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The Diets of Nile Perch (*Lates niloticus)* in Oyan Dam

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Target Audience: Fish Farmer, Researcher and Aquaculturist

Abstract

Samples of Nile perch (*Lates niloticus* L.) *were collected for stomach analysis from artisanal fishermen using fishing gear such as, cast nets, gill nets, set nets, in Oyan dam, Abeokuta, Ogun state, Nigeria. Frequency of Occurrence and Numerical methods was used to analyse the stomach contents of 60 specimens of Lates niloticus collected. The results of analysis of the food items found in the stomach of Late sniloticus obtained from Oyan dam were presented. The percentage of empty stomach was low; out of the 60 specimen examined only 14 had empty stomach. These specimens had a total length varying from 9.0 – 40.0cm with a mean of 19.21 ± 0.95 and a standard length from 7.8- 38.0cm, with a mean of 17.47 ± 0.90. The body weight varied from 23.5 – 550g, with mean of 188.91 ± 2.16. Only 23% of the specimens had empty stomachs. The food items encountered in the stomach covered a wide spectrum and it's shown that it feed on a variety of food items. Fish parts dominate the stomach content followed by Insects and Blue green algae, which indicate that the species is a carnivore. Unidentified detritus also occurred sparingly in the diets*

Key Words: Fish, Food items, *Lates niloticus*, Oyan Lake.

Description of Problem

*Latesniloticus*is the only species of the Family Centropomidae found in northern Nigeria. It is widespread in most parts of Africa, being native to the rivers Congo, Nile, Senegal, Niger and Lakes Chad, Volta, Turkana and other river basins (1) .The diet of Nile perch consists of fishes, insects, crustacea and mollusks. Juvenile Nile perch feed on copepods, prawns in the genus *Caridina*, fish fry, small gastropods, and bivalves. As the fish matures and moves to greater depths *haplochromine* cichlids constitute over 95% of their food consumption. Occasional items found in the Nile perch's diet include smaller fish in the genera *Barbus, Clarias, Haplochromis, Lates, Oreochromis,* and *Xenoclarias.* Besides crustacean zooplankton, invertebrate prey includes snails, clams, and insects (odonate larvae, aquatic *Hemiptera*,mayflies in the genus *Povilla*, and larvae of phantom midges (*Chaoborus*). Fish in the genus *Rastrineobola* are very common in the diet in terms of occurrence, and are second to *haplochromines*. (2) As Nile perch grow larger, they take larger prey. Nile perch less than 80 cm tend to feed on smaller fishes than those greater than 80 cm. This demonstrates that the

predator is capable of shifting to other sizes of prey when more suitable sizes become scarce. (3).

Materials and Methods

Study Area

Oyan dam is in Abeokuta North local government area of Ogun State in South-west of Nigeria, about 20km North-west of the State capital Abeokuta. The dam crosses the Oyan River, a tributary of the Ogun River. The dam has 40km surfacearea with a gross water storage capacity of 270 million cubic meters (m^3) and has been planned to supply 525 and 175 million litres of water per day for municipal and industrial requirement of Lagos and Abeokuta. It also allows for the irrigation of 12,500 hectares of land in the lower Ogun and it is expected to supply or generate 9.00 megawatts (Mw) of electricity.

Oyan dam was constructed in 1979 andit is an earth filled dam under the management of Ogun Oshun River Basin Development Authority (OORBDA). Oyan dam is a major man-made reservoir in Ogun state.

Fishing is the main activity in the dam, the dominant families of fish include: Cichlidae,Bagridae, Mormyridae, Hepsetidae, Cyprinidae, Characidae, Centropomidae and Schilbeidae. The gear use include gillnet, hooks and line, bamboo trap, dug-out canoe (4). Annual fishing landing point in the lake, (Ibaro, Abuletitun, Apojola, and Imala) is about 1.5 metric tons while estimated production figure is 130 metric tons, (4).

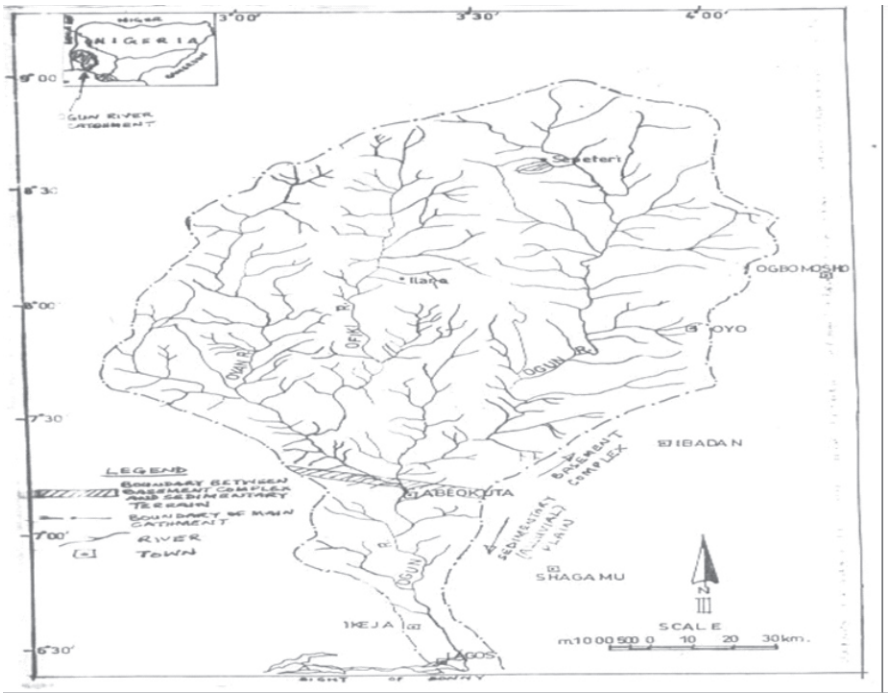

Plate 1: Map of Oyan dam (study area)

Collection of Specimen

The collection of specimen of *Lates niloticus* started in June to September 2014 with the assistance of artisanal fishermen using various fishing gears such as set nets, gill nets, cast nets and traps. The specimens were purchased from the artisanal fishermen. The specimens were serially labelled with numbers after which they were transported to the laboratory in ice boxes to reduce post humours digestion to the minimal before subsequent analyses. These collections were done in the morning on each occasion to avoid serious heat effect of the sun which could lead to faster spoilage of shrinkage in spite of the use of ice chest because of distance.

Laboratory Procedure

In the laboratory, the fish specimens were arranged serially according to the tags. They were weighed individually to the nearest gram using weighing scale. Some morphometric features of each fish was taken which include, the total length(TL),standard length(SL),body weight (BW) was measured to the nearest 0.01 centimeter and 0.01gram respectively using a measuring board and an electronic weighing balance (Ohaus Model Cs 2000) and the values were recorded. The length measurement was taken using a measuring board in which the anterior extremity of the fish is put against the top at the beginning of the measuring board. The total length was measured from the tip of the tail; standard length was measured from its most anterior extremity (mouth closed) to the hidden base of the median tail fin rays.

The fish were dissected and the guts were opened surgically then weighed with or without food. Gut contents were dispensed in sterile petri-dishes and observation under the microscope. Food items in those guts that could not be identified or analysed immediately were preserved in a well labelled bottles containing 10% formalin solution for future identification. Large food items were easily recognized with naked eyes, while binocular microscope was used to enhance proper viewing of food organisms with magnification (at X 100) and identification. All recognized food items were identified (according to5). Food items were analysed using two methods of gut contents analysis these includes frequency of occurrence and numerical methods.

Analysis of Stomach Contents

The relative importance of food items was determined using frequency of occurrence, percentage composition by number and volumetric analysis. In frequency of occurrence method, the number of stomachs in which a given category of food item occurs is expressed as a percentage of the total number of non-empty stomachs examined. In numerical method, the number of items in each food category was counted in all stomachs examined. The volume of each category of food items in each stomach was measured in a partially filled graduated cylinder in the volumetric method of analysis.

Numerical Method

This is usually expressed as:

$$\% \text{ number of food item} = \frac{\text{Total number of the particular food items}}{\text{Total number of all food items}} \times 100$$

Frequency of Occurrence Method

This is usually expressed as:

$$\% \text{ occurrence of a food item} = \frac{\text{Total number of stomachs with the particular food}}{\text{Total number of stomachs with food}} \times 100$$

Results

A total of 60 fish specimen were examined during the period of investigation between June and September 2014. Out of the specimen examined only 14 had empty stomach. These had a total length varying from 9.0 – 40.0cm with a mean of 19.21 ± 0.95 and a standard length from 7.8-38.0cm, with a mean of 17.47 ± 0.90. The body weight varied from 23.5 – 550g, with mean of 188.91 ± 2.16. The preserved fish stomach was gently removed from the sample bottles with forceps in the dissecting kit and placed in a Petri dish, it was split open to check the condition of stomach which varied from ¼ to 1 (full). Only 23% of the specimens had empty stomachs (Table1).

Table 1: Monthly changes in the number of empty stomach

Months	No of spec imens examined	No of specimens with empty stomach	% empty stomach
June	18	4	22.22
July	20	4	20
August	15	3	20
September	7	3	42.85

No of stomach examined –60
No of empty stomach –14
Percentage of empty stomach –23%
Total length range (cm) 40.0 (19.92 ± 0.95) –9.0
Standard length range (cm) 38.0 (17.47 ± 0.90) –7.8
Body weight range (g) 550 (188.911 ± 2.16) –23.5
Higher percentage of empty stomach was observed in June and September which varied from 22.22% to 42.85%, while less percentage of empty stomach was observed in July and August which is 20%

The content of the stomach were then poured into the petri dish and mixed with distilled water, a little was dropped on the slide and covered after which it was viewed under the microscope to check for organisms and other food particles.

The results showed that *Lates niloticus* has a wide feeding range as shown in Table1 and Table 2 indicated that by frequency of occurrence and numerical basis, Fish parts, Insects and Blue-green algae dominated the stomach contents. It was observed in the diet that, fish parts were more abundant. Blue-green algae are also common in the diet, the blue-green algae are of several genera, *Phormidum, Aphanizomenon, Anabaena, Merismopedia, Polycystis* dominate the genera. Likewise in Insect, *Hydrophilidie, Dysticidae, Chaoliodes, Sisyra, Halesus* dominate the genera. Which indicate that the specie is a carnivore.

Table 2: The Percentage of occurrence and Numerical method of dietary abundance of *Latesniloticus* sampled.

Food items	Numerical method		Occurrence method	
	No	%	No	%
BLUE-GREEN ALGAE	1313	18.01	565	20.32
Phormidium	135		70	
Aphanizomenon	60		35	
Anabaena	80		40	
Merismopedia	316		120	
Polycystis	672		300	
GREEN ALGAE	250	3.43	160	6.00
Protococcus	180		120	
Crucigenia	70		40	
DESMIDS	345	4.73	180	7.28
Spirotaenia	85		40	
Closterium	100		50	
Netrium	120		60	
Cylindrocystis	40		30	
DIATOMS	400	5.49	205	8.94
Melosira	200		100	
Stephanodiscus	80		40	
Nitzschia	120		65	
MOLLUSCS	200	2.74	100	5.12
Ancyius	80		40	
Pleurocera	50		30	
Campeloma	70		40	
CRUSTACEANS	550	7.54	200	8.74
Nauplius	**200**		**100**	
Food items	**Numerical method**		**Occurrence method**	
	No	**%**	**No**	**%**
Cypridopsis	350		100	
INSECTS	1215	16.67	540	19.54
Hydrophilidie	400		200	
Dystiscidae	370		100	
Chauliodes	230		130	
Sisyra	145		70	
Halesus	70		40	
FISH PART	2860	39.23	800	24.50
PLANT MATERIAL	157	2.15	300	10.50
DETRITUS	___	___	60	1.25

No of stomach examined – 60; No of empty stomach – 14; Percentage of empty stomach – 23%
Percentage of full stomach – 77%; Total length range (cm) – 9.0-40.0 (19.92 ± 0.95)
Standard length range (cm) – 7.8-38.0 (17.47 ± 0.90); Body weight range (g) – 23.5-550 (188.911 ± 2.16)

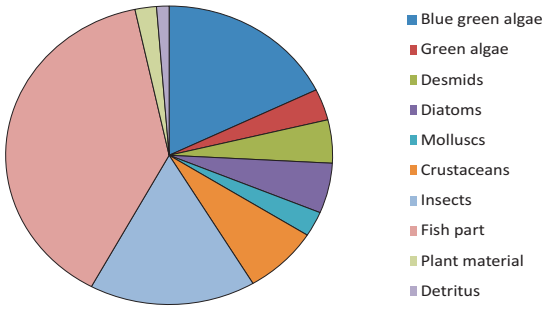

Plate 2: Pie chart representation of the dietary items and quality in *Lates niloticus*

Discussion

In this present study in Oyan Lake, *Lates niloticus* feed on a wide variety of prey organisms starting with zooplankton, subsequently switching to insects, then to the prawn and finally to fish. It was also observed that *Lates niloticus* can be classified as a Carnivores feeder as the diet covers a wide spectrum of fish part. The fish also exhibits an overlapping in food and feeding habits in order to avoid inter and intra specific competition for available food. This is an important strategy for survival and an advantage over the fish species competing for a specific food item. This explains availability of *Lates niloticus* all year round.

This study indicates the preference of *Lates niloticus* for fish part and insects which constitute about 80% of the stomach contents. The insects found in the stomach contents were mostly, *Hydrophilidae, Dysticidae, Chauliodes, Sisyra* and *Halesus.* The difference in prey type of the different size classes could be due to the habitat difference occupied by juveniles and adults.

Juvenile *L. Niloticus* live in shallow littoral areas where as the adults prefer the deeper pelagic areas.

Latesniloticus is not planktonic feeder but also feed little on blue-green algae .*L. niloticus* were the most important prey fish of juvenile. Cannibalism was more common in juvenile *L. Niloticus* that live in the shallower region of the Lake. Both intra - and inter specific competition for food seems to be high in the littoral and shallow offshore regions of the lake. Overcrowding and shortage of food are normally considered to be the major predisposing factors for cannibalistic mode of feeding. The study of (6) also agree with the present study thatJuvenile L. niloticus live in shallow littoral areas where as the adults prefer the deeper pelagic areas. Cannibalism is common in many freshwater (7, 8 and 9) and piscivorous fish species at certain stages of their life cycle.

Conclusion and Application

From the above investigation, it is indicated that

1. *Lates niloticus* fed on variety of diet mainly fish part. Also the species is continuously feeding utilizing flavoured food. So *Lates niloticus* is a carnivore's species. Animals that eat other animals, like carnivores and omnivores are important to any ecosystem, because they keep other species from getting overpopulated. The bigger the carnivore, the more it consume food.
2. With an abundance and readily available food in addition to the presence of suitable breeding ground, the dam may encourage the propagation of the specie.

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