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Production and specific diversity of fish at the level of the Taabo dam lake (Ivory Coast, West Africa)

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Abstract

The management of fishery resources is a concern for managers of the fishing sector. The insufficiency of statistics in this sector is an obstacle to the sustainable management of fish.

This study aimed at determining the fishing techniques, production and biological indices that characterize fishing in Taabo Lake. Data was collected from July 2019 to June 2020 in the Taabo-village station from surveys and analysis of fishermen's catches. Each identified specimen was weighed. The results of the study indicate seven fishing gears including conical fishing basket, castnets and gillnets with meshes smaller than the regulatory mesh. Purse seines and bamboo traps were specifically more selective (1 species). The seines have the annual catches (23,140 kg); CPUE (14.51 kg / exit); highest utilization (29%) and performance (46%) rates. An annual effort of 5501 fishing / trips for 50334.3 kg of fish caught characterized the fishing on Taabo Lake. This production is made up of 44 species belonging to 18 families. The Claroteidae family (47%) and the species *Chrysichthys nigrodigitatus* (46%) dominate the fish population of Taabo lake. This study provides our governments informations in their quest for the sustainable management of fishery resources.

Keywords: Fishing Gears; Fishing Effort; Catches; CPUE; Taabo Lake

1. Introduction

African rivers are rich in fishery resources [1] so that the exploitation of these resources constitutes for the riparian populations an important socio-economic activity. According to [2], the fish is on the way to become the main source of animal protein in the adjacent regions. In addition, for low-income populations, it is often the only accessible source of protein [3]. They are not only less expensive than meat, but very popular with an average individual consumption of 8.50 kg per year and figure prominently in local and traditional recipes [1]. Thus, the search for fish has allowed the development of significant fishing activities in Côte d'Ivoire. The increase in the Ivorian population has resulted in a high demand for halieutic proteins [4]. This strong demand has given rise to significant economic challenges and led to the emergence of new markets around the various Ivorian rivers [5]. These economic issues have oriented Ivorians towards fishing activity and attracted many foreigners to the fishing areas [6]. Thus, fishing in the Ivorian inland waters, long considered an artisanal and subsistence sector for the inhabitants, has undergone significant changes with the improvement of fishing means and a better valuation of the products. This promotion of fishing products leads to the arrival of new fishermen and their techniques in the area [7] leading to an increase in the number of fishermen. The increase in the number of fishermen leads to an intensification of fishing pressure [8] which can lead to stock depletion [9]. Indeed, one of the factors that leads to the degradation of fish stocks is the mode of exploitation of these resources [10].

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It is in this sense that in Côte d'Ivoire, the State has put in place a strategy for the development of fishing and aquaculture, the general objective of which is responsible fishing in order to ensure the conservation, sustainable management and development of fishery resources while respecting ecosystems and biodiversity, in order to better fight against food insecurity and poverty [11]. This study is a contribution to strengthening this strategy on the Taabo Lake.

It was initiated to characterize production, species richness and fishing techniques on Taabo Lake to provide fisheries managers with useful information in their quest for solutions for sustainable management of fisheries resources.

2. Material and methods

2.1. Location of sampling stations

The Taabo Lake (Figure 1) comes from the Taabo hydroelectric dam located on the main course of the Bandama river downstream from the confluence of the Bandama and the Marahoué [12]. It is located between 06 ° 20 "and 06 ° 40" North latitude and 5 ° and 5 ° 30 "longitude West [13]. The Taabo-village station (06 ° 12 'North latitude and 5 ° 06' West longitude) was selected for the sampling of the present study. The choice of this station is justified by the fact that this site is the landing stage for the majority of fishermen working on the lake [14].

2.2. Data collection

The various missions were carried out from July 2019 to June 2020, at the rate of an outing of 10 days per month. During each mission, the inventory and description of fishing gear and practices were made. The number and categories of gear, the fishing techniques, the time and duration of the setting, the dimensions of the gear and the mesh sizes of the nets, the quantity of fish caught, and the number of fishermen in activity were taken into account in the sampling. The dimensions of the fishing gear were measured to the nearest cm using a tape. The meshes of the nets were measured from knot to knot to the nearest mm using a caliper. Catches by gear type and fishing technique were weighed to the nearest gram using a trade balance with a capacity of 20 kg. The number of fish constituting each catch was estimated from a representative sub-sample of the catch. Specimens were identified using identification keys from [15 , 16]. All this information was supplemented in the field by direct exchanges with the fishermen, as well as by direct observations in the field during the follow-up of the fishing sessions on the lake.

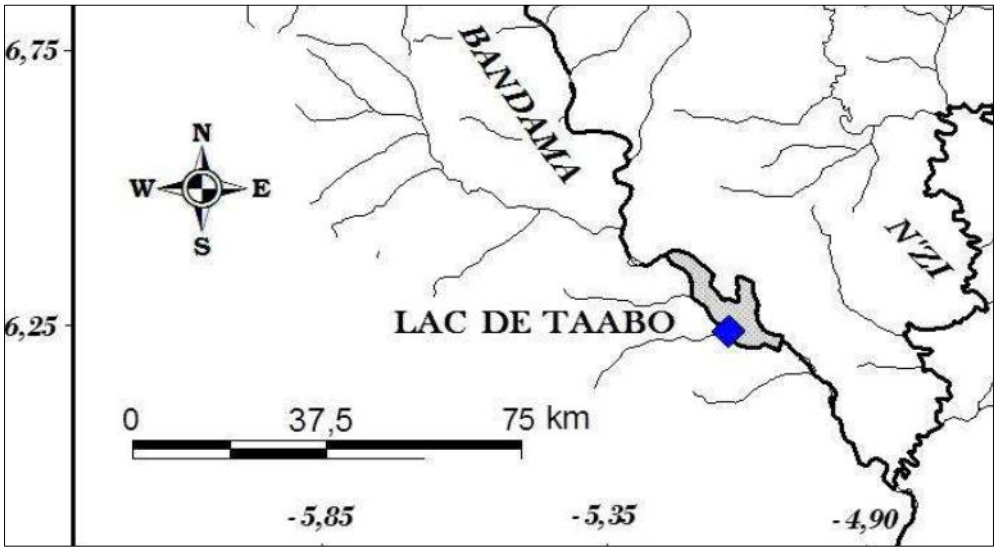

Figure 1 Location of the sampling station

2.3. Data processing

To get a more general idea of the fish population of Taabo lake, a descriptive analysis of the ichthyological population was carried out using the biological indices below:

2.3.1. Specific richness (RS) and percentage of occurrence (PO)

The total specific richness (RS = number of species caught) was determined for the entire sampling period from July 2019 to June 2020. The percentage of occurrence (PO) was calculated by making the percentage of months in which a

species i is sampled against the total number of months sampled. This value is calculated according to the following formula:

- PO = (Mi / Mt) × 100
- Mi = number of months species i was caught;
- Mt = total number of months surveyed.

The classification of [17] was retained for the present study. This breakdown is as follows:

80 to 100%: Very Frequent species; 60 to 79%: Frequent species; 40 to 59%: Quite frequent species; 20 to 39%: Accessory species and less than 20%: Accidental species

2.3.2. Percentage numeric

Percentage numeric: N = Ni × 100 / Nt [18] with Ni = number of individuals of a species occurring in the catches, Nt = total number of individuals in the catches.

2.3.3. Percentage weight

Percentage weight: W = Wi × 100 / Wt (18) with Wi = weight of individuals of a species occurring in the cat, Wt = total weight of individuals in the catches

2.3.4. Shannon Diversity Index

Shannon Diversity Index (H '): H '= -Σpilog2pi with pi = ni / N, where N is the sum total of the numbers (individuals) obtained for all species; nor, the number of individuals per species; pi the relative abundance of species i in the sample.

2.3.5. Equitability

Equitability (E): E = H '/ log2S, with E between 0 and 1. S is the specific richness.

2.3.6. Production

Fish production statistics take into account the total catch per fishing gear (in kg). These data were used to calculate the monthly quantities (in kg) of fish caught in the area. The summation of the monthly quantities makes it possible to calculate the total quantity of fish caught by fishermen in this area in the year [14].

2.3.7. Fishing effort

The fishing effort considered in this study is the set of daily fishing trips for all the gears effectively participating in the catch of fish. In order to determine the actual fishing pressure in the fishing zone, the number of fishing trips per month for each gear, for each fishing unit, was evaluated. These data were used to estimate the fishing effort [25 , 19].

2.3.8. Rate of use of the main fishing gears

The rate of use of fishing gear (Tu) was calculated during this study. This is the number of fishing trips using a given type of machine (Npe), compared to the total number of trips recorded in the year (Npt). The formula used is that proposed by [19]: Tu = (Npe / Npt) x 100

2.3.9. Catch Per Unit of Effort (CPUE)

Catch Per Unit of Effort is the mass of catches made by a fisherman during a fishing trip. It is expressed in kg / trip for all gears. For each month and for each gear, an average catch per unit of effort (CPUEm) was determined from all the daily catches recorded during the month considered according to the following formula:

$$CPUEm = Mt / Nt \text{ [19]}$$

With Mt = total mass in kg of daily catches landed by all the fishermen surveyed during the month; Nt = total number of fishing trips in the month.

2.3.10. Total catches or total productions and yield per gear

For each fishing gear, the monthly catches (Ci) (in kg), were calculated by summing the daily catches made during month i. The summation of the monthly quantities made it possible to calculate the total annual quantity (Ca) of fish caught by each gear and the fishermen. The total quantity was obtained by the following formula:

$$Ca = \sum Ci \text{ [19]}$$

2.3.11. Yield per fishing gear

The yield of the different gears was calculated by making the ratio of the total catch of gear i to the total catch of all the gears considered, the whole multiplied by 100 according to the following formula:

- $Ri = (Pi / Pt) \times 100$ [19]
- With: Ri = yield of gear i;
- Pi = Total catch of gear i;
- Pt = Total catch all gear considered.

2.4. Statistical processing

The ANOVA test was used to compare Shannon Index and Equitability. All statistical analyzes were performed with Statsoft-Statistica, Inc. software.7.0 and Excell 2003.

3. Results

3.1. Access conditions to halieutic resources

The access to the fishing area is by acquisition of a fishing license. However, this obligation is not always respected by newcomers. The fishermen congregate by ethnic groups but there are no fishermen's associations in the localities visited. These structures based on ethnicity are involved in the control of fishing activities in collaboration with the officers of the fishing offices and recognized by the departmental directorate of animal and halieutic resources.

Thus, any new fisherman in the fishing area is supported by his ethnic group before applying for a fishing license from the authority in charge of fisheries management. The cost of this license is 15000 f / year. In addition, the fisherman must honor a tax of 3000 f / month. He also has to pay 2000f / month to the village authorities for access to water.

3.2. Fishing gear and techniques

The fishing gear used by artisanal fishermen on Taabo Lake from July 2019 to June 2020 are diverse. These are seines, gillnets, conical fishing baskets, castnets, harpoons, longlines and bamboo.

Two kinds of shore seines (ali and djoba) are present on Taabo lake with the main difference being the mesh of the net which constitutes their pocket. With a length varying between 100 and 200 meters, the meshes of the central *ali* layer are between 5 and 13 millimeters. It is a purse seine designed especially for the capture of a small pelagic: *Pellonula leonensis* (locally called "mimie la go"). The *Djoba* is larger in size, handled by a team of four to six people. Its length varies from 100 to 250 meters. She is without a true pocket. The meshes of the central layer are 35 millimeters.

The gillnets (*djo*), rectangular in shape and wet vertically in the water, are stretched between the floats (pieces of sandals) of the upper rope and the sinkers of the lower rope. Installed at nightfall, they are picked up the next morning. The meshes used vary between 10 and 55 mm. The most used nets are those with mesh between 10 and 35 mm (88%). The nets used are either multifilar nylon white or blue; either monofilar in fine nerve of light green color.

The castnet (locally called fri djo), is a flared conical-shaped device generally used in shallow water. This gear can be launched from the shore or from a boat. It captures fish by falling back and closing in on them. It is one of the main active gear used on this lake with mesh sizes between 20 and 65 mm. The average drop is 5 m. Its circular base has a diameter varying between 4 and 7 m and is provided with weights at the periphery. It is often used by a single fisherman, the owner.

The harpoon (*marfa*) is a weapon consisting of a launcher mounted on a barrel and a projectile which is a large spear (130 cm) attached to a thick rope. The lance has sharp hooks in the form of barbs. While diving, the fish is bombarded

with the hooks of the spear that penetrate its flesh. The hooks thus remain stuck in the flesh and the fish is retrieved by pulling on the rope. The harpoons used by fishermen on the Taabo Lake are generally of the traditional type with an average length of 87 cm.

The conical fishing basket is a trap shaped like a cage that is used to catch fishes. Two types of traps are used on the Taabo Lake: net traps and grilling traps. The traps covered with net (*papolos*) are made of a frame of lianas or strips of wood that meet almost at the top, and whose flexibility allows the fish to enter the gear. They are of variable dimensions and used in fixed fishing. The nets used for these traps are multi-threaded nylon white or blue. These traps are baited with corn bran or boiled rice and pieces of rotten cassava. The mesh size of these nets is between 24 to 30 mm. Wire traps have an average mesh size of 35 mm.

The trap is placed between 3 and 6 m deep by the fisherman who dives for its installation and its recovery. The activity is carried out by a single fisherman and the laying time can take tens of hours.

The longlines consists of a main rope to which are attached secondary ropes (branchlines) on which many hooks are attached. Longlines are set in the evening and can stay in the water for 3 to 4 days. Frogs and some fish are used as bait. The line is gradually dropped into the water from a canoe. At the surface, the longline is spotted and floats from the small plastic cans which are often attached at intervals of 50 to 100 m. The longline is left for several hours (6-24 hours) before it is picked up by the fisherman.

Bamboo traps are pieces of bamboo, about 45 to 50 centimeters long, each piece is open at one end. The fisherman takes care to connect many pieces by a rope attached to floats, thus forming a line of bamboos several hundred meters long. The line is then placed in the water for a stay of several days or even weeks, at the end of which it is raised with fish inside which have become accustomed to life in the bamboo. The bamboo is better known in Taabo as *bô* in the Malinke language.

3.3. Fishing effort and rate of use of fishing gear

Table 1 shows the fishing effort and the rate of use of the various fishing gears identified on Taabo lake. The calculated fishing effort on the lake gave an annual value of 5501 fishing trips distributed among the seven fishing gears recorded on the lake.

Purse seines are the most used gear (1595 trips or 29% of trips). They are followed by gillnets (1430 trips or 26% of trips), conical fishing baskets (1100 trips or 20% of trips) and castnets (605 trips or 11% of trips). The percentage of fishing trips with harpoons and longlines are respectively 8% (440 trips) and 4% (202 trips). Bamboo traps have the lowest fishing effort (111 trips or 2% of trips).

The ANOVA test applied to these values shows a significant difference ($p < 0.05$).

Table 1 Fishing effort and rate of use of fishing gear on Taabo Lake from July 2019 to June 2020

Gears	Fishing effort (trips)	Rate of use (%)
Seine	1595	29
Longline	220	4
Conical fishing basket	1100	20
Castnet	605	11
Gillnet	1430	26
Harpoon	440	8
Bamboo	111	2
Total	5501	100

3.4. Production, CPUE and gear yield on Lake Taabo from July 2019 to June 2020

Table 2 shows the distribution of the total annual fish catch (50334.4 kg) among the 7 gears used for fishing on Taabo Lake. Purse seines (23140 kg or 46% of the total catch) and gillnets (12583 or 25% of the total production) are the most

efficient gear on Taabo lake. The lowest catches are observed with bamboo traps (511.02 kg or 1.01% of the total catch). These results also show that seines (14.51 kg / trip) and gillnets (8.8 kg / trip) show the highest CPUE, bamboo traps give the lowest CPUE (4.6 kg / trip). The ANOVA test shows a significant difference ($p < 0.05$) between the different productions of fishing gear.

Table 2 Gear production, yield and CPUE on Taabo Lake from July 2019 to June 2020

Gears	Production (kg)	Rate (%)	CPUE (kg/trip)
Seine	23140	46	14.51
Longline	1523.4	3.02	6.92
Conical fishing basket	5530.08	10.97	5.02
Castnet	4033.43	8.01	6.66
Gillnet	12583	25	8.8
Harpoon	3013.37	5.99	6.85
Bamboo	511.02	1.01	4.6
Total	50334.3	100	-

3.5. Occurence percentage

In total, 5453 fish specimens, belonging to 44 species, distributed among 18 families (Table 3) were sampled with different fishing gears during this study. This table also shows the frequencies of appearance of these species in the various catches made on the lake from July 2019 to June 2020.

Of the 44 species of fish caught by the 7 fishing gears, 26 species, or 59.09% of the species (*Oreochromis niloticus, Coptodon zillii, Mormyrops anguilloïdes, Sarotherodon melanotheron, Heterotis niloticus, Schilbe mandibularis, Brycinus macrolepidotus*, *Chrysichthys nigrodigitatus, Labeo coubie, Distichodus rostratus*, *Synodontis bastiani*, *Hemichromis fasciatus, Mormyrus rume*, *Synodontis schall, Petrocephalus bovei, Alestes baremoze, Hepsetus odoe, Brycinus nurse, Brycinus longipinnis, Pellonula leonensis, Marcusenius furcidens, Marcusenius ussheri, Auchenoglanis occidentalis, Hemichromis bimaculatus, Chromidotilapia guntheri* and *Parachanna obscura)* are considered to be very frequent in catches.

The 2 species, *Brycinus imberi* and *Marcusenius senegalensis* (4.54% of species) are frequently found in the catches made by fishermen on the lake.

A third group made up of 7 species: *Heterobranchus isopterus, Heterobranchus longifilis, Sarotherodon galilaeus, Clarias anguillaris, Barbus macrops, Labeo parvus* and *Micralestes occidentalis* (15.9% of species) appear quite frequently in catches on the lake.

Three (3) species or 6.81% of all species were considered accessory in the catches. These are *Polypterus annectens, Polypterus endlicheri* and *Papyrocranus afer.*

The remaining species (13.66% of the species) accidentally enter in the fishermen's catches.

Table 3 Distribution of monthly occurrences of fish species caught on Taabo Lake

Families	Species	Occurrences (%)
Protopteridae	*Polypterus annectens*	25
Polypteridae	*Polypterus endlicheri*	33.33
Clupeidae	*Pellonula leonensis*	91.66
Arapaimiidae	*Heterotis niloticus*	100
Notopteridae	*Papyrocranus afer*	25
Mormyridae	*Mormyrops anguilloides*	100
	Mormyrus rume	100
	Marcusenius furcidens	100
	Marcusenius senegalensis	75
	Marcusenius ussheri	100
	Petrocephalus bovei	100
Hepsetidae	*Hepsetus odoe*	83.33
Alestidae	*Alestes baremoze*	83.33
	Brycinus nurse	83.33
	Brycinus macrolepidotus	100
	Brycinus imberi	66.66
	Brycinus longipinnis	100
	Micralestes occidentalis	50
Distichodontidae	*Distichodus rostratus*	83.33
Cyprinidae	*Labeo parvus*	41.67
	Labeo coubie	91.67
	Barbus macrops	41.66
	Barbus sublineatus	8.33
Claroteidae	*Chrysichthys maurus*	8.33
	Chrysichthys nigrodigitatus	100
	Auchenoglanis occidentalis	91.66
Schilbeidae	*Schilbe mandibularis*	100
Clariidae	*Clarias anguillaris*	41.66
	Heterobranchus isopterus	41.66
	Heterobranchus longifilis	50
Malapteruridae	*Malapterurus electricus*	16.67
Mochokidae	*Synodontis bastiani*	100
	Synodontis schall	100
	Synodontis punctifer	16.66
Channidae	*Parachanna obscura*	100

Cichlidae	*Chromidotilapia guntheri*	91.66
	Hemichromis bimaculatus	100
	Hemichromis fasciatus	100
	Oreochromis niloticus	100
	Sarotherodon galilaeus	41.66
	Sarotherodon melanotheron	100
	Tilapia mariae	8.33
	Tilapia zillii	100
Anabantidae	*Ctenopoma petherici*	16.66
Total 18	*44*	44

3.6. Numerical percentage

The most abundant family is the Claroteidae, which encompasses 47% of all individuals. Then come the families of Mochokidae (19%), Cichlidae (15%), Schilbeidae (9%) and Cyprinidae (5%). The other families only make up 5% of this population (Figure 2).

The species *Chrysichthys nigrodigitatus* was found to be the most abundant in the area with 46% of specimens (Figure 3). It is followed by *Schilbe mandibularis* (9%), *Synodontis bastiani* (8%), *Synodontis punctifer* and *Chromidotilapia guntheri* (6% each). The other species complete the stand with only 25% (Figure 3).

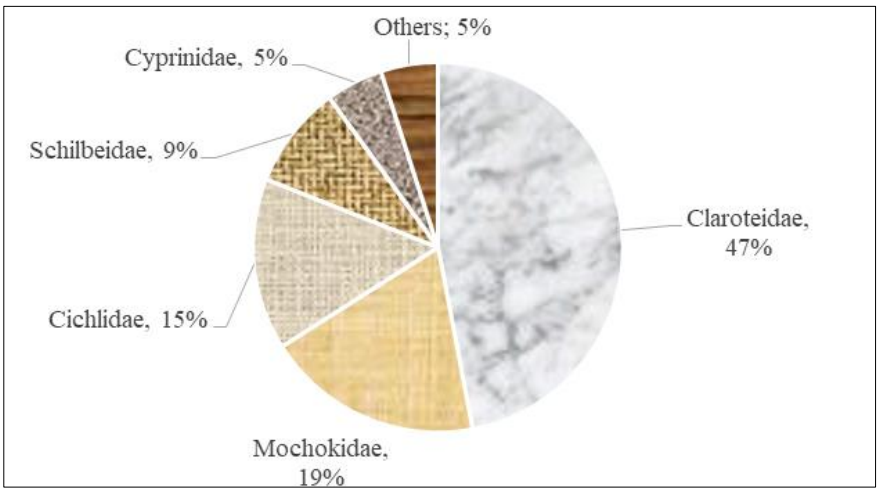

Figure 2 Numerical percentage of the main families of fish caught on the Taabo lake

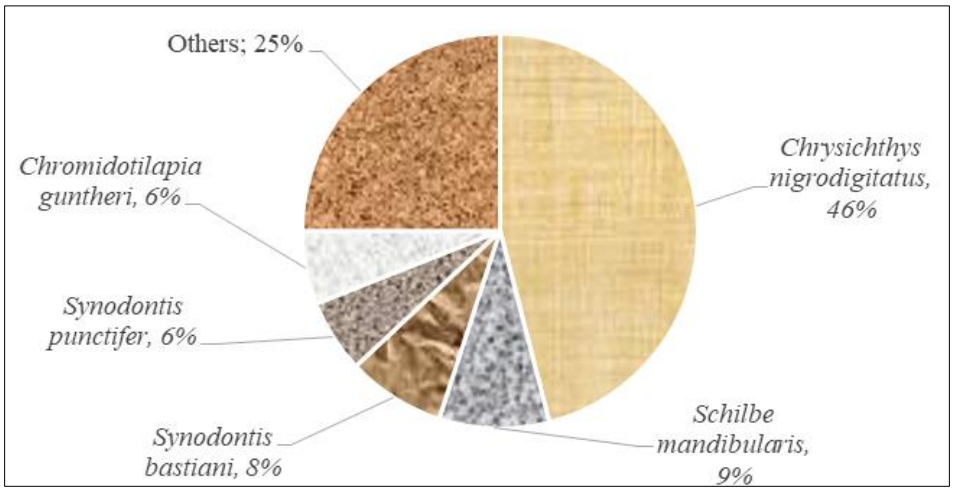

Figure 3 Numerical percentage of the main species of fish caught on the Taabo Lake

3.7. Weight percentage

The Figure 4 shows that the Claroteidae family is the most abundant by mass with a percentage of 32%. Then come the Cichlidae (18%), Cyprinidae (15%), Mochokidae (13%) and Clariidae (7%). The other families represent 15% of all specimens.

The species with the highest mass in the catches is *Chrysichthys nigrodigitatus* with 31% of the total mass (Figure 5). This species is followed by *Labeo coubie* (17%), *Synodontis bastiani* and *Coptodon zillii* (9% each). The other species represent (34%) of the population (Figure 3).

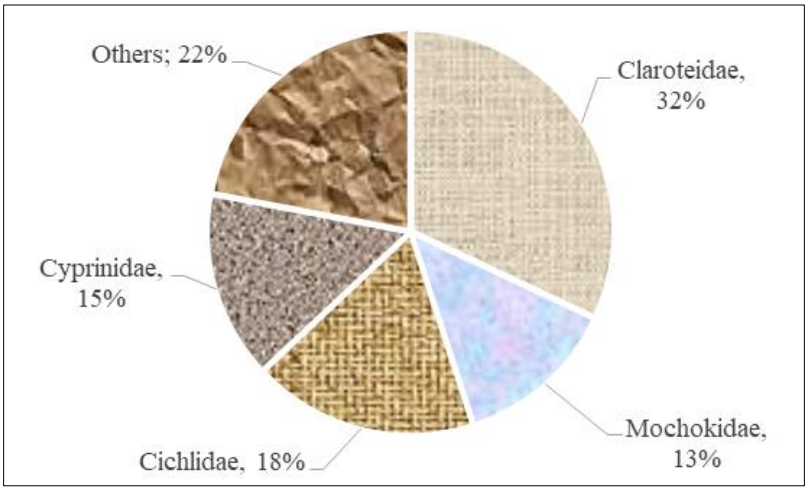

Figure 4 Percentage by weight of the main families of fish caught on the Taabo Lake

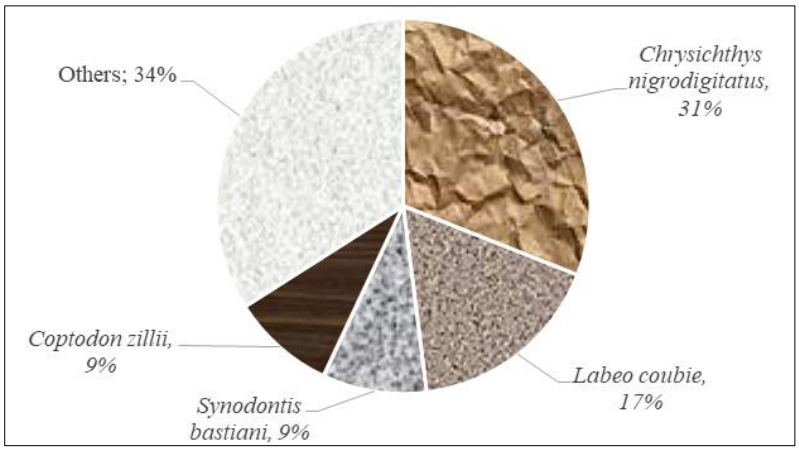

Figure 5 Percentage by weight of the main species of fish caught on the Taabo lake

3.8. Diversity index

The Shannon (H ') and Equitability (E) index calculated (Table 4) in the study area shows values that vary little from one season to another. The highest Shannon index (2.02 bit / ind) and Equitability (0.60) values are obtained during the dry season. While the lowest values are observed during the rainy season (1.93 bit / ind) for H 'and (0.59) for E. The average value of H' is (1.97 ± 0.67 bit / ind) and that of E is (0.59 ± 0.71). These values show no significant variation between seasons for the Shannon (H ') (Anova, p = 0.075; p> 0.05) and Equitability (Anova, p = 0.14; p> 0, 05).

Table 4 Variation of Shannon Index and Equitability on Taabo Lake

Seasons	Shannon Index	Equitability
Rainy season	1.93	0.59
Dry season	2.02	0.60
Average	1.97 ± 0.67	0.59 ± 0.71

3.9. Fishing gear selectivity

The specific selectivity of the fishing gear used in Taabo Lake varies from gear to gear (Table 5). The seine (*ali*) and bamboo were the most selective fishing gears. They usually only catch one species, respectively *Pellonula leonensis* and *Chrysichthys nigrodigitatus*. The seine (*djoba*) is the least selective gear with the majority of the species present in the lake.

Table 5 Preferred target species of fishing gear on Taabo Lake

Fishing gears		Preferred target species
Seine	*ali*	*Pellonula leonensis*
	djoba	*Multispécifique*
Gillnet		*Chrysichthys nigrodigitatus, Clarias anguillaris, Coptodon zillii*
Castnet		*Heterotis niloticus, Coptodon zillii.*
Harpoon		*Heterobranchus isopterus, Clarias anguillaris, Coptodon zillii*
Conical fishing basket	*papollo*	*Chrysichthys nigrodigitatus, Clarias anguillaris*
	grilling	*Clarias anguillaris, Coptodon zillii*
Longline		*Heterobranchus isopterus, Clarias anguillaris, Coptodon zillii, lates niloticus*
Bamboo		*Chrysichthys nigrodigitatus*

4. Discussion

4.1. Specific diversity

The diversity of fishing gear used at Taabo lake made it possible to capture 44 of the 50 fish species identified on this lake by [20].

This difference could be explained by the difference in sampling methods. Indeed, this author used an experimental fishery that then the data of the present study come only from the commercial fishery, much more selective. [21 , 22 , 23] noted that this selectivity of fishing gear can significantly influence the structure of catches, because large species and / or those of commercial interest are particularly targeted by artisanal commercial fisheries. The disappearance of species due to environmental alterations caused by human activities [24] could also explain this drop in specific richness in the present study.

In the present study, the fish population is dominated by Claroteidae while [20] gave the predominant Cichlidae family in this environment in 2010. The predominance of Claroteidae in the present study could be explained by the gradual successful adaptation of this family over time to the unfavorable conditions in this area; in particular the prolonged drop in the water level of the Taabo dam unlike the other species. For this purpose, [25] estimated that the specific composition of the catches reflects a good adaptation of the species which appeared to be dominant.

4.2. Use of fishing gear and their selectivity

The analysis of the frequencies of use of the different fishing gears in Taabo lake, showed a predominance of seines, followed by gillnets and conical fishing basket. The advent of seines and gillnets caused the massive and gradual abandonment of bamboo, formerly more used in fishing on the lake, in favor of seines and gillnets. The large catches made by seines and gillnets on Ivorian lakes [26] associated with the gradual disappearance of bamboos [27] used to make bamboo-traps in the department of Taabo, justify the great preference today for these two types of fishing gear.The results of the present study gave the seine (*ali*) and bamboo-trap specifically more selective by catching only one species of fish each while the seine (*djoba*) and the gillnets were the least selective with the majority fish species caught in Taabo lake.

The lower selectivity of seines (*djoba*) could be explained by its mode of action. Indeed, it exploits quite deeply the littoral part of the lake by acting more on the ecological niche occupied by the majority of the species [28]. This is how [29] asserted in the Sélingué and Manantali lakes in Mali, the use of seines as a sign of more intense fishing pressure and that of longlines as consistent with the lower level of exploitation, particularly targeting large species.

The present study noted that within gillnets, mesh sizes of 10 to 35 mm replaced those of 35 to 55 mm reported by [14]. This situation is explained by the fact that in an aquatic environment, generally when large fish become scarce, fishermen adapt by reducing the size of the meshes and or by changing fishing techniques [30].

4.3. Contribution of gears in catches

Catches are more abundant with seines (23140 kg). This gear also has the highest fishing effort (1595 trips) and CPUE (14.51 kg/trip), leading to higher yields than other fishing gear used on Taabo lake. These results show a positive correlation between fishing effort and catches as reported by [29] when speaking about fishing pressure on Sélingué and Manantali lakes in Mali.

The superiority of the CPUE obtained by the seine, results from the ease with which this fishing gear catches fish, mostly fry and juveniles. Indeed, at these stages of growth, the fish are small, which even justifies the higher number of fish specimens caught by this relatively small-meshed fishing gear [14].

5. Conclusion

This work is a contribution to the responsible management of resources exploited in the fishery of the lower course of the Bandama River. At the end of this study, a few points should be noted. Fishing activity on Taabo lake is associated with the use of 7 fishing gears: gillnets, seine, harpoon, longline, conical fishing basket, bamboo and castnet. The seines which are the most used and less selective fishing gears are those which achieve the best catches per unit of effort (CPUE). In terms of catch composition, 44 species belonging to 18 families and 44 species make up the fish fauna exploited in the Taabo lake between July 2019 and June 2020. Among these species, 26 are more constant in fishermen's

landings. The total production was estimated at 50334.4 kg. Seines and gillnets capture fry and spawners that frequent the lake. Given the economic interest presented by the fish, it is imperative that fisheries managers prohibit the use of small-mesh nets for the rational management of the halieutic resources of Taabo Lake.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors of this work declare that there are no conflicts of financial or relational interest that could impact this work.

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