

TERMS OF REFERENCE
For
Hatchery Expert for Seabass/Mullet- International
Package No. SD23

1. Context

Bangladesh's physical and cultural characteristics and the livelihoods of nearly 165 million people are defined by the Ganges-Brahmaputra-Meghna delta—the world's largest, most densely populated delta, and one of the richest in aquatic resources. Bangladesh has progressed in reducing extreme poverty and boosting shared prosperity, with poverty incidence (based on international US\$ 1.90 per capita/day poverty line and measured using the Purchasing Power Parity exchange rate) declining from 44.2 percent in 1991 to 13.8 percent in 2016. GDP has grown above the average for developing countries, averaging 6.5 percent per year since 2010, and reaching 7.24 percent in 2017,¹ driven mainly by the manufacturing and service sectors.

Recognizing the country's land resource limits and in the face of increasing soil salinity and other climate-related threats, the Government of Bangladesh (GoB) regards coastal and marine fisheries as a new frontiers of growth. Fisheries are vital for Bangladesh's food supply and food security and are central to the livelihoods of millions of fishers' and stakeholders along the value chain. The sector comprises three subsectors: aquaculture (56 percent of total production), inland capture fisheries (28 percent), and marine and coastal capture fisheries (16 percent), with total sector value estimated at US\$ 3.68 billion. As in most other developing countries, Bangladesh's coastal and marine fisheries economic model continues to be driven by targeting ever-increasing volumes, despite the current lack of stock data to back up the expansion.

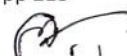
With this background and challenges, and taking into consideration of the positive results from DoF efforts to improve management of the iconic Hilsa fishery, the Ministry of Fisheries and Livestock proposes Sustainable Coastal and Marine Fisheries Project (SCMFP) which will be implemented by the Department of Fisheries. This project is designed as a long-term commitment and support to effectively strengthen the country's coastal and marine fisheries sector as a two-phase series of projects implemented through ten to twelve-year fisheries programs with the support of the World Bank (PAD. 2018)². These programs offer a significant opportunity to contribute to targets of Vision 2041³ for fisheries sector in national economy through innovation and dissemination of environmentally-friendly fisheries technologies. The Vision 2041 emphasizes using of vast sea resources to contribute to food security and food safety ensuring vibrant Blue Economy: [Page 84]. Country Partnership Framework's (CPFs) Focus Areas: growth and competitiveness, social inclusion and climate and environment management.

For the First Phase of the project, the Government of Bangladesh has received an IDA Credit of US\$240 million equivalent for a period of 5 years. The Department of Fisheries (DoF) under the Ministry of Fisheries and Livestock (MoFL) is the lead program implementation agency with overall project implementation responsibilities and direct implementing functions for the project activities

¹World Bank. (2017). DataBank. At <http://data.worldbank.org/country/bangladesh?view=chart>

² Project Appraisal Document on a Proposed Credit. September 14, 2018. The World Bank

³ Making Vision 2041 a Reality PERSPECTIVE PLAN OF BANGLADESH 2021-2041 . March 2020 Prepared and Published by General Economics Division (GED) Bangladesh Planning Commission Ministry of Planning, GoB. pp 218



under Components 1 and 2 (see project component matrix below) estimated at US\$188 million. In addition, the Social Development Foundation (SDF), which is specialized in implementing Community Driven Development (CDD) approach, will implement Component 3 as a co-implementing agency with close cooperation and coordination of DoF in order to build community institutions that can help diversify fishers' livelihoods while supporting co-management approaches for improved fisheries resource sustainability.

As per the Project implementation arrangement, a Project Management Unit (PMU) has been established at the DoF, headed by a Project Director, and staffed with DoF officers and technical consultants. The PMU will also establish its presence in the three regions of DoF, namely Barishal, Chattogram and Khulna⁴. The program is the first re-engagement of GoB with the World Bank in the fisheries sector after two decades, necessitating significant project management, policy and planning, investment design and supervision, capacity building, and monitoring and evaluation support during the implementation of the current phase of the Project⁵.

Project Objectives and Components

The overall objective of the project is to explore greater economic opportunity from coastal and marine fisheries resources, while promoting sustainable management of fisheries stocks and environment to reduce poverty and improve livelihoods of the coastal communities.

Specific objectives

- a) To strengthen stock surveys and assessment program for shrimp, demersal and pelagic stocks in the EEZ;
- b) To build and enhance capacity of DoF and relevant public research agencies to conduct science-based stock conservation and management to promote Blue Economy;
- c) To develop mechanisms for effective implementation of Monitoring Control and Surveillance(MCS) for the artisanal and industrial fisheries;
- d) To develop infrastructure and create production facilities for coastal belt fisheries (capture and culture);
- e) To up-scale cluster farming for shrimp to disseminate best lessons learned from cluster farming approaches;
- f) To strengthen community led fisheries management and transform livelihoods in poor fishing communities by access to recovering fish stocks and reducing dependence on fishing;
- g) To develop National Marine Fisheries Management Plans for sustainable harvest of fisheries resources.

Project Components

The SCMFP Phase I will support GoB in designing, establishing, and effectively operating fisheries management systems for sustainable utilization of coastal and marine fisheries resources. Phase I of the project has four components as outlined below.

Proposed Project Components	Proposed Sub-components
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⁴ Development Project Proposal (DPP), Sustainable Coastal and Marine Fisheries Project, DoF

⁵ Project Appraisal Document (PAD), Sustainable Coastal and Marine Fisheries, World Bank, September 14, 2018

COMPONENT 1: Enabling Sustainable Fisheries Sector Investments and Growth	<ul style="list-style-type: none"> ✦ Subcomponent 1.1: Stock assessment and development of national fisheries management plans ✦ Subcomponent 1.2: Enabling sustainable fisheries sector investment and growth Subcomponent 1.3: MCS development for IUU reduction
COMPONENT 2: Improving Infrastructure and Production Practices	<ul style="list-style-type: none"> ✦ Subcomponent 2.1: Infrastructure improvements for coastal belt capture and culture fisheries ✦ Subcomponent 2.2: Value chain and food safety ✦ Subcomponent 2.3: Boosting coastal aquaculture productivity
COMPONENT 3: Community Empowerment and Livelihoods	<ul style="list-style-type: none"> ✦ Subcomponent 3.1 Fishing community institutions and alternative livelihoods development ✦ Subcomponent 3.2 Business development and market linkages for alternative livelihoods.
COMPONENT 4: Project Management and Monitoring	

The Sustainable Coastal and Management Project under its Component 2 includes activities for boosting aquaculture productivity by supporting applied mariculture research (including cage culture), piloting and commercialization. The mariculture window will support applied mariculture research, technology innovation, market studies and production piloting, while the aquaculture window will focus on piloting domestic mud crab, and finfish hatcheries in boosting productivity of coastal aquaculture and mariculture in cages with economically high value finfish like Seabass (*Lates calcarifer*), mullet or other commercially valuable marine fish species. Among these, Seabass is one of the most important fish of the family *Latidae* available in the estuarine systems on the coast of Bay of Bengal, Bangladesh and a popular fish in most of the Asian countries due to its higher growth rate, giant size, delicacy and higher market value.

Seabass is an euryhaline⁶ fish known by various vernacular names in various parts of the World as Barramundi in Australia and Bhetki or Koral in Bangladesh. It inhabits predominantly the South-East and South-West rivers, estuaries and coastal waters where it is mostly caught by artisanal fishers. Due to its high market demand and value, it is becoming a prominent and prospective species in the aquaculture industry but the paucity of seeds in captivity makes its expansion difficult. Currently, a limited quantity of seabass is produced in the coastal shrimp farms especially shrimp ghers where natural juveniles and fry of seabass enter during tidal flashing and exchange of water. Majority of the seabass production in Bangladesh comes from wild catch and recently through stocking juveniles caught from estuaries. From an aquaculture and mariculture perspective, it could be a demanding and most important species for farming. Its culture has been started in many of the South and South-East countries including Thailand, India, Pakistan, Sri Lanka, Indonesia, the Philippines etc. in the 1970s and continued thereafter through establishment of seabass hatcheries, captive breeding, nursery management and ensured timely supply of fingerlings/juveniles.

In Bangladesh, a preliminary study was conducted on the tilapia and seabass polyculture system (Hossain et al., 1997)⁷ with collection and stocking of wild seabass juveniles. However, breeding and current aquaculture status of seabass in Bangladesh remains scarce and unidentified. According to

⁶Euryhaline organisms are able to adapt to a wide range of salinities and can live in fresh, brackish, or salt water.

⁷ Hossain MA, N Sultana, AM Hossain, SQ Islam, KA Haq and M Alamgir, 1997. Determination of optimum ratio of sea bass, *Lates calcarifer* and *Tilapia* sp. for their mixed culture. Bangladesh Journal of Zoology, 25(1): 9-14

(Haroon et al. 2005)⁸, migration of seabass to spawning areas and maturation of gonads is triggered by an increase in water temperature at the end of dry season. Because the species is catadromous⁹, migration is observed when the fish migrate downstream towards estuaries. However, knowledge of seabass biology, captive breeding, brood stock management, and its artificial seed production technology for boosting aquaculture remains limited and mostly nature dependent, which hinders its opportunity for commercialization both in aquaculture and mariculture ventures. The project has scope for establishing seabass development and demonstration center through improvement of the infrastructure for seabass/mullet seed production and mariculture facilities in suitable marine waters also. In addition, the project will diversify culture practices in coastal aquaculture with high value species like seabass, mullet, crab for export market and to promote blue growth initiative. The project will provide full-fledged support in establishing pilot scale seabass hatcheries and demonstration units for production of seabass at commercial scale by private sector entrepreneurs.

To establish all these systems, the project will engage one international hatchery expert to establish seabass hatchery and improve demonstration facilities.

Aquaculture is an increasingly important source of safe, nutritious, and sustainable seafood for people worldwide. Globally, aquaculture production must double by 2030 to keep pace with demand. The increases in demand for aquaculture products, sea food productivity, food security considerations, and job creation have generated an increased need for skilled workers including facility and technology dissemination for hatchery production of seabass seed to explore the opportunity of Blue Economy from countries with huge coastal and brackish water resources like Bangladesh. The availability of hatchery produced disease free quality seed/fingerlings will open the opportunity for expanding commercial mariculture in cages in addition to stocking in the coastal aquaculture farming system. But the main impediment for venturing production of seabass is the scarcity of seed both in quantity and timely availability requiring stocking from wild sources or waiting for incidental entry to coastal shrimp farms during intake of water from nearby estuarine rivers and its tributaries. No seabass hatchery has yet been established either in the public sector or private sector. The project may learn from its neighbor, India, whose first private sector seabass (*Lates calcarifer*) hatchery was set up since 2018¹⁰ in Karnataka with technical support from the ICAR Central Institute of Brackish-water Aquaculture (CIBA)

A sufficient supply of broodfish is essential for a successful induced breeding operation or artificial propagation. There are two sources of broodstock: wild stock and those from aquaculture or cages. To overcome uncertainty of capturing wild broods, rearing of brood in captivity and domestication would be easier to develop into suitable brood. Management of brood stock, its feed and nutrition, suitable environment such as photoperiod, temperature, salinity and other factors may affect the maturation, gonad development and spawning. Moreover, good quality seawater at 30–31 ppt is required for larval-rearing. Water temperature is also important and should range from 26° to 28°C to promote fast growth of larvae. The larvae start to hatch 16–25 hours after fertilization, depending on the temperature and species. Filtered seawater with very mild aeration and feeding with unicellular algae (*Tetraselmis* sp. or *Chlorella* spp.) are added to the tank maintained at a prescribed density.

⁸ Haroon AKY, M Zaher and IA sayed, 2005. Development of broods for mass seed production of sea bass (*Lates calcarifer*), Marine Fisheries and Technology Station, Cox's Bazar. Bangladesh Fisheries Research Institute, Mymensingh 2201. 113-117.

⁹ Catadromous-Adult lives in freshwater rivers, streams, and estuaries before returning to sea to spawn and lay eggs.

¹⁰ <https://www.thehindu.com/news/national/tamil-nadu/first-private-seabass-hatchery-to-be-set.retrieved on April 22, 2018>.



Thus, for promoting seabass farming and to supply required seed , a hatchery will be established at pilot scale to domesticate wild seabass for brood development and maturation, larval propagation, , production of suitable live feed for larval rearing, and a campus for in-situ training facilities and demonstration unit established. The hatchery expert should dedicated in delivering technical supports to ensure an all-round advise and capacity building of the GoB officials and concerned private entrepreneurs.

The location for such a centre must consider the required salinity with high quality water free from pollution. The facilities will be developed in compliance to strict bio-security measure following a Standard Operating Procedure (SoP).An SOP will also be maintained for larval rearing before transfer to freshwater environment or stocking in marine cages.

Objective of the Assignment

The prime objective of the International Hatchery Expert (Seabass) is to undertake detailed assessment of the present status of seabass industry and prospects for wide scale dissemination through establishing a hatchery at pilot scale and development of demonstration facilities for capacity building of DoF field officials, private entrepreneurs and aquaculture farmers. The Expert will assist in planning, designing and advising the PD, PMU for the establishment of the pilot hatchery and provide necessary guidance for the hatchery Design and supervision of the consultant Firm during the entire course of implementation his assignment. He/she will also provide expert inputs on the evaluation and due diligence of the matching grant applications by eligible private sector producers for piloting mariculture (including cage culture) and its commercialization in close consultation and cooperation with the BFMGF Grant Management. He/She will accomplish the assignment with due consultation and in close coordination with PD, PMU and concerned national and international consultants.

Scope of services, and Tasks

The Hatchery Expert-Seabass-International shall provide pertinent assistance and technical advice as a member of the Project Management Unit (PMU) and under the supervision of the PD, PMU will be responsible for setting up and subsequent management and overall system operations for sustainability of seabass seed production and demonstration and in-house capacity enhancement of DoF Technical Officials and concerned private operators/entrepreneurs. The consultant will be responsible to familiarize her/himself with the project immediately at the beginning of the assignment and work with relevant partners to generate all necessary information to achieve the objectives and scope of services and tasks of this assignment. In rendering services and preparing reports and deliverables s/he will perform adequate visits in the South-East and South-West region of the country and consult and work with projects regional Deputy Project Directors and Assistant Project Directors of SCMFP and with due consultation and with close coordination with PMU officials and consultants.

(i)	The consultant will undertake detailed assessment of the current status and prospect of Seabass (<i>Lates calcarifer</i>) for its enhancement program by conduction of reconnaissance survey along the South-East and South-West region of the country.
(ii)	Conduct consultations with local counterparts and entrepreneurs to review the existing problems and challenges why yet to establish any hatchery for multiplication of available seeds of seabass species.
(iii)	Conduct feasibility study for establishing seabass hatchery at suitable location and piloting of seed production.

(iv)	The consultant will plan and prepare hatchery design with BoQ for Seabass/mullet with all associated infrastructure development and facilities including brood stock management system, hatchery and nursery operation, water intake system and water supply system in consultation with PMU engineers and design and supervision firm.
(v)	Following up and ensure the proper culture of desirable live food organisms (algae, rotifers, brine shrimps, etc.) required for hatchery operations especially for seabass;
(vi)	Provide support in acquiring and to ensure that a continuing supply of pure culture of the appropriate organisms (algae) is available for the station with all sorts of logistics.
(vii)	Prepare a manual with standard operation procedures (SOPs) for hatchery management system from selection of brood stocks, induced breeding, hatching and successful larval rearing.
(viii)	Provide technical support to PMU in developing Training modules and plans & means for in-country training/ capacity building of GoB and private entrepreneurs/hatchery technicians on brood management & hatchery techniques.
(ix)	Provide technical support to PMU in early diagnosis of diseases and controlling with eco-friendly system.
(x)	Provide the plan and methods for contribution of food safety monitoring system from farm fish.
(xi)	Provide training in the different aspects of hatchery operations and larval rearing and stocking in demonstration ponds.
(xii)	Demonstrate hands-on production and rearing larvae of Mullet/Seabass for at least one season to DoF/Project technical staffs.
(xiii)	Coordinate his work closely with the other specialized consultants, in order to attain maximum efficiency in the management of the hatchery.
(xiv)	Assist in the development of demonstration unit for production of seabass fingerlings for supply to prospective entrepreneurs and farmers.
(xv)	For the interest and success of this assignment, any other pertinent activities/tasks requested by Project Director as deemed necessary.

4.0 Qualifications and Experiences

Qualifications

The Hatchery Expert-Seabass/ Mullet-International will have a Master's degree in Fisheries Science, Aquaculture/coastal aquaculture/Marine Science/ Environmental Science and/or any other relevant discipline. Having Ph.D in relevant field with required experience will get preference.

Experiences:

- 10 years working experience in hatchery design, establishment and business plan development for marine species (preferably of seabass, mullet);
- Particularly, 10 years of working experience of hatchery operation and management of marine species preferably of Seabass, Mullet including fish nutrition and feeding;
- Practical experience in genetic improvement programs and design offish selective breeding programs for relevant commercial traits; Experience related to mass production and management of juvenile marine species (preferably seabass / mullet); will be preferred; species (preferably seabass / mullet)

- Working experience in planning and advising in hatchery enhancement program of marine species is desirable;
- Analytical knowledge and capacity on environmental and social safeguards measures in establishing seabass hatchery and demonstration center;
- Experience in designing an early warning system in forecasting any disease outbreak related to seabass of both larval rearing and grow out system;
- Enable to work and communicate with concerned stakeholders and fluency in English with excellent written and communication skills.

5. SELECTION METHOD

The Expert will be selected following the Selection of Individual Consultants method as set forth in the World Bank Procurement Regulations for IPF Borrowers, July 2016 revised in November 2017.

6. Duration of the assignment

The total duration of this assignment is for 24 months. However, the duration may be increased or decreased based on the performance of the expert, project needs, and extension of project duration and availability of finances.

7. Deliverables and Milestones

Sl. No.	Reports and Deliverable	Contents of the Report	Persons to Receive Reports	Milestone
1.	Inception Report	Provide an annotated outline of processes and operational areas for initial setting up of activities as per scope of activities; Include an overall Work plan for the duration of the project based on DPP, PAD and Project Financial Agreement (FA). Incorporate COVID-19 related concerns and issues and recommendations, especially how it might have an impact on operations and progress of envisioned activities.	Project Director, SCMFP	Within 2(two) months of joining
2.	Implementation work plan/ schedule for the consultants activities with Gantt Chart	Prepare a detailed work plan for the first year, specifically in accomplishing as per scope of services and tasks with Gantt Chart. Report.	Project Director, SCMFP	Within (2 (two) months of contract signed.
3.	Assessment of Seabass industry. (Scope No. i)	Assessment of aquaculture and mariculture of seabass for its commercialization. One report on it.	Project Director, SCMFP	Within 3 (three) months of joining
4.	Consultation Reports (Scope No. ii & iii)	Existing problems, challenges and scopes of establishing seabass hatchery and its expansion of its culture technology.	Project Director, SCMFP	Within 2 (two) months of joining
5.	Design seabass hatchery with all sorts of facilities (Scope No. iv)	Prepare hatchery design with BoQ for Seabass/mullet with all associated require infrastructure and facilities.	Project Director, SCMFP	Within 8 (eight) months of joining



6.	Culture of required food organisms. (Scope No. v & vi)	Develop protocol for pure culture and mass production of live feed required for seabass hatchery operations.	Project Director, SCMFP	Within 10 (ten) months of joining
7.	Develop manual with SOP (Scope No. vii)	Prepare a manual with standard operation procedure (SOP) for hatchery management system including successful larval rearing technology and conduct of genetic improvement programs and mating scheme.	Project Director, SCMFP	Within 10 (ten) months of joining
8.	Prepare Training modules & deliver training (Scope No. viii, ix, x & xi)	Developing Training module and plans for in-country training/capacity building of GoB and private and train counterparts in different aspects of hatchery operations including broodstock management and larval rearing.	Project Director, SCMFP	Within 12 (ten) months of joining
9.	Provide hands-on farm training & demonstration (Scope No. xii)	Demonstrate hands-on production and rearing larvae of Mullet/Seabass for at least one season to DoF/Project technical staffs.	Project Director, SCMFP	Continue along the entire contract period.
10.	Progress Reports	Progress of activities	Project Director, SCMFP	Monthly and Quarterly
11.	Assist in establish of demonstration unit (Scope No. xii)	Support service in the development of demonstration unit for production and dissemination of seabass aquaculture system.	Project Director, SCMFP	Within 16 (sixteen) months of joining
12.	Draft Final Report	Comprising an up-to-date account of the activities and accomplishments based on the scope of services and tasks contracted with the project as Hatchery Expert-Seabass.	Project Director, SCMFP	Before 2 (two) months of contract completion
13.	Final Report	Comprising an up-to-date account of the activities and accomplishments based on the scope of services and tasks contracted with the project as Hatchery Expert-Seabass including recommendations.	Project Director, SCMFP	Before 1 (one) month of contract completion

The reports and deliverables shall be submitted in English language. The reports shall be submitted by electronic mail in MS Word/Excel or PDF format, and hard (print) copy as appropriate. MS PowerPoint presentations may also be required. Coordinate and closely consult with other specialized consultants to attain maximum efficacy and practicability on operation of seabass hatchery.

8. Data, Personnel, Facilities and Local Services to be Provided by the Client

The Client will provide relevant data, information, references, documents etc. required to perform the services. Office space and necessary logistical supports will be provided from the project.