

Trends in decreasing discharge in 1970s-1990s in the Chao Phraya River, Kingdom of Thailand



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Introduction

- Social change impacts on water resources and hydrological cycle in Chao Phraya River basin
- Local scientists and engineers in Thailand have pointed out a decreasing trend in discharge in Chao Phraya river in recent years.
- This study is to find trends in river discharge from hydrologic data and to analyze significant causes of the trend.



Map of Kingdom of Thailand and Target Area



Chao Phraya river basin

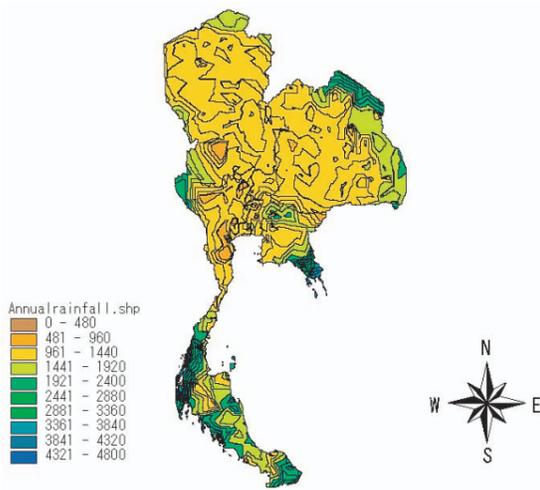
- Largest basin in Thailand
- 29 provinces
- Catchment area: 157,925km²
- 38% of whole population
- 58% of the county's GDP

Most important area in socio-economic viewpoint

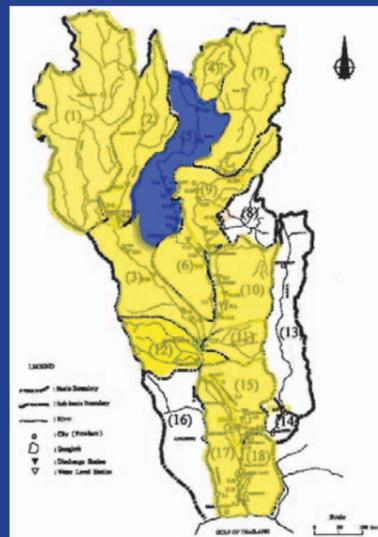


- 18 sub-basin
- Hydrological features
- (1) the upper basin of northern region
- (2) the middle basin of the flood plain with the surrounding watersheds
- (3) the lower basin of the Chao Phraya Delta
- Ping (36,018km²)
- Wang (11,708km²)
- Yom (24,720km²)
- Nan (34,557km²)

River System of Chao Phraya River basin



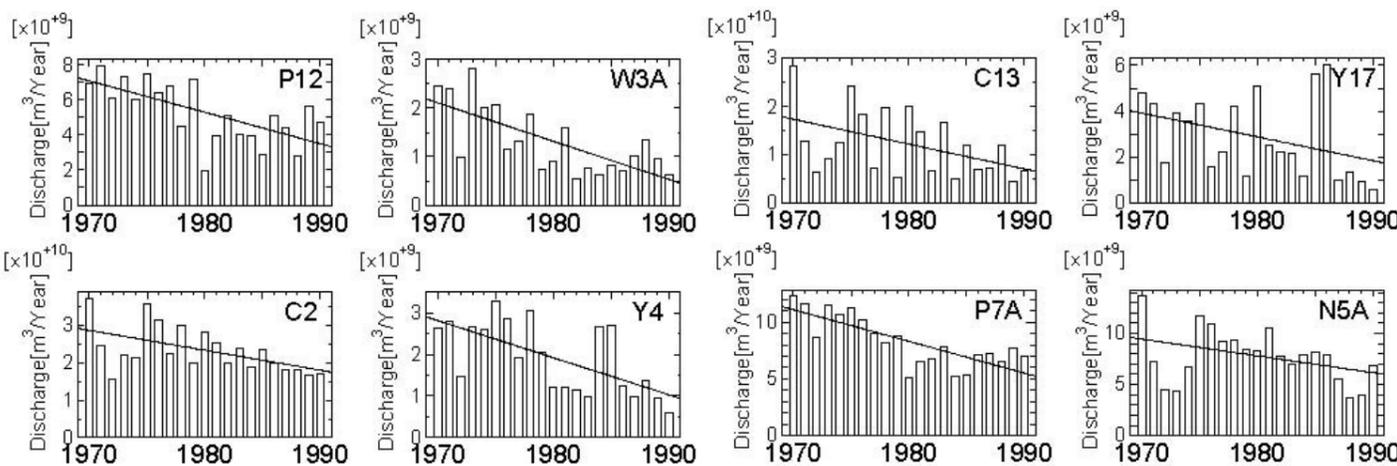
Annual Rainfall (30 years mean) in Whole Thailand



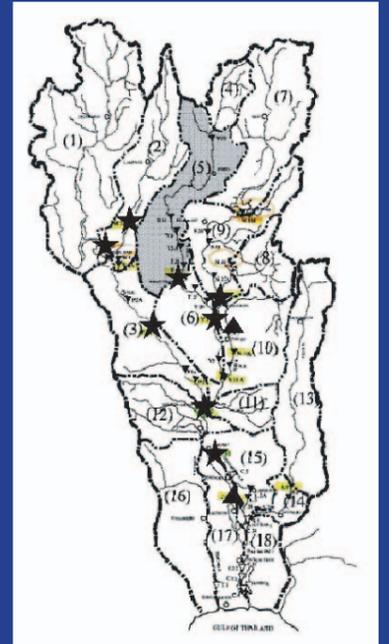
A trend test of Kendall's rank correlation with 95 % significance level applied to annual precipitation of each of the 18 sub-basins during the 21 years turned out that a significant "negative" trend was found for only the sub-basin (5).

Yellow sub-basins where the slope of the regression line was evaluated as "negative".

Trend Test on Rainfall using Kendall's rank correlation

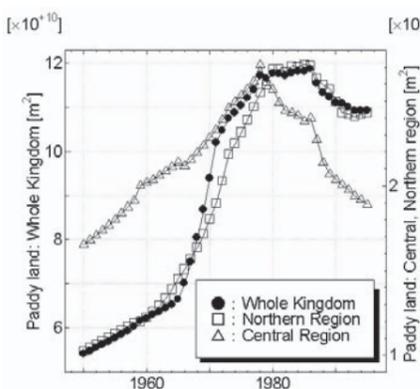


Time series of annual discharge from 1970 to 1990 and their regression line (Results of Kendall's trend test, 8 spots where a significant decreasing trend was obtained).

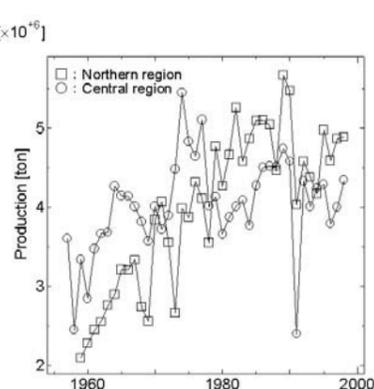


Area characteristics of the results of trend tests performed on the amounts of discharge and rainfall.

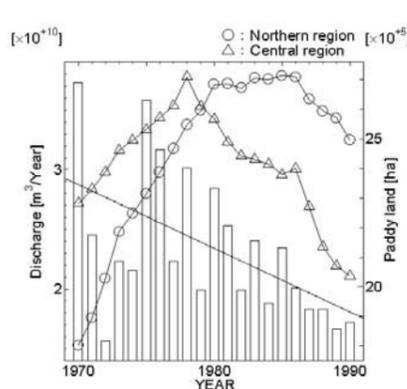
A significant decreasing trend was obtained for the sub-basin (5). ★ indicates a river station where a significant decreasing trend of discharge existed, and ▲ a river station where no significance was recognized, whether increasing or decreasing.



Time series of paddy land area from 1950 to 1995



Time series of the amount of major rice production from 1957 to 1998



Time series of annual discharge in Nakhon Sawan and paddy land area in the Northern region and the Central region.