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Exploratory Analysis of Multiple Use Options for Water Resources Management: The Case of the Mae Klong River Basin, Thailand

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ABSTRACT

Increasing population in urban and rural areas continues to exert pressure on water resources through changing land use, intensive and extensive agricultural production systems, land conversion, etc. Rapid urbanization transforms the spatial and temporal distribution, quantity and quality of water resources resulting in exploitation, environmental degradation and instability. The competition among different sectors such as agriculture, industry, power generation, human settlements, ecological services, etc. for water resources to produce food, fiber, electricity and other products requires efficient and optimal management of these resources in a catchment, and losses or negative effects to the environment are minimized.

Major advances have been made on new or improved models or decision support systems for natural resources management. Systems research tools that are currently available such as dynamic simulation models, geographic information systems (GIS), optimization technique and databases, and which are being used separately in various practical applications can be fully integrated as a decision tool for exploratory water resources management analysis. The interactive multiple goal analysis provides the framework in

which water resources management is approached as a multi-objective optimization problem where development and management priorities and agenda as well as the constraints and limitations on the environment and the natural resources are estimated and quantified. The procedure facilitates interactions among stakeholders such as policy and decision makers, development planners, and leaders at different local government hierarchical levels (i.e. region, province, district and village).

The paper presents a framework for exploratory analysis of the multiple use options by multiple users of water, and applies it to the Mae Klong river basin in west central Thailand. It demonstrates that all stakeholders in the river basin (irrigation department, electricity generating authority, provincial water authority, groups of farmers, different districts, tambons and villages, etc.) may be accommodated in identifying the allocation and management of water resources under multiple uses. Acceptable options with corresponding tradeoffs may be determined which satisfactorily meet the needs for multiple water uses (irrigation, fisheries, power and energy, domestic supply, industrial use, ecological services, etc.).