Effect of Sirikit Dam Operation Improvement on water shortage situations due to the land use and climate changes from the Nan Basin

Sucharit, Koontanakulvong*, Chokchai Suthidhummajit**

ABSTRACT

Land use and climate changes are the important factors to determine the runoff and sediment loads from the watershed. The changes also affected to runoff volume/pattern to the dam operation and may cause flood and drought situations in the downstream area. Sirikit Dam is one of the biggest dams in Thailand which cover about 25 % of the runoff into the Central Plain where the Bangkok Capital is located.

The study aims to determine the effect of land use change to the runoff/sediment volume pattern and the rainfall-runoff-sediment relationship in the different land use type. Field measurements of the actual rainfall, runoff and sediment in the selected four sub-basins with different type of land use in the Upper Nan Basin were conducted and the runoff ratio coefficients and sediment yield were estimated for each sub-basin. The effect of the land use change (deforestation) towards runoff/sediment will be investigated.

The study of the climate change impact on the runoff in the future scenarios was conducted to project the change of runoff volume/pattern into the Sirikit Dam. The improvement of the Sirikit Dam operation rule was conducted to reduce the weakness of the existing operation rules after Floods 2011. The newly proposed dam operation rule improvement will then be evaluated from the water shortage situations in the downstream of Sirikit Dam under various conditions of changes of both land use and climate when compared with the situations based on the existing reservoir operation rules.

Keywords: runoff, sediment yield, land use change, climate change, reservoir operation, Sirikit Dam, water shortage.

* Associate Professor, Department of Water Resources Engineering, Faculty of Engineering, Chulalongkorn University,
** Researcher, Department of Water Resources Engineering, Faculty of Engineering, Chulalongkorn University.