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Assessment of Artisanal Fishery Landings of Some Coastal Communities in the Eastern Axis of Lagos State

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Abstract

It was possible to observe the artisanal fishery catches around three coastal towns: Orimedu, Magbon Alade, and Okun Ilado, situated on the eastern axis of Lagos. Apart from a detailed examination of species composition, catch per unit effort, and growth rates, socio-economic data of fishers were included in the study. To enrich qualitative as well as quantitative information, field surveys, intensive interviews, and specimen analysis were conducted. Sixteen species of fish were present in twelve families. Results indicated the low condition factors for the first three leading species and contradicted female-biased sex ratios and a few depressing constraints such as constrained microcredit and insufficient availability of fishing gear compared to those applied by foreign competitors. Such an array is hence recommended for enhancing supporting mechanisms and compliance with recommendations on regulations which are to guarantee sustainable artisanal fisheries.

Keywords: Artisanal Fishery Landings, Coastal Communities, Eastern Axis, Lagos State, Assessment.

Introduction

In Nigeria, rural household depend on forest resources to meet a variety of livelihood objectives. These objectives include food security, social security, income generation and risk management (Emmanuel, 2022). The majority of people in Nigeria particularly those (communities) that are residing in rural

areas continue to be vulnerable to environmental changes and this vulnerability is greatly increased by the grossly undeveloped agriculture and over dependence on natural resources particularly non-wood forest products for sustainable livelihoods (Agbo 2023). The contributions of non-timber forest products as source of income, diversification of farming activities and food to households cannot be over emphasized; NTFPs are usually for cultural and recreational purposes, biodiversity conservation, and rural economic development (Edward *et al*., 2021). As indicated by (Peter *et al*., 2020), the NTFPs, if prioritized by the government and other stakeholders can

Artisanal fisheries are critical to food security, income, and socio-cultural identity in coastal communities. They are generally small scale, more labor oriented, and use primitive fishing techniques. Artisanal fisheries have a great contribution to the world fish production, employing over 90% of the world's fishers (FAO, 2022). Food Security is greatly impacted through artisanal fisheries by providing an important source of protein to millions, especially in developing countries (Béné et al., 2016). Their sustainability, however, is threatened by overfishing, climate change, and poor governance (Pauly, 2018). Some studies have pointed out the need for co-management approaches where local communities take part in the governance of the fisheries (Gutiérrez et al., 2011). It is estimated that approximately half of the world's small-scale fishers work in developing countries, which require more control. These countries also lack guidelines that are based on basic human needs. In light of these issues, the FAO published the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in 2015 hospitable to issues that sustain small-scale fishers but preserve ecological balance. Reports from the World Bank suggest that in Africa, artisanal fisheries support the livelihoods of around 12 million people (2019). Small-scale fisheries are of critical economic and nutritional value to coastal nations such as Ghana, Senegal, and Nigeria (Atta-Mills et al., 2004). Illegal, unreported, and unregulated (IUU) fishing coupled with weak governance also greatly hinders sustainability (Belhabib et al., 2015).

Women play a more active role in selling and processing fish which is essential in terms of the gender division of labor (Fröcklin et al., 2013). Resources that are vital to social and economic development are restricted due to gender stereotypes (Harper et al., 2013).

Artisanal fisheries represent a significant source of employment in the Niger Delta and coastal regions of Nigeria (Nwabeze et al., 2020). This sector also makes up over 80% of the nation's fish consumption. However, it is fraught with severe pollution, overfishing, and competition from commercial trawlers (Adeogun et al., 2019).

Governance is somewhat addressed by policies such as the National Fisheries and Aquaculture Policy (2008). There, however, the lack of proper enforcement of policy gives rise to control gaps (Udoh & Ukpere, 2012). Self-regulated community fisheries management has worked well in some areas encouraging collaboration between fishers

and fishery management (Olaoye et al., 2013). Nigeria's most populous coastal state, Lagos, relies heavily on artisanal fisheries, particularly in Badagry, Epe and Ikorodu (Adeleke & Afolabi, 2018). Olomola (2016) notes that these are accompanied by urbanization impacts, water pollution, and reduced fish catches.

Studies within this region have also suggested better fishing regulation enforcement as well as alternative livelihood schemes aiming towards reduced reliance on fisheries (Aderinola et al, 2020). The Lagos State Aquaculture and Fisheries Development Project (LSFDP) implemented initiatives such as fish farming training to alleviate pressure on wild stocks (LSMOH, 2021). Lagos State, with its extensive marine environment, is the hub for artisanal fisheries in Nigeria

In the socio-economy and nutrition profile of coastal communities across the globe, particularly in West Africa, artisanal fisheries have a very prominent place. Such small-scale, intensive fishing gives itself in no small measure to livelihoods, food security, and the economy of localities. In Nigeria, especially in Lagos State, thousands of such households use artisanal fisheries for their labor in providing jobs and sources of cheap protein (FAO, 2022). Artisanal or small-scale fishery operations represent about 90% of the global fishing population, meaning they are resourceful in terms of supply within the global fish trade (FAO, 2022; Béné et al., 2023). Artisanal fisheries are important, and yet they are caught very much in the web of overexploitation, habitat degradation, climate change, as well as ineffective enforcement of policy measures. These factors are compounded by heavy competition from industrial fleets as well as unregulated fishing and rapidly urbanizing landscapes that display low catch rates over time and threaten the sustainability of aquatic resources (World Bank, 2021; Belhabib et al., 2019). Such factors include erosion and pollution, coupled with decreased fish stocks attributed to the rapid urbanization of Lagos State, which is coastal in nature (Akinwumi et al., 2022; Akintola et al., 2023).

The renewed interest in studies advocacy for participatory approaches that blend the community-based and co-governance frameworks in which fishers actively engage in regulatory and conservation strategies (Gutiérrez et al., 2020): such participatory approaches could in themselves not only inspire compliance but also significantly empower local stakeholders for better stewardship for marine resources. The FAO Adopted International Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (VGSSF) then offers a strategic roadmap to negotiate governance deficits while improving social equity in the African case (FAO, 2022). Issues of gender within artisanal fisheries should also be tackled. More women are engaged in post-harvest processing and trade, with their income contributing significantly to household incomes and community welfare. However, limited access to finance, training, and decision-making roles are among the barriers they face because of their socio-cultural environment (Harper et al., 2021). Addressing these discrepancies in gender will eventually improve inclusive

fisheries governance. Artisanal fisheries represent a significant source of employment in the Niger Delta and coastal regions of Nigeria, and Lagos State has seamlessly become a hub due to its long coastline and lagoon systems (Nwabeze et al., 2020; LSMOH, 2021). This sector also makes up over 80% of the nation's fish consumption. However, it is fraught with severe pollution, overfishing, and competition from commercial trawlers (Adeogun et al., 2019).

Nigeria's artisanal fisheries Infrastructure access remains insufficient; financing has been little to nonexistent, and policies are fragmented across the span of the sector. Programs, like the Lagos State Fisheries Development Plan, have sought to address into these gaps by encouraging aquaculture and capacity-building amongst fishers (Lagos State Gazette, 2023). Moreover, recent studies have pointed more to evidence-based policy-making, which should include ecosystem-based management, seasonal closures, and sustainable gear use (Adeogun et al., 2020; Ude et al., 2022).

This study thus adds to the growing literature in the theme about artisanal fisheries by providing empirical insights from the coast-lining communities of Lagos. It delves into the dimensions of catch composition, fisher demographics, and biological parameters that provide a footing for more inclusive and adaptive fisheries management strategies in Nigeria.

Previous studies conducted in the eastern part of Lagos-the communities of Orimedu, Magbon Alade, and Okun Ilado-have indicated a decline in catch diversity and low condition factors in dominant species, hence environmental stress and regulatory intervention becomes urgent (Olakunle et al., 2023).

Materials and Methods

This research focused on specific communities—Orimedu, Magbon Alade, and Okun Ilado—where native fishers operate under competitive and environmental pressures.

Study Area

The research was conducted within coastal communities located at the following coordinates: N 06°26′14.0″; E 03°54′21.1″; N 06°26′17.2″; E 03°53′09.8″; N 06°26′16.8″; E 03°53′09.3″. The coordinates correspond to Orimedu, Magbon Alade, and Okun Ilado, respectively (Fig. 2).

Figure 2: Study Area

Methodology

Structured questionnaires were completed from 60 respondents (20 in each community). Fisherfolks and local leaders took part in focus group discussions. *Platybelone argalus* and *Sphyraena sphyraena* had length-weight relationships graphed for assessing growth patterns. Fish species were identified using FAO taxonomic guides. Weight, length, sex, and stomach contents were recorded.

Results

Socio-economic Characteristics of Fisherfolk.

The report offers a graphic and analytical description of the socio-economic characteristics of Orimedu, Magbon Alade, and Okun Ilado artisanal fisherfolk communities in Lagos State. Primary data were collected through organized interviews and focus group discussions as detailed in the earlier study, and the bar charts given below are for gender distribution, education, age groups, marital status, and family size trends.

Further analysis of the socio-economic characteristics of artisanal fisherfolk presented in this long report includes age structure, marital status, dependents, and family size. The graphical presentation shows trends in the three studied communities: Magbon Alade, Okun Ilado, and Orimedu.

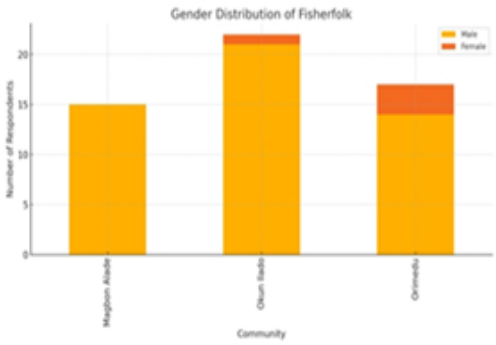

Figure 1: Gender Distribution across Communities

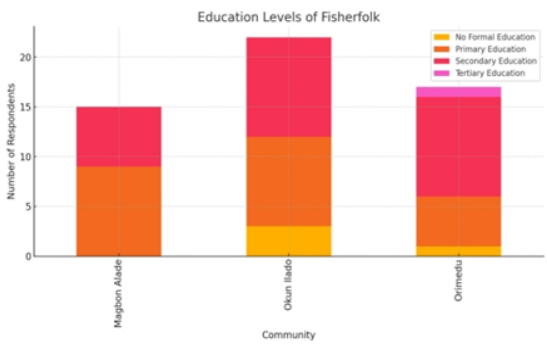

Figure 2: Educational Level

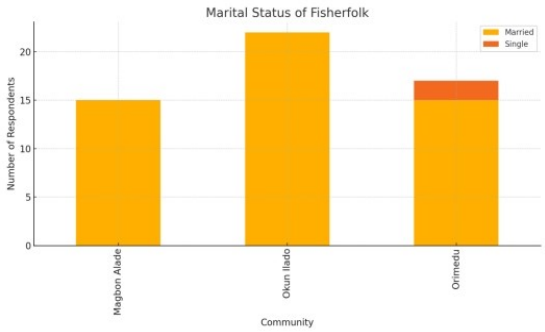

Figure 3: Marital Status

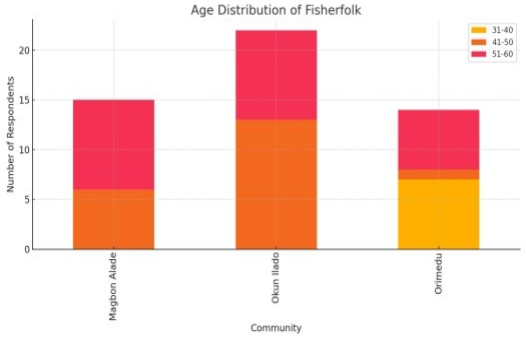

Figure 4: Age Distribution

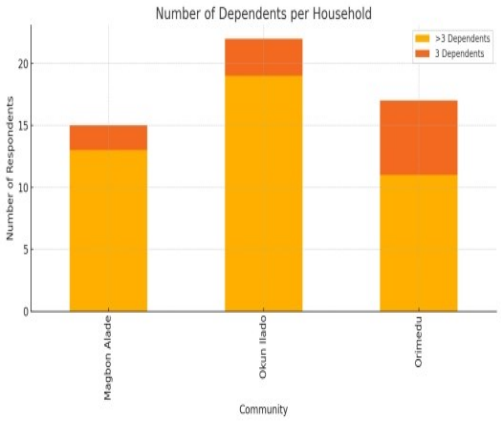

Figure 5: No. of Dependents per household

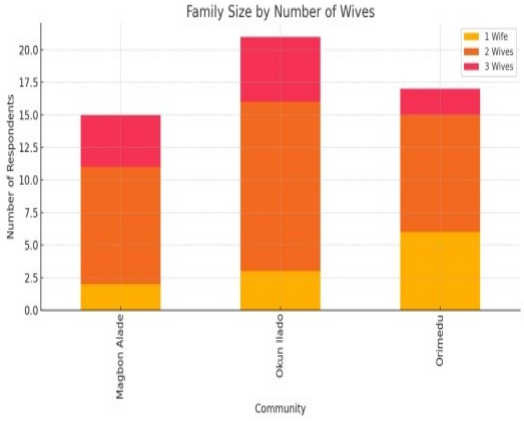

Figure 6: Number of Wives

Fisheries Resources

Table 2: Fish Species Encountered

Common Name	Scientific (family) Name	Species
Barracuda	*Sphyraenidae*	*Sphyraena Sphyraena*
Crevalle Jack	Carangidae	*Caranx hippos*
Blue Runner	Carangidae	*Caranx crysos*
Sardine	Clupeidae	*Sardinella marderensis*
Croaker	*Sciaenidae*	*Pseudolithus senegalensis*
Tuna	Scombridae	*Euthynnus allatteratus*
Spadefish	Ephippididae	*Chaetodipterus goreensis*
Pompano	Carangidae	*Alectus alexandrinus*
Grunt fish	Haemulidae	*Pomadasys jubelini*
West African Spanish mackerel	Scombridae	*Scromberomous tritor*
Threadfin	Polynemidae	*Pentanemous quinquarius*
Sea beam	Sparidae	*Brachydethorus aurita*
Tongue sole	Cynoglossidae	*Cynogglossus senegalensis*
Needle fish	Belonidae	*Platybelone argalus*
Atlantic bumper	Carangidae	*Chlooscombrus chrysurus*
Puffer fish	Tetraodontidae	*Ephippian guittifer*

Table 3: Sex ratio of Species at Orimedu

SPECIES	MALE	FEMALE	TOTAL
Euthynnus alletteratus	2	14	16
Caranx crysos	0	4	4
Caranx hippos	3	13	16
Chaetodipterus goreensis	2	3	5
Platybelone argalus	4	17	21
Alectus alexandrinus	4	0	4
Pomadasys jubelini	1	0	1
Sardinella madrensis	15	12	27
TOTAL	**31**	**63**	**94**

Table 4: Sex ratio of Species at Magbon Alade

SPECIES	MALE	FEMALE	TOTAL
Euthynnus alletteratus	1	8	9
Caranx crysos	1	2	3
TOTAL	**2**	**10**	**12**

Table 5: Sex ratio of Species at Okun-ilado

SPECIES	MALE	FEMALE	TOTAL
Chaetodipterus goreensis	1	5	6
Caranx crysos	1	3	4
Caranx hippos	3	1	4
Pseudotolithus senegalensis	0	1	1
Platybelone argalus	4	3	7
Pentanemous quinquarius	3	4	7
Euthynnus alletteratus	0	2	2
Brachydethorus aurita	3	2	5
Ephippion guttifer	0	3	3
Cynoglossus senegalensis	1	0	1
Sphyraena sphyraena	22	45	67
Sardinella mederensis	13	34	47
TOTAL	**51**	**103**	**154**

Table 6: Status of Stomach Contents

S/N	SPECIES	MALE	FEMALE	full	one-quarter	two-quarter	three-quarter	empty	TOTAL
1	*Chaetodipterus goreensis*	1	5	3	2	1	0	0	6
2	*Caranx crysos*	1	3	1	1	1	1	0	4
3	*Caranx hippos*	3	1	1	2	1	0	0	4
4	*Pseudotolithus senegalensis*	0	1	0	0	1	0	0	1
5	*Platybelone argalus*	4	3	0	1	3	3	0	7
6	*Pentanemous quinquarius*	3	4	0	6	0	1	0	7
7	*Euthynnus alletteratus*	0	2	0	0	1	1	0	2
8	*Brachydethorus aurita*	3	2	0	5	0	0	0	5
9	*Ephippion guttifer*	0	3	0	0	1	2	0	3
10	*Cynoglossus senegalensis*	1	0	0	0	0	1	0	1
11	*Sphyraena sphyraena*	22	45	9	33	12	13	0	67
12	*Sardinella mederensis*	13	34	6	22	9	9	1	47
	TOTAL	**51**	**103**	**20**	**72**	**30**	**31**	**1**	**154**

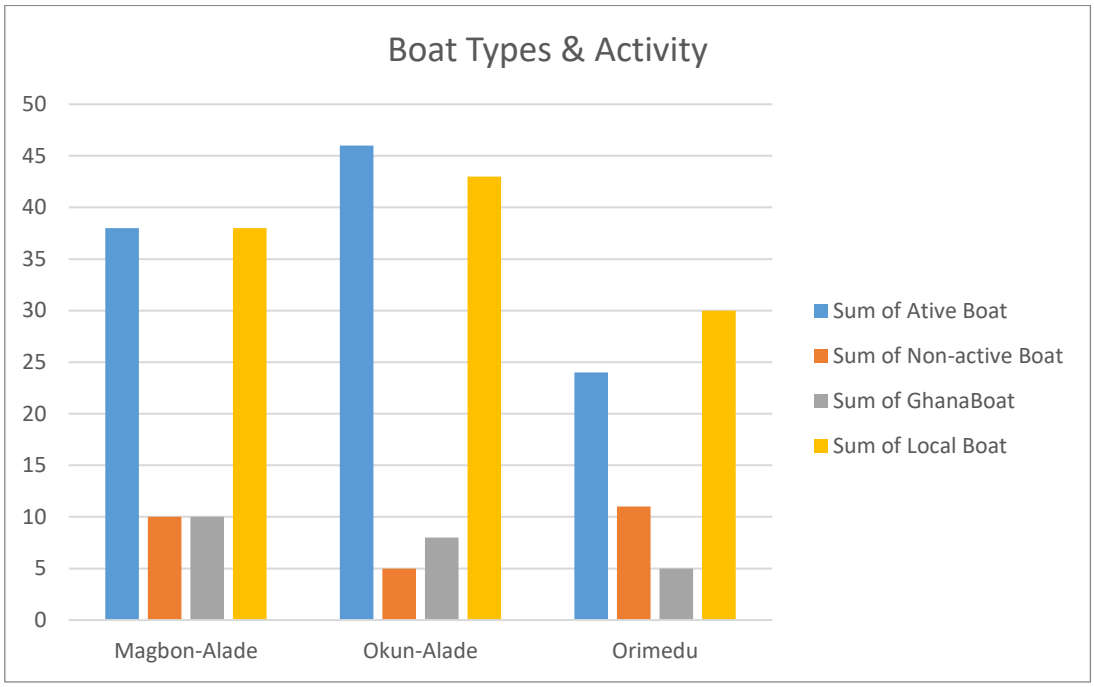

Fig 3: Boat Types and Activity

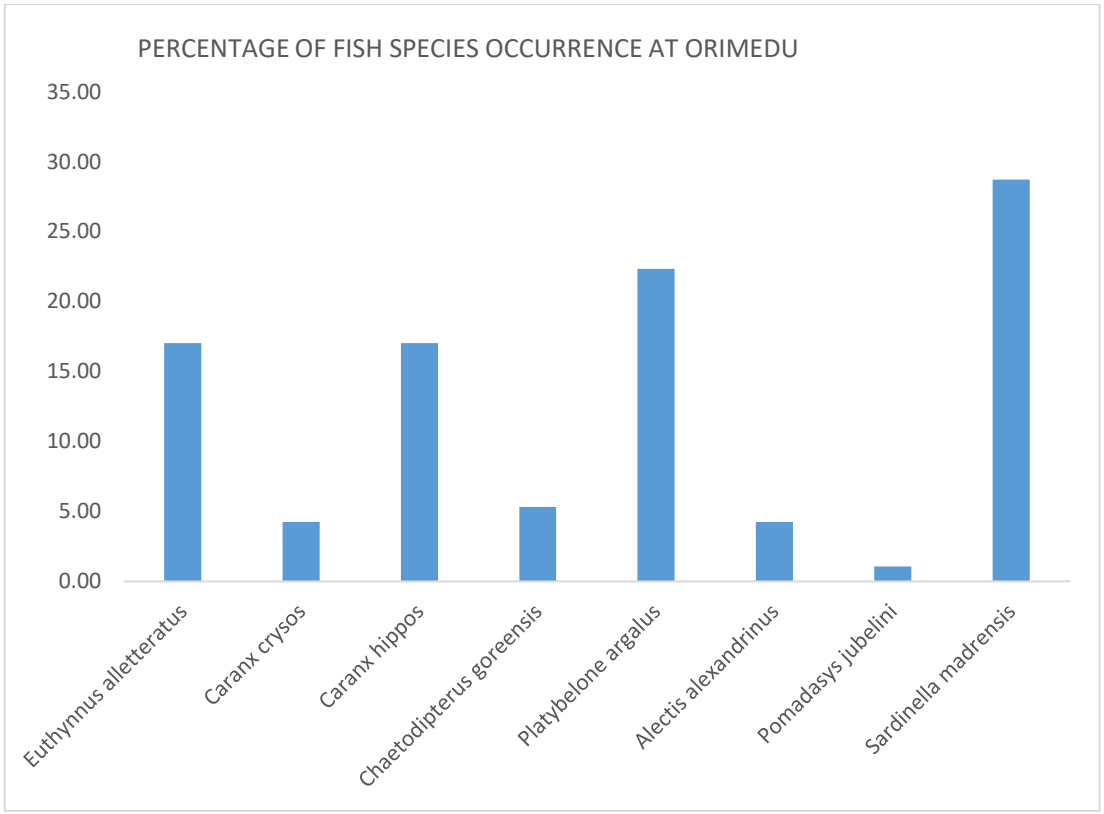

Fig 4: Numerical Occurrence of Species at Orimedu in Percentage.

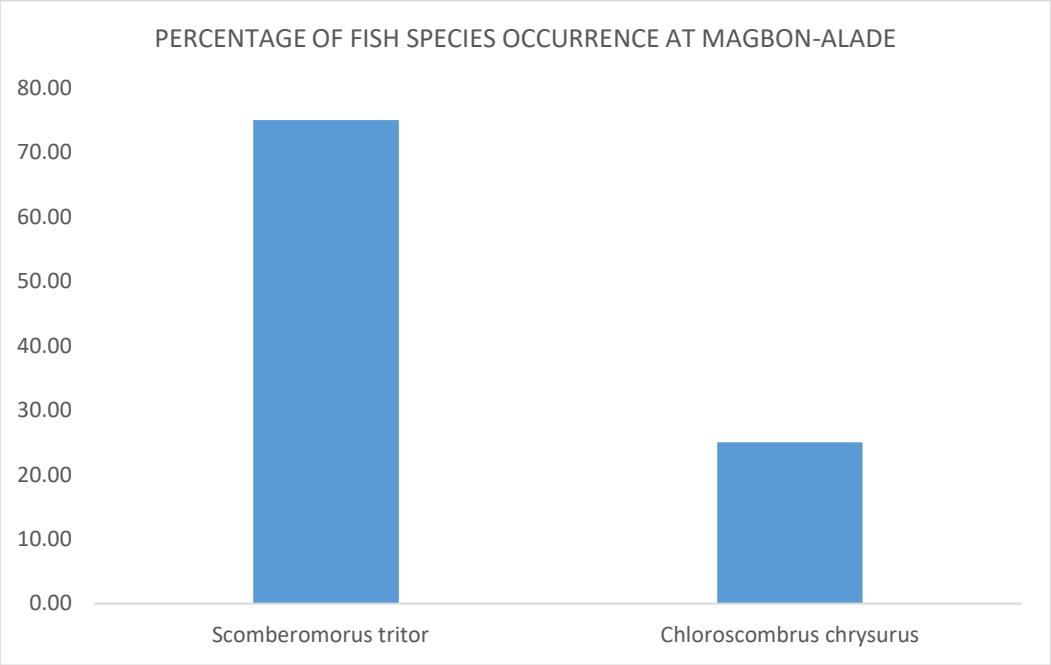

Fig 5: Numerical Occurrence of Species at Magbon-Alade in Percentage.

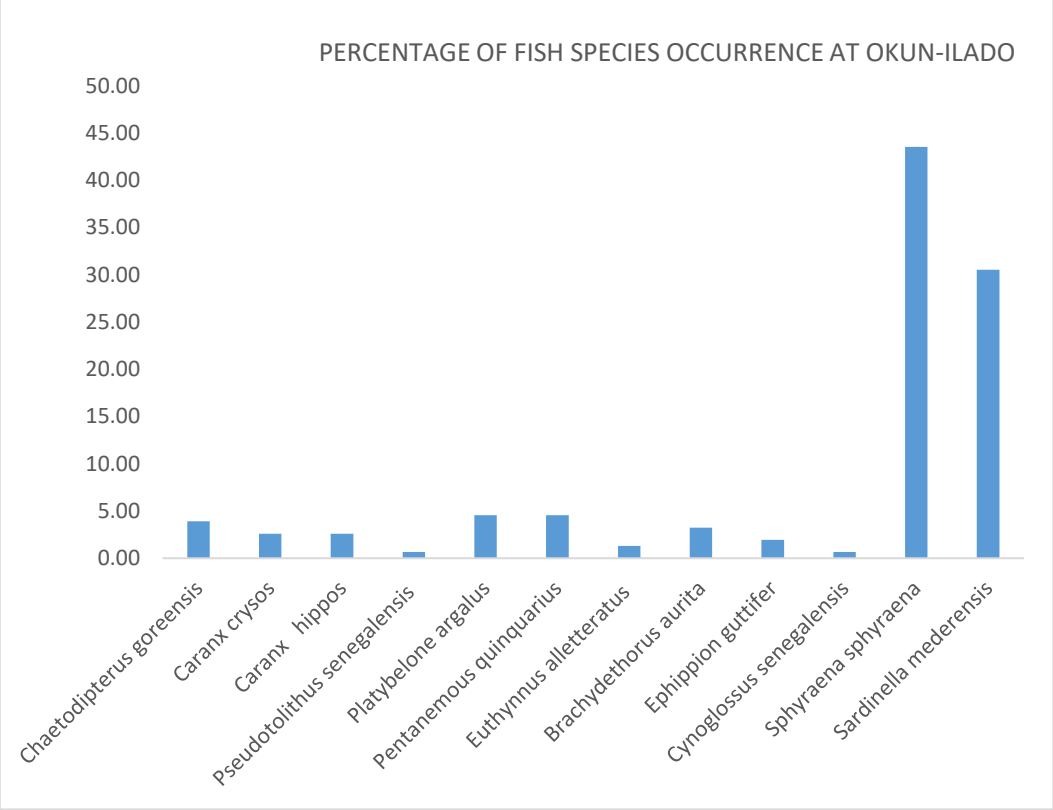

Fig 6: Numerical Occurrence of Species at Okun Ilado in Percentage.

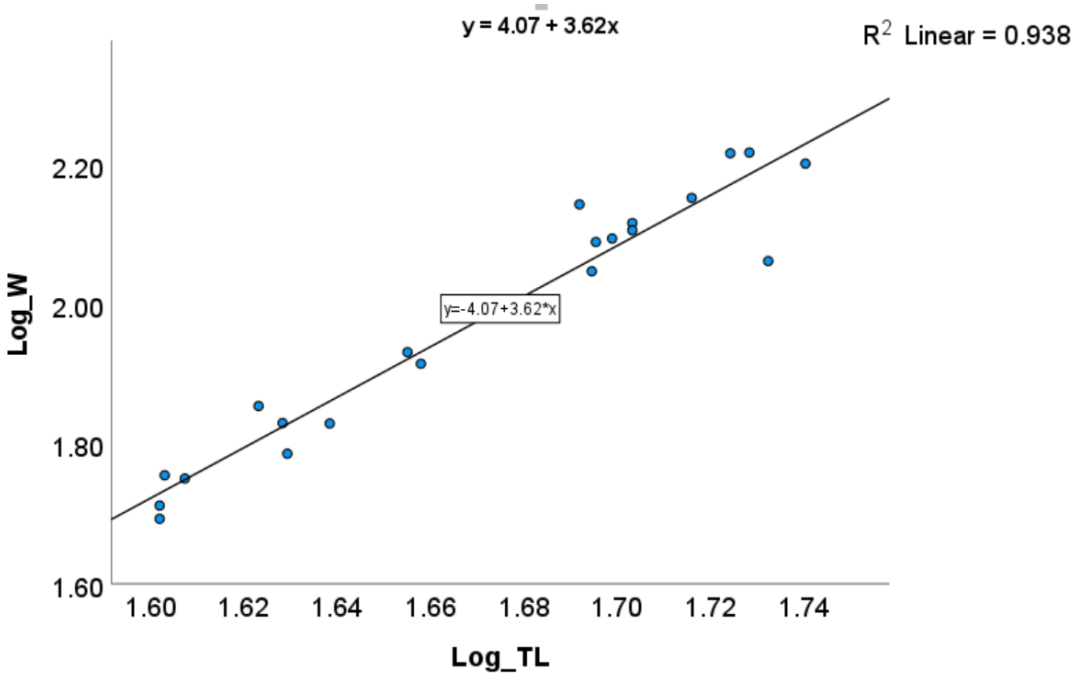

Figure 7: Log Total length – Log Total Weight relationship of *Platybelone argalus* at Orimedu

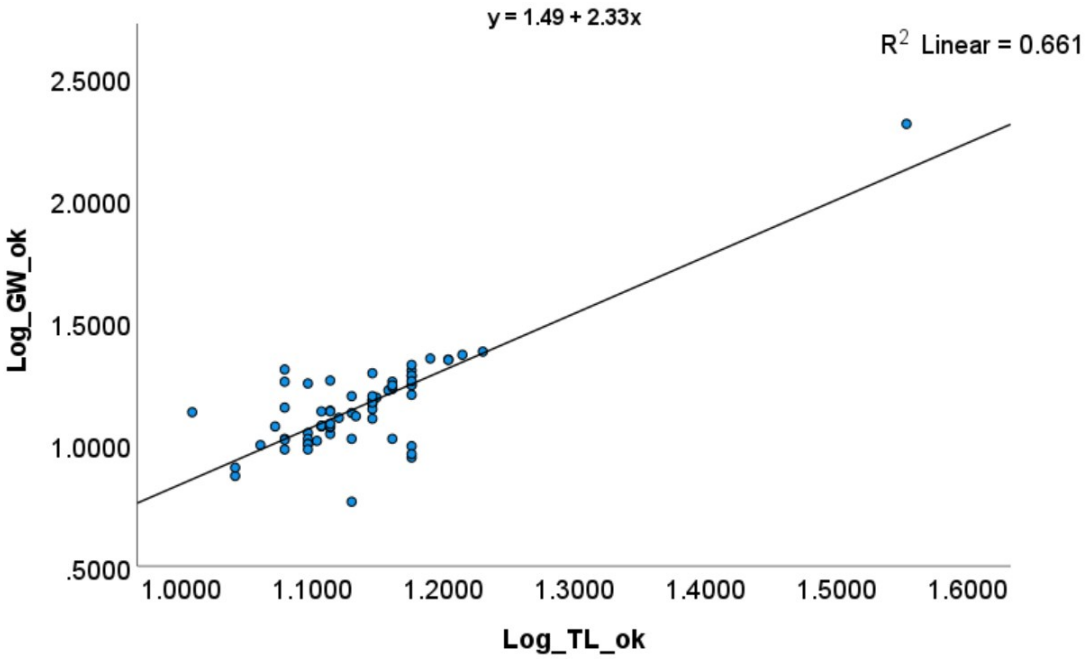

Fig. 8: Log Total length – Log Total Weight relationship of *Sphyraena sphyraena* at Okun Ilado

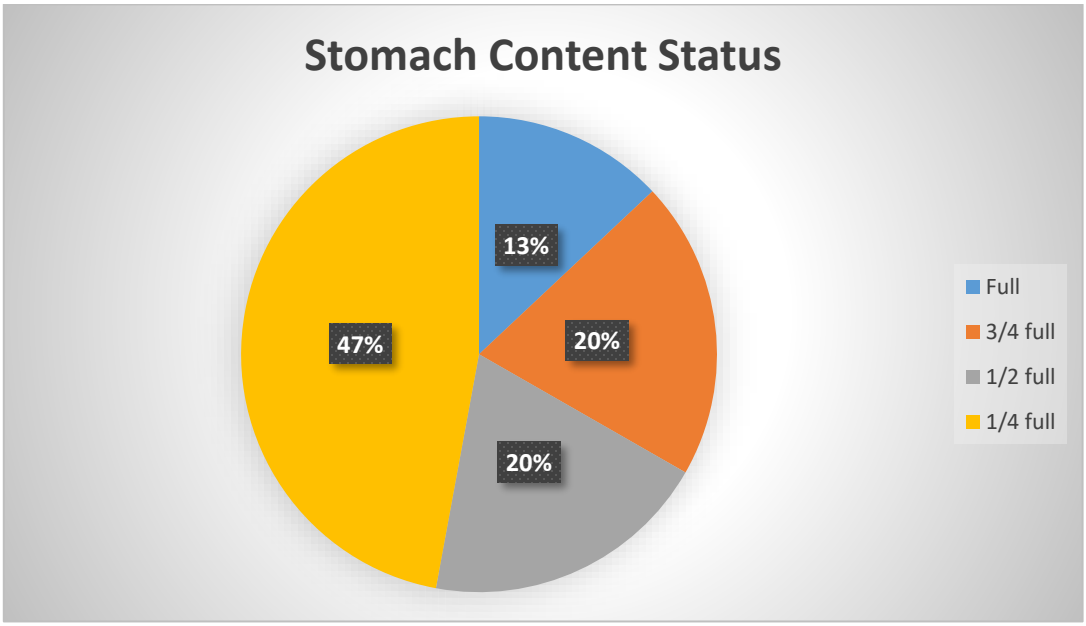

Fig 9: Stomach Content Status Distribution

CONDITION FACTOR

Condition factor of *Platybelone argalus* at Orimedu

$$K = 100 \times \frac{W}{L^3}$$

$$K = 100 \times \frac{2150.8}{988.7^3} \qquad \boldsymbol{K = 0.000222}$$

Condition factor of *Sphyraena sphyraena* at Okun Ilado

$$K = 100 \times \frac{W}{L^3}$$

$$K = 100 \times \frac{1152.9}{933.1^3} \qquad \boldsymbol{K = 0.000142}$$

Discussion

Socio-ecoomics of Fisherfolks

The age structure chart (Figure 3) reveals that the majority of fishermen fall within the range of 41-60 years, thus showing an aging labor force in artisanal fisheries. This situates a long-term sustainability of the industry in jeopardy unless the youth are actively involved in the sector.

The status of marriage discovery (Figure 4) shows more marital persons, which reflects greater household burdens and economic dependence on fishing as a way of life. This is manifested in the family size data (Figure 5), in which polygynous households dominate, particularly in Magbon Alade and Okun Ilado.

Economic burden on fisherfolk could also be shown by numbers of dependants (Figure 6). Most of the households supported more than three dependants, confirming the

importance of artisanal fisheries as a means not only for sustaining livelihood but as a social safety net for the whole family. 1. Gender Distribution. The gender distribution bar chart (Figure 1) shows a clear male dominance in artisanal fishery participation in the three communities: Magbon Alade had 100% male respondents while Okun Ilado had 95.5% male and 4.5% female respondents and Orimedu had 82.4% male and 17.6% female. This trend conforms to the overall gender roles predominant in most coastal African fishing communities, where men are active in fishing activities at sea and women more in charge of post-harvest handling, processing, and trade. Low participation of women in actual fishing may be culturally, socially, and physically deterred due to security and safety issues in marine fishing.

From Figure 2, educational disparities were measured from the level of education across communities:Primary education was the most common in Magbon Alade and Okun Ilado (60% and 40.9%, respectively), while secondary education dominated Orimedu (45.5%) with fairly even distribution of the other two. Tertiary education was only recorded in Orimedu (5.9%) Out of all respondents, over 90% in each community had some form of formal education, contrary to the popularly held stereotype of artisanal fishers being uneducated. This is a very positive indicator of capacity for training and technology uptake, a prerequisite for improving fishing methods, sustainability and resource management.

Fishery Resources

Sixteen species belonging to twelve families have been recorded thus demonstrating a high level of diversity of fauna and flora in the coastal waters. Successful species such as Sardinella maderensis and Sphyraena sphyraena indicate that fishery success is assured. The difference in species composition at different sites, however, is an indicator of local ecological or fishing pressure variations. The occurrence of both demersal and pelagic species also confirms that artisanal catches are multi-habitat. Tables 3-5 show that the three sites had a highly skewed sex ratio in favor of females, especially those in Orimedu and Okun Ilado (a ratio of over 2:1). This may have biological/seasonal reasons with implications of possible reproductive sustainability. Female-biased fish species can be indicators of active spawning or migratory strategies that need more ecological scrutiny.

Stomach Content Status was represented in Table 6 and Figure 9. In most cases, fish specimens had stomachs that were either ¼ full or ¾ full with few being empty. This lends credence to the over-all perspective of a healthy trophic environment implying that the fishes were very much actively feeding. Other species, Sphyraena sphyraena, and Sardinella maderensis, also indicating sustained feeding pressure would reflect the higher incidence of these species in the catches. The information may be depicting diet breadth which is vital in habitat quality and productivity determinations.

Species occurrence per site was illustrated in figures 4,5, and 6. At Orimedu, Sardinella maderensis predominated (more than 28%), reflecting a pelagic-based fishery. A few species dominated Magbon Alade, indicating either selective fishing or low biodiversity, while Sphyraena sphyraena was abundant at Okun Ilado (43.5%), despite a broader species spectrum, reflecting either a healthy ecosystem or a lightly fished one. In figures 7 and 8, Length-Weight Relationships of two representatives, Platybelone argalus, indicated positive allometric growth ($b > 3$), where weight gain is faster than length; positive allometry is characteristically found in well-fed, healthy populations. Sphyraena sphyraena exhibited negative allometric growth ($b < 3$), implying a slower increase in weight compared to length, a sign of environmental stress or food shortage at some point. Both species that were studied had a condition factor (K-values) of less than one, an indication that environmental conditions were not conducive for their survival and growth probably due to pollution, overfishing, or habitat destruction which is a management issue that requires urgent attention.

Conclusion

Artisanal fisheries remain vital to every coastal community within the world, African nations and Nigeria in particular. Integrated management solutions are needed to tackle sustainability issues including overfishing, pollution, and weak governance. The policies formulated to for the region should shift decision making towards the local people, especially women, which is crucial for the future of the sector. The conventional fisheries along the east axis of Lagos State are bioecologically prosperous but face environmental and socioeconomic challenges. Globally, notwithstanding these challenges, with funding, competition, and pollution goodwill should be improved towards granting better food security and local livelihoods.

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