Expression of Interest (EoI)
for
SSP and GIS Mapping and Monitoring

Name of the Project : Host and Rohingya Enhancement of Lives Project (HELP)
Forestry Component : Establishing Green Belt at Bhasan Char and Reforestation of Rohingya Affected Area in Cox's Bazar.
Name of the Package : Consultancy firm (SSP and GIS Mapping and Monitoring)
Package No. : HELP/S-06
Organization :Bangladesh Forest Department (BFD)
Duration of the Contract 06 (Six) months
Duty Station HQ (BFD-PIU) Dhaka, and Project Area

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Contents

1.0 Executive Summary

Moulovibari Research and Partnership Hub (MoRPH) is registered under Bangladesh's Register of Joint Stock Companies and Firms (RJSC). MoRPH, in association with CMD works for the Sustainable Development Goals (SDGs, conducting thematic assessment, action research, rural development, and innovation. We do conduct research and development in numerous sectors and fields like sustainable environmental management, disaster management, climate change and adaptation, the development field, ICT, Monitoring & Evaluation, etc. MoRPH utilizes ICT-based tools, i.e, UAV(Drone), Remote Sensing (RS) technology & Geographic Information Systems (GIS), GPS survey, socioeconomic survey apps/ tools, for conducting landscape and environmental assessment. We do innovative work in various sectors, including Drone Image Analysis, Internet of Things (IoT), Impact-based Early Warning, Location-based Service, etc.

MoRPH strives for client satisfaction by providing state-of-the-art technologies in the fields of Consultancy, Research and development, Remote Sensing (RS) and geographic Information Systems (GIS), location-based Services, RSGIS Training, Surveying (GPS, Drone), Monitoring and Evaluation, Software Development, Disaster Management, and Climate Change and adaptation.

Our vision is to help our nation build technology-oriented solutions and services culture in different sectors. We will eradicate digital barriers at the grassroots level, providing easy and usable solutions in various aspects. To bring everyone to their doorsteps, innovative and cheaper technology and methods for shaping a more livable nation.

2.0 Introduction:

The Cox's Bazar District, south-eastern region Teknaf forest range and Wildlife Sanctuaries i.e., Himchhari National Park, Inani National Park, Fasiyakhali Wildlife Sanctuary, and Medhacocchopia National Park those are on the verge of extinction which being contributes by the multiple risk factors e.g., landscape vulnerability to climate induced cyclonic disaster, sea storm surges, salinity intrusion, heavily populated Rohingya refugees and host community continue to exerts pressure on extracting and overexploiting natural resources, landslide and environmental degradation, etc., all those factors contributed for forest and natural resources degradation of Teknaf and adjacent Cox's Bazar Areas.

Other residual factors are the socioeconomic conditions of the local community, heavily populated settlements, poverty-laden livelihood options needed to ensure household energy and food security, which depend on the extraction and exploitation of resources from reserve forests and sanctuaries, and endangered wildlife. These natural treasures are eventually on the verge of extinction. Until today, the reported cases of garter loss and biodiversity, as of 8,000 acres of forest land, have been degraded, which is putting immense pressure on the area's wildlife. Critically endangered Asian elephants, with only 38 remaining in the fragmented habitat, face a fight for survival.

3.0 Understanding the assignment:

Considering the multi-factored risk drivers to protect reserve forest and sanctuaries (for migratory shorebirds, gross stock taking for birds and other wildlife species) on the verge of extinction, the BFD is soliciting technical solution for comprehensive assessment of forest resources, level of deforestation, identifying the root causes of forest degradation, determine what would be a nature-based solution for conservation of forest ecology, what would be robust ICT driven round-the-clock patrolling and oversights mechanism putting in place, so that a dashboard control system can detect illegal intruders'/exploiters entry and exits, detect theft of resources and other degradation incidences and be able to provide early warning of any impending incidence.

The initial survey/assessment needs to essentially identify the overall risk drivers/factors (climate change-induced factors, nature-induced and human-induced factors, dispersed Rohingya refugees and host community settlements, environmental and ecological degradation factors, landscape fragility, bay proximity cyclone and

storm surge and tidal surge factors, coastal salinity intrusion factors) that are residual factors in biodiversity and ecology losses. The assessment will use remote sensing and GIS, GPS, and UAV-based aerial and surface observation mechanisms to instrumentalize site-specific planning (SSP).

4.0 Objectives:

The main objective of the services is to provide an online web-based site-specific planning (SSP) solution for each plantation intervention site, which is considered a significant activity. Proper identification of the interventions, considering the prevailing natural and socio-economic conditions and site potentials and plants, can ensure success and monitoring. At the same time, the web-based SSP platform at the Bangladesh Forest Information System (BFIS) needs to be integrated.

5.0 Scope of the Services

In consultation with DFD central office and Cox's Bazar office, the overall mission design is to be finalized for conducting the assessment with consideration of the following points;

a) The main scope of work of this assignment will be as follows, but it is not limited to: Under the direct supervision of the Project Director, the MoRPH will provide technical services and facilitate selected Forest Divisions in developing Site-Specific Plans. The assignment will last 6 months and cover the following specific services and deliverables.
b) Using GIS technology, delineate the SSP at selected Forest Beats on-site, including data collection using Android-based ODK, GPS survey, and drone survey for delineating plantation sites, Index mapping of the Beat, and regeneration survey. Organize focus groups for community consultation and identify deforested and degraded pockets for scheduling all silvicultural operations in the nursery and plantation sites.
c) Organizing recurrent discussions with BFD to vitalize the SSP application format. The core consultancy team to be teamed with a Forest Specialist, a Geospatial application developer, a web-based database management specialist, a GIS mapping specialist, and an IT expert.
d) Deploy full-time GIS/GPS and field Surveyors on specific sites for 5 months. The MoRPH will ensure two comprehensive orientations of BFD Officials on SSP processes and their activities.
e) Agreed upon by the BFD to the deploy of a customized and interoperable geospatial platform (ESRI ArcGIS or Open Street Geospatial) to be able to interact /synchronize with field level surveillance apps, online patrolling system and integrated with the SSP platform at the BFIS as a module within the BFD domain (http://bfis.bforest.gov.bd/bfis/), which is hosted by the Bangladesh Computer Council (BCC). A detailed discussion on the platform and approval of BFD's format is required.
f) Develop a mapping interface to export data at GIS as efficiently as possible, using the same map client interface currently in use for the BFIS geoportal. The interface should display a fixed list of layers (from the above) with fixed map symbolization (as may be agreed with BFD) and a suitable selection of freely available base maps.
g) Develop an interface delineating forest division, range, or beat, and oversee the impact level online. There should be provisions for the phasing of 'report endorsement' by the respective Range Officer and Divisional Forest Officer (DFOs), as well as Admin should be provisioned, before making SSP data available to other users. In this connection, the Beat Officer, the finite data user, should be able to revise as per recommendations from the respective endorsing entities (e.g., Range Officer and DFO).
h) After this review, the DFO needs to electronically approve a mechanism/Application to be developed for SSP data collection at the Forest Beat level through a simple Report Format. With the DFO's endorsement, the data will be available to all concerned through the Dashboard and other reports.
i) Develop an inception Report with a work plan, an interim progress report, and a completion report at the end of the assignment. Three workshops, with proceedings, for presenting
    - the method and work plan,
    - mid-line progress of SSO data collection as well as online interface/application development of data management and
    - a final workshop for results at BFD, Dhaka.

h) Support the respective forest officers in developing a geolocation-based plantation journal.

i) Develop technical guidance documents for SSP on-field teams and mid & end-line reporting.
j) The survey will be conducted in all potential plantations in Cox's Bazar South Forest Division.

6.0 Methodology:

6.1 Desk review :

a) Reviews of all relevant studies of DFO, INGOs (USAID), UN-FAOs, WFP, UNDP, UNEP

- Review the BFIS database system, the Bangladesh forest ecosystem services valuation database, the Bangladesh forest inventory, plant species, and the identification of the data gap.
- Review project documents: the Sustainable Forests & Livelihoods (SUFAL) Project, Zoning for tree and forest assessment in Bangladesh (USAID), Bangladesh Forest Information System (BFIS), the Reforestation Information Management System (RIMS) database of the Nishorgo project, the UN-REDD Programme, documents on Encroachment inside Reserve Forests, etc.
- Review information portal bd-forest web portals, www.forestsouth.coxsbazar.gov.bd , Review documents on FAO-Cox's bazar sub office produced on landslide management and slope stabilization.
- Review Bangladesh's FAO-developed new landslide warning system based on Forests and Landslides. Reviews soil and landscape based on the type of trees and forests being recommended for the prevention of landslides and the rehabilitation of landslide-affected areas in Asia
- Review government policy, programme documents on forest conservation, Management Plan for Chunati Wildlife Sanctuary, laws, co-management issues, agroforestry development, regeneration, etc.

b) Review forest-related MIS systems: RIMS, BFIS, landslide warning system, Prepare GIS map on existing generation layer, Land cover map, land use map, multi-hazard prone map, landslide hotspot map**,**

6.2 Survey tools preparation and data collection:

a) **Prepare GIS field map: Survey tools preparation for conducting Survey**: Prepare GIS base map of all Union of Teknaf Upazila (GIS shapefile already in hand) with all mouza layers, other available layers (LGED map), showing forest cover areas (overlaying BFIS forest shape file), Forest Department "Field Maps", Forest Zonation map of DF, Zonation Map of USAID Climate Resilient Ecosystem and Livelihood (CREL) Project, Landslide map of FAO-Cox Bazar Sub-Office for preparing comprehensive survey tools.

b) **Prepare a Remote Sensing map** with interpretation of the trend of land cover and land use change over the years.

b) **Prepare Union and Mouza GIS map** with available GIS layers(to be collected from LGED, DLRS, SoB), delineating the boundary of core zone, bugger zone, impact zone, range area and number, beat area and number, block area and number, and Protected Area (PA) for determining the survey strategy, team planning, mobilization, and capturing geospatial forest site-specific features from field survey.

c) **Prepare Field Survey tools:** Organize technical surveyors with an Android-based GPS logger, GPS Essential apps (capturing georeferenced pictures/videos), Kobo toolbox apps, Drone surveys for stock-taking of trees (count, size, and species types), and producing high-resolution maps. Conduct tree inspections and surveys, photogrammetry & modeling, and pictures and videos for SSP.

d) **Prepare survey templates** for collecting attribute information (hardcopy) of the socioeconomic and other risk drivers(multi-hazards/disaster) and deploy surveyors with survey apps for tracking geospatial layers(point, polygon, polyline features) to be interpreted with GIS layers (hard copy field map, forest department clock/beat map) and latest Kobo-toolbox, GPS logger apps for capturing additional features, attribute datasets.

e) **Prepare an FGD/KII template** for discussions with diverse local DFO actors, forest-dependent stakeholders, service providers, CSOs, and regional institutions to collect risk, vulnerability, community-level information, stakeholders' level information, and actors' level information from the frontline.

6.3 Survey team preparation for data collection :

Team	Member	Activity Aera	Tools
The core consultancy team	Teamed with a Forest Specialist, a Geospatial application developer, a web-based database management specialist, a GIS mapping specialist, and an IT expert.	In consultation with DFO, develop an assessment strategy, guidelines, methodology, tools development, and survey team deployment with the context of the Beat area and number. Block area and number, Protected Area (PA) and number	Maps, Strategy, Mission scope, and mission planning tools
Team for conducting the site-specific survey(SSP)	• Students • Community Member • Ethnic community member • Local Disaster Management Committee (UDMC, Ward DMC) • Member of the forest patrol/Ranger group • Ethnic community member • Expert livelihood group member (lead farmer) • Local Land Surveyor/local NGO survey • Local Farmers/owners of horticulture/nurseries/livestock herders, etc • Member of Village Conservation Forum (VCF) • Member of People's Forum (PF) • Social actors/social workers • Member of the Co-management Council • Member of Women CPGs • Member of Forest Conservation Club / People's Club • Member of the resource user group • Member of the forest curator/ police	• Core zone area & number • Buffer zone area & number • Impact zone area & number • Beat area and number, • Block area and number, • Protected Area (PA) and number	Android app for GIS/ GPS survey apps, Koto-toolbox, forest apps, etc., for determining tree species, endangered species, canopies, forest types, vegetation type, land cover, land use type, etc.
Team for conducting socioeconomic /livelihood survey	• Students • Community Member • Ethnic community member • Local Disaster Management Committee (UDMC, Ward DMC) • Member of the forest patrol/Ranger group • Ethnic community member • Expert livelihood group member (lead farmer) • Local Land Surveyor/local NGO survey • Local Farmers/owners of horticulture/nurseries/livestock herders, etc. • Member of Village Conservation Forum (VCF) • Member of People's Forum (PF) • Social actors/social workers • Member of the Co-management Council • Member of Women CPGs • Member of Forest Conservation Club / People's Club • Member of the resource user group • Member of the forest curator/ police	• Mouza/Village/Para (administrative layer), community settlements, etc. • Core zone area & number • Buffer area & number • Impact zone area & number • Beat area and number, • Block area and number, • Protected Area (PA) and number, social forestry area, • Sanctuaries, ecologically critical areas, wetland areas, coastal areas, saline prone areas, storm surge areas.	Android app for GIS/ GPS survey apps, Koto-toolbox, forest apps, etc.

Team	Member	Activity Aera	Tools
GIS Mapping, GPS Survey, Aerial Drone survey team	• GIS Mapping field surveyor, • GPS app-based surveyor, • Drone surveyor	• Village/Mouza/Para (administrative layer), community settlements, etc. • Core zone area & number • Buffer area & number • Impact zone area & number • Beat area and number, • Block area and number, • Protected Area (PA) and number, social forestry area, • Sanctuaries, ecologically critical areas, wetland areas, coastal areas, saline prone areas, storm surge areas.	• Drone, GPS, and Mapping survey apps will delineate the SSP at selected Forest Beats on-site. • Determining tree species, endangered species, canopies, forest types, vegetation type, land cover, land use type, etc. • Android-based ODK, GPS survey, and drone survey for delineating plantation sites, • Index mapping of the Beat and regeneration survey. Organize focus groups for community consultation and identify deforested and degraded pockets to schedule all silvicultural operations in the nursery and plantation sites.
Community risk (multi-hazard) assessment and socioeconomic survey at the community level	• Students • Community Member • Ethnic community member • Local Disaster Management Committee (UDMC, Ward DMC) • Member of the forest patrol/Ranger group • Ethnic community member • Expert livelihood group member (lead farmer) • Local Land Surveyor/local NGO survey • Local Farmers/owners of horticulture/nurseries/livestock herders, etc. • Member of Village Conservation Forum (VCF) • Member of People's Forum (PF) • Social actors/social workers • Member of the Co-management Council • Member of Women CPGs • Member of Forest Conservation Club / People's Club • Member of the resource user group • Member of the forest curator/ police	• Village/Mouza/Para (administrative layer), community settlements, etc. • Core zone area & number • Impact zone area & number • Beat area and number • Protected Area (PA) and number, social forestry area, • Sanctuaries, ecologically critical areas, wetland areas, coastal areas, saline prone areas, storm surge areas.	• GIS / RS / Topographical/ Forest map, social map • Hardcopy FGD/KII template, field book, inventory book • Mobile apps

6.4 Develop a mechanism/Application (customize online/offline apps) for SSP data collection

Explore suitable instruments (Drone/UVA, mobile apps) to be surveying Forest Beat level which needs to be electronically approval by the DFO, after this review and finalize the suitable tools and methodology and to be endorsed by the DFO, complementing the demand driven data format to be visible with the online/offline dashboard and other formats.

6.5 Data collection: Conduct Field Survey :

a) **Aerial Survey: Using UAV (Drone), capture high-resolution images/videos for stock taking of trees (count, size, and species types), and** prepare high-resolution maps. Tree inspections and surveys, photogrammetry and modeling, picture and video capture)
b) **Identify the on-site causal effects of deforestation, regeneration, afforestation, and social forestation, by organizing a Focus Group Discussion (FGD) with the following target group**

Team	Target FGD group	Purposes
FGD Team 1	FGD Co-management of social forestry, Management of horticulture, nurseries,	• Identify members/individuals who depend on the forest for livelihood, including wood/timber collectors, bamboo and cane collectors, timber collectors, grass collectors, house broom grass collectors, grazing, livestock herding, fuel wood collectors, honey collectors, etc. • Local livelihood groups residing along the buffer/impact zone and their livelihood activities, i.e., paddy cultivation, fruit tree gardening, vegetable gardening, betel leaf cultivation, and pisciculture.
FGD Team 2	Forest encroacher /resource dependency stakeholders/entrepreneurs	• Identify members/individuals of forest land encroachers, fuel-wood collectors, illicit loggers, forest produce collectors, hunters, farmers, fruit collectors, and tourists. Secondary stakeholders include timber merchants, brickfield owners, hotel/motel owners, furniture businesses, sawmill owners, and others linked indirectly with forest-based activities. • Identify Institutional stakeholders, including the Forest Department, NGOs, Union Parishes, and Police. • Identify CMC, Co-management organization (CMO), Co Management Committee (CMC), Co-management council, Peoples forum (PF) , Village conservation forum (VCF)
FGD Team 3	Forest resource dependency, Local Community/ethnic community, livelihood groups etc.	• Identify members/individuals who depend on forest resources, such as forests, waterbodies, canals, fountains, springs, and water. • Fuel-wood collectors, illicit loggers, forest produce collectors, hunters, farmers, fruit collectors, and tourists.
FGD Team 4	Community risk (multi-hazard) assessment and socioeconomic survey at the community level	• The level of Localized multi-hazards & triggers (cyclone, tropical storm, localized storms, storm surges, salinity intrusion, soil salinity, heavy rainfall induced landslide, tree falls, mudslide, debris fall)

6.5.1 On-site index mapping of the detail component of site-specific planning (SSP)

Type of Survey	Objective	Area
Conducting a drone Survey (Aerial) and ground truthing survey :	For delineating the block, each forest type of block boundary delineation is as follows: core zone, buffer zone, impact zone, beat area, forest blocks, compartments, etc.	Zone, Beat, blocks, compartments
Conducting a drone **survey for stock taking of trees**	count, size, and species types), and high-resolution maps. Tree inspections and surveys, photogrammetry and modeling, picture and video capture)	Zone, Beat, blocks, compartments
Conducting a field survey with a transect walk	for spot verification, ground truthing for boundary delineation, placemark tracking, location tracking, hotspot tracking, etc., with GPS survey apps, Kobo Toolbox apps	Zone, Beat, blocks, compartments, para, Mohallah, Village, etc.

6.5.2 KII/FGD with local user groups (forest resources) :

Consultation	Objective	Area	Local facilitation
KII/FGD with local user groups (forest resource dependency)	Identify the root causes of exploitation & extraction of forest resources - • Organize consultation with land encroachers, fuel-wood collectors, illicit loggers, forest produce collectors, hunters, farmers, fruit collectors, and tourists. Secondary stakeholders include timber merchants, brickfield owners, hotel/motel owners, furniture businesses, sawmill owners, and others linked indirectly with forest-based activities. • Dependency on forest for livelihood, i.e., pisciculture, fuel wood collection, bamboo and cane collection, timber collection, sungrass collection, house broom grass collection, grazing, etc. • Institutional stakeholders include: Forest Department, NGOs, Union Parishes, and Police.	Zone, Beat, blocks, compartments	• Village Conservation Forum (VCF) • People's Forum (PF) • Co-Management Committee (CMC) • Elected representative from villages and local communities within the Protected Area landscape. • Local Disaster Management Committee (UDMC, Ward DMC) • Women, the youth, lower-income households, and essential resource user groups.
KII/FGD with local buffer group	Buffer zone annexed livelihood groups of paddy cultivation, betel leaf cultivation, agroforestry owners, pisciculture owners, etc., to identify the gaps in implementing tree plantation, reforestation, habitat restoration, nature tourism activities, and other management activities of the protected area	Zone, Beat, blocks, compartments	

6.5.3 Putting digital surveillance in the main encroachment pockets:

For incident tracking, install surveillance BFD local units instrumented with a special-purpose Drone to survey stock taking of trees (count, size, and species types), and high-resolution maps. Tree inspections and surveys, photogrammetry and modeling, picture and video capture)

- Identify elephant corridors, exit/entry routes of wildlife, elephant, deer, monkey, and other wildlife
- Identify exit/entry routes of livestock animals for illegal grazing /fodder collection.

6.6 Develop a geospatial online dashboard:

An online geospatial portal (open-source or ESRI ArcGIS portal, map tiles, map layer) with a database can display the map and event online. The interface will be created with field-level apps for directly updating and selecting events in the online map. Evey stakeholder will be connected via apps, instant messaging services, GPS apps adding georeferenced information to server about incidence (illegal encroachment of forest resources, land grabbing, hill cutting, tree cutting, landslide, treefall, hunting wildlife, animal poaching (elephant), illicit logging timber, damaging of trees/seedling, sapling/. The online real-time tracking system will be facilitated on the following surveillance.

- Identify Direct Threats: Encroachment, illicit felling, Wildlife hunting, Forest fire, etc.
- Tracking Brick field, illegal/informal settlement of land inside forest, Illegal housing inside forest, Sawmill, Furniture shop, livestock grazing inside forest
- Tracking annual regeneration rate
- Tracking the annual forest degradation rate

- Tracking annual planting rate
- Tracking degraded areas
- Tracking illegal resource extraction by the extractors and encroachers' livelihood group encroachment
- Mobile apps for community patrols at strategic locations.
- Tracking an instant snapshot from the photo of the most degraded edge point
- Community petrol for forest protection (with apps)

6.7 Review and propose to improve smart patrolling :

Petrol group	Types of equipment	Apps for tracking	Activities
Community Patrol Group (CPG)	• Roaming IP Surveillance camera, • Drone • Android phone / GPS Place mark logger, Kobo Toolbox apps • Crowdsource pictures/event situation updates (georeferenced picture/snapshot) for tracking incidents and sending information to an online dashboard	Kobo toolbox (GPS logger apps) for tracking instant updates/hot spot event directory to a web-based platform for visualization of events.	Tracking forest land encroachers, fuel-wood collectors, illegal loggers, forest produce collectors, hunters, farmers, fruit collectors, honey collectors, local tourists, etc., is directly associated with forest resource extraction activities.
Plant growth and status monitoring	• Roaming IP Surveillance camera, • Drone captured image/video • Android phone / GPS Place mark logger, Kobo Toolbox apps • Crowdsource pictures/event situation updates (georeferenced picture/snapshot) for tracking incidents and sending information to an online dashboard	Kobo toolbox(GPS logger apps) for tracking instant updates/hot spot event directory to a web-based platform for visualization of events.	Co-management committee of south forest division, with ten transect sites, including site-1 (Teknaf), Site-2 (Dumdumiya), Site-3 (Ledha), Site-4 (Hnila-south), Site-5 (Hnila-north), Site-6 (Raingkhali), Site-7 (Saplapur), Site-8 (Shilkhali), Site-9 (Mathabanga) and Site-10 (Rajarchara) etc. to montiir growths of main tress e.g, **Garjan, Jam, Akashmoni, Mehogony, Shegun, Chikrassi, Chapalish, Chatian Jolpai, Dumor, Bohera, Gamar, Sheora, Kat badam, Amloki, Horotoki, Kathal, Lotkon, Bell, Jambura, and Kotbel.**
Establish a Photo point	• Roaming IP Surveillance camera, • Drone captured image/video • Android phone / GPS Place mark logger, Kobo Toolbox apps • Crowdsource pictures/event situation updates (georeferenced picture/snapshot) for tracking incidents and sending information to an online dashboard	Kobo toolbox(GPS logger apps) for tracking instant updates/hot spot event directory to a web-based platform for visualization of events.	Along the block boundary, establish a geofenced photo point for regularly capturing georeferenced photos and sending them to the server to get to know the weekly/bi-monthly/monthly status of encroachment, periphery area livelihood actions (agriculture and farming), creating alert messages to the SSP team for punitive action. Control of forest grazing through patrolling
Monitor soil topography	• Roaming IP Surveillance camera, • Drone captured image/video • Android phone / GPS Place mark logger, Kobo Toolbox apps	Kobo toolbox(GPS logger apps) for tracking instant updates/hot spot event directory to a web-based platform for visualization of events.	**Collect soil samples and research on land degradation potentials**

Petrol group	Types of equipment	Apps for tracking	Activities
	• Crowdsource pictures/event situation updates (georeferenced picture/snapshot) for tracking incidents and sending information to an online dashboard		
Oversight of Landscape Transformation	• Roaming IP Surveillance camera, • Drone • Android phone / GPS Place mark logger, Kobo Toolbox apps • Crowdsource pictures/event situation updates (georeferenced picture/snapshot) for tracking incidents and sending information to an online dashboard	Kobo toolbox(GPS logger apps) for tracking instant updates/hot spot event directory to a web-based platform for visualization of events.	Tracking incidence and hotspot, event situation reporting to main server
The FAO developed a landslide early warning system for the co-management of forests from degradation	• Roaming IP Surveillance camera, • Drone • Android phone / GPS Place mark logger, Kobo Toolbox apps Crowdsource pictures/event situation updates (georeferenced picture/snapshot) for tracking incidents and sending information to an online dashboard	Kobo toolbox(GPS logger apps) for tracking instant updates/hot spot event directory to a web-based platform for visualization of events.	Develop a strategy and a mechanism for a weather forecast-based forest/sanctuary protection early warning system.

6.8 Data integration and comparison

All GPS placemarks and Kobo-Toolbox collected data were verified with Google Maps to check data quality, design survey areas, and identify non-survey areas for next-level surveying. All the data collected were integrated and compared. Both alignment and data content were checked. All the GIS data were displayed; otherwise, the accuracy was compared with the reference layer. Accuracy was also compared among the sources.

6.9 Online dashboard for Site Management:

a) Develop geospatial platform (Open source/ ESRI ArcGIS / Map tiles/ Map Layer, etc) :

To facilitate ICT-driven, evidence-based geospatial services-enabled facilities, MoRPH intends to install and operationalize a Geospatial platform (ArcGIS Platform), interfacing with ArcGIS/QGIS software, and uploading delineating and tracking impacts over the following zones.

Site	Core zone	Buffer zone	Impact zone	Support Service	
site-Teknaf	• Identify the forest degradation pocket, deforested pockets, , and vulnerabilities (salinity intrusion areas, ground water polluted areas, water logging areas, degradation pockets, degradation and regeneration rates, gaps	• Delineation of buffer boundary, conduct aerial surveys, conduct a transect walk by the s, etc., damage of socioeconomic infrastructure, systemic loss and damages (L&Ds) elements of impact areas for encroachment, entry points for theft resources, other and residual effects of human activity in the adjacent	Delineation of the impact boundary and tracking the residual impacts from the livelihood activity group exerting threats to the forest	Beat offices, Range offices, NSP offices, Guest houses, and Police stations have apps that monitor and track incidents.	Applying GIS techniques, the spatial boundaries are analyzed to determine the impact level

Site	Core zone	Buffer zone	Impact zone	Support Service	
		areas, and the sanctuary environment • Identify elephant corridors, exit/entry routes of wildlife, elephant, deer, and other wildlife • Identify exit/entry routes of livestock (cattle, buffalos, goats) for illegal grazing /fodder collection.			

6.10 Analysis of hydrometeorological factors for forest delegation and regeneration:

Monitoring local extreme weather events (heavy rainfall, heatwave, dry spells, coastal surges, salinity intrusion, etc.), quantifying climate-induced loss and damage(L&Ds), and proposing adaptive measures. Access the FAO developed Slope map, Land Degradation map, landslide early warning system, and capacity building for SSP -FD for adaptive planning/actions.

6.11 Prepare a hydrometeorological multi-hazard map:

Develop a multi-hazard exposure, risks, and vulnerability risk atlas and analyze the impacts on the forest elements.

6.12 Feeding local level Impending multi-hazard exposure, risk, and vulnerability by the Uapzila, Union & Ward Disaster Management Committee to the geospatial platform:

A mobile phone (Android)- based WhatsApp group and GPS apps will be installed, oriented to the Beat offices, Range offices, NSP offices, Police stations, Village Conservation Forum (VCF) , People's Forum (PF), Co-Management Committee (CMC), Elected representative from villages and local communities within the Protected Area landscape, Local Disaster Management committee (UDMC, Ward DMC), Women & youth-led group with apps based monitoring and tracking incidences to provide the forest site-specific petrol and incidence report to the central server etc. to provide the forest site specific petrol, incidence report to central sever for visualization.

7.0 Timeline with key Milestones:

Activities	Timeline																													
	June 2025				July 2025				Aug 2025				Sep 2025				Oct 2025				Nov 2025				Dec 2025				Jan 2026			
	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
1) Inception Report, in consultation with PIU and RIMS Unit of BFD; 2) A sharing workshop at BFD.																																
Finalizing the approaches of a) development of a web-based Site-Specific Planning application operational at the Field and National level. b) development of SSP application.																																
Development of Site-Specific Plans (SSPs); module at BFIS																																
Reporting interface demonstration to BFD for SSP database management for Reporting.																																
Functional SSP Interface by Database, Server and GIS experts, with Operational Acceptance Testing (OAT) and User Acceptance Testing ng (UAT) at PMU and 3 sample Field Divisions																																
Orientation of RIMS Unit (BFD) team members																																
GIS Support for SSP Mapping																																
Technical supervision and support by PIU																																
Finalizes on SSP development with functional interface and Comple on report																																

8.0 Name, designation, and short brief about the key team member of the Consultants:

Name & Proposed Position	Professional Qualification	Remarks
Md. Mozaharul Alam **Team leader**	Md. Mozaharul Alam holds **an MSc and a BSc in Forestry from the University of Chittagong and an** MSS in Governance and Development Studies from Jahangirnagar University. Having over 15 years of progressive experience in forest restoration, community-based natural resource management, climate resilience, and livelihood development, he has worked with renowned organizations including NACOM, Shushilan, CNRS, and SHED, among others, under projects funded by USAID, WFP, FAO, and IOM. His core competencies include project coordination, stakeholder engagement, M&E, capacity building, and disaster risk reduction, with proven success in implementing integrated forest conservation and sustainable development programs in challenging environments. Mr. Mozaharul Alam is a forestry professional with a Master's in Forestry & Master's in Governance and Development Studies, with over a decade of experience in natural resource management, ecosystem restoration, and climate change adaptation. I have worked extensively with government agencies, NGOs, and international development partners, leading and supporting forest restoration, afforestation, and biodiversity conservation initiatives. My skills include project planning, stakeholder engagement, GIS applications, and policy analysis. I bring a strong track record in implementing community-based forest management programs and sustainable landscape restoration strategies aligned with national and international environmental goals.	Detailed CV attached
Z M Sajjadul Islam: Deputy team leader (Geospatial Developer, Risk assessment Specialist) (Master in Disaster Management, MSc in Geography, MBA)	Mr. Islam has completed a Master's in Disaster Management, a Master of Science (MSc) in Geography & a Master's in Business Administration (MBA) with MIS, and a result-oriented total of 26 years of professional experience. Having 13 years in UN Agencies. e.g UNRC Office, UNDP (Mongolia, Bangladesh), UNCDF, UNDRR-Africa/ROAS, UN-Women, WFP, UNDP-GEF Financed environmental management program (UNDP & Local Governments), GIZ-Bangladesh in eight developing countries(Bangladesh, Mongolia, Niger, Malai, Mozambique, Zimbabwe, Somalia, Ghana) in the aeras of Multi-hazard early warning, GIS Mapping, geospatial platform development, Impact forecasting, Climate and Multi-hazard Risk Assessment. Worked as DRR Coordination Specialist at Cox's Bazar UNDP Sub-Office. Engaged Over 15 years of professional experience with Government sector ministries & local governments (Bangladesh, Mongolia) in the DRR, CCA, and regional climate governance (UNDP, UNCDF, Local Governments). He has specialization in ICT tools-based multi-hazard early warning development (in UNDRR-Africa and Mongolia), database development, information management & online geospatial service & web applications development. Expertise in GIS mapping, IT tools (GIS, GPS, drone, Apps) based multi-hazard & climate risk & vulnerability assessment (UNDP), risk-informed tools, climate resilient planning, etc (UNDRR-Africa, UNDP-Mongolia, Bangladesh).	Detailed CV attached
Md. Mesbahuddin Malik Software/Database Engineer (Head of IT) **B.Sc. in Electrical & Electronic Engineering**	Head of IT or CTO, leveraging over 20 years of expertise in IT, software development, system administration, and cloud computing to drive innovation and operational excellence.	Detailed CV attached
Md. Khyer Ali GIS Expert MA & BA in Geography	Mr. Ali is a renowned RS & GIS professional in Bangladesh. He is highly experienced in Remote Sensing (RS), Geographic Information Systems (GIS), Web-GIS Programming, Spatial and Non-Spatial Database Development. He has pursued Master of Geography and Environmental Studies and obtained Post Graduate Certificate in GIS with specialization in Global Positioning System (GPS) and Remote Sensing, Mapping Course and Computer Cartography from Rajshahi University, Bangladesh. He has more than 23 years of multidisciplinary working experience in National and Development Partner Organizations. So far, he has worked in Local Government Engineering Department (LGED) as GIS Specialist (Consultant), in United Nations Development Programme (UNDP) as Sort Term National GIS Consultant, Hifab International AB, as Land Acquisition & Mapping Expert, Sundarbans Environmental and Livelihood Security (SEALS) Project, Forest Department as Consultant (GIS Expert), JICA Expert Team, Dhaka City Corporation as Consultant (GIS Specialist), Family Health International(FHI) as Consultant (GIS Specialist). He is also experienced in GIS data capturing using GPS, Satellite and Drone based Imagery (Drone Survey Data processing by drone deploy flight planning, DroneDeploy Mapping, UAS Master, Summit Evolution Software), GIS based Urban and Rural Planning, GIS based Suitability Analysis for Urban Development, RS&GIS based Urban Planning using Building Footprint captured from Satellite Image. He has field experience in collection of Building Inventory using Building Footprint. He has good knowledge of Training Manual Development. He is very much conversant using different Commercial and Open Source Software for Web Application Development. The software includes ArcGIS/ArcGIS Pro, QGIS, ArcGIS Server,	Detailed CV attached

Name & Proposed Position	Professional Qualification	Remarks
	Enterprise Geodatabase, Geo-Server, City Engine, ArcGIS Field Maps, QField, ArcGIS Survey123, KoboTool Box, Google Map (Google Earth), Atlist, Google My Maps, Erdas Imagine, ENVI, Leaflet/Openlayers, JavaScript, HTML, CSS, Enterprise PostgreSQL, PostGIS, MySQL, and PHP etc. He is quite good at designing Cartography Map layouts. He is very much interested in Utility Networks, Networks Analyst, Linear Referencing, and Land Acquisition planning.	
Tanveer Ahmed IT expert	BSc in Computer Science, with 5 years of experience in an NGO.	Detailed CV attached
Surveyors (5 Groups, 6 Surveyors)	Education: Graduation/HSC	