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IMPACT OF GEOMORPHOLOGICAL COMPLEXITY ON THE LIKELIHOOD OF FLOODING IN SRI LANKA

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River networks are identified as epitomes of multifractals with a tree-like structure. The fractal river networks are a result of physical, lithological and climatological factors. The natural texture of a river network gets considerably stable as it achieves the least energy expenditure throughout every stage of evolution. Hence, river networks can be recognized as a major component of basin geomorphology which affects many hydrometeorological disasters. This study investigates the impact of the geomorphological complexity on the likelihood of flooding by fractal geometry approach. Nine catchments from 03 main river networks (Mahaweli Ganga, Kelani Ganga, Kalu Ganga) were selected, depending on the availability of past flood events, recorded in the irrigation department databases. Flood frequency was calculated for each catchment using the flood data for the last 51 years (1969-2019). The geomorphological complexity of each sub catchment was quantified and the fractal dimensions were obtained using a generalized fixed-size algorithm. Statistically significant strong negative correlation (-0.929) with a P value of 0.001, was observed between the fractal dimension and log (flood frequency). It concludes that the likelihood of flooding is high when the natural geomorphological complexity of a river network is low. The results imply that it is crucial to assess the changes in the morphology of a river basin, before any medium to large scale human activity (construction, mining, deforestation, flood plain reduction etc.) takes place in and around a river basin. Both the magnitude and the frequency of flooding can be minimized by paying attention to minimize the changes to the natural geomorphologic complexity of river networks of the basin.

Keywords: *River networks, Geomorphology, Fractals, Flood frequency, Fractal dimension*
