MANAGEMENT TECHNIQUES FOR REVITALIZATION AND EFFECTIVE UTILIZATION OF YINAGU RIVER IN MADAGALI LOCAL GOVERNMENT AREA OF ADAMAWA STATE

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ABSTRACT

The study examined the management techniques towards the revitalization and effective utilization of the resources of Yinagu river in Madagali LGA of Adamawa State. A total of 200 fishermen aged between 45 years and above were sampled using semi-structured interviews and closed ended questionnaires from January 1998 to December 2003. Factors affecting fish production in Yinagu river were identified in their order of perceived importance as the use of nets of small mesh size (73.5%), poaching (60.0%), flooding (40.0%), rainfall (34.0) and blockage of the river tributaries (18.0%). The management techniques employed to effectively utilize the resources of Yinagu river include the specification of fishing sites, use of two seasonal fishing, use of rituals, local administration, creation of buffer zones between the water body and sites of farming activities among others.

Keywords: Management, Revitalization, Effective utilization, Yinagu river, Productivity, Exploitation

INTRODUCTION

The increasing demand for fish protein and farmland, and irrigational practices have tremendously affected the sustenance of Yinagu river The combine forces of these factors had subjected the river to its present deplorable state, because it has gone beyond the river's resistance, there by leading to a cumulative effect of over-utilization of the river, which now is at the verge of extinction.

Brown (1987), reported that revitalization of a given resource can only be achieved through the co-operation of the users and the government. According to Brown, the future economic stand of a particular resource depends on the level of its utilization and management. In support of Brown's report, Hepher (1990) suggested that because of the disappearing water bodies in the world there is need to explore more method of water resources management if the present world increasing human population must be sustained.

It is widely accepted across the globe that fish is among the most common resource of the river on which human lives depend, the common man who cannot afford the purchase of beef, mutton, goat meat, poultry etc is left with fish as the only source of animal protein. According to ADADP (1995), man is led to exploit this resource beyond the river's resistance resulting in its drastic reduction in terms of fish productivity. ADADP further reported that about 80 – 95% of the rural populace depend on fish as the main source of animal protein. Consequently, many people are involved in buying and selling of fish and fish products thereby making a fishery sector a source of employment.

The inhabitants of the study area mostly Margi constitute one of the leading consumers of fish protein in the North – East sub-region, because of the surplus of fish usually obtained from the river and its tributaries. As a result of the preference of fish protein by Margi people, a standard fish dish referred to as "Margi special" is widely accepted across the state. Gabon (1993), reported that most rivers in Adamawa State have been converted to mere standing ponds due to human activities such as farming practices, uncontrolled draining of water during fishing etc. usually enhanced by government negligence. According to Gabon, people catch the fishes, destroy the river banks and pollute the waters with agrochemicals used in farming thereby destroying both the physical and biological components of the river. ADADP (1995) reported that although the revenue generated from fishery sector was enormous, natural riverian environments endowed with considerable resources and attractive features were sometimes hardly appreciated by humans and thus abused. Amos (2002), stressed that effective management of our local rivers can increase fish productivity across sub-Saharan Africa. Hence, concerted effort should be geared toward stopping further deterioration of our riverian ecosystem.

This paper examines the traditional and modern management techniques and how they can be effectively utilized for the revitalization of Yinagu river that use to provide most of the fish protein required by the people of Adamawa-North and Borno-South before its present state of non-productivity (ADADP, 1995).

1. The specific objectives to be investigated include:
2. Assessment of the fish productivity level of Yinagu river from 1998 to 2003.
3. Identification of the factors affecting fish production in the study area.
4. Identification of the traditional and modern management techniques employed in the sustenance of Yinagu river.

5. To ascertain whether both management techniques were effective and
6. To suggest other traditional and modern management techniques for effective utilization and sustenance of Yinagu river.

MATERIALS AND METHODS

Study Area: The research was conducted in Yinagu and its neighbouring villages in Madagali local government area of Adamawa State, located in Adamawa North senatorial zone, which shares a common boundary with Izege in Gwoza local government area of Borno State. The Yinagu river lies between longitude 14^0 48 E and latitude 12^0 32 E and the tributaries are located as follows: Yedzaram (13^0 42N, 11^0 24 E), Dir-Uwal (14^0 33 N, 12^0 17 E), Birishishiwa (12^0 23 N, 10^0 21 E and Tsugadi (13^0 16 N, 9^0 18 E) as reported by Satumari (2004)

The climatic condition is typical that of tropical regions of the world, with mean daily temperature ranging between 28 – 34 ^{0}C. During harsh periods, usually from March to May, the temperature may rise up to 38-39^{0}C. The relative humidity is variable, with the peak of it during rainy season especially from late July to September (Toyo, 1996). The mean annual rainfall ranging from 700-900mm and the rainy season last for about 3-4 months, usually June to September (Akosim *et al,* 1996). The vegetation is constituted by the guinea savannah and consists of abundant woody plant species (Akosim *et al,* 1996). The primary occupation of the inhabitants is farming, which at times is being complimented by petty trading and fishing.

A total of 26.2 km^2 length of the river and its tributaries were covered. The sample area include; Kwappa, Yaffa, Kirchinga, Mbitiku, Uddah, Birishishiwa and Yinagu-Via villages, through which the river's tributaries pass. Research was conducted on the following rivers; Yadzaram, Dir-Uwal, Biri-Shishiwa and Tsugadi as they constitute the Yinagu river.

Data collection: A total of 200 professional and non-professional fishers aged 45 years and above residing along the river and its tributaries were randomly sampled using semi-structured interviews and closed ended questionnaires from January 1998 to December 2003. Other information through personal observation and literature search were equally utilized. For easy administration of the questionnaire, participatory rural appraisal method was employed because it allows free interaction and understanding between the researcher and the respondent (Dunn, 1994). The age preference was to ensure that such person or persons have witnessed the changes that took place within the period of 6 years of fishing activity and its management. The knowledge of sampled villages helped to prevent the concentration of respondents in a given village, thus avoiding bias. The assessment of fish productivity level, identification of traditional and modern management techniques and ascertaining of the effectiveness of both management techniques were based on analysis of data collected from respondents and personal observations. The contents of questionnaire include; Name of village, age, years of fishing experience, educational qualification, fishing gears used types of fish captured, type of craft use, possible factors affecting fish productivity, traditional and modern management techniques in use in the management and sustenance of Yinagu river, and the effectiveness of both management techniques.

RESULTS AND DISCUSSION

Fishing Pattern: Awi (2002) reported that the fishing patterns include: the dry season fishing which takes place between March and May and rainy season fishing between September and October. Fishing in two seasons is only by obtaining a tariff from the local government authority. The tariff on fishing in Yinagu river also specifies that the upper part of the river is prohibited from being fished except seldom poaching done by some indiscreet fishers. Fishing in this portion is only done during Yinagu Fishing Festival which is usually between the months of March and May, organized jointly by the local and the state governments.

Fishing Equipment: The fishing equipment are mostly the locally constructed fishing nets e.g. cast nets, bag nets, hook nets, drag nets and also the use of free hand fishing. Generally, variable numbers of fishing gears are used during any fishing event. Adamawa State Agricultural Development Programme, ADADP (1995), reported that the use of a particular fishing gear depend on individual fisher (Table 1)

Table 1: Fishing Gears used in Yinagu river fisheries

S/No	Fishing Gears	Mean Quantity of Fishing Gears Per Fishing Festival
1	**Cast nets**	760
2	**Bag nets**	500
3	**Hook nets**	200
4	**Drag nets**	460
5	**Free hand fishing**	variable

Use of Gears: The use of a given gear depends on the season of fishing. The cast and hook nets are used during rainy season fishing, (when the water volume is high) while the bag nets, drag nets and free hand fishing are used during the dry season fishing (when the volume of water in the river is low).

Specification of Fishing Gears: The local administration of Yinagu river in conjunction with the government specifies that fishing nets with smaller mesh sizes should not be used to avoid catching of fingerlings, but lack of enforcement of management

techniques, the fishes are caught indiscriminately. The most common fishes caught are C*larias* species, *Synodontis* species, *Tilapia* species*, Microlestes species, Protopterus* species, *Mormyrus* species, *Alestes* species etc, although *Clarias* and *Tilapia species* are normally caught in large quantities (Awi, 2002).

Types of Craft Use: The fishing gear nets are made up of locally processed A*donsonia digitata* fibres. The nets only differ in shape and sizes. In some cases, hooks are attached e.g. hook nets popularly called "Taru" in Hausa and "Cadra" in Margi language.

Years of Fishing Experience: Every member of the sampled fishers should have being fishing for at least 6 years of un-interruption.

Fish Productivity Level of Yinagu river from 1998 to 2003: Adamawa State Agricultural Development Programme ADADP (2004) reported that the fish productivity level of Yinagu river had drastically reduced over the years from 1998 to 2003 (Table 2). According to Adamawa State Agricultural Development Programme, the reduced productivity was attributed mainly due to poor management of the resource.

Table 2: Responses on Estimate of Fish Productivity Level of Yinagu river

S/no	Year	Estimated quantity of fish in kg
1.	1998	5,786
2.	1999	3,924
3.	2000	3,566
4.	2001	3,022
5.	2002	2,978
6.	2003	2,224

Factors Affecting Fish Productivity

The factors affecting fish production in Yinagu river were as tabulated in table 3 thus:

Rainfall: 34% of the respondents believed that the yearly quantity of water in the river was directly influenced by the amount of the annual rainfall, which had direct influence on fish production. They believed that the more the quantity of water in the river the higher the chances of increased fish production.

Flood: Forty percent (40%) of the respondents revealed that the rate and extent of flood affects fish production in the river. Flood exposes most of the fingerlings to danger and in addition carries them along to distant water bodies. Odihi (1992), reports that the bank of the river may suffer erosion and this can lead to destruction of spawning sites. Generally, high fishing activity is recorded during low waters of the dry season (Welcome, 1979) in tropical flood plain rivers.

Poaching: Sixty percent of the respondent attributed decline in fish production of Yinagu river to be as a result of poaching.

Use of nets of smaller mesh size: 73.5% of the respondents consider that the inability of managers of Yinagu river to determine the type of gear net mesh size for fishing, made the fishers to use any type of gear net during their illegal activities. This result to indiscriminate catching of both bigger fishes and fingerlings.

Blockage of tributaries using pegs: 18% of the fishers had fished through the blockage of the river's water source. These acts results in death of most fishes especially the fingerlings, and also prevent them from entering the main water body.

Table 3: Observed Factors Affecting Fish Productivity in Yinagu River by Respondents

S/NO	Factor	No. of Respondents	Percentages (%)
1	**Rainfall**	68	34.0
2	**Flood**	80	40.0
3	**Poaching**	120	60.0
4	**Use of nets of smaller mesh size**	147	73.5
5	**Blockage of tributaries**	36	18.0

Management Techniques

The following management techniques are being practiced for the sustenance of Yinagu river. Details of the respondents' reactions are given in Table 4.

Local Administration: The management of the River is headed by the Village head, who gives directive to "ptilmi" (sarkin ruwa) and from Ptilmi to fishers' group leaders and from group leaders to individual fisher. Also the reports on fishing or poaching activities are passed back through the same route in a reverse order. Details shown by Information flow channel below (Figure 1).

Village head

↕

Ptilmi (Sarkin ruwa)

↕

Fishers' group leaders

↕

Individual fisher

Figure 1: Information flow channel in rural resources management. Source: Environmental study, 2005.

Use of rituals: To enable continuous fish production by the river, "Annual rituals" are performed using black goat at the beginning of rainy season, usually after the first rainfall and then a day before the fishing festival. Sixty-eight percent (68 %) of the respondents (Table 4) reported that such practice helps to appease the gods of the land and the river. According to the respondents, the ritual performance is done by Ptilmi. The ritual perform is an obligation and dues paid to the gods of the land and water (Ntasimda, 1985).

Use of two seasonal fishing: 62% of the respondents (Table 4) reported that the used of seasonal fishing helps to monitor the activities of poachers and determine the size of fish that should be caught, because the nets used are usually inspected by a committee headed by Ptilmi before usage. The long period between the fishing activities allow the fingerlings to grow and be recruited into the fishery. This management technique when strictly adhere to as reported by Food and Agricultural Organization, FAO (1999) will guarantee the increased fish productivity of a given water body. The two seasons are dry season (March to May) and rainy season (September to October). The fishing is usually done within these months.

Creation of buffer zones between the water body and sites of farming activities: 85% of the respondents (Table 4) reported that farming activities was only allowed at 80 metres away from the water body. This helps to prevent unnecessary blockage of water ways and excessive deposit of sand in the river. Continuous sand deposition may result to river extinction. Amos (2002), reported that creation of buffer zones permits the development of the river and its surrounding close to its natural form. This will lead to increase fish productivity of the river.

Table 4: Operational and Effectiveness of Management Techniques in Yinagu river Fishery

S/NO	Operational Management Techniques	No. of Respondents	(%)	Effectiveness of responses	%
1	Local administration	182	91.0	144	72
2	Use of rituals	136	68.0	62	31
3	Use of two season fishing	124	62.0	116	58
4	Creation of buffer zones between the water body and sites of farming activities	170	85.0	130	65
5	Specification of fishing sites	63	31.5	42	21

Specification of fishing sites: 21 % of fishers reported that partial fishing is allowed at the lower part of the river. This constitute only one-tenth of the river and in addition is clearly demarcated from the main water body by off-shore sand deposits as reported by Awi (2002).

Effectiveness of management techniques: Although the fishers reported that management techniques such as: local administration, creation of buffer zones and the use of two season fishing were adequate (table 4), but with the present trend of things such as: increasing demand for fish protein, farmland, irrigation practices and other resources of the river made the techniques less effective (Awi, 2002). The effectiveness of particular management technique was assessed based on the number of respondents in agreement with a given operation, out of the total sampled population of 200 fishers.

Conclusion: The decreasing fish productivity of Yinagu river is due to poor approaches to the management techniques because of increasing human population, that led to increased exploitation coupled with environmental factors and poor fishing practices. Results have shown that if the management techniques in place are observed and sustained, then Yinagu river can regain its productivity level

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