



Research Paper

DIVERSITY OF FISH LARVAE IN THE SEABOARD OF ROGBANE AND TAKONKO-CONAKRY, REPUBLIC OF GUINEA

Pé 2 GOUMOU¹, Cé II ZOTOMY¹, Lanan Wassy SOROMOU¹, Kebe Bouya DORE¹ and Bangaly KABA²

¹Higher Institute of Sciences and Veterinary Medicine (ISSMV) of Dalaba,
BP: 09, Republic of Guinea,

²Center for Scientific Research, Conakry Rogbane, Guinea.

Abstract

The success of recruitment in a fish population depends primarily on the processes that take place during the early life stages where mortality is particularly high. In the Bay of Sangaréah, Taouyah, CERESCOR and the beach of Ratoma, larvae and juveniles of fish, shrimps, crabs and molluscs are caught by the shoreline population. The objective of this study was to identify and assess the distribution of fish larvae in the sea facades of the Taouyah, CERESCOR and Takonko. During our investigations, we found that 81.8% of fishermen use conical nets "Tété yèlè" made of mosquito netting and 18.2% use synthetic nets with a mesh size of about 5mm, which is a major handicap to the biological productivity of the ichthyofauna. In addition, the fishermen confirmed the informal nature of their activity, as they have no relationship with the local authorities of the fishing industry. The samples were composed of 14 families and 18 species of larval fish. These families of fish larvae belong to three (3) ecological groups including: pelagic fish (Clupeidae, Carangidae, Pristigasteridae and Hemiramphidae), demersal fish (Sciaenidae, Polynemidae, Drepanidae, Sphyrnidae, Albulidae) and benthic fish (Cynoglossidae; Tetraodontidae, Gobiidae, Mugilidae and Trichiuridae).

Key words: Diversity, larvae, fish, facade, Guinea.

INTRODUCTION

Reproduction is the process by which living beings perpetuate their species, of which the larval stage is a very sensitive phase for the development of aquatic animals.

Around the world, more than two thirds of the species fished at sea come from coastal areas. The reefs, mangroves, wetlands, bays, mouths and intertidal zones are very essential for the biological productivity, breeding and feeding of the majority of known aquatic animal species [1]. According to the United Nations Food and Agriculture

Organization (FAO), in West Africa, the waters are very rich in ichthyological resources that constitute a source of proteins, and their exploitation provides employment and income for the local population [2]. The Guinean coastal zones in general and those of Taouyah, CERESCOR and Takonko beach in particular constitute a veritable environments that facilitate the development of larvae of different species. However, these ecosystems are subject to dangerous anthropic factors. The larvae and juveniles of fish resources should be given special attention since they are the basis for the renewal of fish stocks.

Over the last two decades, the exploitation of marine resources has developed rapidly in Guinea. Until the mid-1980s, these resources were in a status generally considered as unexploited, but within 15 years they reached a stage of overexploitation [3,4].

Among the fishing gear used, the conical net "Tètè Yèlè", once used for subsistence and self-consumption, is now tending to become an important income-generating tool. It is one of the main gears used in breeding, feeding and ichthyological development areas [5,6]. In order to reduce the losses caused by these types of nets to fish, it is necessary to assess their effect, to know and inventory the species of fish larvae that may be victims and to apply measures to avoid overexploitation of the Guinean continental shelf. This could enable researchers and the public authorities to take decisions that would help the fishing industry along Guinea's Atlantic coast to become more prosperous.

MATERIALS AND METHODS

A. Materials

Study areas

The city of Conakry has been developed on the ancient island of Tombo with an area of 450 km² and on the almost island of Kaloum which opens to the continent, 36 km long and 5 km wide [7]. It is located between 9° 32' 53" north latitude 13° 40' 14" west longitude. Its urban area extends from the south-west to the north-east, passing through the Gbassikolo channel; it constitutes the state and land potential of the capital. It is bordered to the east by the prefecture of Coyah, to the west by the Atlantic Ocean, to the north by the prefecture of Dubréka, and to the south by the prefecture of Forécariah. Conakry's population is very diverse, consisting of both nationals and foreigners . Its population exceeds two million (2000000) inhabitants with a density of 2487 inhabitants per km².

The relief is formed by a plain that consisting of relatively flat terrains. It appears as a platform that is uneven in places, which gives it a slightly undulating appearance. The Mount Kakoulima (at an altitude of 1007m) plays an important role in the phenomenon of condensation [8].

The study areas selected for this investigation are represented by the sites of :

- ✓ Taouyah (North Latitude 9° 57'28"; West Longitude: -13.66'56", precision 3.80m) ;
- ✓ Cerescor (North Latitude 9° 58'51"; West Longitude -13.66'50", precision 5.40m);
- ✓ Takonko (North Latitude 9°59'18" West Longitude -13°65'91", precision 5.20m)

Equipment used

The equipment used is as follows:

- Animal material: 476 fish larvae
- conical net Tètè yèlè": 3
- GPS (Waypoints) (1),
- Jars (2),
- Survey sheets (11).

B- METHODS

Our investigations were initiated by a survey among the managers of the Scientific Research Center of Conakry Rogbanè and the National Center of Fishery Sciences of Boussoura with whom we exchanged views on issues related to the exploitation of the Guinean coastal zones, the use of the "Tètè yèlè" net in the breeding areas and the exploitation of fish larvae in the seafront of Roganè and Takonko.

Using a pre-established survey form, we continued our surveys with fishers who use the traditional net ("Tètè yèlè" in the local language) to collect information on the using of this gear, the categories and quantity of fish larvae caught.

After identification of anthropogenic activities and their impacts in these localities, random sampling was carried out using the traditional net in the different sites; the

catches were put in jars and then sent to the laboratory for analysis. Four sampling sessions were carried out in each site with a one-week interval between sampling.






The samples were mainly composed of zooplankton among which ichthyo plankton, especially larvae were targeted. These fish larvae after capture were separated from the large zooplankton group using needles and tweezers, grouped in petri dishes by adding a few drops of drinking water and 40% lugol solution and left to rest for a few minutes before being identified under the binocular magnifying glass (SERET, B 2011). The specimens were measured (total length) using 8X and 10X millimetre eyepieces. Finally, data for all activities at all levels were collected and processed using Excel and Sphinx software QGIS Desktop 2.18.0.

RESULTS















(a) Inventory of families and species of fish generally fished on the Guinean sea facade

Our surveys with fishermen and managers identified 35 species of fish belonging to 20 families (Table 1).

Table 1: List of Fishes Generally Fished on the Guinean sea facade

N°	Family	Scientific Names	Illustrations	Name in French (FAO, 2004)	Names in local language (soussou)
1	<i>Albulidae</i>	<i>Albula vulpes</i>		Banane de mer	Khomoukhomou
2	<i>Ariidae</i>	<i>Arius latiscutatus</i>		Mâchoiron de gambie	Konkoé
		<i>Arius parkii</i>		Mâchoiron	Konkoé
		<i>Arius heudeloti</i>		Mâchoiron banderille	Konkoé
3	<i>Haemulidae</i>	<i>Plectorhynchus macrolepis</i>		Diagramme à grosses lèvres	Kinsidinyi

4	<i>Pomadasyda e</i>	<i>Pomadasys jubelini</i>		Grondeur sompat	Kessi-kessi
5	<i>Carangidae</i>	<i>Caranx crysos</i>		Carangue commune	Kawrè
		<i>Caranx senegallus</i>		Caranx du sénégal	Kawrè
6	<i>Ephippidae</i>	<i>Chaetodipterus gorenensis</i>		Chèvre de mer	Debelenyiforè
7	<i>Claroteidae</i>	<i>Chrysichthys nigrodigitatus</i>		Bagridatfish	Khökhounyi
8	<i>Cynoglossidae</i>	<i>Cynoglossus monodi</i>		Sole-langue de guinée	Fagba
9	<i>Sparidae</i>	<i>Dentex angolensis</i>		Denté angolais	Sinapa
10	<i>Drepanidae</i>	<i>Drepane africana</i>		Drepane africain	Débényi
11	<i>Clupeidae</i>	<i>Ethmalosa fimbriata</i>		Ethmalose africain	Bonga
		<i>Ilisha africana</i>		Alose rasoir	Laati
		<i>Sardinella maderensis</i>		Sardinelle plate	Bongasèri
12	<i>Cichlidae</i>	<i>Hemichromis fasciatus</i>		Carpe	Toka
		<i>Tilapia guineensis</i>		Carpe	Khöbè
13	<i>Trichiuridae</i>	<i>Trichiurus lepturus</i>		Poisson sabre	Paniyèkhè
14	<i>Sphyraenidae</i>	<i>Sphyraena barracuda</i>		Barracuda	Kouta
		<i>Sphyraena guachancho</i>		Barracuda	Kouta

15	<i>Mugilidae</i>	<i>Liza falcipinis</i>		Mulet à grande nageoire	Sèki
		<i>Liza grandisquamis</i>		Mulet à grandes écailles	Sèki
		<i>Mugil cephalus</i>		Mulet cabo	Sèki
16	<i>Polynemidae</i>	<i>Galeoides decadactylus</i>		Petit capitaine	Sanis
		<i>Pentanemus quinquarius</i>		Capitaine moustache	Gbalakassa
		<i>Polydactylus quadrifilis</i>		Gros capitaine	Söri
17	<i>Sciaenidae</i>	<i>Pseudotolithus senegalensis</i>		Otolithe sénégalais	Sosoékondouké
		<i>Pseudotolithus branchygnatus</i>		Otolithe gabo	Fouta
		<i>Pseudotolithus elongatus</i>		Otolithe bobo	Boboè
		<i>Pseudotolithus epipercus</i>		Otolithe guinéen	Boboè foré
		<i>Pseudotolithus typus</i>		Otolithe nanka	Sosoékonkouyé
18	<i>Dasyatidae</i>	<i>Dasyatis margarita</i>		Pastenague à perle	Kouléyèkhè
19	<i>Rhinobatidae</i>	<i>Rhinobatos cemiculus</i>		Raie-guitare	Matéki
20	<i>tretraodontidae</i>	<i>Ehipion guttifer</i>		Compère à point blanc	Bayakui

(b) -Categorization of fishermen

After contacting the fishermen, we grouped them on the basis of gender. This allowed us to report that 81.8% of the fishermen are represented by females as opposed to 18.8% by males (Diagram 1).

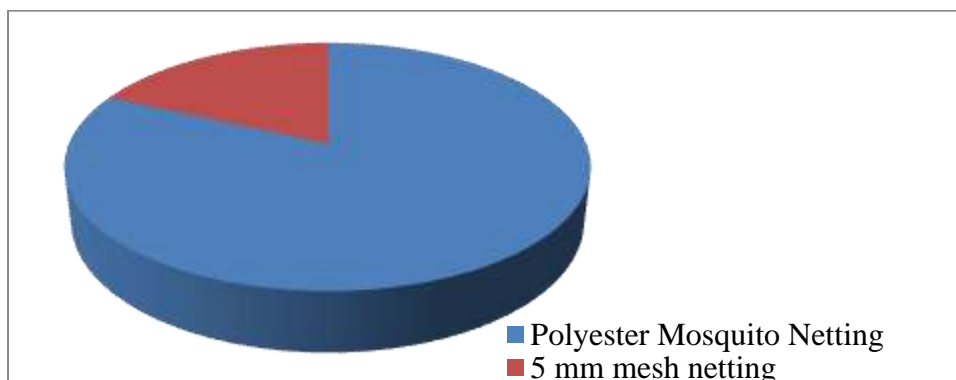


Diagram 1: Distribution of fishermen by gender

(c)-Classification of nets used for fishing

During fishing, two (2) types of nets have been identified and are represented by 1)- Polyester Mosquito Netting and 2)-that of 5 mm mesh netting (Diagram 2).

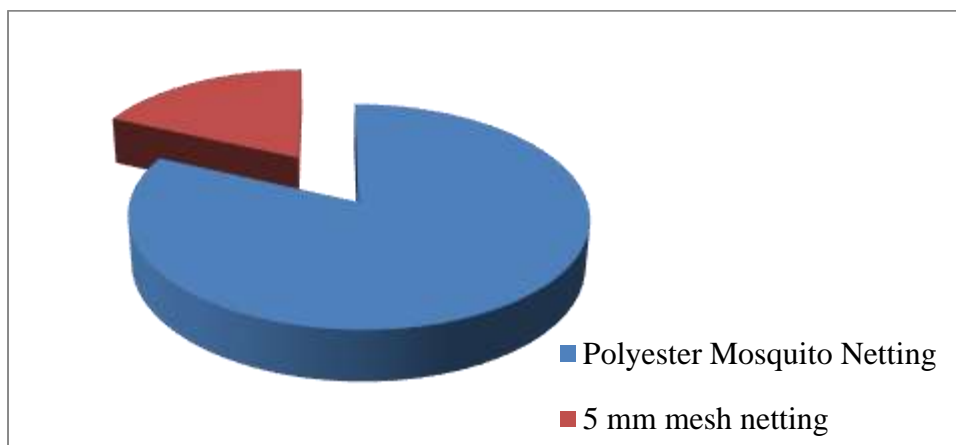


Diagram 2: Types of nets used for fishing

(d)-Species of juvenile fishes caught with the conical net "Tètèyèlè"

In the seafront of Ratoma municipality, many species of fishes are usually caught in the juvenile stage through the conical net "Tètè yèlè" and composed of several fish larvae.

These are: the Royal captain, the Sardinella, the African ethmalosis and the Razor shad (Table 2).

Table 2: List of juvenile fish species generally fished with the conical net "Tètè yèlè"

N°	Names in french	Names in local language (soussou)
1	Royal captain	Gbalakassa
2	Sardinella	Pentö
3	African ethmalosis	Coupè
4	Razor shad	Lati

(e) - Inventory of fish larvae identified by sites

In the scope of our activities, we inventoried fourteen (14) families of fish, out of which eighteen (18) species were defined. They are : Sphyraenidae, Hemiramphidae, Trichiuridae, Tetraodontidae, Sciaenidae, Pristigasteridae, Polynemidae, Mugilidae, Gobidae, Cynoglossidae, Carangidae, Clupeidae, Drepanidae and Albulidae (Table 3). The characteristics of the different species of fish larvae caught as well as their morphometric study and species richness by station are described in the tables, histograms and map below.

Table 3: Results of the inventory of fish larvae found by site

N°	fish larvae		Sea facade			Total
	Families	Species	Taouyah	CERESCOR	Takonko	
1	Albulidae	<i>Albula vulpes</i>	0	13	7	20
2	Drepanidae	<i>Drepana africana</i>	0	15	8	23
3	Clupeidae	<i>Ethmalosa fimbriata</i>	5	28	22	55
4		<i>Sardinella aurita</i>	0	22	9	31
5	Carangidae	<i>Chloroscombrus chrysurus</i>	0	12	7	19
6	Cynoglossidae	<i>Cynoglossus monodi</i>	0	5	0	5
7	Gobidae	<i>Gobius angolensis</i>	10	9	9	28

8	Mugilidae	<i>Liza falcipinis</i>	2	22	14	38
9	Polynemidae	<i>Galeoides decadactylus</i>	4	17	12	33
10		<i>Pentanemus quinquarius</i>	2	17	12	31
11	Pristigasteridae	<i>Ilisha africana</i>	5	18	15	38
12	Sciaenidae	<i>Pseudotolithus typus</i>	0	12	15	27
13		<i>Pseudotolithus elongatus</i>	0	12	9	21
14		<i>Pseudotolithus epipercus</i>	3	9	6	18
15	Tetraodontidae	<i>Ephppion guttifer</i>	0	19	16	35
16	Trichiuridae	<i>Trichiurus lepturus</i>	0	2	0	2
17	Sphyraenidae	<i>Sphyraena barracuda</i>	11	23	14	48
18	Hemiramphidae	<i>Hemiramphiphus brasiliensis</i>	0	2	2	4
Total			42	257	177	476

Table 4: Description of fish larvae encountered in the investigative sites

Nº	fish larvae species	Characteristics of the larvae
1	<i>Albula vulpes</i>	Elongated shape, the base of the dorsal fin is short, the caudal fin is forked, the mouth turned a little downward.
2	<i>Drepana africana</i>	Laterally flattened shape, very high body height, the first rays of the dorsal fin are spiny between 8 and 9 spines, the tip of the pectoral fin is pointed, the caudal fin is diamond-shaped.
3	<i>Ethmalosa fimbriata</i>	The body is high and compressed, ventral and dorsal profile is very convex, one or more melanophores are behind the operculum extending to the tail.
4	<i>Sardinella aurita</i>	Elongated body with 8 to 9 rays in the pelvic area, the caudal bone forked, black point at the edge of the opercula.
5	<i>Chloroscombrus chrysurus</i>	Body strongly compressed laterally and a ventral profile clearly more convex than the dorsal profile, 8 spines at the first dorsal, the second and the anal are similarly long, the presence of the outline

		of 6 to 12 weak scutes at the caudal peduncle.
6	<i>Cynoglossus monodi</i>	The muzzle is distinctly more elongated, the eyes and mouth are very small, the pectoral muscles are also absent.
7	<i>Gobius angolensis</i>	The body is fusiform and has a large, slightly depressed head. The muzzle is short and rounded. The spiny dorsal fin has its first filamentous rays; the caudal fin is rounded.
8	<i>Liza falcipinis</i>	The body is clearly compressed, the muzzle rounded. The anal side has 3 spines and 10-11 soft rays. The caudal fin is moderately forked. There is a black spot at the base of the pectoral fin.
9	<i>Galeoides decadactylus</i>	This species has 9 to 10 short, free pectoral filaments. Its snout is remarkably conical; there is often a rounded smoke patch above the pectoral.
10	<i>Pentanemus quinquarius</i>	The body is highly compressed, characterized by the outline of its 5 long pectoral filaments; the first dorsal fin is hard and the second soft; the caudal fin is forked.
11	<i>Ilisha africana</i>	The body is slightly elongated; the mouth is pointing to the top; the pelvic fin is very small or missing; the anal fin is very long and the caudal fin is forked.
12	<i>Pseudotolithus typus</i>	The body is fusiform and the head is cylindrical; The dorsal and ventral profiles are almost symmetrical. The dorsal fin has 10 spines and 28-32 soft rays.
13	<i>Pseudotolithus elongatus</i>	The body is fusiform and compressed, its greatest height is at the level of the first spines of the dorsal; the muzzle is short and the dorsal profile is more convex than the ventral profile. The dorsal ridge has 11 spines.
14	<i>Pseudotolithus epipercus</i>	The body is elongated, approximately cylindrical or compressed; the mouth is terminal; the caudal is pointed and lozenge-shaped.
15	<i>Ephippion guttifer</i>	The caudal is rounded, the dorsal has 10 to 12 rays and the anal has 9 to 11. The pelvic fins are absent.
16	<i>Sphyraena barracuda</i>	The body is elongated and compressed. The head is long and broad with a pointed muzzle. The mouth is widely slit. The first dorsal fin consists of 5 spines, the second is soft and opposite to the anal. The caudal is forked, the pelvic vertebrae are positioned abdominally and the pectorals are short.
17	<i>Hemiramphus brasiliensis</i>	Elongated body, upper jaw very short and lower jaw longer; caudal forked and the dorsal close to caudal pedicle with 12 to 14 radius at the anal region.
18	<i>Trichiurus lepturus</i>	The ribboned body ends in a tapered point, the caudal is absent, as well as the pelvic and anal. Three spines at the upper base of the dorsal fin.

Table 5: Morpho-metric study of the different species of fish larvae encountered

Species	Taouyah		CERESCOR		Takonko	
	Height (mm)					
	Mini	Maxi	Mini	Maxi	Mini	Maxi
<i>Albula vulpes</i>	-	-	16, 2	20 ,5	15, 0	19,8
<i>Drepana africana</i>	-	-	15,7	17,3	13, 0	14,2
<i>Ethmalosa fimbriata</i>	14,2	17,7	12,3	15,9	15, 2	16 ,4
<i>Sardinella aurita</i>	-	-	14,2	16,6	12, 8	15,1
<i>Chloroscombrus chrysurus</i>	-	-	12,6	15,4	14, 3	18,3
<i>Cynoglossus monodi</i>	-	-	13,4	14,9	-	-
<i>Gobius angolensis</i>	11,2	13,9	12,4	16,7	12, 3	14,8
<i>Liza falcipinis</i>	13,2	16,3	13,4	16,9	14, 2	17,5
<i>Galeoides decadactylus</i>	15,8	17,5	14,6	16,7	14, 9	16,3
<i>Pentanemus quinquarius</i>	18,9	19,7	14,5	16,8	14, 2	15,6
<i>Ilisha africana</i>	14,8	18,9	13,8	14,0	15, 6	17,7
<i>Pseudotolithus typus</i>	-	-	19,3	22,8	21, 1	23,9
<i>Pseudotolithus elongatus</i>	-	-	14,3	15,0	13, 8	14,4
<i>Pseudotolithus epipercus</i>	14,2	17,1	13,9	15,7	12, 2	14,8

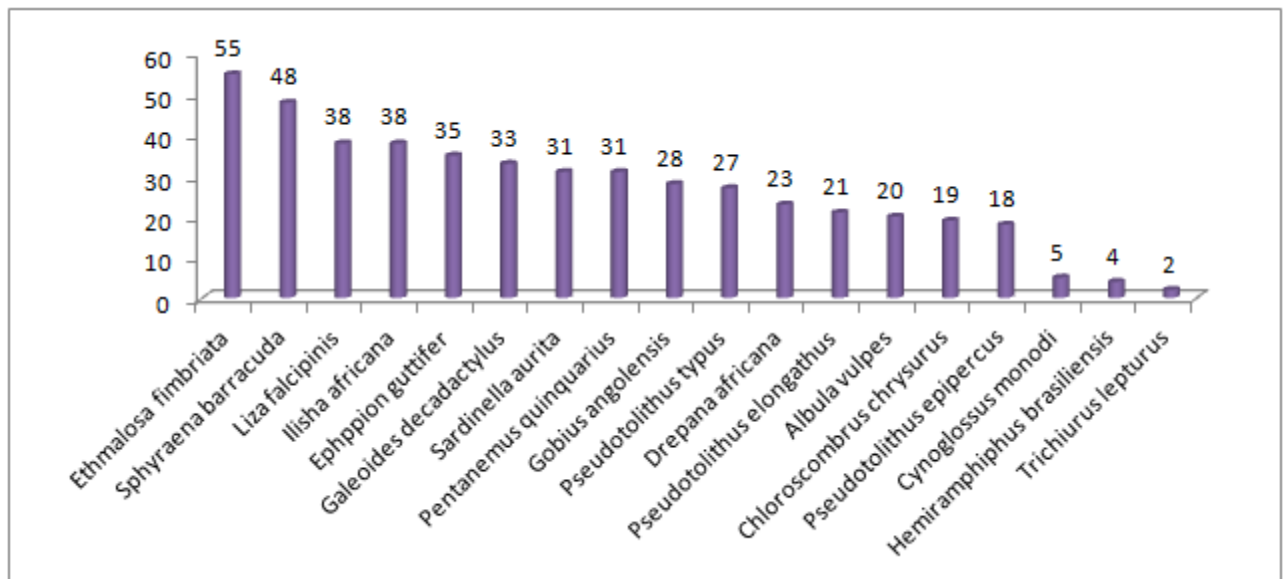
<i>Ephppion guttifer</i>	-	-	12,0	14,3	15, 0	18,6
<i>Trichiurus lepturus</i>	-	-	29,4	35,2	-	-
<i>Sphyraena barracuda</i>	24,3	26,7	24,0	25,2	25, 4	27,7
<i>Hemiramphus brasiliensis</i>	-	-	25,1	29,4	24, 2	25,9

Table 6: List of species of fish larvae encountered by site

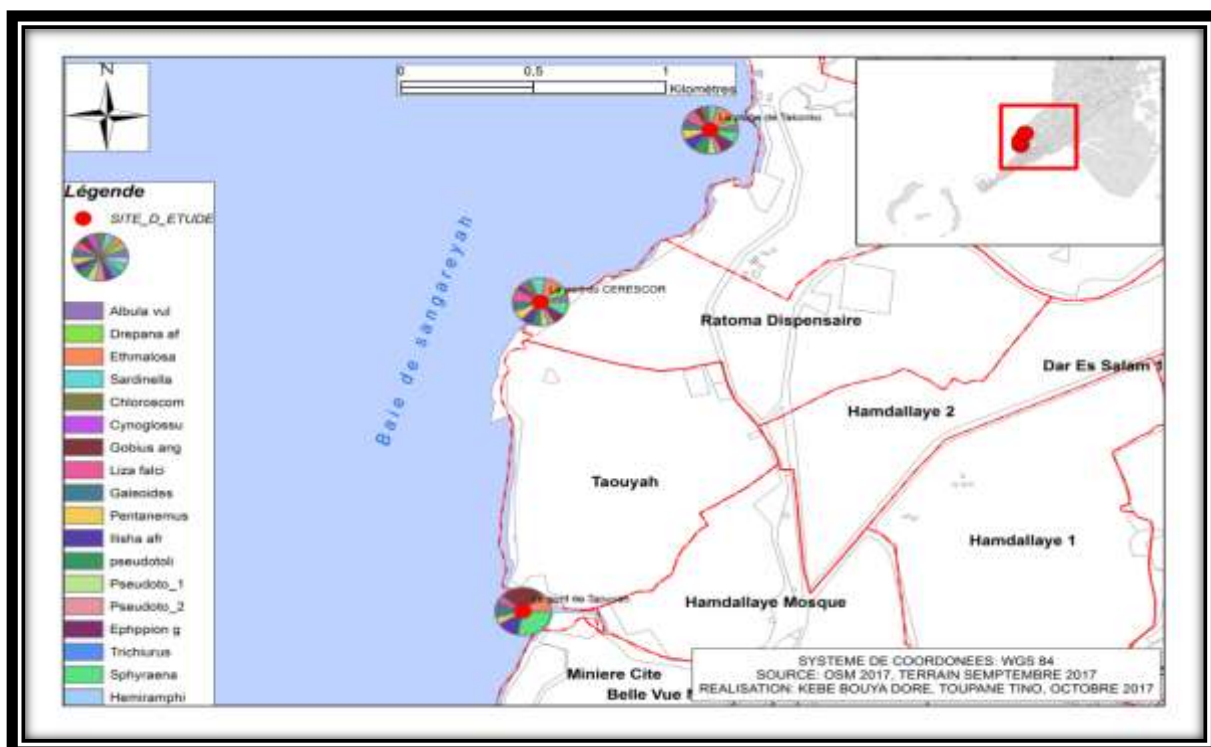
No	Number of species per area		
	Taouyah	CERESCOR	Takonko
1	-	<i>Albula vulpes</i>	<i>Albula vulpes</i>
2	-	<i>Drepana africana</i>	<i>Drepana africana</i>
3	<i>Ethmalosa fimbriata</i>	<i>Ethmalosa fimbriata</i>	<i>Ethmalosa fimbriata</i>
4	-	<i>Sardinella aurita</i>	<i>Sardinella aurita</i>
5	-	<i>Chloroscombrus chrysurus</i>	<i>Chloroscombrus chrysurus</i>
6	-	<i>Cynoglossus monodi</i>	-
7	<i>Gobius angolensis</i>	<i>Gobius angolensis</i>	<i>Gobius angolensis</i>
8	<i>Liza falcipinis</i>	<i>Liza falcipinis</i>	<i>Liza falcipinis</i>
9	<i>Galeoides decadactylus</i>	<i>Galeoides decadactylus</i>	<i>Galeoides decadactylus</i>
10	<i>Pentanemus quinquarius</i>	<i>Pentanemus quinquarius</i>	<i>Pentanemus quinquarius</i>
11	<i>Ilisha africana</i>	<i>Ilisha africana</i>	<i>Ilisha africana</i>
12	-	<i>Pseudotolithus typus</i>	<i>Pseudotolithus typus</i>
13	-	<i>Pseudotolithus elongatus</i>	<i>Pseudotolithus elongatus</i>
14	<i>Pseudotolithus epipercus</i>	<i>Pseudotolithus epipercus</i>	<i>Pseudotolithus epipercus</i>
15	-	<i>Ephppion guttifer</i>	<i>Ephppion guttifer</i>
16	-	<i>Trichiurus lepturus</i>	<i>Trichiurus lepturus</i>
17	<i>Sphyraena</i>	<i>Sphyraena barracuda</i>	<i>Sphyraena barracuda</i>

	<i>barracuda</i>		
18	-	<i>Hemiramphiphus brasiliensis</i>	<i>Hemiramphiphus brasiliensis</i>
Total	8	18	16

Histogram 6: Percentage of catch in investigation sites



Map 1: Specific yield per station



DISCUSSION

Several species of fish are exploited on the Guinean coast as well as in the West African sub-region. In the sea and brackish waters of Guinea, 589 fish species have already been identified by FAO, 2004 [9]. However, many fish species are caught with "Tètè yèlè" nets, generally caught in the juvenile stage and composed of several fish larvae. The results showed variability in the number of individuals caught per site, the species caught, and the influence of environmental factors. Continuing the fisheries will allow us to compare the results obtained amply and to better understand the factors most influencing their distribution. The results correspond to those of Ministry of Fisheries and Aquaculture of Guinea, which explain that the fishery products caught with the traditional net "Tètè yèlè" are very diversified and are also composed of many fish larvae (10). This observation is very important if we know that the presence of larvae can provide information on the periods and areas of egg-laying, as well as on the spatio-temporal distribution of the first life stages of fish [11]. Fishing with this traditional net is an activity predominantly practiced by women. These results are in line with those of Camara S. et al. (2007) [12] who point out that this activity is generally practiced by women. For this reason, this equipment is qualified as a women's net.

Studies have revealed that the traditional net is a conical-shaped synthetic or vegetal fibre net with a wooden hoop as a support. The circumference of the hoop and its depth depend on the user's ability. Field measurements show that the depth varies from 1 to 1.81m and is approximately equal to the diameter of the hoop. This description is consistent with that of [10] which concludes that the depth of the net varies between 1 and 1.60 m approximately.

After counting the larvae of the fish species encountered, the CERESCOR area was the richest with the presence of 18 species divided into 14 families, followed by the Takonko area with 16 species divided into 12 families and the Taouyah bridge area with 8 species divided into 7 families. After the observation of fish larvae samples, 476 individuals divided into 14 families and 18 species were identified in the three sites. A study conducted on sardinella between June 24 and July 7, 2008 by authors showed that the high intensity of egg laying of some species depends on the duration of the survey [13].

These identified types of fish belong to three ecological groups, namely: Pelagic fish, composed mainly of Clupeidae, Carangidae, Pristigasteridae and Hemiramphidae. Demersal fish, represented by Sciaenidae, Polynemidae, Drepanidae, Sphyraenidae, Albulidae and Benthic fish, represented by Cynoglossidae; Tetraodontidae, Gobidae, Mugilidae and Trichiuridae. These results are approximately similar to the 17 fish families found in the juvenile stage in Kaporu Bay [14]. Similar studies have shown that most of the families of fish with high economic value, exploited by artisanal and industrial fisheries in the Guinean facade, are found in Kaporu Bay [15].

The species of fish encountered are different from each other by their morphological characteristics. For example, *Sardinella aurita* has 8 to 9 rays at the pectoral fin, has an elongated shape, forked caudal fin and the presence of black points at the edge of the operculum; as for the species *Sardina pilchardus*, the larvae measuring 11.1mm already have 7-8 definitive rays on the dorsal fin located just in front of the anus. The pigmentation of the body remains the same, except for the post anal part where the quantity of melanophores is higher and they form a lower caudal row [16].

The size of identified individuals varies from 11.2 to 35.2 mm. The presence of smaller individuals in these areas shows that they are areas that are favourable to the development of the fish population. This result is related to the gear used to catch the samples.

Traditional nets made with mosquito nets capture individuals that are in the first stage of their life (eggs, larvae, and juveniles of fish). Compared to the results of the morphometric parameters of the main fish species caught in the juvenile stage with the "Tètè yèlè" net, the fish caught are for the most part comprised of numerous fish larvae. *Ethmalosa fimbriata* (55 individuals) is the most dominant species, followed by *Sphyraena baracuda* (48 individuals) and the species *Trichiurus lepturus* is the least encountered (2 individuals). These results are similar to those of the 58 fish species recorded in Kaporu Bay of which *Ethmalosa fimbriata* was the most dominant [14].

CONCLUSION

The study area composed of Taouyah, CERESCOR and Takonko is rich in a wide variety of fish resources. The species encountered are ecologically divided into pelagic, demersal and benthic species. From the morphometric perspective, the species

encountered are small in size, which means that these ecosystems are areas of reproduction, nursery and development of the ichthyological population. As far as the use of the traditional net "Tètè yèlè" is concerned, it is first of all a subsistence activity before taking a commercial dimension. It is an informal activity since the operators have no relationship with the authorities of the fishing industry. The general trend in catches in all the sites is declining and that of the mangrove on Takonko beach remains in relict form. The increase in the number of users of this net and the shift from subsistence fishing to commercial fishing with this gear may contribute to the overexploitation of the Guinean continental shelf.

ACKNOWLEDGEMENT

The authors wish to acknowledge the help provided by Higher Institute of Sciences and Veterinary Medicine, Dalaba (Guinea) for their assistance in data collection.

REFERENCES

- [1] Nagelkerken, I., Blaber SJM., Bouillon, S., Green, P., Haywood, M., Kirton, LG., Meynecke, JO., Pawlik, J., Penrose, HM., Sasekumar, A., and Somerfield PJ, 2008, The habitat function of mangroves for terrestrial and marine fauna : A review, *Aquatic Botany*, 89 (2), 155-185
- [2] FAO. 2019, Africa's inland aquatic ecosystems: how they can increase food security and nutrition, *Nature & Faune journal*, Volume 32, Issue no.2. Accra. 108 pp. Licence: CC BY-NC-SA 3.0 IGO.
- [3] Lobryal, J., gascuel, D., and Domain, F., 2003, The specific biodiversity of demersal resources of the Guinean continental shelf: the use of classical indices for a diagnosis of the evolution of the ecosystem. Ed. Ensar, Rennes (Fernch version).
- [4] Worm, B., Barbier, EB., Beaumont, N., Duffy, JE., Folke, C., and Halpern, BS., 2006, Impacts of biodiversity loss on ocean ecosystem services. *Science*, 314,787-790
- [5] Polet, H., Coenjaerts, J. and Verschoore, R., 2004, Evaluation of the sieve net as a selectivity-improving device in the Belgian brown shrimp (Crangon crangon) fishery, *Fisheries Research*, 69, 35-48.

-
- [6] Catchpole, TL., Reville, A.S., Innes, J., and Pascoe, S., 2008, Evaluating the efficacy of technical measures: a case study of selection device legislation in the UK crangon (brown shrimp) fishery. *ICES Journal of Marine Science*, 65, 267–275.
- [7] Cybriwsky Roman Adrian, 2013, *Capital Cities around the World: An Encyclopedia of Geography, History, and Culture*, ABC-CLIO, USA, p. 89
- [8] National Directorate of the Meteorological Station of Conakry, 2014
- [9] FAO, 2004, Identification of species for fishing purposes. *Eastern Central Atlantic*. Area 34, 47. Volume 1 - 6. Ottawa, Canada. (French version)
- [10] Ministry of Fisheries and Aquaculture of Guinea, April 2009, Fisheries and Aquaculture Development Policy Letter (LPDPA): Assessment and Strategy, P 6-7
- [11] Alemany, F., 1997. Ictioplankton del Mar Balear. Ph. D. thesis, Univ. Illes Balears, Palma de Mallorca. 496 p
- [12] Camara, S., Morand1, P., Magassouba, M., Diallo, A.P., and Cissé, B., 2007. Inventory and description of the major features of the continental fisheries of Upper Guinea: scientific bases for a system of evaluation and periodic monitoring. *Bulletin Semestriel du CNSHB* Vol. 2, N°1-2. (French version)
- [13] Koched, W., Hattour, A., and Said, K. Les larves de poissons téléostéens le long des côtes Est tunisiennes : distribution et abondance. *Bull. Inst. Natn. Scien. Tech. Mer de Salammbô*, 2011, 38 : 29-39
- [14] Bamy, IL., Bangoura, SF., and Doumbouya, F., 2007, Study of the juvenile population of the Faban and Sofonia estuaries. *Bul. CNSHB*, Vol.2 (N°1-2)31-32 (French version)
- [15] Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean (COMHAFAT), October 2012. Fisheries and aquaculture industry in Guinea. e-Provisional Version Report n° 3 of the review of the fisheries and aquaculture industry in the 22 Member States of COMHAFAT, 8-9 (French version)

- [16] Lecaillon, G., Murenu, M., Felix hackrad, F., and L'enfant, P., 2012, Identification guide for Mediterranean post-larvae. Edited by ECOCEAN for the Foundation for Research on Biodiversity. 66 p. (Fernch version)