Terms of Reference

Flood Hazard Mapping Expert (Hydrologist/Hydraulic Engineer)
for
Flood/inundation hazard mapping and upgrading of hydro-meteorological station in Madi and Seti Sub-River basin to support flood early warning system

1. Introduction

Hariyo Ban Program phase II builds on the advances made in biodiversity conservation and climate change adaptation along with gender equality and social inclusion (GESI), and governance as the important cross-cutting components. The goal of Hariyo Ban II is **increased ecological and community resilience in the Chitwan-Annapurna Landscape (CHAL) and the Terai Arc Landscape (TAL).** This will be achieved through two objectives: improve the conservation and management of GON-identified biodiverse landscapes- CHAL and TAL; and reduce climate change vulnerability in CHAL and TAL. The Program is funded by the United States Agency for International Development (USAID) and being managed by a consortium of World Wildlife Fund (WWF), Cooperative for Assistance and Relief Everywhere (CARE), Federation of Community Forest Users Nepal (FECOFUN) and National Trust for Nature Conservation (NTNC).

In order to reduce climate change vulnerability in CHAL and TAL the program has been supporting planning and implementation of climate change adaptation (CCA) and disaster risk reduction (DRR) interventions as per policies and guidelines of the Government of Nepal (GON). Climate vulnerability assessment of TAL and CHAL has highlighted that flood is one of the serious hazard which has been causing disasters each year. Climate change has a bearing on flooding, which has major implications, not just for livelihoods and food security, but also for overall strategies for adapting to climate change. The impacts of past flood events suggest what future impacts are likely to be if extreme floods become more frequent. They also give indications of how we have to respond the flood hazards. One of the important measure of flood disaster risk reduction is flood/inundation hazard mapping and installation of early warning system. Reliable hydro-meteorological data analysis and proper communications between upstream and downstream communities as a means of early warning systems can help to minimize the loss from the flood to great extent. For this adequate number of hydro-meteorological stations need to be established or maintained. Hariyo Ban Program focuses its intervention in critical and climate vulnerable complexes, corridors, river/sub-river basin, blocks, watersheds / sub-watersheds/Micro-watersheds which include part or whole of Metropolitan city, Municipalities and Rural Municipalities within priority landscapes. Seti sub-river basin of the Gandaki river basin is one of the climate vulnerable sub-river basin within the programs working area. According to Narayani River Basin Office, DHM also suggested that Madi River Sub-basin is also another vulnerable area that to be included in this assessment process.

In Annual Work Plan of year III, an important activity - 'Flood/inundation hazard mapping and upgrading of hydro-meteorological station in Seti Sub-River basin to support flood early warning system' is planned. This activity need to be implemented in year III in consultation with Department of Hydrology and Meteorology (DHM), Hydrology Division, Flood Forecasting Section.

In this connection, CARE Nepal, Hariyo Ban Program is seeking Flood/inundation Hazard Mapping Expert (Consultant) for the following specific task.

2. Objectives of the Study

Overall Objective:
The overall objective of this assignment is to support flood/inundation hazard mapping, upgrade hydro-meteorological station in Seti and Madi Sub-River basin to support flood early warning system.

Specific Objectives:

- To identify flood/inundation hazard prone areas along sides of Seti and Madi river and prepare hazard maps with reference to the water levels in Madi River (at Shishghat, Lamjung and Damauli station Tanahun) and Seti River (at Jyamirebari, Machhapurchchhre Rural Palika Kaski and Damuali station, Tanahun).
- To identify and recommend hydro-meteorological stations that need to be upgraded in Seti and Madi sub river basin.
- To support establishment of early warning system.

3. Methodology and Scope of Work

Broader scope of the flood/inundation hazard mapping and upgrading of hydro-meteorological station in Seti and Madi Sub-River basin to support flood early warning system include:

- Flood / inundation hazard mapping in Seti-sub river basin from Gaighat (confluence of Seti and Trishuli river) to Jyamirebari at Kaski; and from Tal (near Sikles) to Damauli, Tanahun of Madi River
  - Communication/coordination with local governments and DHM
  - Flood/inudation hazard mapping and sharing of results with stakeholders
  - Final report endorsement by DHM
- Upgrading of hydro-meteorological station in Madi between Tal at Sikles to Damauli and Seti Sub-River basin to support flood early warning system between Jyamirebari and Gaighat (confluence of Seti and Trishuli river)
  - Assessment of hydro-meteorological stations in Seti and Madi Sub-River basin in consultation with DHM
  - Identification of hydro-meteorological stations that need to be upgraded in consultation with DHM
  - Support upgrading of gap identified hydro-meteorological stations
  - Establishment of early warning system

Considering above mentioned broader scope, the consultant shall carry out the following works during the contract period:

The work at each station should consist of the following:

- Acquire/Prepare DEM for the area from the available high resolution data and other point elevation data available at the Department of Hydrology and Meteorology/ Department of Survey.
- Evaluate Manning's n and establish stage-discharge relationships from measured discharges and cross-section survey.
- Set up and run hydrodynamic model (e.g. HEC-RAS, MIKE 11, GeoSFM or similar) for the area and generate different scenarios of flooding and hazard map for the area for different water level at each flood forecasting station.
- Find out danger level (threshold water levels) above which there would be significant flooding and damage to life and properties downstream.
- Assess warning level (water level less than danger level but warning should be issued).
- Validate the flood warning level and danger level using field information and DHM data.

- Prepare inundation maps (1:50,000) for danger level, warning level and in the interval of every 1m above danger level upto 5m above flood marks of both the stations for the area.
- Estimate the number households affected by danger level flood and each hazard scenarios of above danger level.
- Mark the warning level and danger level at the forecasting station with different color by erecting flood pillar.
- Prepare and submit reports, share with stakeholders and incorporate comments/suggestions in the report.

Inception Report, Draft Report and Final reports have to be presented to a panel of concerned staff of CARE Nepal, Hariyo Ban Program and DHM technical staff (Hydrologists, Technical Evaluation Team) and other invited experts if needed. Payment to the consultant will be made after recommendation/approval of the reports by DHM focal person.

4. Required qualification and experience:

The consultant should have following q**ualification and experiences at minimum**

a. Bachelor Degree or above in civil engineering or water resources or hydrology or meteorology or any other relevant field
b. Minimum 3 years of professional experience in relevant work/projects
c. Excellent in Nepali and English writing as well as speaking

5. Supervision and Coordination

The consultant will report to Team Leader, CARE Nepal, Hariyo Ban Program and focal person of DHM. S/he will be in regular coordination with CCA Advisor for technical support and with Team Leader for managerial support. In addition, s/he will work closely with CCA and DRR Specialist, respective Field Coordinator of CARE Nepal, Hariyo Ban Program. Administrative arrangement will be managed by CARE Nepal, Hariyo Ban Program with support of procurement, finance and admin unit of project office.

6. Role of CARE Nepal, Hariyo Ban Program

CARE Nepal, Hariyo Ban Program will support the consultant by providing resources and available information, facilitating coordination with different stakeholders and logistic arrangements to the consultant. Specifically, CARE Nepal will be primarily responsible to:

a. Coordinate with stakeholders for necessary cooperation and support.
b. Facilitate sharing and feedback collection on the report submitted by the consultant.
c. Support the consultant by providing financial resources as per the agreement,
d. Monitoring and providing feedback and suggestion
e. Support in arranging logistics as per agreement.

7. Role of consultant

The consultant will be responsible to execute the entire task in close coordination with Team Leader, CARE Nepal, Hariyo Ban Program and Focal person of DHM. More specifically, the roles and responsibilities of the consultant will be as follows:

a. To complete the entire task with due quality and within stipulated time.
b. Coordinate and ensure high ownership of the local government and DHM in the process.
c. Prepare all reports mentioned in the deliverables
d. Submit the work completion report and other invoices in time as per agreed deadlines
e. Take prior approval of the contact person in case any additional work is required.
f. Comply with the norms and policies of the donor USAID and CARE Nepal, Hariyo Ban
g. Program as required and effective.

8. Time frame:

The assignment will be for 3 Months in between last week of December 2018 – 30 March 2019.

9. Key deliverables

The consultant should deliver following deliverables within the time of the contract.

S.N.	Deliverables	Reports to be Submitted	Due Date
1.	Inception Report	Electronic Copy and 3 Hard Copies	30 Dec 2018
2.	Draft Report	Electronic Copy and 3 Hard Copies	30 February 2019
3.	Final Report along with	Electronic Copy and 3 Hard Copies	20 March 2019
4	Photographs and maps	Electronic Copy and 3 Hard Copies	20 March 2018

The final deliverable (s) should be submitted to CARE Nepal, Hariyo Ban Program **NO LATER THAN 105 DAYS** of the agreement.

10. Remuneration and logistics:

A total of 3 months have been estimated for the task to work on monthly basis. The consultant have to submit the cost estimation stating remuneration on monthly basis in package that also includes the cost of transportation, accommodation and food during the field visit. Consultant should manage the transportation, accommodation and food by her/him-self. CARE Nepal will support one staff to accompany in the field.

11. Mode of payment

The entire work of the resource person will be paid based on the satisfactory execution of deliverables, recommendation of DHM focal person and required invoice and bills after completion of the assignment. Monetary transaction will be done through bank account; direct cash/cheque payment will not be done. Any VAT bills should be in the name of **"CARE Nepal/USAID/Hariyo Ban Program"**. GoN taxation policy will be applied in all form of payment.

Payments will be paid in local currency as per standard procedure. The consultant shall provide CARE with periodic and final invoice statements indicating services performed, expenses incurred, past payments made and any other information CARE shall reasonably request. Consultant shall provide a final invoice statement whenever requested by CARE up to sixty (60) days after the date set for the completion of the Services in this TOR.

CARE Nepal will withhold and or make reduction in the payment of consultancy fee if all terms and conditions, including specified deliverables, are not met in a satisfactory manner within the agreed timeline in spite of providing suggestions to the consultant. CARE Nepal will inform the consultant about such issues in writing and give the consultant opportunity for clarification before making final decision.

The interested consultants can obtain the Terms of Reference (ToR) of the assignment and Vendor Profile form CARE website **http://www.carenepal.org/calls.php** and clicking on **TOR# Flood hazard mapping Expert (Hydrologist/Hydraulic Engineer)** for Flood/ hazard mapping and upgrading of hydro-meteorological station in Madi and Seti Sub-River basin to support flood early warning system**.**

Deadline for submission of proposals is 5:00PM, 20th December 2018**.** Proposals should be submitted/e-mailed to below address:

E-mail: deepa.gurung@care.org

CARE Nepal, Hariyo Ban Program
Siddhartha Marga, Nagdhunga, Pokhara
Phone 061-522242/43 ext# 101