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REVIEW

A Critical Review of Fish Production Dynamics and Sustainability in Nigeria

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Abstract

Blessed with vast aquatic resources, Nigeria holds enormous potential for fish production to meet the demands of a rapidly growing population. Fish production in Nigeria plays a significant role in the nation's food security, employment opportunities, and economic development strategies. Fish is one of the most consumed animal proteins in Nigeria, and it greatly contributes to the nutritional needs of the population. However, despite all these natural advantages, the nation has a considerable challenge in its ability to be self-sustaining and make the most out of its fishery sector. This review studies Nigeria's current trend in fish production patterns, including human-induced effects, climate change, and institutional weakness, and makes recommendations for enhancing sustainable and adaptive fisheries.

Key words: Current trends, Fish productivity, Aquaculture sustainability, Challenges, Nigeria

Introduction

Nigeria's inshore water resources are approximately 12.5 million hectares and can produce up to 512,000 metric tonnes of fish annually (Kadurumba et al., 2021). As large as this aquatic base is, the country is yet to overcome very critical challenges in addressing its internal demand for fish. Nigeria is one of the largest consumers of fish in Africa (Tran et al, 2022), with an annual demand of 1.4 million metric tonnes (Ifabiyi, 2024). Local fish production has never kept pace with this demand, and hence, a deficit of approximately 0.7 million metric tonnes has always been felt (Fig.1). To compensate for this lack, Nigeria imports nearly $0.5 billion worth of fish annually, severely depleting the nation's economy (FAO, 2024).

Historical data on Nigerian fish production reflect patterns of an unstable nature. Based on the decade from 1981 to 2007, total domestic fish production varied between 242,525 and 615,507 metric tonnes, describing the sector as unstable and underperforming (Busari et al, 2023). The Food and Agriculture Organization (FAO) estimated in 2000 that Nigeria would produce domestically 1.20 million metric tonnes of fish by 2017, while demand would increase to 1.39 million metric tonnes with a deficit of 0.19 million metric tonnes (FAO, 2022). However,

current data indicate that the country is still far from this forecasted level of production (Ogunji and Wuertz, 2023), with production currently averaging about 1 million metric tonnes (Odioko and Becer, 2022; FAO, 2024). This continuous deficit indicates the imperativeness of ramping up local fish production

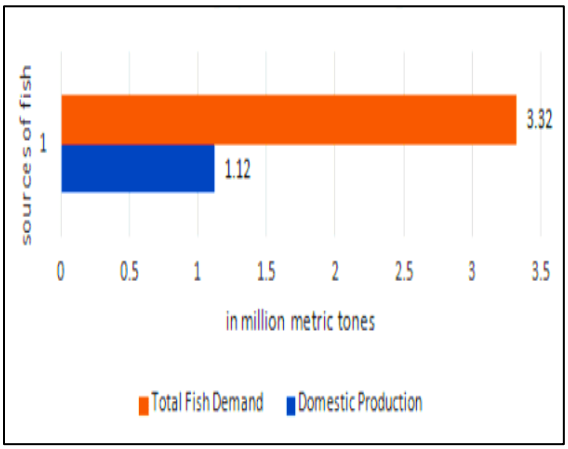

Figure 1: Demand gap for Fish in Nigeria (Ateme, 2021)

capacity to respond to the growing demand and reduce reliance on imports.

The Nigerian fishery sector comprises two main components: capture fisheries and aquaculture. Capture fisheries, including freshwater and marine fishing, have dominated fish production for a long time. However, overfishing, environmental degradation and climate change cut down on wild fish stocks, undermining the sub-sector's sustainability (Ahmad et al., 2025). Aquaculture, however, has emerged as a viable alternative (Table 1), contributing over 40% of total fish production in recent years (Ogunji and Wuertz, 2023).

Table 1: Top aquaculture producers in sub-Saharan Africa from 2008 to 2018 (MT) (FAO, 2025)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Nigeria	143 207	152 796	200 535	221 128	253 898	278 706	313 231	316 727	306 767	296 191	291 323
Uganda	52 250	76 654	95 000	85 713	95 906	98 063	111 023	117 590	118 051	112 344	103 737
Ghana	5 594	7 154	10 200	19 092	27 450	32 513	38 545	44 610	52 480	57 415	76 630
Zambia	5 640	8 505	10 290	10 530	12 988	20 271	19 281	22 754	21 600	21 567	24 300
United Republic of Tanzania	217	202	454	648	3 407	3 477	3 612	3 992	5 047	11 802	15 523
Kenya	4 452	4 895	12 154	22 135	21 488	23 501	24 098	18 658	14 957	12 360	15 124
Zimbabwe	2 652	2 702	2 782	7 682	8 090	10 090	10 600	10 600	10 085	10 300	10 585
Sudan					7 500	6 500	6 000	7 000	6 000	9 000	10 000
Malawi	1 700	1 620	2 631	2 833	3 232	3 705	4 742	4 974	7 646	12 217	9 014
Madagascar	10 836	6 116	6 886	8 845	8 588	8 974	8 470	7 317	8 575	10 928	7 421
South Africa	3 587	3 082	3 133	3 343	3 927	4 813	5 222	5 430	5 594	5 476	6 181
Rwanda	60	60	100	265	506	1 165	1 504	1 620	1 580	3 357	5 128
Benin	213	308	364	400	500	667	1 425	4 460	4 207	4 530	5 114
Côte d'Ivoire	1 290	1 340	1 700	3 394	3 720	3 720	3 750	4 000	4 392	4 500	4 500
Others	7 939	8 275	9 904	9 725	9 173	11 312	13 868	16 268	19 826	21 527	21 818
Total	239 637	273 709	356 132	395 734	460 373	507 477	565 371	586 000	586 807	593 514	606 398

Despite its growth, the aquaculture sector is plagued by inadequate infrastructure, insufficient connections with high-quality input sources, and a lack of technical capacity (Akegbejo, 2022). These must be addressed by adopting a multifaceted approach through additional investment in research and development, enhanced policy enforcement, and utilizing sustainable methods. By using its vast aquatic resources and expansion of aquaculture production, Nigeria will not only meet its domestic fish needs (Fig. 2) but also emerge as a leading fish producer in Africa (Nwuba and Ude, 2022). This review discusses the current trend in fish production in Nigeria, identifies the key challenges, and provides pragmatic recommendations to enhance productivity and sustainability in the sector.

Current Status of Fish Production in Nigeria

Capture Fisheries

Capture fisheries in Nigeria are mostly carried out in the Niger Delta, Lake Chad, and other coastal aeas. It is traditionally a major fish producer; however, it is currently witnessing an enormous production decline owing

to overfishing, driven by unchecked fishing and weak regulation enforcement.

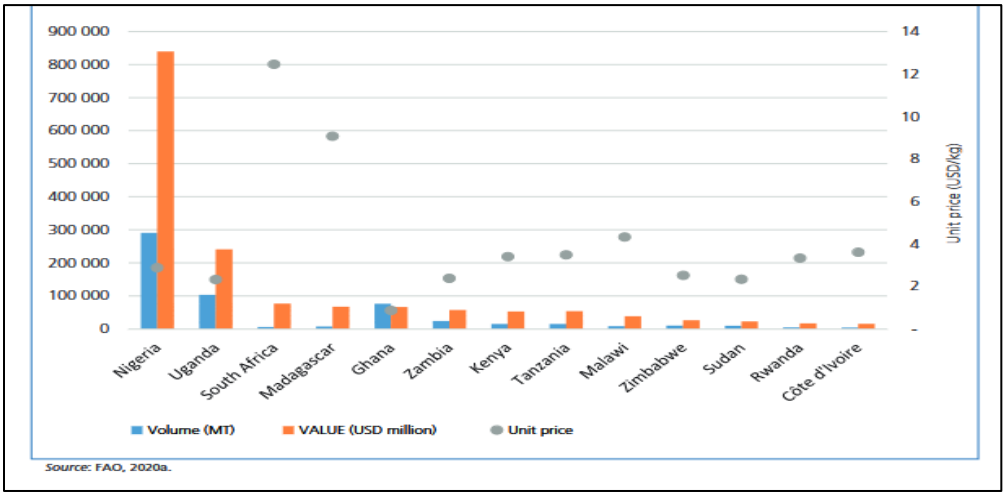

Figure 2: Production volumes and values (top ten producers in sub-Saharan Africa) in 2018

This has led to fish stock depletion in both marine and inland ecosystems (Eruaga and Okukpon, 2023). Besides, the sector is dominated to a large degree by small-scale artisanal fishers on conventional lines and with simple fishing gear (Amos and Peter 2018). Marine fisheries account for a large proportion of the overall catch, with the dominant species being sardines, mackerel, and croakers (Okeke et al., 2022).

However, marine fisheries are faced with the dangers of illegal, unreported, and unregulated (IUU) fishing and habitat destruction. On the other hand, inland fisheries, particularly in the Niger Delta and Lake Chad, have been negatively impacted by oil spill pollution, agricultural runoff, and industrial effluent (Alexander & Imegi 2024). Threats to catch fisheries have also arisen from the impacts of climate change on the ecosystem through sea-level rise, rise in water temperature, and shifts in rain patterns, which all pose additional pressure on capture fisheries (Amos and Peter, 2018).

Aquaculture

Aquaculture is Nigeria's fastest-growing fisheries subsector (Table 2), driven by increasing demand for fish, declining capture fisheries and government initiatives to promote fish farming (Nwuba et al, 2022). Therefore,

the expansion of aquaculture activities, particularly small- and medium-scale operations, and the establishment of 400,000 fish farms could significantly boost domestic production (Sadan and Amuda, 2023).

Table 2: Total African aquaculture production volume by region in 2008 and 2018

Country/area	Tonnes	
	2008	2018
World	70 203 425	114 508 041
Africa	1 061 593	2 308 673
Sub-Saharan Africa	358 948	719 013
Western Africa	152 106	384 876
Eastern Africa	196 657	305 094
Southern Africa	6 117	10 956
Northern Africa (Sudan)		10 000
Middle Africa	4 067	8 087
Top 10 aquaculture countries/territories (by quantity) in sub-Saharan Africa		
Nigeria	143 207	291 323
Uganda	52 250	103 737
United Republic of Tanzania, Zanzibar	107 925	103 234
Ghana	5 594	76 630
Zambia	5 640	24 300
United Republic of Tanzania	5 217	16 852
Kenya	4 452	15 524
Madagascar	14 486	12 758
Zimbabwe	2 652	10 586
Sudan	-	10 000
Malawi	1 700	9 014

Catfish (*Clarias gariepinus*) and tilapia (*Oreochromis niloticus*) are the most popular species farmed, accounting for over 80% of aquaculture production (Ibidapo-Obe and Yusuff, 2024). Productivity has been enhanced by improved breeding techniques, such as the utilization of hybrid fingerlings and integrated fish farming. Notwithstanding, the industry remains underdeveloped due to inadequate access to quality feed/input, high cost of production, inadequate infrastructure and low levels of technical know-how among producers (Akegbejo, 2022) giving rise to suboptimality and deterrence from reaching its potential (Oboh, 2022).

To address these challenges, there is a need to adopt a comprehensive strategy involving investments in research and development, policy implementation improvement,and environmentally friendly methods. Research needs to be encouraged to enable better-quality fish species production, low-cost feeds, as well as efficient disease control strategies, as they are the major determinants of raising productivity (Nwuba et al 2022).

Also, the use of sustainable aquaculture methods, such as recirculating aquaculture systems (RAS) and integrated multi-trophic aquaculture (IMTA), will ensure maximum output with minimal impacts on the environment (Ogunremi et al., 2025). Strengthened fishery law enforcement, such as licensing and monitoring systems, will help combat IUU fishing and, therefore, ensure sustainable aquatic resource management (Yonmo and Asanebi, 2022). In addition, public-private partnerships (PPPs) development can redirect capabilities and resources to cover infrastructure needs and enhance value to the fishery sector (Walakira, 2023). Through exploiting its enormous aquatic resources and expanded aquaculture output, Nigeria will, in addition to satisfying its domestic fish consumption requirements, become one of Africa's leaders in fish production (Fig.2).

Post-Harvest Management and Government Policy

Post-harvest losses resulting from improper handling, processing, and storage constitute a significant constraint on fish supplies and economic gains in Nigeria. Spoilage, particularly under tropical conditions, results in enormous economic losses and compromises food safety (Ojelade et al., 2023). Weak cold chain infrastructure and limited access to processing technologies are some of the factors attributing to the losses (Abdul et al., 2024). Enhancing post-harvest management through the development of improved infrastructure, training, and technology adoption is necessary for loss reduction and value addition. Also, promoting the production of value-added fish products, i.e., fish fillets, fish sausages, and fish powder, can widen market outlets and enhance consumer access to nutritious fish products (Olorunfemi et al., 2015). Institutionalized good governance and policy institutions are crucial in protecting the sustainable management of fisheries resources in Nigeria. On the part of the government, it is important to guide the sustainable development of the sector by developing comprehensive national fisheries policies to address capture fisheries issues, aquaculture, and post-harvest management. Also, geospatial technologies such as GIS and remote sensing can be integrated to generate critical information for effective monitoring and management (Yakubu et al., 2022).

Current Trend in the Nigerian Fisheries Industry

Key Market Indicators

According to ReportLinker.com (2025), there will be a decline in Nigerian fish production, dropping from 260,000 metric tons in 2023 to approximately 240,000 metric tons by 2028, translating to a compound annual

growth rate (CAGR) of 1.3%. Historical data reveal that since 1965, the nation's fish supply has been decreasing by an average of 2.3% per year (FAO, 2020a).

Concurrently, Nigerian Fish Consumption is expected to also fall substantially. Consumption is forecasted to reach around 194,000 metric tons in 2028 from nearly 361,000 metric tons in 2023. This accounts for a 9.8% decrease on a yearly CAGR basis. Since 2019, Nigerian fish demand has already been dropping at a 7.1% annual rate.

Recommendations for Enhanced Fish Production and Sustainability

The following are suggestions for enhancing fish production and ensuring long-term sustainability of Nigeria's fisheries resources (Yakubu et al, 2022):

i. **Promoting Research and Development**: Investment in research and development will improve seed and feed quality, improve preservation techniques and packaging materials, develop climate-resilient strains, and promote the adoption of improved aquaculture technologies.

ii. **Strengthening capture fisheries management**:

iii. Implementing Ecosystem-Based Fisheries Management (EBFM) principles, to enforce fisheries regulations. Also, implementing stricter regulations to curb illegal fishing, establishing fish sanctuaries, and promoting community-based fisheries management can help restore wild fish stocks.

iv. **Enhancing post-harvest management**: Investment in cold chain infrastructure, will promote the adoption of advanced processing technologies, and develop value-added fish products that can boost export potential, particularly to regional and international markets.

v. **Reversing environmental degradation**: Implementation of policies to control pollution, preserve aquatic ecosystems, and mitigate the impacts of climate change.

vi. **Enhancing governance and policy**:

The development of comprehensive national fisheries policies, will enhance institutional capacity, and promote stakeholder participation. Strengthening regulatory frameworks to enforce food safety and quality standards is essential in addressing systemic challenges facing the sector.

vii. **Investing in human capacity development / Cold Chain Infrastructure**: Training and educating fish farmers, fishers, and fisheries practitioners on the principles of safe and sustainable fishing. Developing cold chain infrastructure, including cold storage facilities, ice plants, and refrigerated transport systems, is also essential to reduce spoilage and extend the shelf life of fish. Solar-powered cold storage units offer a sustainable solution for remote areas with limited access to electricity.

viii. **Promoting public-private partnerships**: Encouraging partnerships between the government, private sector, and research institutions to enhance investment and innovation in the fisheries sector.

ix. **Mainstreaming climate change adaptation and mitigation**: Rising temperatures, erratic rainfall patterns, and flooding have adversely affected fish habitats and breeding cycles, further straining fish production. Therefore, developing and implementing strategies to enhance the resilience of fisheries systems to climate change are necessary.

x. **Emphasizing the use of GIS and remote sensing**: Utilizing these technologies will enhance monitoring and management of aquacultural locations and capture fisheries locations.

Way Forward / Future Directions

The Nigerian fisheries and aquaculture sector stands at a crossroads, with tremendous potential to enhance the nation's food security status, create employment, and power economic growth. Despite having abundant aquatic resources like 12.5 million hectares of freshwater ecosystems and more than 850 kilometres of coastline, the sector still has yet to be utilized to its full capacity. The persistent fish demand and domestic supply gap of an estimated 2.5 million metric tonnes highlight the imperative for far-reaching measures.

The reduction of capture fisheries due to overexploitation, pollution, and climate change has pushed the evolution towards sustainable aquaculture. With aquaculture contributing over 40% of Nigeria's total fish production, the sector has demonstrated its capacity to close the supply gap. However, in a bid to harness this capacity to the fullest, investment in research and development, infrastructure, and human capacity building is urgently required. Technologies such as integrated multi-trophic aquaculture (IMTA), recirculating aquaculture systems (RAS), and improved fish feed formulations offer opportunities to enhance productivity with decreased

environmental impacts. Moreover, empowering small-scale farmers with credit, quality inputs, and technical competence can ensure inclusive growth and poverty alleviation.

Policy reforms and implementation are also as critical to the prosperity of the industry. Harmonization of regulation to fight illegal, unreported, and unregulated (IUU) fishing, encouraging sustainable resource management, and developing public-private partnerships (PPPs) can provide a facilitative environment for development. The government's intervention in the form of offering incentives, i.e., tax holidays and grants, will play a crucial role in mobilizing private investment and encouraging innovation. Additionally, the control of environmental challenges such as oil spills, industrial contamination, and global warming is important to safeguard aquatic ecosystem integrity and ensure sustainable fish production in the long run.

Nigeria's journey to achieving self-reliance in fish production is not an easy one, but the reward is phenomenal. Nigeria can transform its fisheries and aquaculture sector into a cornerstone of food security and economic development by leveraging its vast aquatic resources, adopting new technologies, and fostering collaboration between stakeholders. The growth of the sector will not only reduce the nation's reliance on costly fish imports but also create millions of jobs, particularly for women and young people, who are extensively engaged in fish farming and processing.

Conclusion

Overall, the future of fish production in Nigeria depends on a shared commitment to sustainability, innovation, and inclusive growth. Policymaking communities, the research community, private sector stakeholders, and local communities need to come together and work to beat the challenges and reap the opportunities outlined in this review. By so doing, Nigeria will not only meet its domestic demand for fish but also be a regional hub of fisheries and aquaculture that would play a key role in the international agenda for sustainable development. It is imperative to take the necessary steps because the stakes are high and the possibilities are endless, therefore, this review serves as a call to all stakeholders to join forces in unleashing a change in the momentum of Nigeria's aquaculture and fisheries sector.

Declarations of Authors Contribution

JCA conceptualized the study. JCA, GOA, JSN, and VEU designed the study. GOA, JSN, and VEU participated in data collection. JCA and JSN performed the data analysis; JCA, GOA, JSN and VEU interpreted the data. GOA and VEU prepared the first draft of the manuscript, reviewed by JCA, and JSN. All authors contributed to the development of the final manuscript and approved its submission.

Conflict of Interest

None

Ethics Approval and Informed Consent

This study did not involve human or animal subjects. Therefore, ethical consideration was not applicable.

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