AN OVERVIEW OF THE CLUPEID FISHING GEAR OF KAINJI LAKE.

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ABSTRACT

Fishing gears and methods that target the Clupeids are *atalla* lift net, light attraction, midwater trawl and *dala* (Clupeid beach seine). *Dala* (Clupeid beach seine) fisheries have been the most lucrative fishing gear *Clupeids* within the recent past. However, it has been declared as 100 per cent illegal gear having a mesh size of 0.1mm, because it catches indiscriminately undersized (juveniles/larvae) commercial fish of importance. The ban on the gear was therefore mounted through promulgation and implementation of special fisheries laws for Kainji Lake. Although, the use of *Dala* fishing gear and method has decreased due to this management approach, its use is currently on the rise again. It is therefore suggested that the ban on the use of *Dala* may not be the answer, but modification of the gear and methods for harvesting *Clupeids* should be the main focus.

Keywords: *Dala*, Beach Seine *Clupeids*, Kainji Lake, *Atalla* lift net, Light attraction, Midwater Trawl.

INTRODUCTION

Large dams have become a prominent feature in Niger State landscape. Each reservoir especially Kainji Lake have greatly increased culturing of pelagic fish species over the years. According to Otobo (1974), *Pellonula afzeliusi* and *Sierrathrissa leonensis* were in abundance in Kainji Lake (Area 1250 km²), and could support a viable fishery.

*Pellonula afzeliusi* inhabits area closer to the shore and is less numerous than *Sierrathrissa* which stays deeper in the water (Turner, 1994). The detailed biological studies however, have been given by Otobo (1997). In Kainji Lake, *Clupeids* are harvested using different gears and methods. Namely, atalla lift net, light attraction, mid-water trawl and *Dala*.

Little information concerning the *Dala* fishery in Kainji Lake existed before the start of the Nigerian-German Kainji Lake Promotion Project (KKFPP). During the frame survey in 1993 a total of 557 beach seine were recorded (du Feu, 1993). Two further annual surveys revealed the rapid expansion of the fishery which increased in number from 11% in 1994 to 32% in 1995 (Omorinkoba and du Feu, 1996).

*Dala* became a famous and controversial fishing gear and method because of its efficiency in catching *Clupeids* as well as indiscriminate fish catch which include adult and juveniles of some commercial fish species e.g *Citharinus* and *Synodontis*.

In order to arrest this situation, a ban on *Dala* was proposed and drafted in 1996. The main objective of this paper is therefore to have an overview on this small-scale fishery resource management with a view to highlighting the need to develop the *Dala* rather than the ban.

Highlights on Different Clupeid Fishing Gears Atalla Lift Net.

*Atalla* is used for catching *Clupeids* mostly by the Ijaws from the Southern part of Nigeria. Reed *et al.* (1967) remarked that apart from the Ijaws, a few Igala, Igbira and Urhobo fishermen also used the atalla. The net is operated either in motion or stationary position on a canoe by two fishermen.

Operation of *Atalla* is faced with some difficulties and limitations. It is quite laborious on the field and requires special skill. It requires calm waters such as is found in sheltered bays for an effective *Clupeid* harvest and safety of operation. It is difficult to manipulate under wave condition and in any case, the *Clupeids* are known to move deeper down and are thus out of reach of the *Atalla* (Otobo, 1974).
The main feature of the gear is that it catches only *Clupeids* with very little or nothing of the by-catches. So, the use of atalla and method has no implication on other fish species of commercial importance.

**Light Attraction**

This fishing method was introduced by FAO team to the Kainji Lake Research Project since 1963.

The light source was from 100W under water electric bulb powered by a generator with the bulb floating on the surface of the water. The fish so attracted were captured using a lift net (2m x 4m) of 2.5nm bar. The method was only effective during the black flood (Otobo, 1974). *Atalla* fishing gear and method had no negative implication on other fish species. The fish caught were about 100% *Clupeids*. It was operated either in the open water or near the shore.

**Mid Water Trawl**

Pelagic trawling for *Clupeid* was also tried in the Lake by the FAO team. The trawl net was operated from the two boats each with an outboard engine 15 h.p or 25 h.p. The fish caught were mainly *Clupeid* species with only very few by catches made comprising *Lates niloticus* and *Alestes sp.* of the size 0.5m – 1m and 100mm - 200mm. total length respectively. Otobo (1979) gave an average size *Clupeid sp.* caught at 40 – 50nm standard length. *Atalla* and light attraction also had no negative impact on other commercial species. It was however operated in the middle of the open water where it was deep and cleared of debris.

*Clupeid* trawl net used was a mid water trawl designed with theoretical opening of 12.75 square meters. It has four wings, attached to the mouth of the trawl and its total length is 22.5 metres. It had four panels, top, bottom and two side panels. The two bridles on each side terminate into an eye, from where the warp run to the boat. Big weights were attached at the end of the wings with weight on the footrope and floats on headrope to give the net its vertical opening. The codend buoy tied to the codend showed the position of the codent while towing (Yaro, 1979).

The codend mesh size was 3mm, while the wings and the first panel were of 102mm mesh sizes, gradually reducing to 76mm, 13mm mesh sizes in the second, third and fourth panels respectively. The last panel being the codend. The depth of the trawl net starting from the wings to 1st, 2nd, 3rd, 4th and 5th panels were 50 meshes (m), 36m, 50m, 56m, 400m and 400m respectively (Otobo, 1979).

**Dala**

*Dala* is a big *Clupeid* beach seine used in Kainji Lake. According to du Feu (1993), it has a mean length of 147m and an average depth of 7.2m where it is made of completely mosquito type of net webbings with a mesh size of 0.1mm.

It is operated in a semi circle from the shore and then pulled or drawn to the shore manually catching all the fish indiscriminately within the enclosed area. The target fish of course are *Clupeids* of the species *Pellonula leonensis* (Boulenger, 1916) or (Johnels, 1954) in accordance to Olaosebikan and Raji (1998). The by-catches, which are made up of commercially important fish species, include both the adults and juveniles of *Citharius sp.*, *Synodontis sp.*, *Alestes sp.* and *Lates* species. Apart from the small mesh sizes and catching of under sized fish, the breeding grounds are destroyed by clearing of the beaches by the fishermen.

It accounted for 43% of total lake yield of which 18% of the total yield was composed of *by-catch* and 25% *Clupeids*. This ultimately reduces the efficiency of other fishing gears like gill net which prior to the introduction of beach seine used to be the most popular and effective fishing gear on Kainji Lake. Most of the by-catch do not grow to maturity before being caught and this might lead to low recruitment into the fishery and hence low productivity (Omotinkoba and du Feu, 1996).

Table 1 shows the effect of different *Clupeid* fishing gears and methods on the estimation of *Clupeid* biomass in Kainji Lake. Lelek (1972) estimated the *Clupeid* biomass using the light attraction at 161 tonnes. Otobo (1974) and (1977) estimated the *Clupeid* annual yield to be 1000 – 1400 tonnes based on light attraction and mid-water trawling respectively. Türker in (1994) gave much higher yield of 8,400 tonnes (range 2,800-16,800) of *Clupeid* annual yield based on beach seine.

Du Feu and Abiodun (1999) reported that in 1995, 1996, 1997 and 1998 total yield of *Clupeids* were 15,216, 20332, 11,328 and 9,001 m.t respectively (Fig 1).
Table 1: Effect of different clupeid fishing gears and methods on the estimation of Clupeids biomass in Kainji Lake.

<table>
<thead>
<tr>
<th>Method</th>
<th>Year</th>
<th>Weight</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light attraction</td>
<td>1972</td>
<td>161 M.T</td>
<td>Lelek</td>
</tr>
<tr>
<td>Light attraction</td>
<td>1974</td>
<td>1,000 M.t</td>
<td>Otobo</td>
</tr>
<tr>
<td>Light attraction</td>
<td>1977</td>
<td>1,400 M.t</td>
<td>Otobo</td>
</tr>
<tr>
<td>Mid-water trawling</td>
<td>1974</td>
<td>1,550 M.t</td>
<td>Otobo</td>
</tr>
<tr>
<td>Mid-water trawling</td>
<td>1977</td>
<td>3,000 M.t</td>
<td>Otobo</td>
</tr>
<tr>
<td>Dala (Clupeid beach seine survey)</td>
<td>1994</td>
<td>8,000 M.t</td>
<td>Turner</td>
</tr>
<tr>
<td>Dala (Clupeid beach seine survey)</td>
<td>1995</td>
<td>15,216 M.t</td>
<td>du Feu and Abiodun</td>
</tr>
<tr>
<td>Dala (Clupeid beach seine survey)</td>
<td>1996</td>
<td>20,332 M.t</td>
<td>du Feu and Abiodun</td>
</tr>
<tr>
<td>Dala (Clupeid beach seine survey)</td>
<td>1997</td>
<td>11,328 M.t</td>
<td>du Feu and Abiodun</td>
</tr>
<tr>
<td>Dala (Clupeid beach seine survey)</td>
<td>1998</td>
<td>9,021 M.t</td>
<td>du Feu and Abiodun</td>
</tr>
</tbody>
</table>


Fig. 2 illustrates the total number of Dala for the year 1995, 1996, 1997 and 1998 at 618, 810, 755 and 582 respectively.

Fig. 1: A bar chart showing total yield of Clupeids from 1995 - 1998.

Source: du Feu and Abiodun (1999)

Fig. 1: A bar chart showing total yield of Clupeids from 1995 - 1998
DISCUSSION

Clupeid fishery in Kainji Lake is an all season fishery and the fishermen engaged in it are full time Clupeid fishermen. It is a remarkably productive fishery with atalla lift net. A pair of fishermen at the period of high abundance can catch up to a bag of Clupeids weighing about 80kg in a night. It appears therefore that the Lake can support a prosperous Clupeid fishery, but the main constraint is the right type of gear which could be used for cropping the stock (Yaro and Otobo, 1976).

The manifestation of prosperous Clupeid fishery in the Lake is clearly shown in Table 1 where different Clupeid fishing gears and methods were used in estimating Clupeid biomass. The result finally landed with Dala (Clupeid beach seine) which could crop effectively the Clupeid stock in the Lake. It gave the highest estimated Clupeid biomass in 1996 at 20,332 m.t (Fig. 1).

Fig. 1: A bar chart showing number of Dala recorded from 1995 - 1998

Light attraction and mid-water trawling target only Clupeids and do not pose any danger as far as by-catches are concern. The latter is next to Dala as far as effectiveness of cropping Clupeids is concerned (Table 1). However, the analysis of its cost-benefits has not been done to justify its adoption as a small-scale fishery.

Light attraction technique was tried in Kainji Lake and found to be effective only during the black flood (October - April) of the year. Thus, when the
transparency of the water is clear. However, its use was beneficial in the initial estimation of Clupeids biomass (Table 1). Atlalla lift net has been found to be a viable small-scale fishery when operated in calm waters but cannot be operated in the open Lake because of the waves action.

Although Dala has demonstrated its efficiency as a suitable gear for Clupeids, its implication alerted the Kainji Lake Fisheries Promotion Project to design and prepare a fisheries management plan for the optimum and sustainable exploitation of the resources in Kainji Lake to improve the well being of the fish folk.

The Dala fishing gear and method among others e.g cast net and gill net of under meshed size (below 2½")). However, some issues like existing legislative jurisdiction, conservation and management, regulatory and technical issues were first examined and considered. The ban was effected in the rules and regulations viz Niger State of Nigeria gazette of 1997. No. 7 Volume 22. The implementation procedure is as follows.

The existing traditional leadership institutions still command the respect of people in Kainji Lake area, and have authority as agents of the state to issue licenses and collect fees and also enforce fisheries laws in the fishing villages. In order to achieve effective supervision, monitoring and further development of the management model a Kainji Lake Fishery Management and Conservation Unit was formed. The unit is made up of fishermen representatives, representatives of the emirate councils, state department of fisheries and National Institute of freshwater Fisheries Research (NIFFR).

Village heads and district heads are empowered to regulate and enforce the laws with the village heads reporting to the district heads and district heads reporting to the unit (Ajai Esq, 1996).

This innovation has so far proved efficient, especially with regard to revenue collection. Dala fishery has since reduced from 1996-98. However, in the recent past, the use of Dala is again on the rise (Mall. Aliyu Lemu personal communication).

The option of banning the gear is good, but should be treated as a short term solution. For a long-term solution therefore, it is suggested that the present Dala should be developed and improved upon by way of designing different models and conduct experimental fishing trials. The best will then be adopted.

CONCLUSION AND RECOMMENDATION

Dala fishing gear and method has been proved to be the best for harvesting Clupeid stock in Kainji Lake. However, it has an adverse effect on other commercial fishes of importance. The fact that it has been banned for good, it may not be the best solution, since the fishermen have continued to use the gear in one way or the other. It is suggested that the Dala fishing gear be improved upon by way of designs. Udolisa (1995) sharing the same opinion stated that a way out is to redesign the present beach seine and conduct experimental fishing trials with two or three models. He further reported that the same applications and method were used to improve the design operations of a coastal beach seine at Ibese sea village, Badagry in Lagos State. He however did not suggest modifications as regard to mesh and gear sizes.

REFERENCES


