A Rapid Assessment of Fishes in the Atewa Range Forest Reserve, Ghana

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Chapter 8

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SUMMARY

The freshwater ecosystem studied during this RAP survey included the streams of the Atewa Range Forest Reserve, Ghana, an area protecting the headwaters of the Ayensu, Birim and the Densu river basins, and from which these basins originate. A total of 15 streams within the Atewa forest and at sites just emerging out of the forest were surveyed and their fish fauna was documented during the month of June 2006. We recorded 19 species of freshwater fishes, belonging to nine genera of five fish families: Mormyridae, Characidae, Cyprinidae, Cyprinidontidae and Cichlidae. All species encountered in the present study have been recorded in river basins in West Africa, but *Epiplatys chaperi spillamanni*, encountered during our survey in the Ayensu system, was known previously only in the waters of Côte d'Ivoire. In reference to the number of species per stream, it was our observation that where the forest was least disturbed, the number of species recorded in a stream, even where the stream had been sampled at more than one locality, was rarely more than four and the species were predominantly only of aquarium importance. Thus the occurrence of up to ten species per stream, especially where species composition included fishes of food importance, indicated disturbance of stream forest cover. To conserve forest fishes, the waters in which they exist and their forest environment and necessary habitat characteristics must be largely conserved. Therefore, we recommend that removal of forest cover from streams up to a determined distance from stream banks must be seriously controlled and monitored. Additionally, we recommend the implementation of a rural campaign to educate communities on potential benefits of forest fish fauna as well as other flora and fauna.

INTRODUCTION

The Atewa Range Forest Reserve (Atewa) is located in Ghana, a tropical West African country which lies between Latitude 4°30' N and 11°00' N and straddles the Greenwich Meridian from Latitude 1°10' E to 3°15' W. The Atewa Range Forest Reserve is made up of the Atewa Forest Reserve, covering an area of 232 km² (or 23,663 ha) and the surrounding Atewa Range Extension, which, in combination with the Reserve covers a total area of 26,312 ha. Together they form a continuous block lying within latitude 5°58' to 6°20' N and longitudes 0°31' to 0°41' W (Figure 8.1). This forest block was designated as a reserve in 1925 (Abu-Juam et al. 2003), as a Special Biological Protection Area (SBPA) in 1994 (Hawthorne and Abu-Juam 1995), and one of 30 Globally Significant Biodiversity Areas (GSBAs) in 1999 (Forestry Commission 1999). In addition, the area is also one of Ghana's 36 Important Bird Areas (IBAs) as classified by BirdLife International (Ntiamoa-Baidu et al. 2001). All this points to the fact that the area has long been recognized for its high biodiversity values.

Since the pre-colonial years, the most compelling reason for holding the Atewa forests as a reserve has been that the range of highlands which the forests cover provides the headwaters of three river systems in the country: the Ayensu, Densu and Birim rivers. The forests protect important water sources, contributing to both domestic and industrial water requirements in three important watersheds in Ghana.

The streams within Atewa that are protected by the forest cover provide a unique habitat for a number of fishes, as well as other fauna. Fish are of concern to conservation for numerous reasons:

i) Fish constitute a major global food item;

ii) Fish are nutritionally significant as they comprise more than 50% of animal proteins in diets of most developing countries, including Ghana;

iii) Appreciable proportions of developing countries' populations rely on fish for their social and economic livelihoods, including: fishers, fish handlers and processors, fishing vessel engine mechanics, fish traders and also trading systems associated with importation and trading in fishing inputs.

In tropical countries, forest rivers, such as those assessed in the present RAP survey, harbor species of fish whose aesthetic qualities make them of importance to the aquarium trade. Combining the food, trade and livelihood value of fish, their potential to help achieve Africa's Millennium Development Goals has been recognized.

The above makes it imperative that any effort to conserve fish resources at all levels (ecosystem, community, population and species) must be appreciated globally. Efforts to generate information on fish resources and document them to contribute to their conservation everywhere should be supported by authorities and local communities that rely on such resources. This effort would contribute to and elaborate upon known information and reveal further benefits of fish to mankind. Thus a biological assessment of an aquatic ecosystem's fish fauna and diversity is justified and necessary to obtain important biological information. Such information can be made available and used as a developmental tool.

METHODS

The freshwater ecosystem studied during this RAP survey included the streams of Atewa in Ghana. As indicated earlier, the Atewa forest protects the headwaters of the Ayensu, Birim and the Densu river basins, which originate within the reserve. Figure 8.1 shows the study area and its location in Ghana and the three river basins originating within the Range. Table 8.1 provides data on the area encompassed by the basins.

A total of 15 streams within Atewa and at sites just emerging out of the forest were surveyed and their fish fauna was documented during the month of June 2006. This time fell within the major rainy season of this area in Ghana. The season usually lasts from May-June until September-October. Six of the streams surveyed were tributaries to the Ayensu system, five of them contribute to the Birim and four contribute to the Densu river systems (Table 8.2.)

A summary of stream characteristics is presented in Table 8.3. Generally, all surveyed streams were small, ranging from about 1.0 m to about 6.0 m wide, 0.005 to 0.6 m in depth. The nature of the bottom of the streams was mostly rocky with boulders, stones and gravel. In the majority of situations, branches and forest foliage along stream banks covered more than 80% of stream.

The fish team used two types of fishing gear to obtain specimens. First was a "mini-seine" net built with a 2 mm mesh size nylon netting material (not conventional gear). Second, the team used a battery of four gill-nets, each 6.0 m long and 1.0 m deep but with different mesh size netting material. The mesh sizes of the nets were 12.5, 15.0, 17.5 and 20.0 mm (lateral stretch). The mini seine net yielded the most abundant results.

RESULTS

Table 8.4 gives the checklist of fish species in Atewa's streams based on the current study. The list indicates 19 species, belonging to nine genera of five fish families. The families we documented included: Mormyridae, Characidae, Cyprinidae, Cyprinidontidae and Cichlidae.

Table 8.5 presents fish species recorded in each of the three river basins of which the Atewa Range provides the headwaters. The number of species per stream ranged from one, in Manmen stream, to ten, in Adensu stream, a tributary to the Ayensu River (Table 8.2).

DISCUSSION

To date, no records exist to suggest that the fish fauna of Atewa had been studied prior to the present work. However, all species encountered in the present study have been recorded in river basins in West Africa, including parts of Ghana (Leveque et al. 1990, 1992; Dankwa et al. 1999).

Table 8.1. Physical data on river basins associated with the Atewa Range Forest Reserve, Ghana.

BASIN	AREA			
	Acres	Square Miles	Hectares	Square Kilometers
Birim	969,240	1,514	392,251	3,922
Ayensu	305,983	478	123,831	1,238
Densu	463,054	723	187,398	1,873
Total Area	**1,738,277**	**2,716**	**703,481**	**7,034**

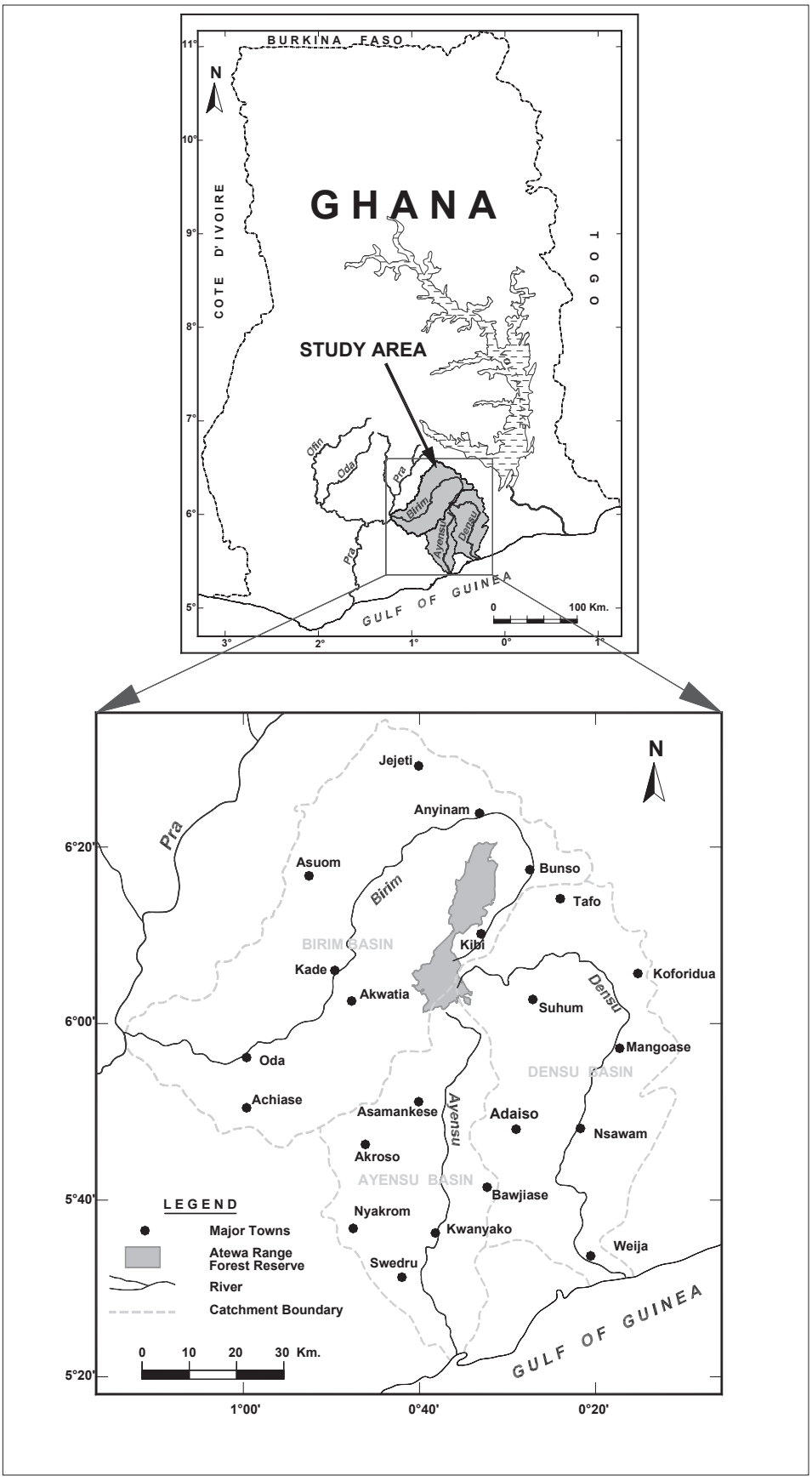

Figure 8.1. Map of Study Area: Birim, Ayensu and Densu river basins in Ghana.

Table 8.2. Fish species occurrence in streams of Atewa Range Forest Reserve, Ghana during the RAP survey in June 2006.

Species Name	STREAMS INTO BIRIM RIVER					STREAMS INTO DENSU RIVER				STREAMS INTO AYENSU RIVER					
	Wankobi 1 & 2	Birim	Obeng-ne Obeng	Supong	Adensu	Densu	Mamen	Anko	Ohunfon	Ayensu 1,2 &3	Adensu	Sukuntu	Ansom	Name unknown	Surum
Brienomyrus brachyistius											+				
Brycinus leuciscus				+											
Brycinus longipinnis						+		+	+						
Brycinus nurse	+	+	+	+						+	+		+		+
Micralestes elongatus	+	+	+	+	+					+	+		+		
Micralestes occidentalis		+	+							+	+		+		
Barbus trispilos						+	+	+	+		+	+			
Barbus macrops					+										
Barbus ablabes						+		+	+	+	+				+
Barbus walkeri	+	+	+						+	+				+	
Barbus macinensis		+				+		+			+	+			
Aplocheilichtys pfaffi	+	+	+	+	+										
Epiplatys dageti dageti								+	+					+	
Epiplatys chaperi schreiberi														+	
Epiplatys chaperi spillmanni														+	
Tilapia busumana								+			+		+		
Tilapia zillii						+					+				
Chromidotilapia geuntheri				+											
Hemichromis fasciatus					+	+					+				
No. of Species	**4**	**6**	**5**	**5**	**4**	**6**	**1**	**6**	**5**	**5**	**10**	**2**	**4**	**4**	**2**

Table 8.3. Habitat characteristics of Atewa Range Forest Reserve streams, June 2006.

Stream name		Location Surveyed	Stretch of Stream (m)	Av. Width (m)	Av. Depth (m)	Bottom cover	% Foliage Cover	% Forest Disturbance
B	Wankobi (2)	Adukrom-Kejebi Road	200	2.5	0.04	Stones, gravel	90	30
	Birim Oben-ne-oben	Akim Apapam	300	7.0	0.04	Boulders. Rocks Sand	90	20
	Supong	Atewa forest (flows→Wonkobi	250	2.5	0.3	Rocks, Stones, gravel, mud	90	< 3
	Adensu	– Birim)	100	3.5	0.4	Rocks, stones mud	80 – 90	30
		(joins Brim at Asiakwa) Sagyimase bridge						
D	Densu	Akim Odumasi Bridge	70	0.3	0.5	Rocks, stones mud		
	Mamen	Apeniapong (via Suhum)	10	0.003	0.005	Sandy	70	< 50
	Anko/Densu	Potroase	60	4.2	0.8	Stones, Sand	70	40
	Ohunfen	Between Ptroase & Odumase	100	0.70	0.03	Boulders, Stones Sand	90	Old 10
A	Ayensu	Bele (near Obɔɔho)	250	8	0.5	Rocks, Boulders		2 – 5
	Ayensu	Anum-Apapam (Bridge)	100.0	7.0	0.6	Mud, Sand	20	80 – 90
	Adensu	Anum-Apapam (just prior to join	500.0	2.5	0.4	Mud, Sand, Boulders	30	80 – 90
	Ansom	Ayensu)				Mud		
	Unknown	Outskirt of Asamankese	80 – 100.0	3.6	0.4	Mud & Stones		
	Surum	Brekumanso (Owuram to Asamankese	300	2.0	0.5	Mud – Gravel	80	40
		(Join Ayensu at Obɔɔho)					80 – 90	50
			20	0.3	0.03			

Table 8.4. Checklist of fish species of Atewa Range Forest Reserve, Eastern Ghana.

FAMILY (5)	GENUS (9)	SPECIES (19)
MORMYRIDAE	*Brienomyrus* (Tarverne 1971)	*brachyistius* (Gill, 1863)
CHARACIDAE	*Brycinus* (Valenciennes, 1849)	*leuciscus* (Gunther, 1967)
		longipinnis (Gunther,1864,Paugy 1986)
		nurse (Ruppel, 1832; Paugy 1986)
	Mircralestes (Boulenger, 1899)	*elongatus* (Daget, 1957)
		occidentalis (Gunther, 1899)
		trispilos (Bleeker, 1963)
CYRINIDAE	*Barbus* (Cuvier & Cloquet, 1816)	*macrops* (Boulenger, 1911, Hopson & Hopson 1965)
		ablabes (Bleeke, 1863)
		walkeri (Boulenger, 1904)
		macinensis (Dagct 1954, Hopson & Hopson1965)
	Aplocheilichthys (Bleeker, 1863)	*pfaffi* (Daget, 1954)
CYPRINIDONTIDAE	*Epiplatys* (Gill, 1863)	*dageti dageti*
		chaperi schreiberi
		chaperi spillmanni
CICHLIDAE	*Tilapia*	*busumana* (Gunther, 1903)
		zillii (Gervais, 1848)
	Chromidotilapia (Boulenger, 1898)	*guentherii* (Sauvage, 1882)
	Hemichromis (Peters, 1858)	*fasciatus* (Peters, 1852)

Leveque et al. (1990) and Dankwa et al. (1999) both indicate that species such as *Brycinus nurse. Mircrales occidentalis*, and the *Barbus*, *Tilapia*, *Chromidoliapia* and *Hemichromis* (listed in Table 8.4) had been recorded in river basins associated with forest streams.

Our current survey revealed additional information related to fish and their distribution. For example, *Brienomyrus brachyistius*, had previously not been recorded in the Ayensu river system but only in the Birim and Densu, most likely in lower parts of the river. *Micralestes elongates* had been previously recorded in river ecosystems in Ghana similar to the Ayensu, Birim and Densu rivers of Atewa. Finally, Leveque et al. (1992) noted that *Epiplatys chaperi spillamanni*, encountered during our survey in the Ayensu system, was known previously only in the waters of Côte d'Ivoire.
The species we encountered were mostly forest stream freshwater fishes, in terms of diversity and quantities, with the following major common characteristics:

- Generally, small species (e.g. the *Micralestes, Barbus, Aplocheilithys* and *Epiplatys* species) were recorded. This could be anticipated since the streams surveyed are themselves small with reference to width and depth (see Table 8.3)
- Diet of typical forest stream fishes typically consists of forest materials (e.g. seeds, fruits and insects from forest vegetation) as primary productivity in forest streams is minimal.
- In reference to the number of species per stream, Table 8.2 indicates between one and ten. It was our observation that where the forest was least disturbed, the number of species recorded in a stream, even where the stream had been sampled at more than one locality, was rarely more than four and the species were predominantly of aquarium importance. Thus the occurrence of up to ten species per stream, especially including fishes of food importance, indicated disturbance of forest cover of streams at study site(s).
- The occurrence of 'big' fish species recognized as food fishes, such as the *Tilapia* and *Hemichromis* species, indicated considerable removal of forest cover of streams to be able to sustain fauna which depend mostly on direct or indirect photosynthetic output.

In tropical countries, forest rivers, such as those assessed in the present RAP survey, harbor species of fish whose aesthetic qualities make them of importance to the aquarium trade. This situation could be harnessed and developed to the economic benefit of entrepreneurs and local young men and women.

CONSERVATION RECOMMENDATIONS

To conserve the fishes of the forest, the waters in which they exist and their forest environment and necessary habitat must be largely conserved. Therefore, the following are recommended:

- Control and monitor the removal of forest cover from streams up to a determined distance from stream banks.
- Plan and implement a rural campaign to educate communities on the potential benefits of forest fish fauna and other flora and fauna.

Table 8.5. Basin distribution of fishes of Atewa Range Forest Reserve streams, June 2006.

			RIVER BASINS			
FAMILY	GENUS	SPECIES	Ayensu	Birim	Densu	EI
Mormyridae	*Brienomyrus*	*brachyistius*	+	-	-	F
Characidae	*Brycinus*	*leucicus*	-	+	-	A
		longipinnis	-	+	-	A
		nurse	+	+	-	F&A
	Micralestes	*elongatus*	+	+	-	A
		occidentalis	+	+	-	A
Cyprinidae	*Barbus*	*trispilos*	+	-	+	A
		macrops	-	+		A
		ablabes	+	-	+	A
		walkari	+	+	+	A
		macinensis	+	+	+	A
Cyprinidontidae	*Aplocheilichthys*	*pfaffi*	-	+	-	A
	Epiplatys	*dageti dageti*	+	-	+	A
		schrecberi	+	-	+	A
		spllmanni	+	-	-	A
Cichlidae	*Tilapia*	*busumana*	+	-	+	F
		zillii	+	-	+	F
	Chromidotilapia	*guentheri*	-	+	-	A
	Hemichromis	*fasciatus*	+	+	+	

Legend:

+ = Present
- = Not encountered
EI = Economic Importance (major)
F = Food
A = Aquarium

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