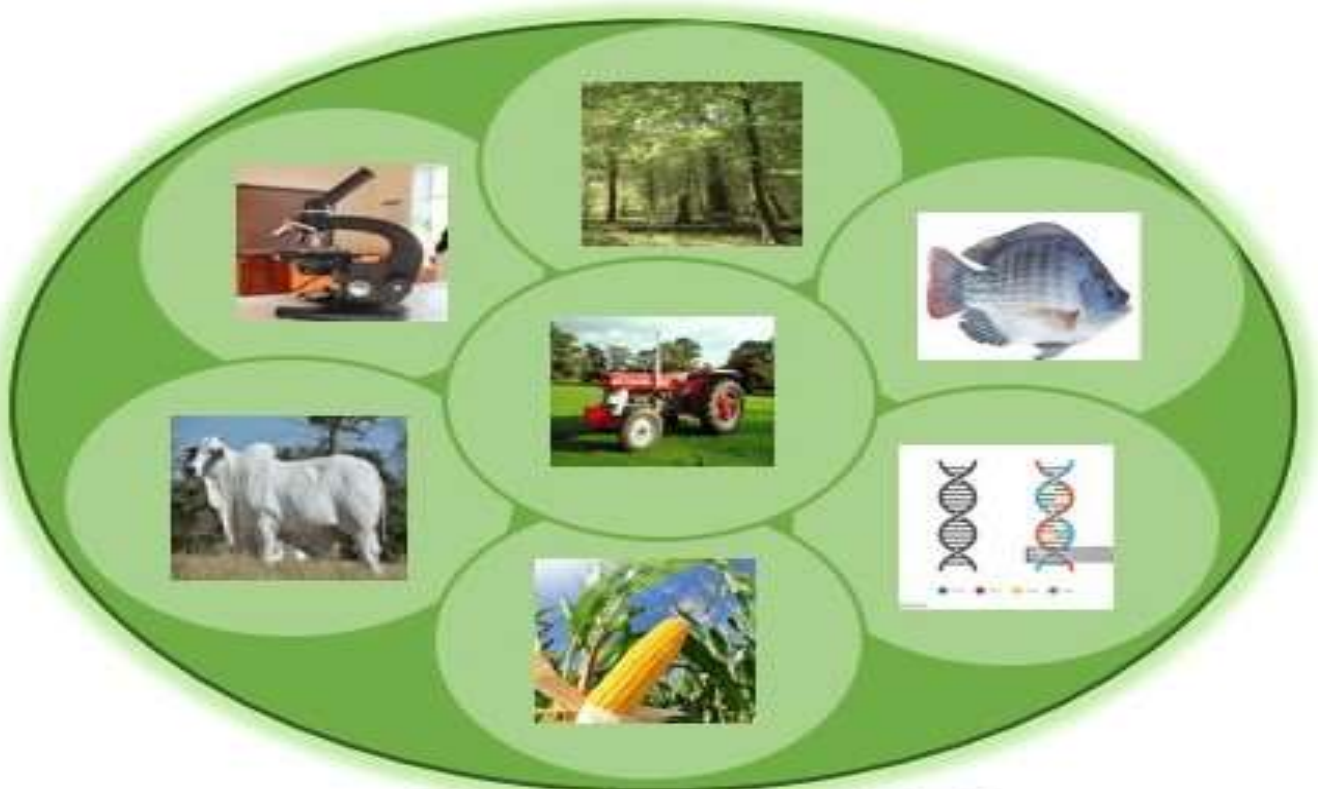




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DEVELOPMENT AND DETERMINATION OF CATCH EFFICIENCY OF A DRUM FISHING TRAP AT RIVER BENDU, KEBBI STATE, NIGERIA

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ABSTRACT

*This study aimed to develop and evaluate the catch efficiency of the drum fishing trap in the Bendu River, situated in Dakingari region of Suru Local Government Area, Kebbi State. The gear was constructed using a normal metal drum with dimensions (height 895mm, diameter 585mm) and it was baited with groundnut cake. It was set at the littoral zone of the river around 7:00am in the morning and hauled after every two days around 7:00am in the morning to uphold a soaking time of 48 hours for four weeks. The fish species caught were sorted and counted based on the number of catch and subsequently were separated according to their respective families and species using fish identification keys. The data collected was subjected to descriptive statistics and analysis of variance (ANOVA). The results shows that a total number of 146 fishes were caught from 5 families and 9 species with *Oreochromis niloticus* having the highest number (52) and *Synodontis sorex* the least number (5) with significance difference ($p>0.05$). The study indicated that river Bendu provides a diverse range of fish species for local fishermen, and the utilization of drums as fishing gear is advised for the capture of these species.*

Keywords: Construction, Catch efficiency, Drum, Fishing trap

Introduction

When viewed collectively, the term "fishery" refers to a variety of fisheries in a particular region or nation. It might indicate a region where the fish or aquatic population is harvested for its commercial value. A fishery can be generally defined by the people involved, the species or type of fish, the area of water or seabed, the fishing method, the class of boats, the purpose of the activities, or a combination of the aforementioned characteristics (Grey et al., 2007). According to Sanni et al. (2011) fish can be raised through aquaculture or fish farming, or they can be caught in the wild. More than 500 million Nigerians rely on fisheries and

aquaculture for their livelihood, either directly or indirectly (Sanni et al., 2011).

According to Grey et al. (2007), fishing is the activity of collecting aquatic life, including finfish, shellfish, squid, octopus, turtles, frogs, and some edible marine invertebrates, using the basic ideas of filtering the water, attracting prey, and outwitting them through hunting. Fishing gear, which includes lift nests, drift nets, cast nets, traps, and other specialized diverse equipment, is frequently used in this profession (Tagago and Ahmed, 2011; Kwen et al., 2013). Technological progress has resulted in the development of new and improved fishing equipment (Tagago and Ahmed, 2011; NIFFR, 2012). Seasonal changes in species diversity and

abundance have encouraged the design of varieties of fishing traps. One of such traps that has undergone numerous design specifications is the Drum trap which is popular in some of the inland waters of Nigeria (Kwen et al., 2019).

The drum trap fishery began in the Nun River between 2006 and 2007 (Kwen et al., 2019). The trap is hauled by a nylon rope. The trap is typically set with several kinds of baits in the littoral zone of rivers or streams. According to Kwan et al. (2013), the trap frequently catches a variety of fish species, including *Chrysichtys*, *Bagrus*, *Clarotes*, *Heterobranchus*, *Synodontis*, and *Malapterurus*.

New technology adoption may help small-scale fisheries capture more fish. They might be able to take use of an untapped resource or more successfully compete with industrial fisheries. NIFFR (2012) recommends the use of energy-efficient technologies whenever feasible. Any new fishing technology must always be introduced with appropriate national control and management. New techniques or equipment must also be matched with vessels. It can be necessary to upgrade the size, power, and design of vessels as the equipment grows more sophisticated. Adimola (2023) states that the location specificity of fishing arts should always be taken into account.

Although drum trap fisheries are becoming more and more popular in various parts of the country (as in Nun River, Bayelsa State, Nigeria, by Kwen *et al.*, 2019), no scientific research has been done on the trap in river Bendu, indicating that the use of drums as fishing gear is still relatively new. Thus, the study's findings might provide fundamental knowledge on the drum trap fishery, including its construction method, species composition, and most common species caught by the gear.

Materials and Methods

Study Area

The study was carried out at Bendu river located in Bendu town which is located approximately 11.6800° N latitude and 4.1316° E longitude, in Suru Local Government Area; in the Dakingari district. Dakingari is the headquarters of Suru Local government, east west of Kebbi State in Nigeria. Other communities around Dakingari include Barbarejo, Al-jannare, Fana and host of others. River Bendu is the major source of water supply to people of Bendu community and the activities of people within the riverine environment are mainly farming and fishing.

Selection of Setting station

The station used to set the gear for the study was carefully chosen based on the fishing activities on-going along the river and the major fishing site was selected along the river.

Materials for construction

The materials used for the construction of the experimental Drum Trap are: metal drum, synthetic twine (210d/9), netting material of three inches mesh sizes, Liane canes (*Calamus spp.*), nylon rope of 15 mm, chisel, hammer, knife, razor blade and needle (Kwen, K. et al., 2019).

Preparation of the Drum Prior to Construction

The Drum used for the study was filled up with water for one week before the construction process after which it was washed using detergent powder and rinsed with clean water. This was done in order to reduce or remove the substance and smell of the content that was contained in the drum not to scare away fish from entering the trap.

Mode of construction

The trap was constructed in the works department of Kebbi State Polytechnic Dakingari. The construction was done using a chisel to cut along the marks drawn on the drum, starting with the opening for fish collection (200mm), followed by entrance valve (220mm) and boring of holes at the posterior part. After which an entrance valve

made of bamboo poles and netting material was installed using twine. Nylon rope was fastened to the drum which was used for hauling the Drum

trap. The construction was done in accordance with the construction method by Kwen, et al., (2019).



Plate 1: An empty drum before construction.



Plate 2: The drum under construction



Experimental design

The trap was baited with groundnut cake and set at the littoral zone of the river at the selected station in the morning around 7:00 and hauled after 2 days in the morning 7:00am maintaining a soaking time of 48 hours for four weeks.

Sampling Methods

The study was carried out for 4 weeks to obtain fish samples twice a week at 3 days' intervals at

the fishing ground selected along the bank of river. The Trap was set in the morning around 7:00am and hauled after 3 days in the morning around 8:00am maintaining a soaking time of 72 hours. The fish species caught, were sorted, counted and subsequently, separated into their respective families and species using fish identification keys by Idodo-Umeh (2003), Olaosebikan and Raji (2013).



Plate 3. A complete constructed drum trap on setting site

Data Analysis

The data collected for the research was subjected to descriptive statistics and Analysis of Variance (ANOVA) using the Statistical Package for the Social Sciences (SPSS, 1999).

Results

Composition of Fish Species Caught using the Drum Fishing Trap

The species caught during the study by the drum trap fishing gear is presented in the Table I. Nine

(9) fish species belonging to five (5) families were caught during the study. The family *Cichlidae* had the highest number (52) of fish with 35.62% of the total catch, followed by *Claroteidae*, *Mochokidae*, *Clariidae*, and *Bagridae* with 23.97%, 15.75%, 13.67 % and 10.96 %, respectively. The number of the species caught in the drum trap fishing gear varied greatly whereby *Oreochromis niloticus* accounted for the highest number (52) while *Synodontis sorex* was the lowest with 5.

Table 1: Catch composition of the drum trap during the study

S/N	Family	No. of fish caught	% of total catch	Species identified	No. of fish caught	% of total catch
1	<i>Cichlidae</i>	52	35.62	<i>Oreochromis niloticus</i>	52	35.62
2	<i>Bagriidae</i>	16	10.96	<i>Bagrus bayad</i>	9	6.16
				<i>Bagrus filamentosus</i>	7	4.79
3	<i>Clariidae</i>	20	13.67	<i>Hydrobranchus bidorsalis</i>	14	9.59
				<i>Hydroranchus longifilis</i>	6	4.11
4	<i>Claroteidae</i>	35	23.97	<i>Chrysichthys nigrodigitatus</i>	24	16.44
				<i>Clarotes laticeps</i>	11	7.53
5	<i>Machokidae</i>	23	15.75	<i>Synodontis clarias</i>	18	12.33
				<i>Synodontis sorex</i>	5	3.42
Total		146	100%		146	100%

Field survey, 2023



Plate 4: Samples of some species of fishes caught during the study the drum trap employed in this investigation. With dimensions; height 895mm, diameter

Discussion

Since traditional fishing techniques have been adapted to suit local needs such as species to be caught and the optimum size, kind, and situations of the fishing ground, they are typically the best options for a particular area. Any traditional fishing technique or piece of equipment must take modernizing considerations into account. If conditions were similar, it would also be possible to transfer effective fishing techniques from one area to another (NFFR, 2012). There are a lot of unknown instances of creative fishing techniques being practiced in Nigeria.

Emerging technology may unleash previously untapped resources or make it easier for small-scale fishermen to compete with the industrial sector. Modernizations in these fisheries is demonstrated by the use of more durable building materials than traditional woods and fibres. Traps are low-cost, low-input, and highly specific to species and sizes. Their placement necessitates knowledge of local conditions.

A standard metal drum, synthetic twine (210d/9), two-inch (2") mesh netting, galvanised wire, nylon rope (15mm), a chisel, a hammer, a knife, a razor blade, and a needle were used to construct

585mm opening for fish collection 200mm and entrance valve 220mm. This was similar to drum traps used by Kwen, et al., (2019) at Nun River, Bayelsa State, Nigeria with dimensions; height 895mm, diameter 585mm, an opening for fish collection of 200mm and entrance (non-return) valve of 220mm. The diversity of fish species recorded in this study indicated that the fishing in River Bendu is multispecies. The 5 families and 9 species recorded in the drum traps were also indication that a groundnut cake can be a good source of bait for the fishing gear especially for *Cichlidae* (*Oreochromis niloticus*). However, the number and size of fish species caught in this study shows that the gear can be a very good material for the exploitation of fish in the river. These variations in terms of number of fish caught and sizes could be attributed to the time frame of the study (Davies and Kwen, 2012), soaking time (Davies and Kwen, 2012), variation in sampling methods, difference in locations (Okorie, 2005), and water bodies where the studies were carried out (Sonyinka and Kazeem, 2008). *Oreochromis niloticus* constitute the highest number of species caught with the gear in river Bendu. The size distribution of the fishes caught revealed that the drum traps were capable

of capturing larger sized fish than juveniles. Earlier investigation (Kwen *et al.*, 2013) in freshwaters in Nigeria showed that drum trap with small mesh sizes used in the construction of the non-return values exploited juvenile fishes. However, the size range of fish (9.22-38.41 cm) caught in this study were smaller than those reported by Anwa-Udondiah *et al.* (2013) (10.50-48.10 cm) in Ifiyong River in Akwa-Ibom State. In general, cichlids dominated the drum traps that were utilised. This viewpoint differed significantly from that of Kwen *et al.* (2013), who claimed that drum traps are more selective for catfishes in particular. Anwa-Udoncliah *et al.*, (2013) also observed that *Chrysichthys nigrodigitatus*, *Clarotes laticeps*, and *Heterobranchus bidorsalis* were dominant in the Ifiyong River in Akwa-Ibom State. More *Oreochromis niloticus* than any other species were captured by the drum fishing trap used in this investigation. It may have caught more *Oreochromis niloticus* because of the trap's hollowness and darkness, the groundnut cake used as bait, or the fact that the trap is selective for *Oreochromis niloticus*. The number of families and species recorded in the drum fishing trap was similar with those recorded in the fishing pot trap in River Rima, Northwestern Nigeria (Agbelege and Ipinjolu, 2001) and that of Davies and Kwen (2012) in the Upper Nun River, Niger Delta, Nigeria using the Malian and Ikara traps. The results show that the highest catches were obtained in week 1 (52) and week 2 (23). This could be as a result of the attraction by the bait used.

Conclusion and recommendations

The Results of this study showed that; river Bendu offers a variety of fish species for fishers which include *Oreochromis niloticus*, *Bagrus bayad*, *Bagrus filamentosus*, *Chrysichthys nigrodigitatus*, *Clarotes laticeps*, *Heterobranchus bidorsalis*, *Heterobranchus longifiliis*, *Hydrocynus forskalii*, and *Synodontis sorex*. The most abundant family in the catch was *Cichlidae* and least was *Bagridae*. The drum trap

fishery is multi-species but specific to *Cichlidae* in the study area which could be as a result of the groundnut cake used as the bait. Drum trap baited with groundnut cake can be effective in the catch of *Cichlids*, *Claroteids*, *Mochokids*, *Clariids* fisheries in river Bendu.

Based on the results of this study, the use of drum as a fishing gear is recommended for capturing different species of fish mostly of *Cichlidae* such as *Oreochromis niloticus* in river Bendu. Using groundnut cake as the bait is essential in catching different species of fish. Further studies should be carried out in order to look at different soaking time in relation to catch. Further studies should also be conducted on the drum traps, to ascertain their suitability and environmental friendliness and also to test the efficiency of other local baits.

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