

発展途上国における土砂災害警戒雨量～メキシコの事例

Rainfall Warning for Sediment Related Disasters in Sierra Madre Oriental, Mexico

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1. INTRODUCTION

Intense and prolonged rainfall events are known to be a serious cause of sediment related disasters like landslides and shallow landslides. Several studies have been developed to look at the influence of hydrological and climatic factors on sediment related disasters. In the mountainous regions of Mexico those disasters, have taken a big number of human lives and extensive material



Fig.1 Location map of the site in Mexico



Fig. 2 Examples of disasters by hurricane Alex (in 2011)

damages (Fig.1,2). It is necessary to establish the criteria to allow citizens and authorities to identify and assess the risk associated with sediment related disasters.

2. RESULTS

70 rainfall events with the Total Rainfall (mm) and Maximum Rainfall Intensity (mm/day) recorded from 1970 to 2009 were analyzed. (1) Using the probability method we could calculate rainfall thresholds: based on total rainfall in where 71.9 mm. is the minimum amount for a disaster to occur, below this point the disaster probability is 0% and 113 mm is the amount of rainfall that if is exceeded there is a disaster probability of 100% (Figure 5). Based on maximum daily intensity: the

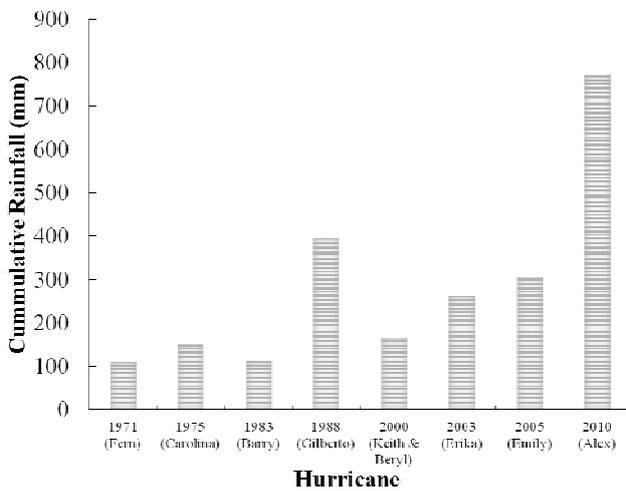


Fig.3 Cumulative rainfall with hurricane events

minimum threshold for a disaster to occur is 57.7 mm/day. and 87 mm/day. is the rainfall amount that if exceeded disaster probability is 100% (Figure 6).

3. CONCLUSIONS: Sediment Related disasters in Nuevo Leon are usually caused by hydro meteorological events. Disastrous and Non Disastrous sediment related disaster events are clearly recognized by Hirano mathematical model of debris flow and this model can be used to establish a disaster scale, in the study area only big sediment related disaster reach the populated areas and cause a disaster. Due to the lack of hourly rainfall information in the study area the proposed probability method can be used to determine a “yellow zone” or

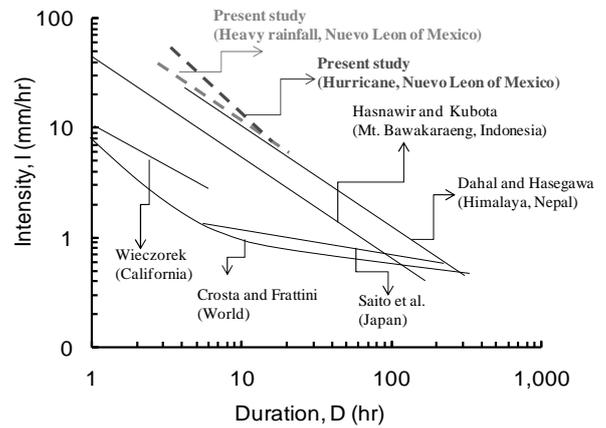


Fig. 4 Rainfall thresholds curve for landslides and comparison of the rainfall thresholds from various studies with the present studies (Intensity "I" were derived from daily rainfall.)

warning area in which the probability of disaster is 50%, when the rainfall exceed such area, evacuation can be executed.

Disaster score: No landslide occurrence = 5.0, Occurrence = 10.0

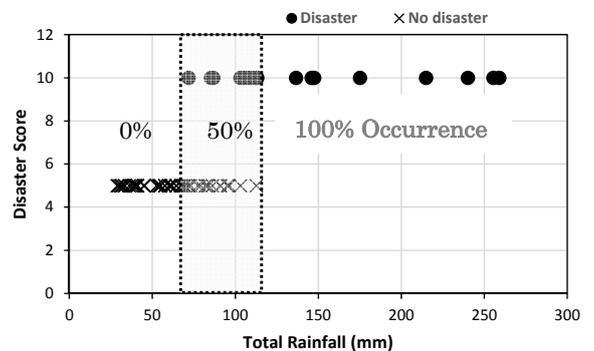


Fig.5 Yellow Zone based on Total Rainfall

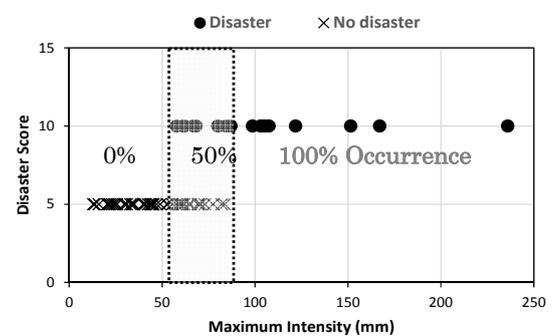


Fig.6 Yellow Zone based on Maximum Intensity (daily rainfall: mm/day)