**Terms of Reference**

**To develop trigger alert tool to activate Early Action Protocols for cyclone and flood**

## Background

The Bangladesh Red Crescent Society (BDRCS) and German Red Cross (GRC) with technical support from the Red Cross Red Crescent Climate Centre (RCCC) are implementing a new approach in Bangladesh- Forecast based Financing (FbF)- to act before the impact of an extreme weather event based on forecast. FbF is an innovation that identifies forecast-based thresholds on various timescales, which trigger disbursement of funds and implementation of short-term actions in the critical window of time after a forecast but before a disaster. The trigger in the context of flood will be activated if the probability of the forecast is high enough and shows the depth and duration of the flood exceeding identified limits (express in-term of hazard intensity -return period e.g. 1 in 10 years’ flood) and have sufficient impact potential on a community’s live and livelihood of the vulnerable community.

In phase 1, GRC with BDRCS and RCCC were relying on FFWC/BMD and other global/regional climate institutes for flood and cyclone forecasts for the pilot areas. FFWC/ BMD are the key national institutes to monitor the triggers, however, with current resources and capacities they cannot ensure a continuous and automatic monitoring of all relevant forecasts. In BDRCS, the technical capacity to interpret forecast advices provided by FFWC/BMD to ascertain whether a trigger has been hit is limited. The FbF approach foresees a system and tool to monitor FbF triggers and ensure a continuous monitoring of flood and cyclone forecasts, specifically during the hazard seasons. This trigger alert tool will use forecast information from FFWC/BMD and global and regional institutes to identify 1) the area’s most likely to be impacted by the hazard, and 2) the lead time for implementation of early actions. Ideally, the alert tool will indicate when a forecast threshold has been reached and identify the sub-district and Unions in the area likely to be likely severely affected with a ranking system.

## Objective

The objective is to develop a web-based software (alert tool) to monitor hydro-meteorological forecasts and observations and generate trigger alert message/notifications (SMS and/or email – internal for BDRCS) to support the activation of the Early Action Protocol (EAP) once the trigger is reached. The alert tool shall be an open source web-based tool covering the flood exposed area of major rivers (Jamuna, Meghna, and Padma) and the cyclone prone coastal area of Bangladesh.

The consultant will develop the alert tool in close collaboration with Bangladesh Meteorological Department, Flood Forecast and Early Warning Centre (FFWC) of Bangladesh Water Development Board, BDRCS and other key stakeholders. The tool should be flexible to update, upgrade and include new hazards and area of interest and able to produce outputs in GIS platforms.

## Information and data provided from BDRCS/GRC to the Consultant

BDRCS/GRC will provide all background information and relevant data/information pertaining to this assignment and facilitate necessary arrangements. This will include, but not limiting to:

***Alert tool for floods***

1. Providing historical data on water level and discharge for all the forecasting stations in the Jamuna river basin (five day lead time with more than 50% time the prediction is accurate) from BWDB/FFWC. The Technical Advisor of the RCCC will analyse the flood frequency (1 in 5, 10, 25, 50 and 100 year) of all the FFWC forecasting stations where this data has been collected.
2. Providing GIS data layers (on population, poverty, house type and embankment)
3. Definition of the impact level: When more than 30% of houses are forecasted to be impacted.
4. An institutional arrangement with FFWC to access relevant data and maps. Ensure on-boarding and participation of FFWC/BWDB in the process.
5. Arrangement of meetings and consultations as required.

***Alert tool for cyclones***

1. Providing information/data on historical cyclone track data (date, location, and wind velocity), landfall and impact, and impact hazard curves.
2. Definition of the trigger criteria: When the forecast has sufficient probability (for example, over 50%) and when the cyclone’s intensity is high enough (for example, wind velocity over 125km/hr; storm surge height over 3 meter; or 1 in 5 year return period) to exceed the coping capacity (for example, over 25% of assets damaged) of the vulnerable community.
3. An institutional arrangement with BMD to access data. Ensure BMDs participation in the development of the tool.
4. Arrangement of BDRCS, Cyclone Preparedness Programme (CPP) and BMD joint workshops on cyclone watch and on the alert system.

##  Scope of Work

The output of the assignment is to:

* ***Design Phase:*** Develop a prototype of the alert tool and validate it with key users including BDRCS, PNSs, WFP, DDM, and others.
* ***Testing and Finalizing Phase:*** Finalize the user-friendly alert tool incorporating inputs and feedbacks from key users.
* ***Hosting:*** Host the system in cloud.
* ***Functional Phase:*** Provide essential trainings to users and admins to enable them for operating, upgrading and maintaining the alert tool.

In order to deliver the outputs mentioned above, following is the suggestive scope of work to be undertaken

1. Collate and organize data provided by GRC/BDRCS and produce metadata on:
* GRC installed water level monitoring data for seven stations
* BWDB and BIWTA data
* FFWC historic and real time flood forecast data
* BMD rainfall, temperature and cyclone observed and forecast
* global and regional hydro-metrological forecasts and observations
1. Collate and organize GIS data
	* GRC collected data
	* impact data from reliable source
	* recent poverty data
	* data on beneficiaries of the social safety net programme (depending on availability)
	* relevant layers for the tool
2. Review the forecast data of FFWC, BMD and Disaster Management Information Centre (DMIC)
3. Prepare system flow diagram and prototype of the alert tool together with FbF team, BMD, FFWC, BDRCS, CPP and DDM.
4. Develop the computational engine and algorithm to combine the exposure map, hazard map, vulnerability map in order to identify the intervention unions
5. Develop the alert tool based on impact-based forecasting and set criteria for triggering an alert message to the user
6. Develop, test, and adjust the flood and cyclone alert tool
7. Develop a manual and conduct trainings on the use of the alert tool
8. Produce monitoring report
9. Any other tasks as seen necessary

## Deliverables

* Operational Open Source Web based[[1]](#footnote-1) user-friendly Alert Tool for Trigger to advise to get prepared and to activate early action based on set of criteria and procedure.
* Technical document and manual for the users and admin support.
* Training of technical professionals from the FFWC, BMD, BDRCS, CPP, GRC, DDM and other
* The output real time map connection with interactive displays to visualize flood/cyclone situation and advice
* Arrangement of hosting the system in clouds.
1. **Timeframe**

The assignment will start right after issuance of work order. The final version of the web-based software (alert tool) should be **submitted by mid-October, 2019.**

## Qualification

The lead consultant must have the following qualifications:

* A postgraduate degree in computer science or engineering or equivalent.
* Proven experience in developing open source GIS and web-based software and applications. Working with natural hazard data is considered an advantage.
* Working experience with BMD, FFWC, Red Cross Red Crescent movement is considered an advantage.
* Experience in developing algorithm
* Experience in conducting training
* Good language command of English; both speaking and writing is required.

## Technical and Financial Proposal and payment schedule

The technical proposal should include but not limiting to application model, design and programming mythology, scripting language, RDBMS, development language, application server, web browser, server, OS, API, API type, API access technology, Report, mapping, Graphing/Cart, schedule etc. along with a system structure/diagram and process on place.

Financial proposal should be done considering the following task:

* web-based software development including analysis & system design, dashboard and integration
* Test run, infrastructure setup
* Training, capacity building,
* Regular maintenance
* Tax will be deducted as per government rule

Payment will be made in three phases: 20% on signing the contract, 30% on submission of the prototype, and remaining 50% on satisfactory completion of the assignment.

## Method of Application

Interested individual/ firm are invited to submit proposal by 28 June, 2019 through email to hr.dhaka@grc-bangladesh.org with the following documents:

* **Individual/ Firm profile:** CV of expert/s including records on past experience in similar assignment and references
* **Technical Proposal:** with detailed description of deliverables, methodology, tools, technology and work plan along with samples (at least two) of previous work
* **Financial Proposal:** listing all costs associated with the assignment including consultancy fees for database development, test run, training, maintenance, tax etc.
1. Compatible with mobile platforms [↑](#footnote-ref-1)