

Climate change impacts on water resources in Thailand using 20-km AGCM projections

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This paper presents a preliminary study which we have carried out to identify the possible impacts of climate change on water resources in Thailand. To identify the changes, we analyzed three basic meteorological parameters, precipitation, temperature and evapotranspiration of GCM20 projection data set (global data set with 20km spatial resolution prepared by Japan Meteorology agency and University of Tokyo) for the current climate (1979-2003), near future climate (2015-2039) and future climate (2075-2099).

Thailand is situated in the Southeast Asia and having land area of about 513,000 km². The total population of the country is approximately about 65 million and majority live in rural, agricultural areas. The effects of global warming including frequent catastrophic flooding, droughts, severe storms, higher surface temperature and etc. put the entire population at high risk and may adversely affect to the agriculture and industry of the country.

Preliminary analysis shows that the spatial pattern of the annual precipitation over Thailand does not change significantly with time. However, 1% to 5% decreases of the precipitation can be observed in the central region of Thailand and 1% to 10% of increase in annual precipitation can be observed in southern region in the near future climate (2015-2039). Decreasing the rainfall over central region may badly affect to the availability of the water resources especially for rice production in the region. The average annual rainfall shows increasing trend in most places except some areas of the central region of Thailand for future climate (2075-2099). Notably, for

the future climate conditions, it is expected to have 1% to 10% of increase in annual precipitation in north mountainous region and 5% to 10% increase in northeast region. Increase in annual precipitation over most part of Thailand may increase the risk of flooding in the downstream area. Moreover, we can observe a clear increasing trend of the annual maximum hourly rainfall intensity over Thailand for both time periods. Notably, in future climate we can observe about 20% of increase of annual maximum hourly rainfall intensity in many parts of the country and this may leads to have catastrophic flood disasters and sediment disasters in future.

The potential evapotranspiration is calculated using temperature data and extraterrestrial radiation and we clearly noticed that the potential evapotranspiration will increase by 4% to 6% in near future climate and 4% to 10% in future climate. Moreover, we can clearly observe an increasing trend of average annual number of dry days in the central region and part of the northeast region of Thailand for the near future as well as for the future time period. Some part of the northeastern, south and north regions shows 1% to 10% increase of annual maximum consecutive dry days. Situation become worsen for the future climate. South region shows 15 % to 20 % increase and many places of northeast and north regions show 5% to 15 % increase. Therefore, we can expect more severe drought situations in many parts of Thailand at the end of 21 century.

Future research is to study the above findings in detail by simulating the river flows using a distributed hydrological model with GCM20 data.