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Socio-Economic Determinants and Production Constraints of Fish Farming in Ebonyi State, Nigeria: Evidence from Abakaliki and Afikpo North

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Abstract **Original Research**

This study assessed the socio-economic characteristics and major challenges faced by fish farmers in the Abakaliki and Afikpo North Local Government Areas of Ebonyi State, Nigeria. Primary data were collected from 100 fish farmers using a structured questionnaire and analyzed with descriptive statistics. The findings showed that most respondents were aged 21- 40 years, predominantly male, and fairly well educated, with Abakaliki recording a higher proportion of tertiary-educated farmers. Most farmers had less than five years of experience, indicating that fish farming is still relatively new in the study area. Concrete pond systems were the most common production structure, suggesting semi-intensive management. Information was mainly shared through word of mouth, while access to formal extension services was limited. Financing largely depended on personal savings because credit access was limited. Major constraints included high feed costs, difficulty in fish marketing, limited access to credit, and weak government support. Although the socio-economic profile of farmers appears favorable for aquaculture expansion, persistent institutional and market barriers continue to limit productivity. Strengthening extension services, improving access to affordable inputs and credit, and enhancing market linkages are necessary to support sustainable fish farming in the area.

Keywords: Fish farming, Socio-economic factors, Production constraints, Aquaculture, Ebonyi State, Nigeria.

1.0 Introduction

Aquaculture has become one of the fastest-growing food production sectors worldwide, yet its contribution to animal protein supply and rural livelihoods differs widely across regions. According to FAO's latest SOFIA report, world aquaculture production reached a record 130.9 million tonnes in 2022, reflecting continued expansion since 2020 (FAO, 2024). However, in sub-Saharan Africa,

growth has remained limited, and production continues to fluctuate in countries such as Nigeria. This uneven performance highlights the region's slower development relative to global trends.

Despite Nigeria's position as the leading fish farming producer in sub-Saharan Africa, recent FAO reports indicate that aquaculture output has fluctuated and fell below the 2020 level after a partial rebound in 2021. Fish farming is dominated by African catfish (*Clarias spp*.) and tilapia (*Oreochromis spp.),* together with other inland water species (Sheu et al., 2024;Omeje et al., 2020) FAO estimates that Nigeria's total fisheries production reached about 1.1 million tonnes in 2022, and also highlights aquaculture's growing role in creating employment and business opportunities(FAO, 2026). However, sectoral growth continues to be limited by weak institutions, poor infrastructure, and adverse socio-economic conditions.

Socioeconomic characteristics such as age, gender, educational attainment, and years of farming experience significantly influence smallholder farmers' adoption of improved technologies and better management practices. Access to timely, accurate, and contextually relevant information has been shown to enhance productivity and foster innovation uptake (Shitaye et al., 2025). Extension services and information and communication technologies (ICTs) are widely recognized as critical enablers of improved agricultural performance (Ahsan et al., 2023; Chandravanshi et al., 2025; Khatri et al., 2024) However, limited extension penetration and weak institutional support structures often restrict the effective dissemination of knowledge, particularly among small-scale producers. In the aquaculture subsector, rising feed prices, constrained access to credit, and poorly developed marketing channels further undermine the viability and sustainability of fish farming operations in Nigeria (R. Adam et al., 2025; Okon et al., 2025)

Even though detailed studies focusing on Ebonyi State remain scarce, there is a growing need to understand the social and economic characteristics, knowledge levels, production potential, and constraints faced by fish farmers in Abakaliki and Afikpo North. Therefore, this study examines the socioeconomic characteristics, awareness patterns, production capacity, and key constraints affecting fish farmers in Abakaliki and Afikpo North Local Government Areas.

2. Materials and Methods

2.1 Study Area

The study was conducted in Abakaliki and Afikpo North Local Government Areas of Ebonyi State, Nigeria. Ebonyi State is in southeastern Nigeria, lies roughly between latitudes 5°40' and 6°45' N and longitudes 7°30' and 8°30' E, with a humid tropical climate, a distinct wet season (April-October) and dry season (November-March), mean annual rainfall between about 1,313 mm and 2,186 mm, and temperatures ranging from 26°C to 32°C(Mbanasor et al., 2024). Although with a humid, tropical-monsoon-type climate that strongly influences agriculture and aquaculture, these areas have experienced increasing interest in aquaculture, with fish production occurring primarily in earthen, concrete, and tarpaulin pond systems.

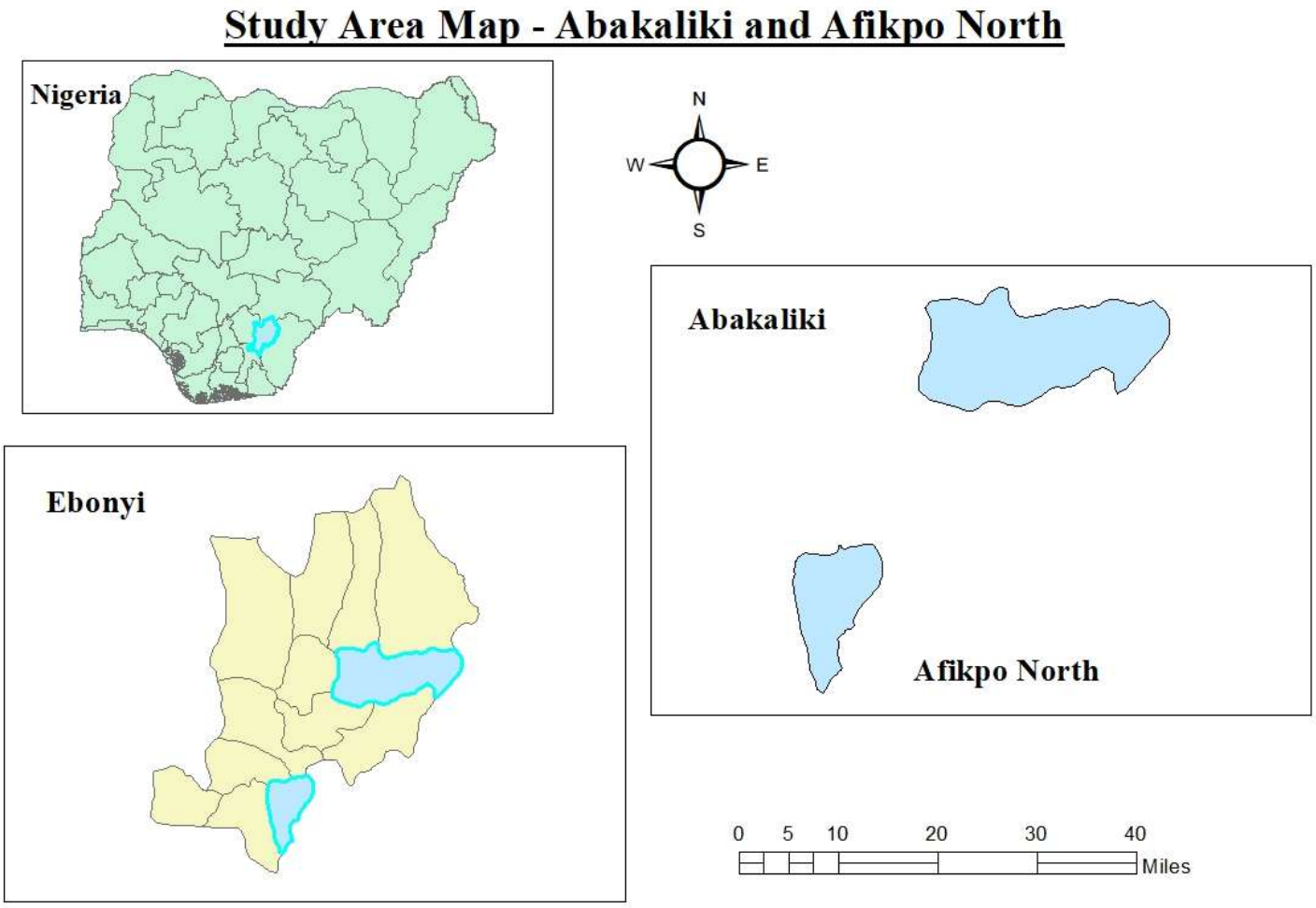

Figure 1. Map, showing the Study Area

2.2 Sampling and Data Collection

A total of 100 fish farmers (50 from each Local Government Area) were selected through purposive sampling, focusing on active practitioners. Primary data were collected using a structured questionnaire administered through face-to-face interviews to ensure completeness and accuracy.

2.3 Data Analysis

Descriptive statistical tools, including frequencies and percentages, were used to analyze socioeconomic variables, awareness levels, stock size distribution, and production constraints.

3. Results and Discussion

3.1 Socioeconomic Characteristics

Fish farming in the study areas is predominantly practiced by men (as shown in Figure 1), which is consistent with several national-level findings on small-scale aquaculture in Nigeria. Multiple surveys in states such as Edo, Plateau, and Niger report male shares of fish producers typically between about 67% and 70%, reflecting a pattern of male dominance in pond-based fish farming across the country.(R. Adam & Njogu, 2022; Igoche et al., 2019; Ob, 2015) Recent gender-sensitive value-chain studies further show that men are

over-represented in input supply, fish production, and wholesale nodes of the aquaculture sector, while women are more concentrated in lower-profit post-harvest and processing activities (R. I. Adam et al., 2025; Adeleke et al., 2020)

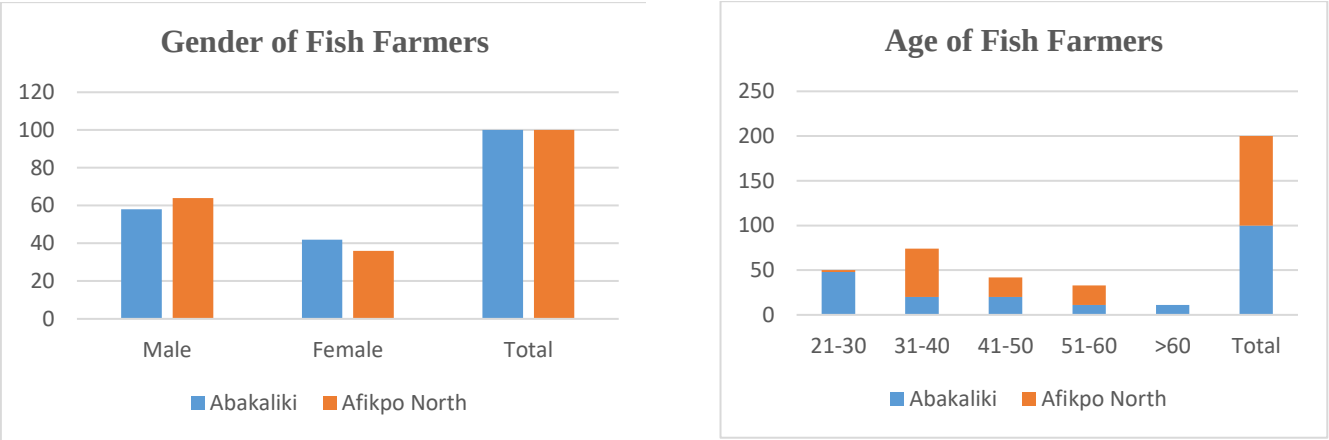

Figure 2. Socio-Economic Characteristics

The majority of fish farmers in the 21-40year age bracket is also consistent with evidence on youth participation in Nigerian aquaculture. Several assessments note that younger, economically active adults (often 20- to 40-year-olds) are increasingly engaged in pond culture because these age groups combine physical capacity with potential for adopting new technologies (NIFFR, 2025; Manyise et al., 2024; Ob, 2015). This age profile supports the inference that fish farming in Abakaliki and Afikpo North is youth-intensive and, therefore, relatively open to innovation adoption

Educational achievement was notably higher in Abakaliki, where the majority of respondents had attained tertiary education. Higher levels of formal education and literacy are positively associated with improved managerial capacity, better decision-making, and more effective utilization of production and market information in small-scale agriculture and aquaculture (Ituma et al., 2017). However, most respondents reported fewer than five years of fish farming experience, indicating that aquaculture is still a relatively new enterprise in the study areas, with limited accumulated on-farm technical knowledge despite comparatively high educational attainment (Igoche et al., 2019; Ob, 2015)

Concrete pond systems were dominant in the study areas, reflecting a shift toward semi-intensive production methods. Such systems provide greater control over water quality, feeding, and stocking density, which can enhance management efficiency and increase yield potential compared with simple earthen ponds (Jacob et al., 2023) However, concrete ponds also require higher capital investment for construction, linings, and associated infrastructure such as water intake and drainage, and are typically more costly to establish than earthen systems (Jacob et al., 2023; Y.C. Shang, n.d.)This cost structure can limit their adoption by small-scale fish farmers with constrained access to finance, even though the systems offer higher production predictability and operational durability once built.

Table 1. Socio-Economic Characteristics

Shows the demographic and economic attributes of respondents, including age, gender, education, household size, and farming experience, presented in frequencies and percentages.

S/N	Characteristics	Category	Abakaliki		Afikpo North	
			No. of Respondents	Percentage	No. of Respondents	Percentage
1	**Gender**	Male	29	58	32	64
		Female	21	42	18	36
		Total	**50**	**100**	**50**	**100**
2	**Age**	21-30	24	48	1	2
		31-40	10	20	27	54
		41-50	10	20	11	22
		51-60	3	11	11	22
		>60	3	11	-	-
		Total	**50**	**100**	**50**	**100**
3	**Household Size**	1-5	25	50	16	32
		6-10	23	46	23	46
		11-15	1	2	5	10
		16-20	1	2	6	12
		Total	**50**	**100**	**50**	**100**
4	**Educational Level**	No Formal Education	-	-	7	14
		Primary Education	3	6	10	20
		Secondary Education	6	12	14	28
		Tertiary Education	41	82	19	38
		Total	**50**	**100**	**50**	**100**
5	**Fish Farming Experience**	1-5 years	30	60	25	50
		6-10 years	15	30	18	36
		11-15 years	3	6	4	8
		>16years	2	4	3	6
		Total	**50**	**100**	**50**	**100**

6	**Type of Fish Pond**	Earthen Pond	5	10	9	18
		Concrete Pond	36	72	32	64
		Re-circulatory	1	2	-	-
		Tarpaulin	6	12	8	16
		Others	2	4	1	2
		Total	**50**	**100**	**50**	**100**

Source: Survey data 2021

3.2 Awareness and Participation

Information flowed mainly through informal networks among neighboring fish farmers, with relatively few formal links to extension services. Despite their presence in the study areas, extension workers pointed to gaps in institutional support structures. Earlier work by Akinbile & Alabi, 2010 similarly reported weak extension coverage and emphasized the need for improved delivery channels for farm-level advisory services. Financing of fish farming was largely dependent on personal savings, highlighting limited access to institutional credit. Inadequate capital has been widely documented as a major constraint to aquaculture expansion in Nigeria (Sadiq, 2015) Despite variations in how frequently extension agents contacted farmers, many respondents reported infrequent interaction. In areas of low outreach, outdated management practices persisted, and the adoption of new technologies remained slow. Field observations further revealed patterns of isolation, with technical guidance seldom reaching those directly engaged in day-to-day fish production.

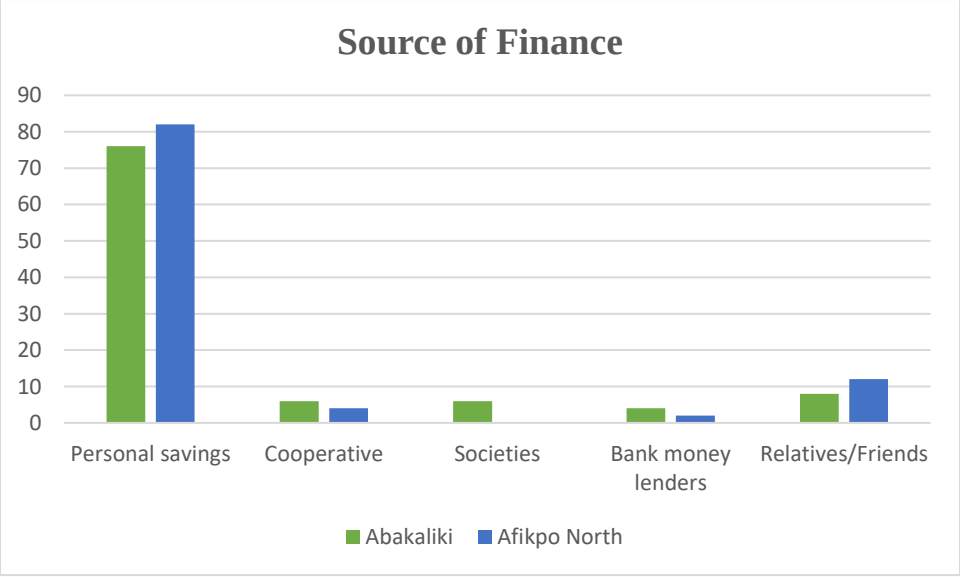

Figure 3. Source of Finance

Table 2. Awareness and Participation

Shows respondents' level of awareness and involvement in fish farming activities, presented in frequencies and percentages.

S/N	Characteristics	Category	Abakaliki		Afikpo North	
			No. of Respondents	**Percentage**	**No. of Respondents**	**Percentage**
1	**Source of Information**	Extension Agent	13	26	5	10
		Television	-	-	3	6
		Fish Buyers	3	6	3	6
		Friends/Families	9	18	11	22
		Fish Farmers Association	11	22	-	-
		Other Fish farmers	14	28	25	50
		Input Suppliers	1	2	1	2
		Internet/social media	-	-	2	4
		Total	**50**	**100**	**50**	**100**
2	**Income Level**	#80,000 - #200,000	15	30	6	12
		#200,000 - #320,000	8	16	21	42
		#320,000 - #440,000	4	8	7	14
		#440,000 - #560,000	10	20	9	18
		#1 Million and Above	13	26	7	14
		Total	**50**	**100**	**50**	**100**
3	**Number of Ponds**	1-4 pond	22	44	15	30
		5-8 pound	16	32	19	38
		9-12 pond	7	14	8	16
		>12	5	10	8	16
		Total	**50**	**100**	**50**	**100**
4	**Source of finance**	Personal savings	38	76	41	82
		Cooperative	3	6	2	4

		Societies	3	6		
		Bank money lenders	2	4	1	2
		Relatives/Friends	4	8	6	12
		Total	**50**	**100**	**50**	**100**
5	**Contact with Extension Agent**	13-18 contacts/year	8	16	12	24
		7-12 contacts/year	12	24	13	26
		1-6 contacts/year	19	38	14	28
		Zero contact	11	22	11	22
		Total	***50***	***100***	***50***	***100***

Source: Survey data 2021

3.3 Production Capacity and Constraints

Stock sizes in the study areas suggest predominantly small- to medium-scale production systems. Although some farmers operated relatively larger stock sizes, overall production capacity remains modest, indicating that many farms have not yet reached optimized scale.

High feed cost emerged as the most significant constraint, corroborating earlier findings that feed accounts for the largest share of operational expenditure in aquaculture enterprises (Aliu et al., 2022; Boi et al., 2023; Sadiq, 2015). In Afikpo North, poor marketing infrastructure and limited access to credit were particularly pronounced challenges, further constraining farmers' ability to expand and buffer against price fluctuations. Disease outbreaks and poaching were also reported as important risks that undermine productivity and farm-level returns.

Despite these ongoing constraints, weaknesses remain evident across input-supply systems, access to capital, and coordination along the production and marketing networks. For aquaculture in Ebonyi State to fully realize its potential, these deep-rooted structural obstacles must be addressed. Ultimately, sustainable progress will depend on resolving foundational gaps related to inputs, finance, and market linkages that continue to restrict output and limit the sector's growth.

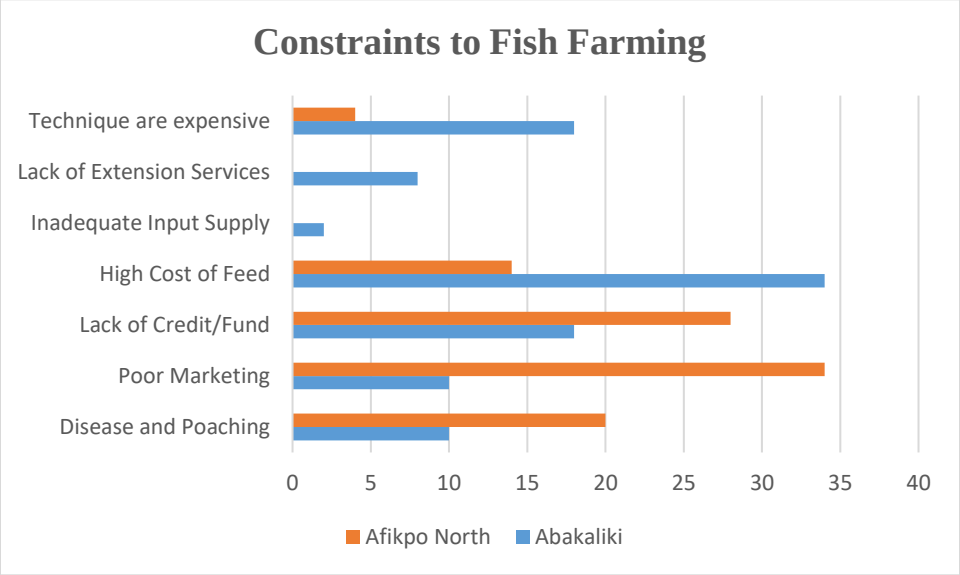

Figure 4. Constraints to Fish Farming

Table 3. Production Capacity and Constraints

Shows respondents' production capacity and the major constraints affecting fish farming, presented in frequencies and percentages.

S/N	Characteristics	Category	Abakaliki		Afikpo North	
			No. of Respondents	Percentage	No. of Respondents	Percentage
1	**Stock size**	500 fish	14	28	4	8
		500-1000	6	12	16	32
		1000-1500	6	12	8	16
		1500-2000	8	16	11	22
		>2000	16	32	11	22
		Total	**50**	**100**	**50**	**100**
2	**Constraints to Fish Farming**	Disease and Poaching	5	10	10	20
		Poor Marketing	5	10	17	34
		Lack of Credit/Fund	9	18	14	28
		High Cost of Feed	17	34	7	14

		Inadequate Input Supply	1	2	-	-
		Lack of Extension Services	**4**	**8**	-	-
		Technique are expensive	9	18	2	4
		Total	**50**	**100**	**50**	**100**

Source: Survey data 2021

4. Conclusion

The study reveals that fish farming in Abakaliki and Afikpo North is predominantly practiced by working-age adults with at least secondary education, indicating a relatively strong human capital base. However, progress in the sector is constrained by several interrelated barriers, chief among them being high feed costs, which significantly raise production expenses. Access to formal credit remains limited across these zones, making it difficult for farmers to expand or invest in improved technologies. Extension support is often irregular and infrequent, exposing gaps in advisory delivery, while market channels operate below expected efficiency, resulting in suboptimal prices and reduced incentives for scaling up operations.

Despite the promising growth potential of aquaculture in these areas, sustained progress will depend on more structured support from regulatory and institutional frameworks. Strengthening input supply systems, improving access to affordable credit, enhancing extension services, and upgrading market infrastructure can align strategic oversight with long-term economic returns, thereby fostering more sustainable and scalable fish farming in Ebonyi State.

5. Recommendations

To enhance aquaculture productivity and sustainability in Ebonyi State, the following measures are recommended:

- Extension services should expand their outreach and strengthen farmer training initiatives. Improved and consistent advisory support, particularly where extension coverage is low, enhances farmers' knowledge of best practices and boosts on-farm performance.
- Government and financial institutions should establish low-interest, aquaculture-specific credit schemes to improve access to capital, reduce reliance on personal savings, and enable investment in improved inputs and infrastructure.
- Promotion of local feed production and the use of locally available, cost-effective feed ingredients should be encouraged to reduce dependence on expensive imported feeds and lower variable production costs.
- Development of organized fish marketing infrastructure, including better transport networks, collection centers, and cold-chain facilities, is needed to reduce post-harvest losses, improve price realization, and expand market reach.
- Capacity-building initiatives on modern aquaculture technologies such as semi-intensive pond management, water-quality monitoring, and improved disease-control practices, should be scaled up to raise productivity and sustainability.
- Strengthening fish farming cooperatives and producer groups can enhance shared access

to inputs, credit, and market channels. As group structures gain stability, collective bargaining power improves, dependence on external intermediaries declines, and resilience along the value chain increases.

6. Acknowledgements

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7. Conflict of Interest

The authors declares no conflict of interest.

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