Rainfall extremes under climate change in the Pasak River Basin, Thailand

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ABSTRACT

Changes in extreme rainfall tend to be magnified into unpredictable fluctuations in runoff, leading to flooding and drought in the Pasak River Basin of Thailand. Moreover, it also affects the operation of the existing infrastructure. Therefore, it is important to monitor changes in the extreme rainfall events and integrate them into planning and operations with the additional challenges posed by climate change. In this study, rainfall data at the ten observed stations across the basin was used to assess the extreme rainfall indices over the baseline period 1985–2014. The five new CMIP6 global climate model datasets and two Shared Socioeconomic Pathways of SSP2-4.5 and SSP5-8.5 were selected to project the future climate scenarios from 2023 to 2100. The extreme rainfall indices trends are analysed using the Mann-Kendall test and Sen's slope, while the IDW technique is adopted to visualise the spatial trends. The results show that most of the rainfall indices in low-altitude areas are higher than in high-altitude areas, except for the duration-based indices CWD and CDD. The observed extreme rainfall shows a larger variation than that predicted by climate models. The very high greenhouse gas emissions exhibited by the SSP5-8.5 scenario contribute to greater uncertainty in future extreme rainfall for plain areas than in high-altitude areas. The Pasak River Basin is expected to experience wet rather than dry climates in the future. The spatial trends from past and future periods highlight the significant increasing trends in the area where the Pasak Jolasid reservoir is located. The results of this study will benefit policymakers in a position to reduce future climate vulnerabilities and can be used for building local adaptation strategies in response to long-term climate change.

Key works: climate change, Coupled Model Intercomparison Project 6 (CMIP6), extreme rainfall indices, Pasak River Basin, Thailand, trend analysis