

Regional climate change impact on water quality in the lower Chao Phraya River, Thailand

Taichi Tebakari¹, Sanit Wongsas², *Horiuchi Yusuke¹

1. Toyama Prefectural University, 2. King Mongkut's University

River water quality requires a great deal of time, labor, and cost for measurement and analysis, but could be useful background information for returning to the present situation in the event of a quality problem. However, in developing countries and middle-developed countries, environmental water quality standards are still low, and many rivers do not satisfy even those standards. In Thailand, which has been middle-developing country in recent years, the environment of river water has not been significantly improved since 1996 due to socio-economic development, and it is the fact that major rivers are deteriorating. Also, in recent years, the change of river water quality is very complicated due to the construction and operation of many hydrological structures throughout the Chao Phraya River. Bangkok, is located on the coastal lowland, Thailand. At present, most of the tap water used in Bangkok is taken from the Chao Phraya River, which flows on the coastal lowland. This intake is located in the brackish water area of the lower Chao Phraya River. In the dry season, the rise in salinity of rivers and the rise in sea level caused by climate change may affect the intake. The Thai government has identified the Chao Phraya River as a priority area, where salinization is a problem in terms of water quality management.

Therefore, water quality observations were conducted in the lower Chao Phraya River November 2016, March 2017, August, November, April 2018, June and November, and using the results of the Thai government's automatic water quality observations from August 2016 to February 2020, By comparing these data (water level, discharge, air temperature, water temperature, pH, EC, salinity and dissolved oxygen) with each other, the secular variation of the water quality characteristic of saltwater run-up was clarified.

As a result, in the dry season, pH ranged from 7.2 to 8.2 along the river, from neutral to slightly alkaline. The water temperature was found to be between 28 °C and 34 °C along the river. The DO was very low, less than 3 mg / l from the estuary to 80 km from the estuary in the dry season from November to April. There was no seasonal change in pH, but the seasonal change in water temperature was about 4°C between the dry season and the rainy season. The water quality along the Chao Phraya River was high salinity, low water temperature and low oxygen. In the rainy season, the water quality along the Chao Phraya River was low salinity, high water temperature and high oxygen state. the increase and decrease of EC were clearly divided according to the water level fluctuation during the rainy and dry seasons. It was found that the saltwater intrusion range was changed by the difference of discharge volume of Chao Phraya Dam during the rainy season and the dry season. During the rainy season, the salinity intrusion was suppressed by the natural discharge from the Chao Phraya Dam. In the dry season in February, the peak of EC increase was observed and the value was high from 80 to 100 km from the estuary. In the dry season of 2016 and 2020, the salinity of the intake water exceeded the standard of raw water in Thailand of 0.5 g / L. Thus, it is thought that the seasonal change is closely related to the inflow of saltwater due to the difference in discharge from the Chao Phraya Dam.