

ECONOMIC BENEFITS OF UTILIZING SMALL SIZED RESERVOIRS FOR CAPTURE FISHERIES. THE ALAU LAKE EXPERIENCE

By

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ABSTRACT

The paper discusses possible approaches to employ in harnessing fish resources in a small sized reservoir. It reveals how capture, extensive and integrated culture fisheries could be beneficially employed to derive maximum gains from the reservoir without jeopardizing its fisheries potentials especially in terms of conservation.

A financial outlay / cost benefit analysis for engaging in combined economic activities of artisanal capture fisheries. fish culture using cages, extensive pen culture and integrated culture practices are given over a period of three years.

This is meant to sensitize / serve as an eye opener for potential fishers as well as intending culturists that the approaches discussed could offer a very good and attractive employment opportunity in fisheries, particularly in these days that Government is trying hard at poverty alleviation, economic empowerment and self-sustenance for the masses.

INTRODUCTION

Lake Alau in Maiduguri Borno State is a small sized reservoir of about 5600 Ha which had been reported to offer a great potential for multi purpose use. (Bankole and Okaeme, 1999). Further details of the reservoir's description had been given in Bankole and Mbagwu, (2000). Apart from being primarily created for the dual purposes of potable water supply to the Maiduguri metropolis and irrigating its adjacent farmlands, artisanal fisheries had thrived on the lake. There is no doubt however that the fisheries of the lake is faced with a dwindling fortune and imminent over fishing if the present trend of unregulated and incessant harvesting / cropping of fish year in year out continues without being checked.

Furthermore, fish production through capture fisheries from inland water bodies in this country is

faced with the problem of overexploitation. The alternative lies in fish culture, which could give a reprieve to the artisanal capture fisheries sector. Yet fish culture has its own constraint too. These include the fear of the possibility of success if the venture is engaged in. This morbid fear arises from the lack of understanding of the potential and prospects of fish farming especially in pens and cages. More especially in increasing fish production beyond the maximum obtainable from reservoirs, lakes and rivers through capture fisheries.

The Alau Lake had been described to be shallow and rich in natural fish food (Bankole, 2002) thereby making it to be very suitable for pen and cage culture. These culture systems of fish farming had been practiced for long in the Eastern

parts of the world and they involve holding or keeping fish captive in enclosures. They have been started in this country in recent times.

The attractive thing about the systems is that they do not require any land procurement / purchases (except securing a permit to farm fish on the lake) neither do they involve high capital investment.

This paper describes possible approaches to employ in harnessing fish resources in a small sized reservoir. It reveals how capture and extensive culture of fish could be beneficially employed to derive maximum gains from the reservoir without jeopardizing its fisheries potentials, especially in terms of conservation.

Approaches Towards Developing Other Fisheries Practices Into Capture Fisheries On The Lake

Capture fisheries has been the only fisheries activity on the lake but it (the lake) possesses both physical and limnological characteristics that indicates that it could be of immense benefit if used for extensive fish culture practices. Pen culture and Sport fishing are the approaches proposed to elevate and improve the fisheries of the lake.

The Lake is most suitable for cage and pen cultures because it is a shallow lake, which is rich in natural fish food. Its mean dissolved oxygen is over 6.0mg / l while water current is about 30cm /second and there are no voracious predators in the lake.

One of the requirements to making a success of the introduction of extensive fish culture on the lake is to minimize the number of fishers there. The lake is 56Km² and that would only require 112 fishers (Henderson and Welcomes, 1974).

Another factor is to capitalize on the immense cultural authority wielded by the Serikin Ruwas while trying to establish a sort of community-based approach towards managing the fisheries.

Thirdly, the fishers would be educated and properly enlightened from the onset to the end on the innovation to be carried out to help enhance their means of livelihood. Once they are carried along from the onset, being involved in the decision making, the approaches would succeed and conflicts that probably would have arisen ordinarily would be averted.

Investment requirement

The magnitude of financial investment required to set up, operate and maintain an aquacultural system depend on the level of technology involved and the type of culture to be adopted Baluyut, (1989). Extensive systems require the least capital investments while intensive ones needed most. Where land, labour and fish are inexpensive, (like in Alau) and feed is unavailable or expensive, extensive culture, utilizing larger pond areas and natural food are preferred. This determined the choice of pen culture for the Lake

Pen culture

Pens are fencelike and require less materials since the lake bottom forms the flooring thus pen culture is preferred over cage culture due to its less financial commitment. Also, both the terrain and the shoreline round the Alau reservoir are very suitable for pen culture.

Pens could be engaged in either by the State Government or the fishers as a body (cooperative society)

Requirements

Frames: This could be bamboos, raffia palms or wooden posts.

Fencing materials: nets made of synthetic materials.

Materials for rigging the poles and floats on the nets.

Acquisition of Materials

Fishers could obtain bamboo poles or wooden poles from the forest areas of Borno State. This could be done individually or through cooperative efforts just as fishers could engage in the pen culture at individual or group levels (cooperatives).

Netting materials for fence construction are obtainable from Maiduguri.

Site Selection and Preparation / construction of Pens

The land ward side of the shoreline would be the best to be used for pen culture to preserve productivity of the most productive part for capture fishery resources.

Pens of about 250m² could be sited and constructed in 3 choice locations around the lake. One could be sited near the Dam site, another close to Abari where the fishers are highly concentrated and a third location could be near the resettlement village of Alau Ngaufate (See Fig 1). These sittings are for the ease of closely watching over the pens to

prevent poaching. This is because fishers, who themselves are the owners of the pens live in all these locations, hence affording proximity, close monitoring, management and protection for the pens.

Procurement of fingerlings for stocking

Fish seeds of *Clarias gariepinus*, *Oreochromis niloticus* and *Sarotherodon galilaeus* are abundantly available all year round in the Lake. These could be easily obtained using batteries of the prominent Malian Gura traps as presently obtainable on the lake.

Stocking, Rearing and Harvesting

The fingerlings of these culturable fish species that would be procured from the Lake could be stocked into the pens for polyculture. These would be reared for about 6-7 months when they would have reached harvestable size. The financial layout for the pen culture proposed for Lake Alau is shown in Table 1.

Table 1. Financial outlay for the pen culture practice proposed for Lake Alau fishers.

Input	Year 1	Year 2	Year 3
	N : K	N : K	N : K
1. Operating Costs			
1) Fencing poles (Bamboo, wood) for 3 pens of 250m ² at 50 / pen	25,000.00	20,000.00	20,000.00
2) Netting material(3/4")net 50 bundles at N6000.00	300,000.00	-	-
3) Construction of 3 pens	100,000.00	-	-
(a) Fish seed procurement at 2500 seed / pen and stocking	375,000.00	375,000.00	375,000.00-
(b) Labour	50,000.00	-	-
Total Input	850,000.00	395,000.00	395,000.00
B. Revenue	1,200,000	1,200,000.00	
Harvest 6000kg @ 200 1st Yr @ 250 3rd Yr			1,500,000.00
Total Revenue	1,200,000.00	1,200,000.00	1,500,000.00
C. Benefit = Output - Input	350,000.00	805,000.00	1,105,00.00
D. Cost -Benefit ratio	1 : 0.47	1 : 2.04	1 : 2.8

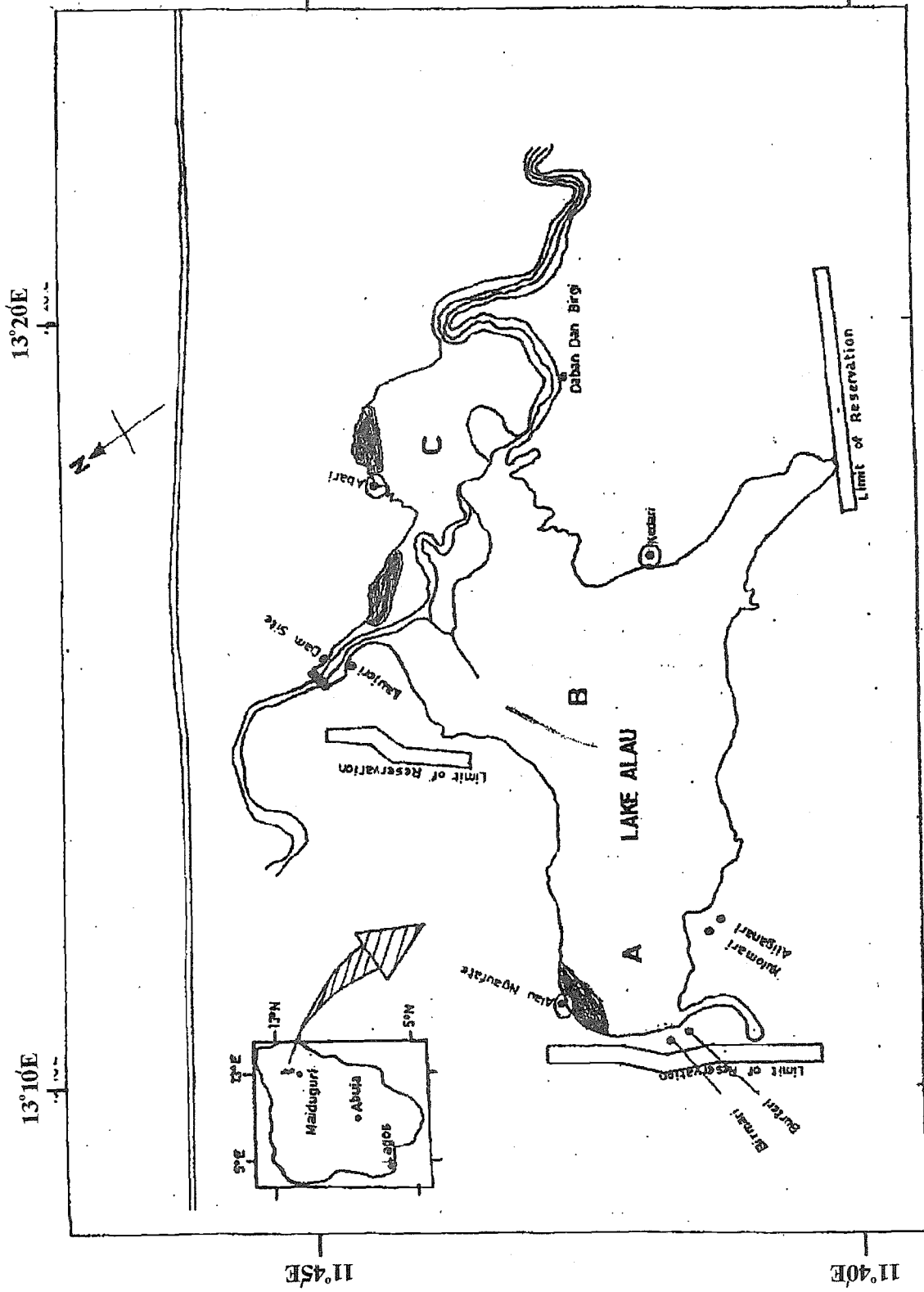


Fig. 1 Map of Lake Alau showing fishing camps and Villages and inset (Nigeria)

Introduction of Sport Fishing

Clarias gariepinus and *Schilbe intermedius* are the major carnivores available on the lake and both are quite abundant but not at a level that is deleterious to the fishery. The current forage to carnivore ratio in the reservoir is 3:1 (Bankole, 2002).

Sport fishing could be introduced by the State Government. This will help to raise the awareness of the lake as a tourist resort thereby meeting the aspiration of the populace. The lake is located within the precinct of the Sambissa Game Reserve. Tourists who visit the reservoir could easily then engage in some angling, which could generate funds for the Borno State.

Infrastructural Development Required.

- Construction of booths and shed to protect sport fishers from the intense sun
- Construction of snacks booths
- Construction of platforms for sport fishers to stand upon
- Construction of record booths for recording fishers' catches.
- Provision of hooks and lines to be purchased by sport fishers.
- Establishment of a bait yard.

Fishers on the Alau already know how to produce special baits for fishing will not be a problem. Table 2 shows the financial layout for the sport fishing proposed on Lake Alau.

Derivable benefits from setting up pen culture and Sport fishing on the Lake

It could be seen from the financial layouts for both proposals that quite a handsome profit can accrue from both ventures especially from the second year of starting for both the fishers and the State Government. The pen culture enterprise would give a profit of N350,000.00 and a cost benefit ratio of 1 : 0.41 by the end of the first year and the same would have increased to slightly over N1,000,000.00; with a cost benefit ratio of 1: 2.8 by the end of the third year. The sport fishing which is anticipated to give a profit of N389,000.00 with a profit ratio of 1 : 0.47 in the first year would also be yielding a profit of over N900,000.00 and a cost benefit ratio of 1 : 2.0 by the third year. These could be real worthwhile ventures because the profit margins could be much more than these. Business opportunities are also created for people who are willing to trade in snacks and other petty trading at the Lakeside.

In the pen culture, apart from generating income for the fishers, most of the fishers would be involved which would reduce the pressure exerted on the fishery. They would have some control over the fish being cultured in the pens. More importantly too, it will minimize dependence on the already dwindling natural catch from the lake, while natural catch will only now complement what is obtained from the pens.

Table 2. Financial layout for the Sport Fishing proposed for Lake Alau

Input	Year 1	Year 2	Year 3
	₦ : K	₦ : K	₦ : K
A. Capital input			
a. Construction of shaded booths for anglers (5)	100,000.00		
b. Construction of s nacks booths (5)	100,000.00	-	-
c. Construction of fishing platforms (10)	100,000.00	-	-
d. Constuction of office shed for Recording / weighing catches	55,000.00	-	-
B. Operating Costs : Materials			
1. Purchase of hooks and angling line (2500).	25,000.00	-	-
(a) Purchase of weighing Balance (2)	15,000.00	-	-
Recurrent Inputs			
1. Fishery Assistants	252,000.00	262,000.00	272,000.00
2. 3 Security Guards	189,000.00	199,000.00	209,000.00
3. Maintenance of booths	-	10,000.00	10,000.00
Total Inputs	836,000.00	471,000.00	491,000.00
C. Revenue			
a. Registration of sport fishers at ₦ 250. 00 @for 2500 sport fishers	625,000.00	625,000.00	750,000.00
b. Rentage on snacks booths (5)	200,000.00	225,000.00	250,000.00
c. Subsidised Fish catch at ₦ 100 / Kg for <i>Clarias</i> or 2500 kg	250,000.00	250,000.00	300,000.00
d. Subsidised Fish catch at ₦ 60 / Kg for other sp 2500 kg	150,000.00	150,000.00	175,000.00
Total Revenue	1,225,000.00	1,250,000.00	1,475,000.00
D. Benefit = Output - Input	389,000.00	779,000.00	984,000.00
E. Cost – Benefit ratio	1 :0.47	1 : 1.7	1 : 2.0

CONCLUSION

The development of other fisheries practices on Lake Alau would benefit every stakeholder. The capture fishery would be better for it, the fishers would have better prospects through engaging in this other venture and the government would also have some part of the benefits. The pen culture could be a real positive worthwhile distraction for the fishers, enough to give the already burdened fishery a big relief from the pressure it is presently subjected to.

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