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## SURVEY OF FACTORS AFFECTING THE SUSTENANCE OF A TROPICAL STREAM IN NIGERIA

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### ABSTRACT

*Man is at the center of natural resources development and destruction. This study assessed the productivity level of Gada stream and examined the factors militating against its sustenance. A total of 150 respondents, consisting of local fishers, fresh and dry fish traders, fish consumers and those living along the stream were randomly sampled. Data collection was by personal observation, oral interview and semi-structured questionnaires. The data was analyzed using descriptive statistics. Results showed that there was decreased fish production in the stream. Factors militating against fish production in Gada stream were continuous excavation of sand (81.33%), destruction of stream banks due to farming activities (60.0%), water pollution (48.67%), seldom flood (42.67%), over exploitation of fish (28.0%) and the types of fishing gears and techniques involved (21.33%). Management techniques such as avoidance of sand excavation (85.33%), use of nets of 1 cm<sup>2</sup> mesh size (78.0%), controlled fishing activity (70.67%), use of buffer zones (68.67%) and planting of horticultural crops along the stream banks may be adopted for the stream's revitalization, management and sustenance.*

**Keywords:** Gada stream, Productivity, Factors affecting sustenance, Revitalization, Management, Conservation

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### INTRODUCTION

Fishery is one of the most important constituent of wildlife resources globally. It is therefore important to conserve our water bodies such that the fish productivity level can be sustain and maintain at the level capable of providing the need of the growing human population across the globe. African Wildlife Foundation, AWF (2007), reported that sustenance of fish productivity in the African water bodies for economic growth (streams, rivers, dams, lakes etc) can only be attained through effective management of aquatic ecosystems, of which Gada stream falls within the area of concern.

According to Hunter (1990) fish species should be maintain even for its scientific and posterity value, this is why water bodies are considered as field laboratories for fishery experts. It is therefore necessary to conserve the Gada stream so as to maintain its fish productivity level. Gabon (1993) reported that stream conservation and management are affected by human activities such as unguided fishing, overuse of water for other purposes, farming along the river banks and dumping of refuse among others.

Consequently, this research considered the status of the Gada stream as it affects the human populace of Mubi in terms of social and economic role because Amos (2002), reported

that our water bodies have immense role in maintaining a healthy environment, as these ecosystems provide protein for man and other animals. In addition, they provide the water required by wild and domestic animals and also sustain the flora and fauna hence it is necessary to effectively manage the Gada stream as most of the fresh fishes consumed in Mubi yearly from the months of August to October comes from the Gada Stream. This situation can only be overcome based on Brown (1987) who reported, that the management of a given resource for its revitalization and sustenance can only be achieved through the co-operation of the resource users and the government arm charged with its management. Brown (1987) further stated that the future economic stand of a particular resource depends on the level of its utilization and management. Correspondingly, Gabon (1993) supported this observation that people catch fishes, excavate sand, destroy the stream banks through farming practices, use the water for roads and house constructions as well as pollute the water through various means including the use of Agro-chemicals for fishing, thereby altering the physical and chemical factors as well as destroying the biological components of the stream. Consequently, following these ugly acts of man, Amos (2002) suggested that there is need for effective management of our natural and man-made water bodies for increased fish production across Sub-Saharan Africa as this sector plays a vital role in the economic growth of any nation.

This study examined the pattern of fishing, nature of fishing equipment, management techniques in practice and how they can be effectively improved for the revitalization and sustenance of the fish productivity level of Gada stream through the following objectives: (i) identification of fish species usually caught, (ii) examined the fishing pattern, (iii) identification of the fishing equipment in use, (iv) identification of the management techniques in practice and their effectiveness, (v) identification and ascertaining the factors militating against the management techniques in use (vi) estimation of the fish productivity level of the stream from 2005 – 2007 and (vii) develop techniques that could

be used in the management of the Gada stream.

## MATERIALS AND METHODS

The study was carried out on Gada Stream of Mubi – North Local Government Area of Adamawa State, Nigeria covering its major fishing sites that include; Yawa, Madanya, Gopalma, Gada, Blue House and Vimtim. The study covered a period of 3 years from 2005 to 2007. The climatic condition is typical that of tropical regions of the world, with mean daily temperature ranging between 28 – 34°C. During harsh periods, usually from March to May, the temperature may rise up to 38 – 39°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 lasts for about 3 – 4 months, usually June to September (Akosim *et al.*, 1999). The inhabitants of the study area are primarily subsistence farmers although few of the population are made up of civil servants and petty traders. A total of 26km length of the stream was covered.

A total of 150 respondents were randomly sampled using a close-ended questionnaire and semi-structured oral interviews, using simple random sampling technique (Jen, 2002). The sampled population consisted of local fishers, fresh and dry fish traders, fish consumers as well as those living along the stream. The fish productivity was assessed physically and also using information gotten from the sampled population. The estimate of each fish species caught was done using basket quantification as a measure.

For easy administration of the questionnaires, participatory rural appraisal technique was employed (Dunn, 1994). The contents of the questionnaire include; Name of respondent, fish species usually caught, types of fishing pattern, fishing equipment in use, management techniques in practice, factors militating against the management techniques, estimated fish productivity and management techniques that could be used in the sustenance

of fish productivity. The data collected was analysed using descriptive statistics.

## RESULTS AND DISCUSSIONS

The fish species usually caught included; *Mormyrus rume*, *Mormyrus macrophthalmus*, *Petrocephalus bane*, *Marcusenius psithacus*, *Alestes macrolepidotica*, *Alestes nurse*, *clarias lazera*, *Schilbe mystus*, *Synodontis clarias*, *Hyperopisus bebe*, *Malapterurus electricus*, *Protopterus annectens*, *Tilapia galilaea*, *Tilapia nilotica*, *Tilapia aurea*, *Tilapia zilli* and *Hemichromis fasciatus*. Reports from respondents showed that the fish species listed above were caught along the entire stream length of the study area. Main fishing activity in the study area starts from August and end in June, but fishing is done in only few selected points from March to May because a large portion of the stream dries up within this period.

The fishing equipment were mostly the locally constructed fishing nets e.g. clap nets (*Koma*), cast nets (*birge*) fowl – hook longlines (*mari-mari*) and trap nets (*gussa*) (Table 1). The listed fishing gears were being complemented by free hand swimming, total draining of selected points (usually from March to May), use of funnel traps (a gear locally constructed using forbs and grasses) and construction of blockage fence across the tributaries of the stream using reeds of sticks assisted by nets. Clap nets, long lines, cast nets and total draining technique were widely accepted by fishers as the most preferred fishing methods as reported by 68.0%, 56.0%, 50.67% and 40.0% of the respondents, respectively (Table 1). The least accepted fishing methods include; use of fence, hand fishing and trap nets as reported by 6.67%, 7.33% and 10.0%, respectively (Table 1).

For the sustenance of Gada stream three management techniques were in practice as reported by the respondents (Table 2), of which controlled use of chemicals (134, 89.33%) and use of agronomical technique through planting of horticultural crops along the stream banks (97, 64.67%) were considered most effective. The sampled respondents (43.33%) also reported that awareness

campaign mounted towards reduction in sand excavation also helped in the management of the stream. Although the management techniques were effective as reported by the respondents but the activities of man coupled with natural factors militated grossly against the management techniques, thereby making the techniques ineffective in achieving the desired target.

Management techniques in practice were grossly affected by some factors such as excavation of sand, (81.33%), destruction of stream bank due to farming activities (60.0%), water pollution (48.67%) and seldom flood (42.67%). These factors constituted serious threat to the management techniques in practice. Correspondingly, factors such as types of fishing gears and techniques (21.33%), followed by over-exploitation of fish (28.0%) were relatively less significant (Table 3).

The yearly quantity of each species caught indicated that there was general decrease in quantity of fish caught from 2005 to 2007 (Table 4). This may be as a result of some factors such as water pollution, continuous excavation of sand, and destruction of stream banks due to farming activities among others that were reported to be the main attributes to decreased fish production of the stream.

The study also revealed that fish species such as *Tilapia* species, *Clarias* species and *Hemichromis fasciatus* tend to be less affected by the listed factors as observed based on the estimated quantities caught. For effective management of Gada Stream, the following management techniques were suggested (Table 5).

The suggested management techniques were in line with those of Amos (2002), that buffer zones created between the stream and sites of farming activity can prevent the possibility of sand deposition into the water body, which usually account for reduced volume of water in the stream.

It is obvious that when sand excavation is stopped, then there will be reformation in the stream bed and banks, leading to a relatively natural condition that will provide the

**Table 1: Fishing gears and techniques in use in Gada stream, Mubi North Local Government Area, Adamawa State, Nigeria**

S/No	Fishing gears/methods	Number	Percentage respondent
1.	Clap nets	102	68.00
2.	Cast nets	76	50.67
3.	Long lines	84	56.00
4.	Trap nets	15	10.00
5.	Funnel traps	19	12.67
6.	Fence	10	6.67
8.	Hand fishing	11	7.33

**Table 2: Management techniques in practice for sustenance of Gada stream, Mubi North Local Government Area, Adamawa State, Nigeria**

S/No	Management options	Number	Percentage respondent
1.	Controlled use of chemicals	134	89.33
2.	Reduced sand Excavation	65	43.33
3.	Use of agronomical technique through planting of horticultural crops along the stream banks	97	64.67

**Table 3: Factors militating against the management techniques in practice in Gada stream, Mubi North Local Government Area, Adamawa State, Nigeria**

S/No	Management Techniques	Number	Percentage respondent
1.	Types of Fishing gears and techniques	32	21.33
2.	Continuous excavation of sand	122	81.33
3.	Destruction of stream banks due to farming activities	90	60.00
4.	Over-exploitation of fish	42	28.00
5.	Water pollution	73	48.67
6.	Seldom flood (Natural factor)	64	42.67

**Table 4: Fish species and yearly quantity caught from Gada stream, Mubi North Local Government Area, Adamawa State, Nigeria**

S/No	Fish Species	Yearly quantity (Kg)		
		2005	2006	2007
1.	<i>Mormyrus species</i>	2,265.0	1,862.5	1,209.00
2.	<i>Petrocephalus bane</i>	106.0	87.3	40.60
3.	<i>Marcusenius psithacus</i>	2,034.0	1,418.0	1,136.70
4.	<i>Alestes species</i>	2,815.0	2,908.4	2,041.00
5.	<i>Clarias species</i>	4,774.8	3,055.0	3,825.00
6.	<i>Schilbe mystus</i>	2,336.0	1,410.0	812.62
7.	<i>Synodontis clarias</i>	403.0	98.5	109.20
8.	<i>Hyperopisus bebe</i>	85.0	22.1	30.40
9.	<i>Malapterurus electricus</i>	3.0	0.85	-
10.	<i>Protopterus annectens</i>	35.0	12.0	15.60
11.	<i>Tilapia species</i>	4,986.3	3,232.0	3,042.
12.	<i>Hemichromis fasciatus</i>	168.0	202.6	82.50
<b>Total</b>		20,038.1	14,309.25	12,344.12

**Table 5: Management techniques for revitalization and sustenance of Gada stream in Mubi North Local Government Area, Adamawa State, Nigeria**

S/No	Management Techniques	Number	Percentage Respondent
1.	Use of Buffer zones	103	68.67
2.	Avoidance of sand excavation	128	85.33
3.	Planting of horticultural crops along the stream banks	87	59.33
4.	Controlled fishing activities	106	70.67
5.	Use of nets of 1cm <sup>2</sup> mesh size	117	78.00

environment needed for the survival of aquatic life forms, of which fish is not an exception. This technique will also help in preventing destruction of spawning sites and nests. Generally, crops such as mango, lemon, orange, guava, and banana etc. can be planted along the stream banks in order to provide a semi-natural environment for growth and development of fishes. This also helps in consolidating the stream banks thereby making it to withstand erosion due to increase in water volume hence control of flood.

Controlled Fishing Activity can help in revitalizing the stream through effective utilization without causing any damage to the productive base. Here, period for fishing activity should be spelt out clearly for users of the stream and also the act of total draining of some selected points of the stream be avoided completely.

The comparatively small to medium size fingerlings will not be affected, if fishing nets of 1cm<sup>2</sup> mesh size are used. This technique will go a long way in sustaining the productive base of the stream as it applies to fish resource.

The poor economic state of most of the inhabitants of the study area made them to over-exploit the resources of the stream, a level that grossly affected the productive base of the stream. The collective practice of increased fishing activity, high demand for building components (sand, gravel, water, clay etc), and farming practices done close to river banks made this ecosystem suffer due to human threat.

The re-cognizance survey study 2007 revealed that the cumulative effect of the above listed human activities has gone beyond the stream's resistance and now the consequence is

drastic reduction in water volume and diminish in fish production. This problem of resource mismanagement had led some species of fish close to extinction point, as they are rarely sighted. For instance, the electric fish (*Malapterurus electricus*), which have been the pride of the stream is now rarely caught. These human acts observed in Gada stream is inline with Olofin (2000), who reported that mankind is capable of destroying the delicate balances that exist between his manipulation of the environment and the range of adjustment the environment can undergo. Bwala (2000) also stressed that man's ignorance of the consequences of uncontrolled use of natural resources had led him to destroy even the productive base as observed in Gada stream without taking into cognizance the consequences of his action.

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