

Draft Methodology – Risk Assessment and Evaluation of Probability of Extreme Hydrological Events and Recommendation on Subsequent Disaster Management for Noakhali Sadar and Shubarno Char Upazilas

1. Background Information:

This is a sub-component of a bigger project – *Promotion of adaptation to climate change and climate variability in Bangladesh* financed by Netherlands Climate Change Assistance Program Phase II (NCAP). The project will be implemented in Noakhali coastal district and detailed studies will be undertaken in two upazilas there, viz. Noakhali Sadar and Shubarno Char, which used to be one upazila only a couple of months back. A Work Plan has been prepared in March 2005 and the project is under implementation. In the Work Plan (under article *1.2 Thematic areas of focus* page 2) it has been stated that “*Under the project, the study will also focus on the probability of extreme hydrological events to make specific predictions in order to combat with future climatic scenarios.*”

2. Objective of the main project:

The principal objective of the current project is to create enabling conditions in Bangladesh for promoting adaptation to climate change and climate variability in national policies and plans and also at the local community level.

Following are the specific objectives of the study:

- To **raise awareness** through dissemination of information regarding impact, adaptation and variability to climate change among local community in the study areas as well as among key national policy makers.
- To prepare a **set of recommendations** to integrate climate change adaptation in various national actions with focus on issues related coastal zone management.

3. Purpose of this study

This particular sub-project of the total project will contribute to understanding the probability of extreme hydrological events and make specific predictions to combat the future climatic scenarios.

4. Duties and Responsibilities

The consultant will have the overall responsibility of developing the report on risk assessment and evaluation of probability of the extreme of extreme hydrological events. The consultant will also be responsible for plotting the available data on a GIS based model.

The specific task will include, but not be limited to, the following:

- Finalising the methodologies which would be used while conducting the study.
- Collecting data and secondary information on various extreme meteorological and hydrological events, including data of surrounding hydro-methodological statistics, as available and appropriate to the project area, that is, Noakhali Sadar and Shubarno Char upazilas.

- Analysing the available data on the following aspects with a view to identifying unusual events associated with the phenomenon of climate variability. The meteorological aspects to be studied are as follows:

- I. Temperature
- II. Precipitation
- III. Sea level rise
- IV. Cyclone and Storm Surge

Along with these, the study will also include other hydrological aspects that contribute to the climate variability.

- Identifying the natural variability of extreme weather events peculiar to the coastal region.
- Analysing the trends of meteorological and hydrological aspects viz. Temperature, rainfall, storm surge, wind speed etc. Climate variability induced probable changes in trend or pattern, frequency and duration will also be indicated.
- Reviewing the local institutional capacity mechanism in minimising risk and other institutions which have the possibility and potential to be involved in minimising practicable extreme hydrological events.
- Mapping/plotting the data into the GIS model based on comparative risks and natural hazards. The model will cover the vulnerable zones, extent of vulnerability and predictive modelling.
- Carrying out consultations at the project site with the key stakeholders to obtain information on past hydrological events.
- Predicting future hydrological events based on the extreme events that occurred in the coastal regions, specifically in Noakhali Sadar and Shubarno Char upazilas now.
- Preparing the final study report.

5. Expected output

- Methodology of the study
- Draft final report
- Draft GIS map and report
- Final report
- Final GIS map and report
- Presentation for the National Workshop

6. Proposed methodology

6.1 General

Although the study will be centred at the coastal upazila Noakhali Sadar, but the impact of hydrological and meteorological events transcends upazila boundary. In order to properly appreciate and evaluate the vulnerability of Noakhali Sadar area the study should encompass at least the entire Meghna estuary.

6.2 Data Source

Bangladesh Water Development Board (BWDB) and Bangladesh Meteorological Department (BMD) have their Hydrological and Meteorological Network in the Meghna Estuary. Bangladesh Inland Water Transport Authority (BIWTA) also has their tidal Water Level Station Network in the estuary. A GIS map will therefore be prepared showing the location of hydro-meteorological network in the area (Meghna Estuary).

A database of hydrological and meteorological data was prepared by including the data of BWDB and BMD during the study and preparation of the document "**Bangladesh National Dialogue on Water and Climate: Variability Induced Extreme Events-2002**". The database includes tables of information ranging from temperature, rainfall, wind speed, cyclone landfall data, cyclone disturbance and storm surges. In consultation with the agencies concerned, the database will be updated to include up to date information and any new information that they might have collected in the Meghna estuary region.

6.3 Past studies

There have been major changes in the morphology of the Meghna estuary. Construction of crossdam-1 and crossdam-2 has caused accretion of large areas in the Noakhali region. In the recent past BWDB has completed a pre-feasibility study on the Meghna Estuary. Another on going study in the area is Integrated Coastal Zone Management (ICZM).

World Bank has also published a report on Bangladesh Strategy for the adaptation of Impact due to Climate Change.

SAARC Meteorological Research Centre, Dhaka has also made a number of publications and these will be collected and consulted.

Related papers, publication and data will be collected from the relevant authority and will be used in the context of present study.

6.4 Data analysis

All time-series data will be analysed for trend and variability. Annual extreme events will be analysed by using a few theoretical frequency distributions. Attempts will be made to separate out the extreme events that cannot be properly defined by the natural frequency curve of the station concern. Investigation will be carried out to find any relationship of these extreme events with climate change.

Rainfall by seasons (Pre-monsoon, Monsoon, Post-monsoon and Dryseason) will be defined and frequency and trend analysis will be done to identify any change in the variability of seasonal rainfall with climatic change.

Past cyclone landfall and storm surge data as available from the updated database will be analysed to identify any effect of climate change on the frequency, wind speed and storm surge associated with cyclone.

6.5 GIS maps

Project site will be visited, BWDB and LGED field offices will be contacted and necessary information will be procured to prepare GIS maps for various infrastructures and natural features. Design information particularly the crest level of embankments and roads inside and outside polders will be collected.

6.6 Discussions with the stakeholders

Two group discussions (FGD) will be held with District Administration and public representatives such as Members of Parliaments, Members of Municipalities and Union Parishad Members followed by another FGD with the BWDB, LGED, PHE, DAE and Engineering Members of Municipalities. In the first Group Discussions, requirement of the people will be identified and in the

second FGD an outline of recommendation for disaster management will be formulated. This arrangement will enable identification of components that are already under implementation by the respective GoB Agencies. Modification of project components necessary to take into account of the impact of climate change will also be identified.

6.7 Presentation in the National Seminar

Draft report will be presented in the National Seminar. Based on the recommendation, the draft report will be finalised.

7. Draft methodology has been formulated by following the draft TOR. Methodology may be finalised after further discussion.

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