

Preeyaphorn Kosa 2007: Evaluation of Spatial and Temporal Evapotranspiration Using Satellite Imagery in the Chao Phraya River Basin. Doctor of Engineering (Water Resources Engineering), Major Field: Water Resources Engineering, Department of Water Resources Engineering. Thesis Advisor: Associate Professor Kobkiat Pongput, Ph.D. 296 pages.

This research is an evaluation of spatial and temporal evapotranspiration by applying recorded data and satellite images to study the water budget in the Chao Phraya River Basin. The actual evapotranspiration calculation was based on the Penman-Monteith equation and SEBAL. Weather data is the input data for the Penman-Monteith equation while MODIS image is the input data for SEBAL. Rainfall was obtained from both TRMM images, provided by NASA, and recorded rainfall. To combine rainfall from TRMM image and recorded data, the concept of Kriging was used. Thereafter, monthly water budgets in the sub-basins of the Chao Phraya River Basin were computed.

The study indicates that actual evapotranspiration in the lower Chao Phraya River Basin is more than that in the upper Chao Phraya River basin during January to December. Also, since actual evapotranspiration takes place in forests, non-irrigated areas, and irrigated areas it is necessary to consider actual evapotranspiration in forest, non-irrigated, and irrigated areas when water budgets of basins and sub-basins are computed. For rainfall, the mean monthly rainfall gradually increases from January to May and decreases in June. From June to September, the mean monthly rainfall gradually increases again. From September to December it decreases rapidly. The highest mean monthly rainfall can be found in the upper Chao Phraya River Basin. Finally, water budget calculation indicates that there is a water shortage during the dry season while there is excess water during the wet season. However, the summation of annual rainfall is more than the summation of annual actual evapotranspiration for all land use in all sub-basins except for the Chao Phraya and Tha Chin sub-basin. This finding indicates that the rainfall in these sub-basins can support actual evapotranspiration if the excess water during the wet season is stored to be utilized during the dry season while the Chao Phraya and Tha Chin sub-basin should be supported with water from other sub-basins. In addition, although the results from this research are intended to be useful for Thailand, the methodology can also be applied in other countries around the world.

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Thesis Advisor's signature

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