

Modelling Flood Events in Botswana (Palapye) for Protecting Roads Structure against Floods

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Abstract : Botswana has been affected by floods since long ago and is still experiencing this tragic event. Flooding occurs mostly in the North-West, North-East, and parts of Central district due to heavy rainfalls experienced in these areas. The torrential rains destroyed homes, roads, flooded dams, fields and destroyed livestock and livelihoods. Palapye is one area in the central district that has been experiencing floods ever since 1995 when its greatest flood on record occurred. Heavy storms result in floods and inundation; this has been exacerbated by poor and absence of drainage structures. Since floods are a part of nature, they have existed and will to continue to exist, hence more destruction. Furthermore floods and highway plays major role in erosion and destruction of roads structures. Already today, many culverts, trenches, and other drainage facilities lack the capacity to deal with current frequency for extreme flows. Future changes in the pattern of hydro climatic events will have implications for the design and maintenance costs of roads. Increase in rainfall and severe weather events can affect the demand for emergent responses. Therefore flood forecasting and warning is a prerequisite for successful mitigation of flood damage. In flood prone areas like Palapye, preventive measures should be taken to reduce possible adverse effects of floods on the environment including road structures. Therefore this paper attempts to estimate return periods associated with huge storms of different magnitude from recorded historical rainfall depth using statistical method. The method of annual maxima was used to select data sets for the rainfall analysis. In the statistical method, the Type 1 extreme value (Gumbel), Log Normal, Log Pearson 3 distributions were all applied to the annual maximum series for Palapye area to produce IDF curves. The Kolmogorov-Smirnov test and Chi Squared were used to confirm the appropriateness of fitted distributions for the location and the data do fit the distributions used to predict expected frequencies. This will be a beneficial tool for urgent flood forecasting and water resource administration as proper drainage design will be design based on the estimated flood events and will help to reclaim and protect the road structures from adverse impacts of flood.

Keywords : drainage, estimate, evaluation, floods, flood forecasting

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