**Government of the People’s Republic of Bangladesh**

**Protection of Sundarbans Mangrove Forests Project**

**Bangladesh Forest Department**

**Boyra, Khulna**

**TERMS OF REFERENCE (TOR)**

**for**

**Selection of Consulting Firm for Assessment of Aquatic Resources of the Sundarbans**

1. **Introduction**

The Sundarbans is the largest contiguous patch of mangrove forest in the world and is located in the estuary of the river Ganges in the southwestern corner of Bangladesh. The area of the forest is 6017 km2 of which about 30% area comprises complex network of streams and rivers varying considerably in width and depth. The Sundarbans mangrove forest provides a unique habitat for varieties of mammals, reptiles, fishes and birds. Species composition and richness of the Sundarbans represent varieties of economic, social and environmental values compared to many other mangroves of the world. However, in spite of the richness and diversity, there has been growing concern over depletion and destruction of habitats causing many in endangered and some are in vulnerable condition. To conserve the biodiversity of the Sundarbans, Bangladesh Forest Department is implementing a GoB funded project named “Protection of Sundarbans Mangrove Forests” where there is a provision for assessing the aquatic resources of the Sundarbans.

1. **Protection of Sundarbans Mangrove Forests Project**

Bangladesh Forest Department (BFD) under the Ministry of Environment, Forest and Climate Change has been implementing GoB funded “Protection of Sundarbans Mangrove Forests Project” for the period of 4years (01 January 2021 to 31 December 2024). Total project cost is 157,87.51 lakh in BDT. The overall objectives of the project are to improve efficiency of Forest Department officials who are engaged in Sundarbans Forest management, improvement of infrastructure and communication facilities, use of information technologies, creation of proper work environment, strengthening forest management through strong patrolling, survey on wildlife and their habitat, status of protected areas and ecological condition, measurement of aquatic resources, survey on climate change impact through analyzing soil, salinity and other parameters, develop monitoring system and scientific Forest management. Through scientific Forest Management and introduction of improved monitoring system, sustainable use of fishery resources, forest resources and other services have to be ensured for future generation and sustainable livelihood of local communities. Mitigation of Climate change impacts through raising green belt in coastal areas, landscape development; meet the local fuel wood demand through plantation program. Project will implement a number of activities which are grouped under following four components:

Component-1: Strengthening Management Capacity.

Component-2: Scientific Forest Management and Observation.

Component-3: Mitigation of climate change impact, landscape development and fulfill the demand of fuel wood through creation of greenbelt.

**Major activities under the project:** Training of Forest Department officials who are working in the Sundarbans to increase their efficiency on wildlife crime control, Wildlife (conservation and security) Act-2012, primary treatment, SMART patrolling, wildlife habitat observation, wildlife sanctuary management, wildlife rescue and tranquilizing, GPS, computer data entry and networking, sustainable livelihood, Co-management and PA Rules, engine boat driving and maintenance etc. Arrange training for the tour operators, tour guides, co-management organizers and resource users of the Sundarbans to increase their efficiency and socio economic condition. Establishment of GIS lab and provide health facilities. Up to date the Integrated Resources Management Plan of Sundarbans for 10 years for scientific management of the Sundarbans. Conduct research works and survey activities by engaging researchers and research firms. Excavation of river and canals of Sundarbans, construction of infrastructures in the Sundarbans, procurement of water vessels, vehicles, constructions of pontoon and gangways, automation of pass permits and identity cards of Sundarbans resources users, different plantation programs etc.

1. **Objective of the assignment**

The overall objective of this consultancy is to assess the aquatic resources of the Sundarbans specially the fish, crab and other important aquatic fauna to ensure the conservation and sustainable use of coastal biodiversity and ecosystem services, which will be considered/ incorporated in management strategies of aquatic resources of the Sundarbans.

More specifically, the key objectives of this consultancy would be-

* To identify the aquatic biodiversity of the Sundarbans.
* To assess stock of major commercial fish species in the Sundarbans
* To assess stock of commercial crab species in the Sundarbans
* To identify breeding period of mud crab and recommendation of banning period of crab harvesting.
* To assess stock of other aquatic species (dolphin, mollusk, crustacea) in the Sundarbans.
* To identify suitable breeding ground of important aquatic species.
* To assess the impact of salinity & climate change on the aquatic resources of the Sundarbans.
* To assess the impact and present scenario of 18 restricted cannels in the Sundarbans.
* To assess the impact of water pollution on aquatic resources of the Sundarbans.
* To provide recommendations for sustainable annual catch/ better management of aquatic resources of the Sundarbans considering existing rules-regulations, management interventions, dependency of local people, sustainable livelihoods etc.
* The results of the assessment could be applied directly to the aquatic resource management and conservation.

1. **Scope of the service**

* Need of detailed survey of aquatic species of the Sundarbans by taking representative samples of reliable precision.
* Fish, crab and other important aquatic resources detailed survey for statistical validity and thus require technical support for setting management strategies of aquatic resources of the Sundarbans.
* It has been growing recognition of the need for biodiversity surveys especially for aquatic resources that remain under water and are not seen. Little know-how about the stock and diversity as well as its relation with other resources.
* Literature review and consultation with Forest Department, relevant Government Agencies, Local fishermen and other stockholders.
* The fishermen are not sufficiently aware of the benefits of the Sundarbans Reserve Forest conservation and their role. Uncontrolled fishing, unauthorized catch, use of poison and destructive nets in fishing.
* Stock depletion due to catching of juveniles, reduction of fresh water flows accompanied with higher salinity and water pollution.
* Readjustment of BLC numbers considering the expansion of protected area and local demand.
* Ecosystem based biodiversity conservation management implies sustainable management of resources also for the benefit of people.
* Determination of fish breeding ground for commercially important species and investigation of fish biology and spawning season of important fish species.
* GIS mapping of important breeding ground and habitats of aquatic resources.
* Environmental impact caused by water quality changes and man-made barrier on fish spawning, recruitment and yield of important fish species.
* Investigating on the status and diversity of the aquatic flora and fauna affecting fish production.
* To assess the impact of salinity & climate change on the aquatic resources of the Sundarbans.
* Conduct 20 nos. programs based Focus Group Discussion, 2 regional level and 1 national level workshop to share the findings of the assignment.
* There might be other relevant issues, which are not included, which could arise from the assessment and survey, should be considered and included in the final report by the consultants.

1. **Activities and tasks to be performed by the firm**

- Literature review and analysis.

- Primary and secondary data collection.

* Conduct survey and identify of fish and other aquatic species in Sundarbans

- Data collection, analysis and stock assessment of commercially important fish, crustacean species and other important aquatic species including dolphin considering seasonal variation.

* Under take major species-wise detail survey to find out population status, structure, distribution and its trend
* Determine the fish breeding ground for commercially important species and investigation of fish biology and spawning season of important fish species.
* Determination of breeding period of mud crab and recommendation of banning period of mud crab harvesting.
* Identify the causes of depletion of the aquatic resources (if any)
* Calculate annual catch and the number of BLC to be issued for the fishermen
* Prescriptions for better fisheries management for the Sundarbans
* Assessment of Phytoplankton and zooplankton diversity of the Sundarbans in relation to water chemistry.
* Assess the impact of climate change on the aquatic resources of the Sundarbans
* Consultation and discussion with aquatic resource users and related stakeholders.
* Validation and finalization of aquatic resources assessment report.
* Quality color printing of approved stock assessment report- 100 copies and brief assessment report (in Bangla) - 500 copies. Soft copy of the report also has to be submitted to PD/ concern DFO.

1. **Policy relevance:** The principal policy directives and legislation which affects sustainable aquatic resources management and biodiversity conservation are-
2. The Forest Act, 1927 (amended 2000)
3. The National Forest Policy of Bangladesh, 2016
4. Bangladesh Forestry Master Plan 2017-2036
5. Bangladesh Wildlife Conservation Master Plan 2015-2035
6. Bangladesh Environment Conservation Act, 1985
7. National Environmental Policy of Bangladesh, 1992
8. The National Conservation Strategy (2016-2031)
9. The Wildlife (Conservation and Security) Act, 2012
10. Bangladesh Biodiversity Act, 2017
11. Protection and Conservation of Fish Act, 1950
12. Protection and Conservation of Fish Rules, 1985
13. The Protection and Conservation of Fish (Amendment) Act, 1995
14. The Marine Fisheries Ordinance, 1983
15. Marine Fisheries Act, 2020
16. Bangladesh Delta Plan 2100
17. **Qualification and experiences of the firm**

* Minimum 10(ten) years of proven work experience in the field of natural resource especially aquatic resources survey/research activities in the Sundarbans / coastal areas in Bangladesh.
* The Firm should have valid Government registration with experienced office staffs.
* The Firm should have experience to implement at least 3(three) research/study works related to the coastal aquatic resources/ fishery**.**
* The Firm should have experience with dealing the professional consultants.

1. **Team composition of the consulting firm**

Interested consultant Firm feature at least the following key professionals along with Financial and Admin officer and support staffs needed to accomplish the assignment. The qualification and experience of key professionals are outlines in the following table.

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| **SI** | **Description** | **Qualification** | **Experience** |
| 1 | Team Leader | Masters in Fisheries/ Aquatic Resource Management or relevant subject. Experience in research on Aquatic biodiversity of mangroves and related PhD degree will be given preference. | 10 years experience in related field specially aquatic resources management. |
| 2 | Mangrove ecologist | Masters in Aquatic Ecology/ Marine ecology/ Natural Resource Management/ Forestry or relevant subject. Experience in research/work on Aquatic ecology of mangroves and related PhD degree will be given preference. | 8 years work/ research experience in related field. |
| 3 | Aquatic Resource Management Specialist | Masters in Fisheries Management/ Aquatic Resource Management or relevant subject. Experience in work/ research on mangrove aquatic resources management and related PhD degree will be given preference. | 8 years experience in related field. |
| 4 | Fish Biodiversity Specialist | Masters in Fisheries/Zoology or relevant subject. Experience in research/ work on Mangroves/ Coastal and Marine Biodiversity and related PhD degree will be given preference. | 8 years experience in related field. |
| 5 | Shellfish (mollusks and crustacean) Biodiversity Specialist | Masters in Zoology/ Fisheries or relevant subject. Experience in research/ work on Mangroves/ Coastal and Marine Biodiversity and related PhD degree will be given preference | 8 years experience in related field. |
| 6 | Non-piscine Aquatic Vertebrates Biodiversity (e.g. reptiles, amphibians and mammals) Specialist | Masters in Zoology/ Relevant subject. Experience in research/ work on Mangroves/ Coastal and Marine Biodiversity and related PhD degree will be given preference | 8 years experience in related field. |
| 7 | Fish Stock Assessment Specialist | Masters in Fisheries or relevant subject. Experience in research/ work on Stock Assessment of Coastal and Marine fish and shellfish. Related PhD degree will be given preference | 8 years experience in related field. |
| 8 | DNA taxonomy Specialist | Masters in Microbiology/Biotechnology / Molecular taxonomy/ Marine biology/ /Fisheries/ Zoology or relevant field. Experience in research/ work on Coastal and Marine Biodiversity based on DNA taxonomy or DNA bar-coding and related PhD degree will be given preference. | 5 years experience in related field. |
| 9 | Climate Change Specialist | Masters in Climate Change/ Environment Science. Experience in climate change, adaptation and mitigation in coastal region and related PhD degree will be given preference. | 5 years experience in related field. |
| 10 | GIS & Data Analyst | Bachelor in Geography/ Computer science/ Geo-informatics/ Statistics. Experiences in big data analysis will be given preference. | 5 years experience in related field. |

1. **Reporting obligation**
2. Inception Report: The consultant will submit an inception report stating methodologies for data collection, survey, assessment and detailed work plan with key milestones within 4 weeks of signing the contract. The planning and organization of project team should be defined during the inception phase and approved by the Project Director.
3. Interim Progress Report: Quarterly.
4. Draft Report: The draft report must be submitted 8 weeks before the end of the contract.
5. Validation Workshop: The result of the study must be validated by an expert group that will include representatives of the Universities, Government and non-government organizations.
6. Final Report: Accepted by PD/ Concern PE (DFO).

All reports shall be submitted in hard copies (10 copies) and in editable soft copy. The language of the assignment shall be in English. There shall be no security restrictions on printing or editing in the deliverables.

1. **General Terms & Conditions:**

The reports produced in connection with this assignment, shall be strictly confidential. All documents shall become the property of Bangladesh Forest Department. However, in case of any emerging need to use it or any part of it by any academics or other users, prior informing and written endorsement from Bangladesh Forest Department is mandatory. The copyright of the final product will be endowed with Bangladesh Forest Department. In the event of any emerging priorities and needs Bangladesh Forest Department shall enjoy all authority to reschedule operational framework of this assignment. The consulting firm shall submit all collected data to Bangladesh Forest Department along with the final report. Final payment will be made only on the final deliverables, and these final deliverables should be to the satisfaction of the Project Director or concerned authority.

1. **Selection method**

The Consultancy firm will be selected following the Quality & Cost Based selection (QCBS) method described in the PPA, 2006 and PPR, 2008.

1. **Duration of the assignment**

The duration of the contract will be 24 months from the starting date and the intended start date of the contract is August 2023.

1. **Institutional arrangement**

The Consultancy Firm will work under direct control of the Project Director or assigned DFO. Reporting will be directly to the Project Director/ DFO with close collaboration with other officials of the Project. The firm will be accountable to the Project Director/PE for its day-to-day activities. Only office accommodation will be provided at Khulna by the project.