Pakorn Ditthakit 2008: Decision Support Modeling for Coastal Gate Operations. Doctor of Engineering (Water Resources Engineering), Major Field: Water Resources Engineering, Department of Water Resources Engineering. Thesis Advisor: Associate Professor Suwatana Chittaladakorn, Ph.D. 264 pages.

The coastal lands are one of the most important areas intensely settled by human beings owing to their fertility and abundance of natural resources. However, at present, those areas have been facing with the problems of insufficient water quantity and poor water quality. The coastal gates have been built in several countries around the world to solve these problems. Nevertheless, the optimal coastal gate operations become a complicated task because it concerns the management of multiple objective problems which are frequently conflicted. Therefore, it is necessary to find an appropriate methodology to deal with the difficulties.

This research presents the development of decision support modeling based on coupling simulation and optimization model (CoastalGate model) to find the optimal coastal gate operation scheduling. The weighting technique was selected for solving multi-objective decision-making problem. The Differential Evolution (DE) approach and River Operation Model (ROM) were applied herein as the optimization and simulation models, respectively. To demonstrate the use of the developed model, it was applied to plan the operations for Pak Phanang coastal gate system, located in Nakhon Si Thammarat province, for various cases. It was found that the proposed model can be satisfyingly employed to assist in decision-making for operating coastal gates under various environmental, ecological and hydraulic conditions. In addition, this research proposed a method for deriving coastal gate operating rules through neural network controller. To complete this task, the CoastalGate model was used as reference model to generate several pair data sets between influencing water parameters and the optimal gate settings. Then several Artificial Neural Networks were applied to find the relationship between those data sets. The comparison of coastal gate control performance between using the best neural network controller and reference model were undertaken. It showed that neural network controller could be successfully applied for operating coastal gate in real-time control.

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