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The Suphan Buri River is a subsidiary river of the Chao Phraya river. It begins at tumbon Makamtao, Wat-Singha District, in the city of Chainat. It flows through Pholthep diversion dam which feeds three projects namely Thaboht, Samchuk and Phophraya. Water allocation for each of these projects is controlled by a gate which has main duty of keeping water at the designed level. At present, the control of these gates is inappropriately configured, thus the water feeding to downstream agricultural areas is insufficient especially during dry season. The objective of this research is to examine hydraulic characteristics of the Suphan Buri river so that it can be used as a guideline for appropriate water management at its existing conditions. The study began by collecting relevant data, and then validated it with actual operation. These data were input into mathematic model, which was calibrated and validated for accuracy so that it can be represented for the operation of the Suphan Buri river. And several studying cases of gate control operation were tested so that its results can recommend the suitable guideline for the control operation of each gate.

From validation process, the differences of flow rates between as simulated and from field data are in an acceptable range. The values of Manning roughness coefficient of the river are 0.030 for the range of Pholthep gate km. 0+300 to Thaboht gate km. 27+500, 0.027 for the range of Thaboht gate km. 27+500 to Chollamart-Pijarn gate km. 80+000, and 0.0270 for the range of Chollamart-Pijarn gate km. 80+000 to Phophraya gate km. 115+400. The mathematic model was then simulated with the actual water management operation's records of RID Branch Office 12. The results of case study indicates that if the water level in front of each gate could be raised at the designed level sufficiently for feeding main canals, the openings of each gate would be 0.25 m. for Thaboht gate, 0.1 m. for Chollamart-Pijarn gate, and between 0.02 and 0.05 m. for Phophraya gate. The results of other cases from the actual gate operations, found that the gate could not raise water to be at the designed level. The additional several studying cases were therefore determined and tested in order that the results could be as guideline for each gate operation, which was recommended in the results of this research.

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