Chapter 7

Conclusion

In this chapter a brief conclusion of our study has been drawn. For this study annual maximum rainfall data of 12 gauzed stations covering North East India has been considered. Regional rainfall frequency analysis has been performed using four parameter estimation methods. They are L-moments, LQ-moments, LH-moments and TL-moments.

In the Chapter 2, regional maximum rainfall frequency analysis has been carried out using L-moment methods. Discordancy measure shows that data of all gauging sites of our study region are suitable for using regional frequency analysis. Also from homogeneity test, the region has been found to be possibly homogeneous. Regional rainfall frequency analysis was performed using five extreme probability distributions: viz. GLO, GEV, GPA, GNO and PE3. Using L-moment ratio diagram and Z-statistic it is found that PE3 distribution is the best fit distribution for regional maximum rainfall frequency analysis of North East India. The parameters of PE3 distribution are calculated and using the quantile function of PE3 distribution regional growth factors are calculated. The regional rainfall frequency relationship for gauged stations has been developed for the region.

In the chapter 3, regional maximum rainfall frequency analysis has been carried out using LQ-moment methods. From discordancy test it is found that all the data of the 12 stations of the study region can be considered for the study. From heterogeneity test it is observed that the 12 stations of the study region form a homogeneous region.

Z-statistic criteria and LQ-moment ratio diagram shows that GPA distribution is the best fit distribution for the study region. Parameters of GPA distribution are calculated using LQ-moments. Substituting the regional parameters of GPA distribution in the quantile function of GPA distribution growth factors at different return periods are calculated. Finally using flood index procedure and GPA distribution regional rainfall frequency relationship has been developed.

In the chapter 4, regional maximum rainfall frequency analysis has been carried out using LH-moment methods of four orders. From discordancy test using L_1, L_2, L_3, and L_4-moment it is found that all the data of the 12 stations of the study region can be considered for the study. From heterogeneity test it is observed that for L_1-moment the 12 stations of the study region form a homogeneous region whereas for L_2, L_3, and L_4-moment the region can be considered as a possibly homogeneous region. For L_1-moment Z-statistic criteria and LH-moment ratio diagram shows that GPA distribution is the best fit distribution for the study region. For L_2, L_3, and L_4-moment GLO distribution is selected as the best fit distribution. Parameters of GPA and GLO distributions are calculated using respective LH-moments. Substituting the regional parameters of GPA and GLO distributions in the respective quantile functions, growth factors at different return periods are calculated. Finally using flood index procedure regional maximum rainfall frequency relationships has been developed.

In the chapter 5, regional maximum rainfall frequency analysis has been carried out using TL-moment methods. From discordancy test using TL-moment it is found that all the data of the 12 stations of the study region can be considered for the study. From heterogeneity test it is observed that the 12 stations of the study region form a possibly homogeneous region. Z-statistic criteria and TL-moment ratio diagram shows that GPA distribution is the best fit distribution for the study region. Parameters of GPA distribution are calculated using TL-moment. Substituting the regional parameters of GPA distribution in the quantile function of GPA distribution growth factors at different return periods are calculated. Finally using flood index procedure regional maximum rainfall frequency relationships has been developed.

In the chapter 6, a comparative study has been carried out among the methods of parameter estimation. For this purpose, Monte Carlo simulation is used to calculate RRMSE and RBIAS error. Also box plot is used to compare the RRMSE and RBIAS values. From, comparison between L-moment and LQ-moment, it is found that PE3

distribution designated by L-moment is more robust distribution. Also L-moment method is significantly more efficient than LQ-moment method. From comparison between L-moment and LH-moment it is found that GPA distribution designated by L_1-moment method is more suitable distribution and L_1-moment method is significantly more efficient than L-moment and other orders of LH-moment. Again from comparison between LH-moment and TL-moment it is found that GPA distribution designated by L_1-moment method is more suitable distribution and L_1-moment method is significantly more efficient than TL-moment and other orders of LH-moment. From comparison between L-moment and TL-moment it is found that PE3 distribution designated by L-moment is more suitable than GPA distribution designated by TL-moment method and L-moment method is significantly more efficient than TL-moment. Also from comparison between LQ-moment and TL-moment it is found that TL-moment is significantly more efficient than LQ-moment. Again from comparison between LQ-moment and LH-moment it is found that L_1-moment is significantly more efficient than LQ-moment and other order of LH-moment.

Hence from comparison among the methods of parameter estimation it can be concluded that the GPA distribution designated by L_1-moment is the best fit distribution for regional maximum rainfall frequency estimates of North East India. Also L_1-moment method is the most significant method for parameter estimation and quantile estimation of maximum rainfall estimation of the 12 gauzed stations of North East India.

The regional rainfall frequency relationship for gauged sites of study area using GPA distribution designated by L_1-moment is given by the equation 4.5.3. This equation may be used to find maximum rainfall of 12 gauzed stations of the study area at desired return period.

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