi Creek (but not in the Sipaliwini River at Sites 2 or 3). This indicates that habitat plays an important role in species distribution.

The role of habitat was apparent throughout the entire region. Particular species were found in particular habitats, regardless of which sub-basin they were in. For example, creeks were characterized by *Pyrhulina stoli*, *Jupiaba abramoides*, *Rineloricaria*, and *Rivulus*. Rapids were characterized by *Pseudancistrus corantijniensis*, *Lithoxus* aff. *bovallii*, and *Guayanacistrus brevispinis*. Larger and deeper sections of the rivers held *Schizodon fasciatus*, *Hemisorubim platyrhynchos*, and *Prochilodus rubrotaeniatus*.

During this survey, many young fishes were found in flooded forests, even if the adults lived in rivers or other habitats. This is because many fishes spawn in flooded areas at the beginning of the rainy season, which was several months prior to the expedition. This strategy gives young fishes an opportunity to find hiding places among submerged vegetation. There is also an increased amount of food in the form of insects falling into the water, suspension of nutrients from the leaf litter, greater access to seeds and fruits, etc. (Roberts 1972, Goulding 1980, Lowe-McConnell 1987). The RAP survey was conducted at the end of the rainy season, so we found many fishes that were only a few months old. This demonstrates the importance of seasonal flooding and the interconnection of terrestrial and aquatic habitats. If anything negatively impacts the forest, it will also impact the fishes in the river.

We recorded a small number of very large piranhas around Sipaliwini (Site 2), including a black piranha *Serrasalmus rhombeus* that was 41 centimeters in standard length and weighed 3 kilograms (see color plates). We found numerous piranhas nearer to Kwamalasamutu, but they were almost all juveniles or small adults. Large catfishes were rare, as were tucunaré. Small tetras were abundant at Sipaliwini and Werehpai, but far less so in the Kutari River (where the large predator *Hoplias aimara* was most common). Usually there are fewer small tetras in areas with many predators. This is consistent with what we observed. Overall, large top-level predators were uncommon. In pristine environments, these types of fishes are abundant, but they are the first to disappear when there is excessive fishing pressure (Mol et al. 2006). We often saw people fishing along the river, and nearly every household had a gill net. The region is exhibiting the first stages of overfishing. Many fishes still occur in the Sipaliwini area, but there is a need to assess fishing pressure and implement management plans.

The primary threat to the fishes of the Sipaliwini River is overfishing. Fishes are an important source of protein in the region, and people in Kwamalasamutu have to travel hours from the village in order to find large fishes. Fish diversity is still high, but popular food fishes are decreasing in size, and some are becoming less common (e.g., red-tailed catfish *Phractocephalus hemioliopterus*). Logging would have negative impacts by increasing erosion and decreasing the amount of food that falls into the water, especially when the rivers flood. We are unaware of any imminent plans to deforest the region. We are also unaware of any plans for gold or bauxite mining. However, diamond exploration concessions exist in a watershed well upstream. Excessive mining would result in erosion and sedimentation, negatively impacting fishes, especially those that live along the bottom.

CONSERVATION RECOMMENDATIONS

- Assess which fish species are used for food. Determine amount caught and eaten. Study life-history of these species to determine how fast they reproduce and grow.
- Determine the amount of fish that can be sustainably harvested. Set catch limits and/or seasons if necessary to avoid overfishing.
- Create picture guides of fishes, especially colorful species and fun-to-catch species, in order to increase appreciation and knowledge of fishes. These guides can be used to promote ecotourism.
- Maintain forests along rivers, especially in areas that flood. This is to prevent erosion and maintain the amount of nutrients (i.e., insects, leaves, fruits, etc.) that fall into the water and act as fish food. Flooded areas, such as Kutari River and Wioemi Creek, are important breeding grounds for fishes.

- Additional scientific surveys are necessary to document the fish biodiversity. There are species present that we did not collect, and there could be new species to science yet to be discovered. Additional surveys should be conducted at different times of the year, especially when river levels are lower. These surveys could also explore further upstream and downstream than we traveled.

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Appendix. List of fishes recorded in the Kutari and Sipaliwini rivers.

Taxon	Kutari	Sipaliwini	Werehpai
RAJIFORMES			
Potamotrygonidae			
Potamotrygon boesemani	X	X	
CHARACIFORMES			
Acestrorhynchidae			
Acestrorhynchus microlepis	X	X	X
Anostomidae			
Anostomus anostomus	X		X
Hypomasticus megalepis			X
Leporinus fasciatus			X
Leporinus friderici	X		
Leporinus granti		X	X
Leporinus nijsseni	X		
Schizodon fasciatus	X		X
Characidae			
Astyanax bimaculatus		X	X
Astyanax sp.		X	
Brachychalcinus orbicularis	X	X	X
Brycon falcatus	X	X	X
Bryconamericus hyphesson		X	X
Bryconops affinis	X	X	X
Bryconops melanurus		X	
Chalceus macrolepidotus	X		X
Charax gibbosus	X	X	X
Cynopotamus essequibensis	X	X	X
Hemigrammus ocellifer	X	X	
Hemigrammus orthus	X		X
Hyphessobrycon rosaceus	X		X
Jupiaba abramoides	X	X	X
Jupiaba meunieri		X	X
Jupiaba polylepis		X	X
Moenkhausia chrysargyrea	X	X	
Moenkhausia collettii	X	X	X
Moenkhausia georgiae	X	X	X
Moenkhausia grandisquamis			X
Moenkhausia hemigrammoides		X	X
Moenkhausia lepidura	X	X	X
Moenkhausia oligolepis	X	X	X
Myleus rhomboidalis	X	X	X
Myloplus rubripinnis	X	X	X
Odontostilbe gracilis	X		X
Phenacogaster carteri	X		X
Poptella longipinnis		X	X
Roeboexodon guyanensis	X		X
Serrasalmus rhombeus	X	X	X
Tetragonopterus chalceus		X	X
Tetragonopterus rarus	X		
Triportheus brachipomus		X	X
Crenuchidae			
Characidium zebra	X	X	X
Melanocharacidium dispilomma	X		X
Curimatidae			
Cyphocharax helleri	X	X	
Cyphocharax spilurus	X	X	X
Cynodontidae			
Cynodon gibbus	X	X	X
Erythrinidae			
Hoplerythrinus unitaeniatus		X	
Hoplias aimara	X	X	X
Hoplias curupira	X	X	
Hoplias malabaricus	X		
Gasteropelecidae			
Carnegiella strigata	X	X	X
Hemiodontidae			
Bivibranchia bimaculata		X	
Hemiodus argenteus		X	
Hemiodus quadrimaculatus			X
Lebiasinidae			
Pyrrhulina stoli	X	X	X
Parodontidae			
Parodon guyanensis			X
Prochilodontidae			
Prochilodus rubrotaeniatus		X	X
SILURIFORMES			
Auchenipteridae			
Ageneiosus inermis	X	X	X
Tatia intermedia	X		
Trachelyopterus galeatus		X	
Callichthyidae			
Corydoras baderi	X		
Corydoras sipaliwini		X	X
Cetopsidae			
Cetopsidium minutum	X		
Helogenes marmoratus	X		

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Taxon	Kutari	Sipaliwini	Werehpai
Doradidae			
Doras carinatus		X	X
Pterodoras aff. *granulosus*		X	
Heptapteridae			
Imparfinis aff. *stictonotus*	X		X
Pimelodella cristata	X		X
Pimelodella macturki		X	
Loricariidae			
Ancistrus aff. *leucostictus*		X	
Cteniloricaria platystoma		X	X
Guyanancistrus brevispinis			X
Hypostomus pseudohemiurus	X	X	X
Hypostomus taphorni			X
Lithoxus aff. *bovallii*			X
Metaloricaria nijsseni		X	
Otocinclus mariae	X		X
Pseudacanthicus sp.		X	
Pseudancistrus corantijniensis		X	X
Rineloricaria sp.	X		
Rineloricaria stewarti			X
Pimelodidae			
Hemisorubim platyrhynchos			X
Pimelodus blochii		X	
Pimelodus ornatus		X	
Pseudopimelodidae			
Microglanis secundus		X	X
Trichomycteridae			
Ituglanis gracilior	X		
GYMNOTIFORMES			
Gymnotidae			
Gymnotus carapo	X		X
Hypopomidae			
Brachyhypopomus brevirostris	X		
Rhamphichthyidae			
Rhamphichthys rostratus			X
Sternopygidae			
Eigenmannia sp. 1	X		
Eigenmannia sp. 2	X		
CYPRINODONTIFORMES			
Rivulidae			
Rivulus sp.	X	X	
SYNBRANCHIFORMES			
Synbranchidae			
Synbranchus marmoratus	X		
PERCIFORMES			
Cichlidae			
Apistogramma steindachneri	X		X
Cichla ocellaris		X	X
Crenicichla sipaliwini	X	X	
Geophagus brachybranchus		X	
Guianacara sphenozona		X	
Total 99 species	**57**	**60**	**63**