

## **Changes in extreme rainfall events in urbanized areas of Thailand**

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One of the most serious challenges to society in coping with anthropogenic climate change is an increase in extreme events that represent a critical challenge in the coming years and decades. The most adverse impacts of such extreme-related disasters are likely to occur in urbanized areas where population, resources, infrastructures and social-economic activities are densely concentrated. To quantify changes in extreme rainfall characteristics and associated consequences in urbanized areas of Thailand, high-quality daily rainfall data from 14 urbanized stations throughout Thailand during 1965-2006 were analyzed. A set of core extreme indices recommended by the WMO-CCL/CLIVAR Expert Team on Climate Change Detection, Monitoring and Indices (ETCCDMI) that measures different aspects of extreme events was calculated. Analysis of these indices revealed disproportionate changes with mixed patterns of positive and negative trends in extreme rainfall events. However, the number of rainy days in the urbanized areas of Thailand showed an overall decrease with significant changes occurring in the central and north. Associated changes were marked by spatially coherent and widespread increases in simple daily intensity index (SDII) and consecutive dry days (CDD). 11 out of 14 stations (79%) exhibited increased SDII by about 2.5 % per decade, while the majority of the stations indicated a noticeable increase in CDD by approximately 4.6% per decade. In addition, there was an increasing tendency of heavy rainfall events. A closer examination further reviewed that the Bangkok Metropolis, the rapidly urbanized mega-city situated on a very low-lying flat plain of the Chao Phraya River Delta, has experienced remarkable changes in extreme rainfall events characterized by shifts toward similar increases in magnitude and frequency of more intense rainfall events. Based on the results, it can be concluded that the risks of extreme-related disasters in the urbanized areas of Thailand will increase and affect on millions of people, socio-economic and biophysical environment. These findings are consistent well with the recent massive flooding in several urbanized areas of northeastern, central and southern parts of Thailand. Therefore, detailed and comprehensive studies on vulnerability and risk assessment are great scientific challenges to shed more light on adaptation strategy, disaster preparedness and management plan for urbanized areas, and to mover forward as climate resilient sustainable cities.

Key words: Changes, extreme rainfall events, urbanized areas, Thailand