# Southern Illinois University Carbondale **OpenSIUC**

2004

**Conference** Proceedings

7-20-2004

## Allocation of Water Resources for Large Scale Irrigation Project of Chi-Mun River Basin, Thailand

Tingsanchali

Follow this and additional works at: http://opensiuc.lib.siu.edu/ucowrconfs\_2004 This is the abstract of a presentation given on Tuesday, 20 July 2004, in session 11 of the UCOWR conference.

**Recommended** Citation

Tingsanchali, "Allocation of Water Resources for Large Scale Irrigation Project of Chi-Mun River Basin, Thailand" (2004). 2004. Paper 94. http://opensiuc.lib.siu.edu/ucowrconfs\_2004/94

This Article is brought to you for free and open access by the Conference Proceedings at OpenSIUC. It has been accepted for inclusion in 2004 by an authorized administrator of OpenSIUC. For more information, please contact opensiuc@lib.siu.edu.

#### 2004 Annual Conference on Allocating Water: Economics and the Environment UCOWR/NIWR, Portland, Oregon, July 20-22, 2004

### ALLOCATION OF WATER RESOURCES FOR LARGE SCALE IRRIGATION PROJECT OF CHI-MUN RIVER BASIN, THAILAND

Tawatchai Tingsanchali, Professor, School of Civil Engineering, Asian institute of Technology, Pathumthani, Thailand 12120

#### Abstract

The Mekong river basin is the largest river basin in Southeast Asia having a drainage area of 795,000 km<sup>2</sup> covering some portions of China, Burma, Thailand, Vietnam and almost the entire territories of Laos and Cambodia. The Mekong River is 4,200 km long. The Lower Mekong River starts from Chiang Khan near the common border of Myanmar, PDR Laos and Thailand after traveling 1800 km from its origin. The Chi and Mun river basin which is a sub-basin of the Mekong river basin covers the drainage area of 119,750 km<sup>2</sup> or about two thirds of the Northeast Thailand. Most of the lands are cultivated with rice in the lowland areas and with tapioca, kenaf and maize in the upland areas. The potential irrigation area is 692,258 ha.

Due to lack of sufficient reservoir storage and highly varying seasonal rainfall during May to October, water shortage for agriculture and domestic uses occurs annually for a period of about six months from November to April. Dry season irrigation in the Northeast of Thailand is important, as the net value of the dry season crops is substantially higher than that of the wet season crops. Also the availability of the crops year round lays the basic foundation for the agro-industrial development to bring out value-added production to the Northeast Thailand. As there is insufficient water resources and storages in the Chi and Mun river basin, the transbasin diversion of water from the Mekong River to the Chi and Mun rivers become an attractive solution. With the flow range of the Mekong river at Phonphisai from  $115 \text{ m}^3$ /s in dry season to 4,675  $\text{m}^3$ /s in wet season, the pumping of flow from the Mekong river to the Chi and Mun river basin could serve the expected command area of 1,277,700 ha. The construction of Huai Luang reservoir could serve as an additional storage of the transbasin diversion water. Due to large inundated areas, the confinement of the Huailuang reservoir by surrounding dikes at potential damage locations is necessary. The purpose of the study is to determine an optimal irrigation development scheme that yields maximum net benefit with the proposed transbasin diversion system.

An system optimization model of mixed integer linear programming is used as a fundamental tool for comparative analysis of various irrigation development schemes to maximize system net benefit through optimal combinations of various components of the irrigation development schemes. Various development options consider the existing and proposed irrigation system and reservoirs and the Kong-Chi-Mun transbasin diversion scheme. The optimal use water for irrigation and domestic supply are quantified by taking into consideration the water diversion from the Mekong river into the Chi and Mun river basin and the proposed storage of the Huailuang reservoir. The model requires pre-specified irrigation blocks and reservoirs. In the model, the potential irrigation area is divided into small areas according to lowland or upland type and according to levels of soil salinity. The irrigation canal system is considered as a network of nodes connected by channel links. A node is considered as a junction point, which receive inflows from irrigation canals, rivers or tributaries and discharges outflow into the local irrigation areas and the downstream nodes. Each link has a capacity depending on the demand of the local irrigation areas and the water requirement of the downstream nodes. The costs relating to irrigation area development, pumping, operation and maintenance of the irrigation system while the benefits from crop outputs and existing hydropower are considered for a planning horizon of 50 years. The model computes the reservoir water levels subject to water demand constraints for minimum domestic water demand and flood control constraints. The development options for the first phase and second phase are identified based on maximum net benefits.

From the optimization model and various combinations of irrigation development schemes, the irrigation development scheme that gives the maximum net benefit is identified. The optimal capacity of the link canal between the Mekong river and the Chi-Mun river basin is found to be is within the permissible range of withdrawal of the Mekong river.