M.Sc. THESIS

EVALUATION OF FREQUENCY FACTOR K FOR DETERMINING PMP BY STATISTICAL METHOD

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ABSTRACT

The Probable Maximum Precipitation (PMP) is key for estimation of Probable Maximum Flood (PMF). The present study includes the estimation of Probable Maximum Precipitation (PMP) using Meteorological approach, frequency factor K using Statistical approach and finally the evaluation of correction factors. The Probable Maximum Precipitation (PMP) was estimated using Moisture Maximization, Wind-Moisture Maximization and Moisture Maximization & Storm Transposition approaches. The $K_{m\ (meteorological)}$ factor was estimated by using 24 hour PMP estimates. $K_{m\ (statistical)}$ factor was also calculated by using $K_{m\ (statistical)}$ Hershfield's formula and $K_{m\ (statistical)}$ graphical method. Then the $K_{m\ (statistical)}$ factor was compared with each other and evaluated with the $K_{m\ (Meteorological)}$ factor.

The 24 hour Probable Maximum Precipitation (PMP) of 397 mm, 345 mm and 162.7 mm were estimated for Hub Dam Site, Lasbela and Karachi by using the Moisture Maximization, Wind-Moisture Maximization and Moisture Maximization & Storm Transposition approaches respectively. The highest $K_{m\ (Meteorological)}$ was 18.26, 27.05, and 20.84 by using previously mentioned approaches. The highest $K_{m\ (statistical)}$ was 18 and 13.77 by using graphical and Hershfield's K_m formula respectively. The correction factors of 1.83 and 1.14 were estimated by using Km (statistical) of Hershfield's formula with PMP estimates of moisture maximization and wind-moisture maximization approaches respectively.

Estimation of Probable Maximum Precipitation at three stations using three approaches resulted PMP values ranging from 224 mm to 445 mm. Highest PMP value in the region was estimated as 445 mm by applying moisture maximization

approach. The $K_{m\ (statistical)}$ is best estimated by using Hershfield's Km formula than the graphical method. Highest correction factor between $K_{m\ (Meteorological)}$ vs. $K_{m\ (statistical)}$ is 1.83 using moisture maximization PMP estimate and Hershfield's K_m formula. For this region Hershfield's Km equation is recommended for estimation of Km in statistical method. Average correction factor recommended to be used in statistical equation is 1.19.