



Comparative Studies of African River Prawn, *Macrobrachium vollenhovenii* (Herklots, 1857) in Ose and Osun Rivers, Southwestern Nigeria

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Abstract

Keywords:

Macrobrachium vollenhovenii, condition factor, abundance, sex ratio, water qualities.

Interest in African river prawn, *Macrobrachium vollenhovenii* has increased recently mainly because of the possibility of its commercial culture. This study investigated the abundance, sex ratio and condition factor of African river prawn *M. vollenhovenii* and selected water qualities in Ose and Osun Rivers, Southwestern Nigeria. The water quality parameters of the rivers were recorded in-situ using Hana HI 9828 water multi-parameters. The temperature, pH and dissolved oxygen contents in Ose and Osun Rivers were not significantly ($P > 0.05$) different from each other but the salinity values in both rivers were statistically ($p < 0.05$) different. The species abundance was 31.40% (females); 68.60% (males) in Ose River and 38.52% (females); 61.48% (males) in Osun Rivers. The Sex ratio of 2.18 : 1 and 1.60 : 1, and condition factor of 1.49 ± 0.09 and 1.40 ± 0.07 were recorded in Ose and Osun Rivers, respectively. All the water quality parameters studied were within the recommended ranges for the culture of freshwater prawn. The male populations of *M. vollenhovenii* in Ose River grew better and were more abundant than the females in both seasons. The condition factor was better in wet season than dry season. The research has provided a baseline data on the biology of African river prawn, *M. vollenhovenii* in Ose and Osun Rivers, Southwestern, Nigeria.

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INTRODUCTION

The freshwater prawns of the genus *Macrobrachium* are widely distributed throughout the tropical and subtropical regions of the world (Jimoh et al., 2009). Some species, such as, *Macrobrachium vollenhovenii*, *M. macrobrachion*, *M. felicinum*, and *M. dux* which are of high economic importance, both in artisanal fisheries and for aquaculture diversification occur in the West African region (Jimoh et al., 2005). Interest on the aquaculture of prawns has increased largely due to the possibility observed in some species for commercial development (Marioghae, 1995). They are highly valued as food sources for humans. Marioghae

(1990) reported that *Macrobrachium* constituted about 60% of the catches in Lagos lagoon of Nigeria. Powell, (1980) reported that *Macrobrachium vollenhovenii* are found in freshwater and brackish water areas including rivers, streams, creeks, lakes, lagoons and estuaries. In spite of the economic importance of this species, a detailed scientific knowledge about its culture techniques is at its infancy (Sharma and Subba, 2004). Studies on *M. vollenhovenii* in many water bodies have been reported but at present, there is a dearth of information on its biology and the water quality parameters in Ose and Osun Rivers where they constitute an important component of the fishery. Odedeyi, (2013) reported that Ose River is perennial and took its source from Apata hills and flows

through the Savanna, the rainforest down to the mangrove forest and discharges into the Atlantic Ocean through a series of creeks and lagoons. Osun River also took its source from same place as Ose River. Traditional fishing is customary across the villages near Ose and Osun Rivers and the two rivers have been sustaining thriving fishery in Southwestern part of Nigeria through ages (Fagbenro et al., 1991; Eniade et al., 2018). Therefore, this research was designed to compare some aspects of the biology of *M. vollenhovenii* and water parameters in Ose and Osun Rivers.

MATERIALS AND METHODS

Description of Study Area

The study was carried out in Ose and Osun Rivers Southwestern Nigeria. Ose River lies between longitudes 5°20'E to 6°10'E and latitude 6°20'N to 8°00'N while Osun River is located between longitudes 4°03'E to 4°06'E and latitudes 6°33'N to 6°56'N.

Sample Collection

Samples of *M. vollenhovenii* used in this study were obtained from the catches of the artisanal fishermen within two seasons. The specimens were collected for both dry and wet seasons from May, 2016 to April, 2017. Prawn traps baited with fresh palm kernel fruit were used for the collection of the prawn specimens. The samples included both live and freshly dead, and were sorted into males and females, preserved immediately in 70% formalin solution and conveyed to the Laboratory of the Department of Animal and Environmental Biology, Adekunle Ajasin University, Akungba Akoko for further analysis. Individual measurements of the Weight and Length of the prawns were taken in gram (g) and centimeters (cm) respectively for every collection and recorded accordingly.

Condition Factor

The well-being of the specimens otherwise known as the condition factor was determined by the formula:

$$K = (100W)/L^3 \text{ (Bernacsek, 1984).}$$

Where K = condition factor; W = weight of prawn in gram (g) and L = total length of prawn in centimeters (cm).

Water Quality Parameters

Temperature, pH, Dissolved oxygen (DO₂) and Salinity of the rivers determined in-situ using Hana HI 9828 Water Multi-parameter Probe.

Statistical Analysis

Data collected were subjected to statistical analysis using descriptive statistics.

RESULTS

Relative Abundance and Sex Ratio

83 males and 38 females were observed in Ose River, yielding a male to female ratio of 2.18 : 1. Similarly, in Osun River, during the sampling period, 83 males and 52 females were observed with the male to female ratio of 1.60 : 1.

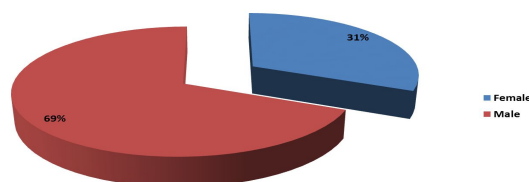


Figure 1: Percentage abundance of *M. vollenhovenii* in Ose River

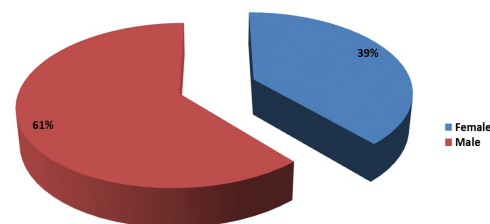


Figure 2: Percentage abundance of *M. vollenhovenii* in Osun River

Condition Factor

The condition factor 'K' values of *M. vollenhovenii* obtained from Ose and Osun Rivers are presented in Table 1.

Table 1: Condition Factor Values

	OSE RIVER		OSUN RIVER	
	WET SEASON	DRY SEASON	WET SEASON	DRY SEASON
	MEAN ± S.E.	MEAN ± S.E.	MEAN ± S.E.	MEAN ± S.E.
FEMALE	1.55±0.12	1.39±0.05	1.44±0.08	1.31±0.05
MALE	1.75±0.13	1.54±0.08	1.61±0.07	1.46±0.06
COMBINED	1.65±0.12	1.46±0.06	1.52±0.07	1.38±0.06

Water Quality Parameters

The water quality parameters for Ose and Osun Rivers are presented in Table 2.

Table 2: Comparative Water Quality Range

Parameters	Observed range from Osun River	Observed range from Ose River	FAO (1986) recommended range
Temperature °C)	27 – 31	24 – 28	25 – 30
Salinity (ppm)	0.06– 0.77	0.05 – 0.18	0.05 - 0.40
pH	6.2 – 6.7	6.3 – 7.0	7.5 -9.0
Dissolved Oxygen (ppm)	0.9 – 4.4	0.6 – 1.5	0.5 – 8.6

DISCUSSION

Relative Abundance and Sex Ratio

Africa river prawn, *M. vollenhovenii* was found to be more abundant in Osun River than in Ose River with a higher male population than the female population in both rivers. The relative abundance of *M. vollenhovenii* in Osun River than Ose River is probably due to the closeness of Osun River at Itokin village to the Lagos Lagoon, a brackish water environment which could offer *M. vollenhovenii* a favourable breeding ground. New and Singholka, (1985) reported that the adult of *M. vollenhovenii* migrated annually to estuaries to spawn. In addition, the physical attributes of the substratum of the river are one of the factors considered to be responsible for the distribution of prawns (Khan *et al.*, 1995). Powel, (1982) observed that *M. vollenhovenii* prefers to forage on sandy substratum than a muddy one. It has also been observed that water and sediment pH may lead to spatial separations or distributions of species, age and sex classes in prawns (Eniade *et al.*, 2018).

The sex ratio showed a higher male population than female in the wet and dry seasons of the two rivers. This is in agreement with the findings of Kingdom and Erundu (2013) that *M. vollenhovenii* deviated significantly from the ratio 1:1 and were males dominated. However, Jimoh *et al.*, (2012) reported a sex-ratio of 1: 3.7 of *M. vollenhovenii* in the Badagry Creek (Southwest Nigeria).

Condition Factor

The result of the average values of the condition factor 'K' of *M. vollenhovenii* obtained in this study is similar to that of Andem *et al.*, (2013) who observed that the condition factor of brackish river prawn *M. macrobrachion* from great Kwa river, Cross River State was within the range of 0.15 to 4.53, 0.65 to 5.59 and 0.85 to 8.00 for male, female and berried female respectively. In this study, the mean condition factor of both rivers was similar but there were variations among the sexes.

Water Quality Parameters

The result of the water quality parameters recorded was within FAO recommended range. FAO, (2013) reported that prawns consumed as low as 0.5% and as high as 8.6% of oxygen. The dissolved oxygen recorded in this work is within tolerable range. Also, the pH values obtained in this study fall within the range of 6.5 to 8.0 required for fresh water (FAO, 2013). However, Abowei, (2010) reported that the pH of Nkoro River of Niger Delta ranged from 6.1 to 8.5. The author attributed the low pH to the decay of domestic and other wastes in the river. Similarly, observations on seasonal variations in pH have been variously reported (Dublin-Green, 1990; Ekeh and Sikoki, 2003; Abowei, 2010; Ansa, 2004).

CONCLUSION

The study revealed that *M. vollenhovenii* was more abundant in Osun River than in Ose River and male population outnumbered the females' in both rivers. The condition factor in Ose River was better than Osun River. Also, the water parameters in Ose and Osun Rivers were within the tolerable range for the culture of Africa river prawn.

RECOMMENDATION

In view of its larger size and economic value, commercial cultivation of *M. vollenhovenii* is recommended in Ose River.

Prawn culturists can take the advantage offered by Ose River for *M. vollenhovenii* cultivation.

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