Current Situation and Challenges in Fisheries Advisory Services of the Department of Fisheries, Bangladesh

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ABSTRACT

Bangladesh's fisheries sector is central to food and nutrition security, rural livelihoods and the national economy. In FY 2023–24, total fish production reached 5.018 million metric tons (50.18 lakh MT), of which inland culture, inland capture and marine capture contributed 59.34%, 28.13% and 12.53%, respectively. The fisheries sector contributed 2.53% to national GDP and 22.26% to agricultural GDP, while fish supplied about 60% of national animal-protein consumption. Bangladesh is among the leading global producers of inland capture fisheries and aquaculture and ranked fourth globally in tilapia production according to the sources cited by the Department of Fisheries (DoF). The effectiveness of this production system depends not only on technologies and inputs but also on accessible, timely and demand-driven fisheries advisory services. This review assesses the current advisory functions of the DoF and synthesizes the major institutional, human-resource, technological, environmental and coordination constraints affecting service delivery. The review is based on secondary information from government statistics, peer-reviewed literature, reports and relevant institutional documents. The evidence indicates that DoF provides farm and fisheries-management advice, training, technology demonstrations, extension-media support, conservation-related communication and e-extension functions. However, service reach is constrained by limited field-level manpower, uneven training and practical exposure, inadequate digital infrastructure and support, weak feedback systems, fragmented coordination, and increasing climate and environmental risks. Recent evidence also indicates that pluralistic extension models and digital tools can complement public advisory services, while climate-resilient aquaculture requires localized risk information and need-based training. The review therefore proposes an integrated institutional response: strengthen field staffing and mobility, establish systematic advisory-service standards and feedback mechanisms, modernize continuous professional development, integrate digital and face-to-face advisory channels, formalize collaboration with competent private and community service providers, and mainstream climate-smart, environmentally responsible and gender-responsive fisheries advisory approaches. These measures can improve the relevance, timeliness, inclusiveness and accountability of fisheries advisory services in Bangladesh.

Keywords: Fisheries advisory services; Fisheries extension; Department of Fisheries; Digital advisory services; Climate-smart aquaculture; Inclusive fisheries development; Bangladesh

INTRODUCTION

Bangladesh's fisheries sector is a major component of the country's food system and rural economy. According to the Department of Fisheries (DoF), fisheries contributed 2.53% of national GDP and 22.26% of agricultural GDP in FY 2023–24, while fish supplied approximately 60% of national animal-protein consumption. Total fish production was 5.018 million metric tons (50.18 lakh MT), comprising 29.78 lakh MT from inland culture, 14.11 lakh MT from inland capture and 6.29 lakh MT from marine capture. These figures correspond to 59.34%, 28.13% and 12.53% of total production, respectively (DoF, 2024). The same year, fish and fishery products generated BDT 4,531.86 crore in export earnings, equivalent to 0.91% of national export earnings.

The production trajectory reflects a major structural transition toward aquaculture. DoF statistics show that total production increased from 7.54 lakh MT in FY 1983–84 to 50.18 lakh MT in FY 2023–24. This growth

has strengthened national fish availability, but it has also increased the importance of farm-level management, disease control, feed efficiency, environmental stewardship, market information and risk management. Consequently, fisheries advisory services must evolve from a predominantly technology-transfer function toward a broader system of problem-solving, facilitation, risk communication and learning.

At the same time, the operating environment has become more complex. Small-scale farmers and fishers face rising input costs, disease risks, water-quality problems, habitat degradation, market uncertainty and climate-related stresses such as flooding, drought, temperature variation and salinity intrusion. Recent peer-reviewed evidence strengthens the case for a pluralistic and digitally enabled advisory system. Obi et al. (2025) found that extension delivered through trained local service providers improved management practices and production outcomes among small-scale aquaculture farmers in Bangladesh. Adikari et al. (2024) documented growing use of smartphone applications in aquaculture, although feature specificity and uneven user experience remain concerns. Studies of field-level extension officers also show that ICT availability alone is insufficient when organizational support, connectivity, maintenance resources and training are inadequate (Kabir et al., 2022). Recent work on sustainable aquaculture further emphasizes the need for advisory services to connect production growth with resource efficiency and environmental protection (Woźniacka et al., 2025).

Background and Rationale

Fisheries extension or advisory services can be understood as organized processes through which fish farmers, fishers, traders, processors and other stakeholders obtain knowledge, technical guidance, problem-solving support and opportunities for learning. In a contemporary fisheries system, advisory services encompass technology dissemination, farm management, conservation and co-management communication, market and input information, capacity development, digital communication and facilitation of linkages among producers, research institutions, government agencies and private actors. The central purpose is not simply to transfer a technology, but to strengthen clients' capacity to make informed decisions and adapt technologies to local ecological and economic conditions.

Objectives of the Study

1. To explore the fisheries resources and role of fisheries advisory services
2. To assess the current advisory services of DoF
3. To identify the key challenges affecting the delivery and effectiveness of these services

MATERIALS AND METHODS

This paper is a review based entirely on secondary information. Sources included the Department of Fisheries Yearbook of Fisheries Statistics of Bangladesh 2023–24, official DoF institutional information, peer-reviewed journal articles, academic theses, books, proceedings and relevant research reports. Particular attention was given to recent literature on fisheries extension and advisory services, digital advisory systems, climate-resilient aquaculture, sustainable intensification and inclusive fisheries development. Government statistics were checked against the latest official DoF figures available for FY 2023–24. Where earlier studies used different years, samples or definitions, their figures are retained only as study-specific findings and are not presented as current national estimates.

RESULTS AND DISCUSSIONS

Fisheries Resources and Role of Advisory Services

Fisheries Resources

Bangladesh has extensive inland and marine fisheries resources. For FY 2023–24, DoF reported 3,861,281 ha of inland open-water bodies and 867,694 ha of closed-water bodies. Inland open water includes rivers and

estuaries, beels, Kaptai Lake and floodplains. Marine fisheries resources include territorial waters, the Exclusive Economic Zone and the continental shelf. The marine water area is reported by DoF as 118,813 sq. km. The diversity and spatial distribution of these resources create substantial advisory needs that vary by production system, ecology, livelihood and level of market integration (DoF, 2024).

DoF and its Manpower

The Department of Fisheries operates under the Ministry of Fisheries and Livestock and maintains administrative structures at division, district and upazila levels. According to current DoF institutional information, the Department has 6,065 technical officers and support staff. Its functions include dissemination of improved aquaculture technologies through training and demonstrations, extension advisory services, fisheries resource conservation and management, quality control, resource assessment, facilitation of institutional credit, alternative-income support and e-extension (DoF, 2025). The total workforce figure should not be interpreted as the number of field extension officers alone; the staffing constraint is therefore better framed as an uneven distribution of personnel and limited field-level reach relative to the geographic and client base of the sector.

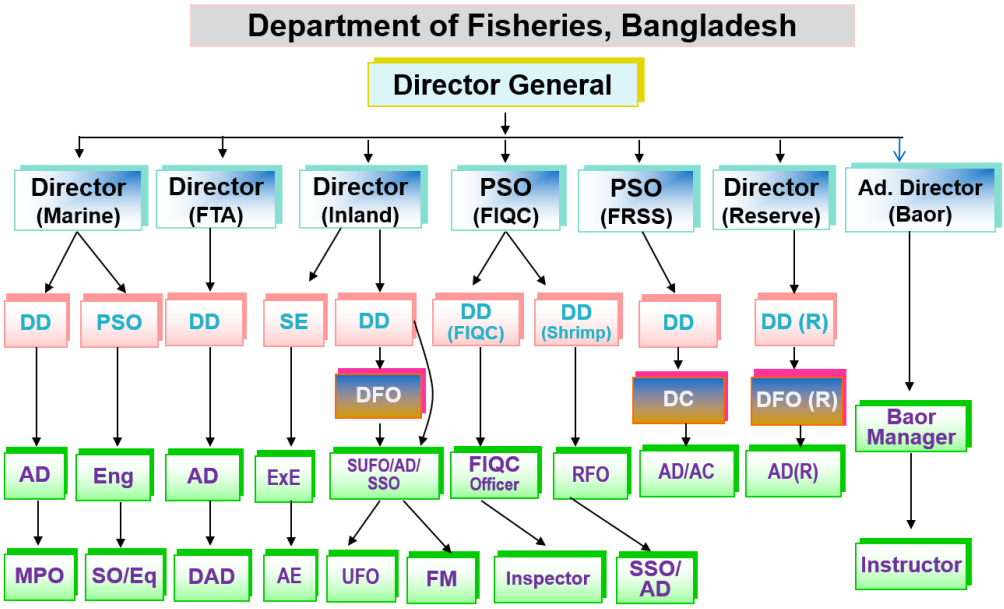

Figure 1: Existing Organogram of DoF (Source-DoF)

DoF is working with the subsequent mandates:

- To disseminate superior aquaculture technologies through training and demonstration and to extend extension advisory services to the major stakeholders.
- To augment fisheries assets through enacting conservation and management events.
- To support the administrative ministry to originate policies, acts etc.
- To impose quality control events and issuance of health credentials for exportable fish and fish foodstuffs.
- To carry out fisheries resources appraisal and estimation of stock to build up fisheries database for apposite planning.
- To aid collection for institutional loan for fish and shrimp farmers, fishers and fish traders and entrepreneurs.
- To facilitate unconventional income generating actions for rural poor and unemployed people towards poverty easing.
- To devise and execute development projects /programs towards sustainable utilization of fisheries resources to ensure food security; and
- To disseminate better aquaculture technologies through e- Extension service.

Present Fish Production Status in Bangladesh

In FY 2023–24, Bangladesh produced 50.18 lakh MT of fish. Inland culture contributed 29.78 lakh MT (59.34%), inland capture contributed 14.11 lakh MT (28.13%), and marine capture contributed 6.29 lakh MT (12.53%). Fish consumption was reported at 67.80 g/person/day against a target of 60 g/person/day, and fish supplied about 60% of national animal-protein consumption (DoF, 2024). The DoF Yearbook cites FAO-based rankings placing Bangladesh third in inland open-water capture production, fifth in world aquaculture production and fourth in global tilapia production; Bangladesh also ranked first among the 11 hilsa-producing countries cited in the Yearbook (DoF, 2024).

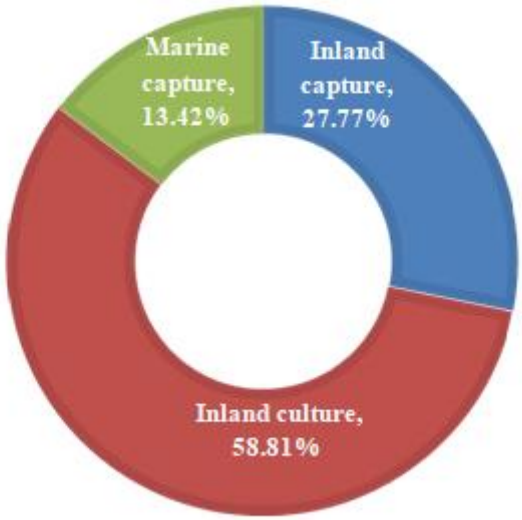

Figure 2. Sector-wise fish production of Bangladesh in 2023-24

The long-term increase in inland aquaculture production coincides with wider adoption of improved management practices, expanding input markets and the dissemination of production technologies. However, a positive production trend should not be attributed to advisory services alone because production is also influenced by investment, seed and feed availability, market conditions, infrastructure, environmental change and policy. Advisory services are best understood as one enabling component within this broader production system. Figure

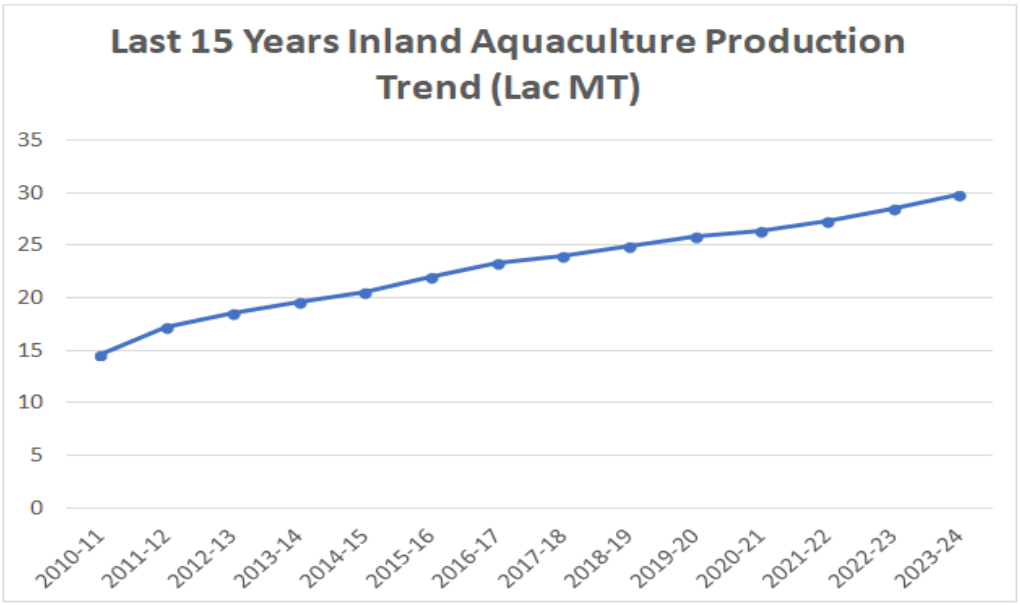

Figure 3. Last 15 years Inland Aquaculture Production Trend

Export of Fish and Fish Products

Fish and fishery products are important export commodities, although the export base remains much smaller than domestic production. DoF reported export earnings of BDT 4,531.86 crore from 77,407.94 metric tons of fish and fishery products in FY 2023–24, representing 0.91% of national export earnings. Major exported products include shrimp and prawn, fish and fish products, crabs and other value-added or processed products. The earlier version relied on a 2003 source to describe export destinations; because those shares are not representative of the current export structure, they have been removed. This correction avoids presenting outdated destination percentages as current evidence. Hossain, 2003Islam et al., 2015

Accordingly, the export discussion should be interpreted in terms of the current value and volume of exports rather than historical destination shares (DoF, 2024).

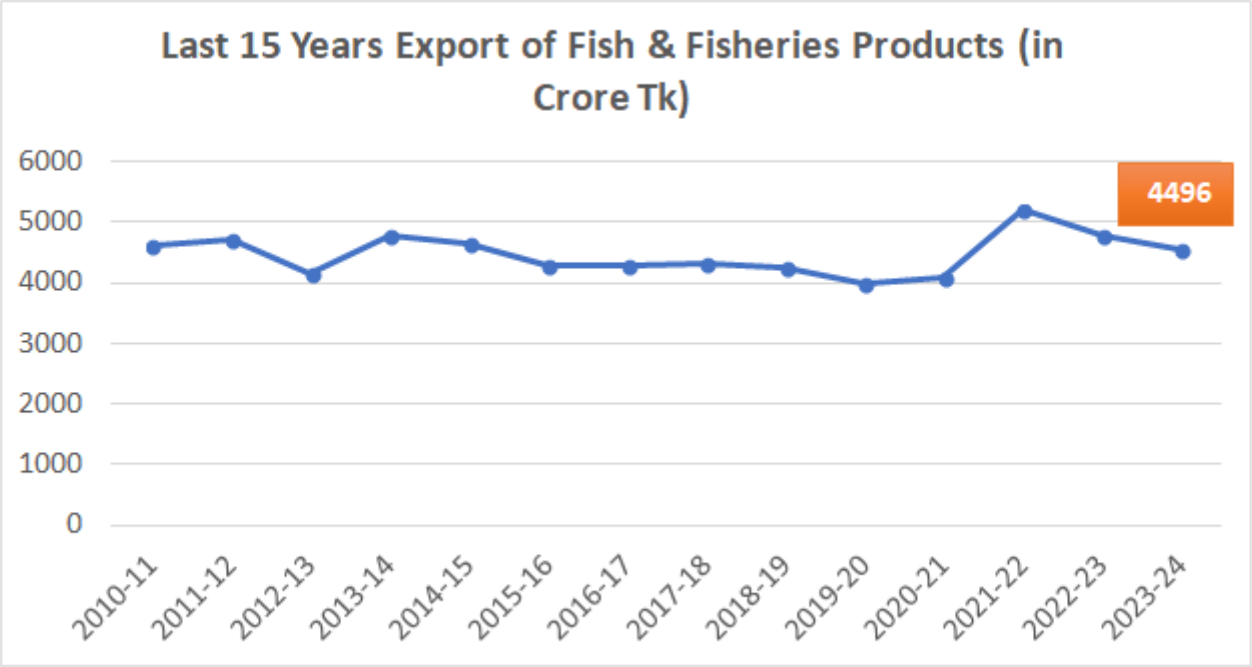

Figure 4: Last 15 years Export of Fish & Fisheries Product

Farmers Satisfaction on Fisheries Extension Services

Haque (2020) reported a study-specific satisfaction score among 103 fish farmers ranging from 3 to 21 against a possible range of 0–24, with a mean of 11.01 (SD = 3.74). The study classified respondents as having low, medium or high satisfaction according to its own scoring thresholds.

Categories	**Basis of Categorization**
Low Satisfaction	Up to 9
Medium Satisfaction	10–13
High Satisfaction	>13

Distribution of the fish farmers according to their satisfaction on fisheries extension services is shown in Table 1.

Categories	Respondents' farmer	
	Number	Percent
Low satisfaction	23	22.3
Medium	75	72.8

satisfaction		
High satisfaction	5	4.9
Totals	103	100

Table 1. Distribution of the fish farmers according to their satisfaction on fisheries extension services in Bangladesh

In that study, 72.8% of respondents had medium satisfaction, 22.3% had low satisfaction and 4.9% had high satisfaction. These findings should be interpreted as evidence from the sampled study area rather than as a national estimate. The predominance of low-to-medium satisfaction nevertheless indicates the importance of responsiveness, accessibility and need-based advisory content in improving farmers' experience of extension services.

Current Advisory Status

DoF advisory services combine individual technical advice, training and demonstrations, technology transfer, extension-media communication, conservation-related communication and e-extension. The current literature suggests that effectiveness depends on the interaction of service coverage, staff competence, quality of communication, farmer trust, timeliness and the availability of complementary inputs. A useful analytical distinction is therefore between service availability, service quality and service use. A service may formally exist but still have limited development impact when farmers cannot access it at the right time, cannot implement the recommendation because of financial or input constraints, or cannot obtain feedback after an initial advisory interaction.

Advice on Fish Culture and Fisheries Management

The DoF operates a structured extension framework with field agents (Upazila Fisheries Officers, Field Assistants) intended to deliver advice across districts and upazilas. Yet studies find this network remains understaffed and overstretched: typically, only 2–3 extension agents per upazila, each covering over 60,000 farms. The fisheries officers at upazila (sub-district), district, division and national levels offer technical advice to the individual office callers. The extension staff, on a fish farmer's specific request, visit his/her farm for any specific investigations and advice (Ahmed et. al., 2018).

Training for Fish Farmers, Fishers and Other Actors

Training and workshops: Training and workshops are frequently organized at upazila (sub-district) and district levels for the farmers. Training sessions are also organized at the DoF fish seed farms and training centers.

A study by Haque (2020), revealed, the aquaculture training experience score of the respondents ranged from 0 to 270. The mean score was 19.93 with the standard deviation of 41.82. On the basis of aquaculture training exposure, the respondents were classified into following three categories:

Categories	**Basis of Categorization**
Low training exposure	< 1
Medium training exposure	1–20
High training exposure	> 20

Distribution of the fish farmers according to their training exposure is shown in Table 2.

Categories(days)	Respondents' farmers	
	Number	Percents
Low training exposure	57	55.3
Medium training	24	23.5

exposure		
High training exposure	19	21.2
Totals	103	100

Table 2. Distribution of the fish farmers according to their aquaculture training exposure

Data contained in the Table 2. revealed that the majority (55.3%) of the farmers had low training exposure as compared to (23.5%) and (21.2%) having medium and high training exposure respectively. Data again revealed that majority (78.8%) of the fish farmers had low to medium training exposure. It is assumed that the farmers having more aquaculture training exposure might have more capacity to determine their satisfaction on fisheries extension services in Bangladesh.

Fisheries Technology Transfer

Fisheries technology transfer is the process of moving innovations from research and development into practical use by fishers, aquaculture producers, and coastal communities. This process enhances productivity, sustainability, and livelihoods in the fisheries sector. Effective technology transfer involves multiple stakeholders and tailored approaches. Demonstration is one of the most important ways of fisheries technology transfer. Demonstrations of new or improved culture or hatchery techniques are provided either in a suitably located private or Government-owned Pond. In either case the demonstrations are open to any interested persons. In the case of private ponds, extension workers provide the pond owner with repeated training and advice. The pond owner is expected to extend the new knowledge and techniques to fellow farmers who, in turn, are expected to disseminate the knowledge to more farmers. Whenever and wherever this method has been organized properly, the new information has trickled down to a large number of farmers in a short time (Ahmed et. al., 2018).

Extension Media Contact

In order to meet the huge demand for information need of the fish farmers and fishers' extension personnel of DoF also use mass media to provide their clientele efficient, effective and timely fisheries information. In this regard they use newspaper, radio, television, posters, etc. to disseminate basic information and simple technologies. They also us different print materials like pamphlets, booklets, manuals, bulletins, hand-outs, and other forms are prepared and distributed to the fish farmers time to time based on situation.

Extension media contact score of the fish farmers ranged from 2 to 13 against the possible range of 0-12 with an average of 7.30 and standard deviation of 2.82. It was measured as one's extent of contact with different media (Haque, 2020). On the basis of their extension media contact, the respondents were classified into following three categories:

Categories	**Basis of categorization**	
Low extension media contact		5-Jan
Medium media contact	6-10	
High media contact	>10	

Distribution of the farmers according to their extension media contact score is given in Table 3.

Table 3. Distribution of the farmers according to their extension media contact

Categories	Respondents' farmers	
	Number	Percent
Low media contact	30	29.1
Medium contact	59	57.3
High contact	14	13.6

Totals	103	100

Data contained in the Table 3 indicated that the highest proportion (57.3%) of the respondents had medium contact as compared to (29.1%) and (13.6%) had low and high media contact respectively. Overwhelming majority (86.4%) of the farmer had low to medium extension contact. It is assumed that the farmers having more extension media contact might have more capacity to determine their satisfaction on fisheries extension service in Bangladesh.

Current Challenges for the Fisheries Sector in Bangladesh

Ghose (2014) observed that the fisheries industry in Bangladesh is confronted with a range of economic, institutional and environmental concerns. According to IUCN (International Union for Conservation of Nature) study, 54 floodplain fish species are in danger of extinction and the pressure of fishing is so heavy in the floodplains that less than 2% of produced fish survives the end of each year. Recurrent floods and natural disasters are believed to be main underlying causes behind this slump. Bangladesh is a low-lying land which makes it extremely vulnerable to sea-level rise, and is ranked first among countries to be affected by the adverse effects of climate change. Nearly 80% of total area in Bangladesh is regarded as floodplains, and its precarious geographical position makes it highly prone to natural disasters as well. Climate change has devastating impacts on fishery-based livelihoods and on domestic food supply. Vulnerability of fishery-based livelihoods may substantially increase in the coming decades due to climate change, and in the absence of adaptation, increased frequency and intensity of cyclones and floods would result in greater damage to fishing materials and loss of fish.

Mariculture is also at risk of increasing salinity and over- fishing. According to FAO, globally, around a quarter of all fish stocks are overexploited and half of them are fully exploited. In Bangladesh, marine capture represents about 20% of total fish production. The floodplain and marine fisheries are under serious threat from overfishing. Overexploitation in the coastal region poses significant challenges on marine living resources and increases the dependency on distant water fishing in the long run.

Water pollution is another growing threat for the future of fisheries sector in Bangladesh and is fast becoming a serious public health issue and a constraint for food production. Industrial (especially textile and tannery) effluent, fertilizer and pesticide run-off, poor sewerage infrastructure and improper disposal of household waste are the major causes of water pollution in Bangladesh. Rivers and canals near the urban areas are threatened by sedimentation and siltation due mainly to soil erosion, and compounded by industrial expansion, most of these water bodies have already become to polluted to support biological system. Poor urban and industrial management and lack of enforcement of environmental laws are contributing to this pollution spree. The Buriganga River that flows through the capital city is the most polluted river in the country, many parts of which have already turned coal black.

Besides these natural and chemical events, inadequate financial capacities, poor resources management and lack of research facilities are also responsible for underperformance of the fisheries sector and environmental degradation. Researchers (Ghose, 2014) have shown that poor management of prawn and shrimp culture is having devastating effects on the Sundarbans (the largest mangrove forest in the world) where an estimated 9700 ha of the forest-mass has been lost as a result of intense shrimp farming. Conversion of many natural wetlands to prawn farms has resulted in impediment of water flows and also decreased the scope of migration for many fish species.

Effective advisory services are needed to overcome these natural and artificial challenges in fisheries sector. But even there, the Fisheries Department faces various challenges, which are summarized below.

Staff Shortage and Field-Level Reach

The current staffing situation is better described as a field-reach problem than simply a shortage in the total DoF workforce. The Department reports 6,065 technical officers and support staff, but this aggregate includes multiple functions and levels. Earlier field studies documented shortages and heavy workloads among local

fisheries extension personnel. Recent evidence is consistent with this concern: a 2026 study of fish farmers in Bangladesh reported that 83% of respondents faced moderate problems in receiving fisheries extension services, including untimely availability of assistant fisheries officers and field assistants, inadequacy of skilled personnel and weak communication skills (Uddin, 2026). The institutional implication is that recruitment should be accompanied by rational deployment, mobility support, workload standards and service-area planning.

Ali (2016) noted that as the largest Extension organization, DAE has expert human resources for extension and advisory services for the farmers all over Bangladesh. It has manpower even at the village level. In livestock sector, DLS is responsible for livestock extension in Bangladesh. But DLS has Upazilla (Sub- district) level officers including Veterinary Surgeon and has no union or village level worker. Again, in the fisheries sector, DOF is responsible for fisheries extension in Bangladesh. But DOF has Upazilla (Sub- district) level officers without any union or village level worker.

A focus group discussion (FGD) was organized to explore the problems faced by them in receiving extension services from LEAF. Ten potential problems were identified with the participation of the fish farmers and then incorporated those in the interview schedule to know the extent of the specific problem. Data presented in Table 4 shows that about half of the respondent fish farmers perceived high level problem that "Shallow knowledge on subject matter" and "Limited motivational capacity". It is also evident from Table 8 that less a little less than half (49 percent) of the respondent fish farmers had perceived as high extent of problem that the LEAF has poor communication ability (Ahmed et. al., 2018).

Table 4. Problems faced by the fish farmers in receiving extension services provided by LEAF (n=72).

Problems	**Extent of problems**				**Problem Facing Index (PFI) Score**
	High	**Medium**	**Low**	**Not at all**	
1. Shallow knowledge on subject matter	42(58)	17(24)	10(14)	3(4)	170
2. Limited motivational capacity	38(53)	19(26)	11(15)	4(6)	163
3. Poor communication ability	35(49)	16(22)	19(26)	2(3)	156
4. Cannot build rapport with farmers	37(51)	15(21)	12(17)	8(11)	153
5. Lack of confidence in solving farmers' problem	17(24)	13(18)	18(25)	24(33)	95
6. Cannot provide solutions to the all problems	37(51)	17(24)	9(12.5)	9(12.5)	154
7. Frequent contact with only resource-rich farmers	0(0)	11(15)	22(31)	39(54)	44
8. Poor command on using different teaching methods	7(10)	11(15)	19(26)	35(49)	62
9. Services provided by LEAF seems sometimes ineffective	34(47)	12(17)	24(33)	2(3)	150
10.Not capable enough in overall dissemination of aquaculture technologies	15(21)	19(26)	24(33)	14(20)	107

Note: Number in the parentheses indicate percentage

It is evident from the data presented in Table 4 that more than half (51 percent) of the fish farmers perceived as high extent of problems that LEAF cannot provide solutions of all of their problems and they have limitations in building rapport with the farmers, which is really very basic for attracting the attention of the clientele towards the extension services. This is may be due to the reason that LEAF has limited experience of providing extension services to the people of the fish farming community. On the contrary, around half of the

fish farmers perceived no problem that the LEAF has frequent communication only with resource-rich farmers and they have poor command on using different teaching.

Inadequate Training Resources and Professional Development

Training constraints affect both the quantity and relevance of advisory services. The central issue is not merely

the number of training events but whether field personnel receive continuous, practical and updated professional development linked to the problems farmers actually face.

Limited Institutional Capacity

Training should cover emerging aquaculture technologies, disease and biosecurity, feed and input efficiency, climate-risk management, digital advisory tools, ecosystem-based fisheries management and communication skills. Recent evidence from Nandail, Mymensingh, found that 61.8% of sampled fish farmers had a medium level of training need for climate-resilient aquaculture practices, particularly in feed preparation, fertilizer management and disease control, and highlighted the importance of extension media contact and knowledge dissemination (Akter et al., 2026).

Outdated Curriculum and Training Modules

Curricula should therefore be revised periodically using a demand-assessment mechanism. The DoF can combine classroom training with demonstration ponds, field problem clinics, peer learning, digital modules and supervised practical assignments.

Lack of Hands-on Training and Practical Exposure

Practical exposure is especially important for climate-resilient and resource-efficient technologies. Training should include water-quality monitoring, disease diagnosis and biosecurity, adaptive stocking, efficient feeding, flood preparedness, drainage and emergency response. The purpose should be to enable officers to diagnose context-specific problems rather than simply reproduce generic technology packages.

Insufficient Funding and Infrastructure

Investment in training infrastructure should prioritize regional demonstration facilities, functional laboratories, reliable internet access, field mobility and updated training materials. The effectiveness of training should be evaluated through post-training indicators such as advisory quality, farmer problem resolution, technology adoption and client satisfaction.

Inadequate Materials, Technology and Digital Support

Digital tools can extend the reach of fisheries advisory services, but they should complement rather than replace field-based support. Adikari et al. (2024) identified 41 smartphone applications relevant to aquaculture in Bangladesh and reported that 57.66% of surveyed farmers were aware of such apps, while private fisheries professionals were an important source of information about them. The evidence suggests potential for disease alerts, water-quality guidance, production calculators, market information and two-way query systems, but also indicates concerns about feature specificity and uneven user experience. A public digital advisory system should therefore prioritize verified content, local language, simple interfaces, offline functionality where feasible, and clear referral pathways to human experts.

Farm-level constraints reported in earlier studies include feed cost, lack of finance, disease outbreaks and inadequate access to quality seed. These constraints are directly relevant to advisory effectiveness because a recommendation cannot produce results if farmers lack the resources to implement it. The advisory system should therefore integrate technical recommendations with information on input quality, credit and service providers, disease reporting and market conditions.

Table 5. Major constraints in fish farming

Constraints	Very critical	Critical	Moderately critical	Not critical	Score	Average	Remarks
Increasing feed cost	18	8	4	0	104	3.47	Critical
Lack of financial support	9	12	5	4	86	2.87	Critical
Disease outbreak	9	14	5	2	90	3	Critical
Lack of quality seed	3	13	10	4	75	2.5	Critical
Poaching and vandalism	0	2	7	21	41	1.37	Not critical
Transportation cost	3	7	11	9	64	2.13	Not critical
Water supply	6	5	13	6	71	2.37	Not critical
Electricity supply	0	1	8	21	40	1.33	Not critical
Fishing accessories	0	1	6	23	38	1.27	Not critical
Natural calamities	2	5	7	16	53	1.77	Not critical

Coordination Failures

Coordination failures can create contradictory messages, duplicated training and weak referral pathways among DoF, Bangladesh Fisheries Research Institute (BFRI), local government, NGOs, private input and service providers, research institutions and fishing communities. A pluralistic advisory system is not inherently a problem; the problem arises when responsibilities, quality standards and accountability are unclear. Evidence from Bangladesh shows that trained local service providers can improve aquaculture management and production outcomes, suggesting that DoF could use a regulated pluralistic model in which competent local providers complement public extension rather than operate as uncoordinated alternatives (Obi et al., 2025).

Climate Change and the Need for Climate-Smart Advisory Services

Climate change is increasingly a core advisory issue rather than a separate environmental topic. Bangladesh's aquaculture and capture fisheries are exposed to flooding, drought, temperature variation, water-quality deterioration, salinity intrusion and extreme weather. These hazards alter stocking decisions, feed use, disease risk, water management and the timing of fishing and harvesting. Recent research on climate-resilient aquaculture training in Bangladesh demonstrates that farmers require targeted knowledge and practical support to respond to these risks (Akter et al., 2026).

Climate-smart advisory services should therefore provide localized risk information and action-oriented recommendations. These may include flood and cyclone preparedness, water-quality monitoring, adaptive stocking and species selection, biosecurity, efficient feeding, pond drainage, emergency fish rescue and post-disaster recovery. Such advice should be integrated with early-warning and meteorological information rather than delivered as generic climate messages.

Environmental sustainability must also be integrated into advisory work. Woźniacka et al. (2025) show that future aquaculture growth in Bangladesh will require better management of freshwater, land, biodiversity and other natural resources. This implies that advisory services should not be evaluated only by production gains; they should also promote resource-use efficiency, water-quality protection, biodiversity conservation and compliance with environmental safeguards.

Analytical Discussion: Linking Challenges with Institutional Solutions

The evidence reviewed in this paper indicates that the major constraints in fisheries advisory services are interconnected rather than independent. Staff shortages reduce field contact; limited training reduces the ability of available staff to solve complex problems; weak digital support limits communication between visits; fragmented coordination reduces access to complementary expertise; and climate and environmental risks continuously create new advisory demands. Consequently, isolated interventions are unlikely to produce sustained improvement.

The Department of Fisheries is a central institution for sustaining Bangladesh's fisheries and aquaculture development. Official FY 2023–24 statistics show that the country produced 50.18 lakh MT of fish, with aquaculture providing the largest share. This production base creates a continuing need for advisory services that can improve farm management, resource efficiency, disease control, conservation, market orientation and climate resilience. The review confirms that DoF already provides a broad portfolio of advisory functions, including technical advice, training, demonstrations, extension-media communication and e-extension.

However, the effectiveness of these services is constrained by limited field-level reach, uneven professional capacity, insufficient digital and logistical support, weak coordination and feedback mechanisms, and rapidly changing climate and environmental risks. The evidence also shows that public extension can be strengthened through pluralistic models, digital communication and demand-driven training. The appropriate institutional response is therefore not to replace public extension but to strengthen DoF's coordinating, quality-assurance and problem-solving capacity while selectively mobilizing competent partners. A more responsive advisory system should be evaluated by service quality and client outcomes, not only by the number of training events or demonstrations conducted.

Digitalization should be treated as an institutional reform rather than simply the development of an app. The platform should have verified technical content, a searchable knowledge base, farmer query management, disease and water-quality alerts, local-language messages, extension-worker dashboards and an escalation mechanism for cases requiring specialist diagnosis. Field officers should receive organizational support for connectivity, maintenance and digital skills because evidence from Bangladesh shows that ICT availability without institutional support does not guarantee sustained use (Kabir et al., 2022).

Inclusion also requires deliberate design. Women and marginalized fishers may contribute substantially to processing, marketing, household aquaculture and fisheries management while remaining less visible in formal decision-making. A systematic review of small-scale fisheries found limited participation of women in more than 80% of examined case studies and linked stronger participation with positive outcomes (Chambon et al., 2024). Fisheries advisory programs should therefore schedule training at accessible times, use communication channels suitable for women and resource-poor households, include women in producer organizations and collect sex-disaggregated service-coverage data.

Finally, advisory services should be evaluated against outcomes rather than activity counts alone. A training event, demonstration or SMS campaign is an input or activity; the more meaningful indicators are whether farmers received timely and relevant information, adopted appropriate practices, reduced avoidable losses, improved profitability or resilience, and reported higher satisfaction. This outcome-oriented approach would align DoF advisory services with contemporary extension thinking and make institutional resource allocation more evidence based.

Challenge	Mechanism affecting advisory effectiveness	Priority institutional solution	Suggested performance indicator
Limited field reach	Few contacts and delayed responses reduce timely problem-solving.	Rational staff deployment, mobility support, advisory clinics and service-area workload standards.	Median response time; farmers reached per officer; unresolved cases.
Uneven technical	Officers may lack updated skills for disease, climate,	Continuous professional development, practical training	Training days/officer; competency assessment;

capacity	digital and resource-efficiency problems.	and demonstration facilities.	farmer-rated technical quality.
Weak digital support	ICT tools are underused when connectivity, maintenance and training are inadequate.	Integrated digital advisory platform with organizational support and human escalation.	Active users; queries resolved; response time; repeat use.
Fragmented coordination	Farmers receive incomplete or inconsistent information and referrals are slow.	Formal referral network linking DoF, BFRI, universities, NGOs and qualified private providers.	Referral completion rate; joint activities; specialist response time.
Climate and environmental risks	Generic advice is insufficient under location-specific hazards and changing conditions.	Climate-smart advisory packages, localized alerts and adaptive management protocols.	Farmers receiving risk alerts; adoption of adaptive practices; loss reduction.
Low inclusion	Women and marginalized groups may have lower access to formal advisory channels.	Gender-responsive scheduling, group organization, targeted communication and sex-disaggregated monitoring.	Women's participation; coverage of marginal groups; satisfaction by client group.

Strengthen field-level staffing and rationally allocate personnel according to client load, ecological context and travel requirements.

Establish minimum advisory-service standards covering response time, field-visit frequency, referral procedures and client feedback.

Introduce continuous professional development on disease and biosecurity, climate-smart aquaculture, feed efficiency, digital tools, communication and ecosystem-based management.

Develop an integrated digital advisory platform with verified content, SMS/app alerts, two-way farmer queries, case tracking and escalation to specialists.

Use trained local service providers, producer organizations and community institutions as regulated complements to public extension, with clear competency and quality standards.

Develop location-specific climate advisory packages linked to early-warning information and practical farm-management actions.

Strengthen coordination among DoF, BFRI, universities, local government, NGOs and competent private actors through formal referral and joint-learning mechanisms.

- Make advisory services more inclusive by ensuring meaningful participation of women, small-scale fishers, resource-poor farmers and other underserved groups.
- Shift monitoring from activity counts to outcome indicators such as response time, problem resolution, adoption, resilience, profitability and farmer satisfaction.
- Promote environmentally responsible aquaculture through advice on water quality, feed efficiency, biosecurity, habitat protection, biodiversity and sustainable intensification.
- Increase field demonstrations and interactive workshops
- Develop apps and SMS platforms for real-time guidance
- Facilitate virtual training sessions and query resolution
- Introduce subsidies or loans to implement recommendations
- Promote cost-sharing models for community-based support

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