RELATIONSHIP BETWEEN THE RAINFALL, WATER LEVELS, FLOODING AND FISH SUPPLY FROM ASA DA

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ABSTRACT

Studies on the relationship between the rainfall, water levels and floods in Asa dam Ilorin, Kwara State Nigeria was carried out for twelve months to determine the impact of these parameters on the supply of fish species from this dam to Ilorin and environ. Maximum rainfall (26.14 cm) was in September. The range values of rainfall recorded during this research was zero (November / February) to 26.14 cm (September). Water levels were lowest in April (11.40 m) and highest in September (12.80 cm). Increased water levels commenced from May (11.90 m) to October (12.60 m). The flooding of the dam began as from August when the dam spillway began to overflow. An assessment of fish catch from six fishermen around the lake showed significant increase in the fish supply at the dry season when water levels were low than the wet season (P < 0.05). Rainfall and water levels were negatively correlated.

Key words: *Rainy days, Water levels, Flooding, fish supply.*

INTRODUCTION

In order to attain the maximum fish production from the lake fishery especially in the West Africa sub region there is need for a basic set of technical skill among the artisan farmers. This skill cannot be limited alone to the use of fishing gears but it must also be extended to the basic knowledge of the environmental factors of the ecosystem in which they operate. Most of our researches on the lake fisheries in Nigeria and other Africa countries did not have any impact at improving sustainable fish production because they have failed to carry the artisan fishery along (Araoye, 1999). The failure of lake fishery in Ebrie and Aghien in Cote d Ivoire, Banfora in Bukina Faso, Brazzaville in the Congo, New- Bussa in Nigeria just to mention a few cannot be exonerated from this simple fact. Indiscriminate fishing characterised these water bodies resulting in the elimination of the usable stock with time. There is need for an intervention program for capacity building of these artisan fishermen in order to improve on their knowledge of the environmental factors that can affect fish production (Araoye, 2002).

Although availability of food has been identified as one of the major factors affecting spatial and seasonal distribution of fishes in Kainji lake (Lelek and El-Zarka, 1973; Willoughby, 1974; Akintunde, 1976; Olatunde, 1977) and also in Asa lake (Araoye, 1999), however environmental factors such as rainfall, water levels and floods determine the seasonal abundance of these food items. It may be assumed that most of the artisans fishermen operating on our water bodies are used to these environmental factors, however most of them now complain about the unpredictable nature of these environmental factors particularly rainfall. Hence the knowledge of the rainy days, water levels and extent of floods at each season can be used by these fishermen to predict level of fish production around this lake.

Fishing activities in Asa dam was enhanced since 1976 that the Kwara State Government established the dam primarily for water supply to Ilorin and environs. Other major sources of fish supply to Ilorin and environ include Kainji and Jebba lakes (Araoye, 1997). This work will be used to educate the fishermen in Asa dam on the use of some environmental factors at predicting fish catch around the lake. This is aimed at a more focused and un-wasted fishing exercise.

MATERIALS AND METHODS

The environmental factors including the rainy days, water levels and flooding around the

dam were determined in March 2003 to February 2004 in the presence of six fishermen representing the fishermen group operating around the dam. Fish species caught by these selected fishermen twice a week were also classified according to families, counted, weighed and recorded. They used traps (Plate 1), gill nets of different mesh sizes, ranging from 7.2 cm to 10.16 cm and cast net to catch the fishes from the surface, shore and bottom habitats. These fishermen who were also fairly educated (primary and secondary school levels) were made to assist in the record keeping. Their fishing sampling sites (Fig. 1) extended from the dam site to Odore, Laduba and Afon Basins. The period of floods around the lake was taken from the day the dam spillway (Plate 2) began to overflow to the last day it stopped overflowing. The number of rainy days was recorded from the records of the meteorological unit of the Ilorin International Airport which is just about 7 Kilometres to the dam site. The water levels around the dam were also recorded using the water level gauge installed at the dam by the Kwara State water cooperation. Correlation values between these environmental factors and total fish catch around the dam were determined.

RESULTS
Rainfall and number of rain days
The monthly variation in the mean rainfall is presented in Table 1. Rainfall commenced in April and continued until the maximum value (26.14 cm) was attained in September after which a continuous decrease occurred until February. The range recorded was zero to 26.14 cm (Table 1). The number of rain days also increased from April (9 days) to September (19 days) during the period of research. The number of rain days decreased from November (2 days) to February (zero). The rainfall and water levels were negatively correlated (-0.54).

Water levels
The result of the water levels is also presented in Table 1. Water levels around the dam began to rise in May (11.9 m) until August (12.8 m) when the maximum level was reached and maintained up to the month of September. The water level began to drop gradually from October (12.6 m) until February (11.6 m) which was the minimum water level. The water level and the total fish catch were negatively correlated (-0.66)

Floods
The spill way began to overflow as from June and this became heavy in August and September. A draw down of the spill over began in the middle of October and finally stops to spill in the Month of November.

Fish catch
The monthly value of total fish catch is presented in Table 1. The months of January (51 specimens, 42 kg) and February (58 specimens, 45 kg) recorded the highest number of total fish caught corresponding with periods of lowest water levels while the months of August (25 specimens, 16. kg) and September (28 specimens, 19 kg) corresponding with the periods of high water levels. The mean value of the total fish caught during this seasonal period was significantly different (P < 0.05).

DISCUSSION
The results have shown that fish catch was higher during low water levels around the dam. This is useful information for the fishermen operating around this water body to reduce wasted effort of fishing activities especially during the rainy season for this species. The seasonal abundance of fish species was shown to be influenced by a combination of physico-chemical parameters and the presence of food items (Fagade, 1983). Araoye, 1999 reported the abundance of *Synodontis* species around the dam during the period of low water levels explaining that during high water levels and floods this cat fish may show restricted movement due to reproductive activities, hence making them less vulnerable to fishing gear catchability. However this work has also shown that the high catch at dry season does not apply to *Synodontis* species alone, but also to other fish species around the dam. Also there is the tendency for high concentration of fish at low water levels to increase catchability.

The results of the negative correlation between the rainfall and water levels is a normal phenomenon in the tropical lakes as reported in Kainji lake (Imevbore, 1975); Asejire lake (Egborge, 1977); lake Brokopondo (Vander-Heide, 1982) Jebba lake (Adeniji, 1991) and Asa lake (Araoye, 1997). Because the fishermen were also involved in the data collection during this research the knowledge acquired by the few selected fishermen will be passed to the rest for more rewarding fishing activities around the dam.

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Table 1

Monthly variations of fish catch, rainfall and water levels in Asa lake

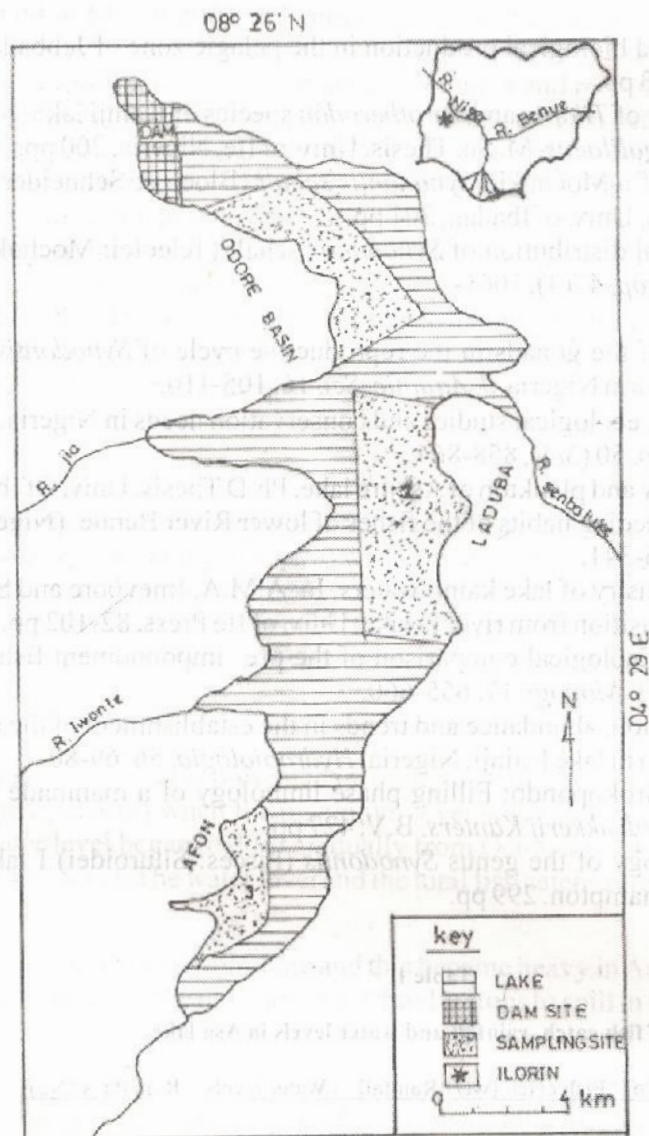| Months	Fish catch (No)	Fish catch (wt)	Rainfall	Water levels	Rain days (No)
March	45	32 kg	0.0 cm	11.6 m	0
April	48	35	8.01	11.5	9
May	46	34	14.48	11.9	12
June	44	34	13.26	12.3	12
July	33	24	18.50	12.5	17
Aug	25	16	6.22	12.8	15
Sept	28	19	26.14	12.8	19
Oct	21	18	6.14	12.6	9
Nov	24	19	16.9	12.2	2
Dec	38	29	4.66	12.0	2
Jan	51	41	0.31	11.9	1
Feb	58	45	0. 15	11.7	0

Fig. 1: Sketch map of Asa lake showing the fishing sampling sites
(Source: Araoye, 2001)