

Thanet Somboon 2007: Multi-Criteria Decision Making for Water Allocation Improvement in Large Irrigation System. Doctor of Engineering (Water Resources Engineering), Major Field: Water Resources Engineering, Department of Water Resources Engineering. Thesis Advisor: Associate Professor Kobkiat Pongput, Ph.D. 150 pages.

The main objective of this research was to set the criteria for water allocation assessment in large irrigation system. The learning process using Rapid Appraisal Process (RAP) is a tool to evaluate 12 Operation and Maintenance (O&M) projects which located in the Chao Phraya river basin, Thailand. The results of evaluation can be guided to set the key performance indicators consisted of quantitative indicators and qualitative indicators.

The qualitative indicators were focused on operation and maintenance in main canal consisted of characteristic, check structure, offtake and operation which obtain 4, 4, 4 and 5 sub-criteria respectively; the relative important of sub-criteria was evaluated using interaction matrix method. The results which have been shown by sub-indicator values are the guide of water allocation improvement. The quantitative indicators will be specified on crop yield analysis using Linear Programming (LP) model. The LP analysis of designed cropping patterns finds out the maximum of cropping area and productivity in order that minimum available water supply and other limiting conditions are obtained. The parameters used for water allocation conditions will be classified to water supply and water demand.

The indicator sets were applied for water allocation evaluation in dry season 2004 at Plaichumpol O&M project, Phitsanulok province, Thailand. The uncertainly parameters were considered under cropping pattern planning, crop yield prediction and water allocation practices assessment. The results of LP analysis found that crop should be put under deficit irrigation because the income from paddy declines faster under deficit supply. Whereas, if in case of no deficit irrigation will be effected to paddy, the productivity could be maximized; Otherwise crop area could not be maximized because paddy requires high water demand. The evaluation of irrigation practices found needs of both management and hardware improvements which directly affect to beneficial impacts on irrigation performance.

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Thesis Advisor's signature

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