

# Determining Flash Flood Danger Level at Gauge Stations of the North East Haor Regions of Bangladesh

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## Abstract:

According to Flood Forecasting and Warning Center (FFWC) of Bangladesh Water Development Board (BWDB), the Danger Level at a river location is the level above which the flood may cause damages to nearby lives, crops and homesteads. The present danger level designed by the FFWC is prepared and updated considering the riverine flood of monsoon season (June-September). But still-now there is no up-to-date information about the danger level of flash flood of pre-monsoon period (March – 15<sup>th</sup> May), which attacks Bangladesh almost every year for ones or twice and causes heavy damage due to sudden onset and having high velocity. The north east region of Bangladesh is highly vulnerable to Flash flood due to surrounding hilly areas and presence of numerous large, deeply flooded depressions between the regional rivers there. Due to lack of proper information on danger level of flash flood, the economy of Bangladesh is adversely affected as the only crop (Boro) of northeast region is adversely damaged in this flood. Submersible embankments have already introduced by BWDB in north east haor areas to provide protection to the people and crop from the flash floods. But that is not enough. So fixation of a reliable danger level for northeast region is a need of the day, which will further help in daily forecasting and early warning of the flash flood and thereby protect the Boro crop of that region. In this study, the danger level of northeast region has been fixed on the basis of flood frequency analysis and existing submersible embankment height. The flood frequency with return period of 2.33, 5, 10, 20, 50 and 100 years are determined for 50 stations of north east region. The required 3-hourly water level data of these stations are collected from BWDB for the year of 1996 to 2014. The flood frequency analysis is done on the basis of goodness of fit (PPCC and RMSD) and statistical behavior study (L Moment Ratio Diagram). Six distributions are checked - Lognormal, Lognormal type III, Pearson type III, Log Pearson type III, Gumbel Distribution and Generalized Extreme Value Distribution. Among the candidate distributions, it is observed that generalized extreme value distribution most perfectly represents the statistical characteristics of observed water level data for northeast region of Bangladesh. In this study the flood level with return period of 2.33 years has been taken as the danger level for most of the stations. In some stations the existing submersible embankment heights of surrounding haor are taken as the desired danger level. The occurrence of flash flood, in low land haor areas of north east, cannot be prevented as a whole but estimation of a reliable flash flood danger level for each of the flash flood vulnerable stations of north east region will assist in daily flood forecasting during pre-monsoon season and provide effective warning at the time of necessity and thus minimize the loss and damage occurred by the flash flood every year.

Keywords: *Danger level, Haor, flash flood, north east, flood frequency, submersible embankment.*