

WATER POLLUTION / A Series of Monographs

OPTIMAL EXPANSION OF A WATER RESOURCES SYSTEM



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Optimal Expansion Of A Water Resources System

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Optimal Expansion Of A Water Resources System:

Optimal Expansion of a water Resources system D.T. O'Laoghaire, 2012-12-02 Optimal Expansion of a Water Resources System describes a methodology that can be used in water resources planning taking into account both water quantity and quality while still remaining computationally tractable. It is concerned with the optimal expansion of a realistic water resources system to meet an increasing demand for municipal and industrial use, irrigation, energy, and recreation over a planning horizon of T_{max} years. This book comprises six chapters with an introductory chapter that discusses such topics as development of water resources, the systems approach to solving water resources problems, and techniques for the optimization of a water resources system. The following chapters then discuss formulating the problem of the optimal expansion of an existing water resources system, a procedure for solving the optimal expansion problem, and application of the optimization algorithm to a water resources system. The remaining chapters discuss the sensitivity of planning decisions in river basin management and how to incorporate water quality and pollution considerations into the model of the water resources system. This book will be of interest to practitioners in the fields of systems philosophy and water quantity studies.

Optimal Expansion of a Water Resources System D. T. O' Laoghaire, 1983 *The Optimal Expansion of a Water Resources System* David Mautner Himmelblau, 1973 **Optimal Expansion of A Water Resources System** O Laoghaire D T., 2005 Optimal Capacity Expansion of a Water Resource System and Issues of Water Allocation and Use Biing-Hwan Lin, Roger G. Kraynick, H. H. Stoevener, 1983 *Selected Water Resources Abstracts*, 1978 A Selected Annotated Bibliography on the Analysis of Water Resource Systems, 1969 **A Selected Annotated Bibliography on the Analysis of Water Resource Systems** Water Resources Scientific Information Center, 1975 **Selected Water Resources Abstracts**, 1981 *Water Resource Systems Planning and Analysis* Daniel P. Loucks, Jerry R. Stedinger, Douglas A. Haith, 1981 *Optimal Expansion of a Water Resource System and Issues of Water Allocation and Utilization* Biing-hwan Lin, 1980 In the past decade considerable research in several disciplines has been oriented toward the design of optimal capacity expansion plans for water resource systems. The emphasis of most of these efforts has been directed toward minimization of total cost outlays in project planning. This focus somewhat limits the full applicability of the optimal capacity expansion solutions since it is believed that the criteria of economic efficiency is not well addressed in this mode. This study explores the merits of scheduling water resource project facilities on the basis of anticipated economic benefits provided an approach needed only infrequently in the systems engineering literature. Using the Umatilla River Basin in Northeast Oregon as a case study example, the facilities and their alternatives of a previously planned federal water resource development project in that area were carefully analyzed with respect to the magnitude and timing of anticipated benefits and costs. Irrigated agriculture and fishery development enhancement benefits were the two principal purposes of the project considered. In addition, benefits arising from flood prevention, municipal and industrial water supply, and erosion control were

also integral to the original overall evaluation The design of the research was to first implement a basic scheduling model in the context of the case study area and then to explore the ramifications of exchange theoretic and distribution theoretic criteria on the timing of facilities and the ultimate allocation of water among purposes The model implemented was aimed at maximizing the present value of net benefits inherent in an optimally timed set of facilities subject to an annual budget constraint Having designed the model along integer programming lines three different solution techniques were explored in order to realize a desirable level of efficiency in basic model solution It was found that reasonably efficient solutions could be obtained By optimally timing the facilities it was found that the total present value of net benefits of the project could be significantly enhanced when compared to the original schedule proposed in the project planning documents Of even greater interest is the issue of incorporating into the planning process and specifically into the capacity expansion mode of planning considerations of tradeoffs or exchanges between project beneficiaries Such exchanges and other distributional criteria can affect and be affected by the selection and timing of project facilities within an overall project design These interrelationships are explored paying particular attention to the way in which exchanges of water via water rights transfers could establish higher levels of benefits in future years Noneconomic exchange processes such as the enforcement of extant property rights relating to water resources are another issue which complicated the process of water planning Such distributional criteria are difficult to incorporate into the capacity expansion mode of planning analysis However ways are explored by which the basic model may be modified and used by decision makers in order to take account of more realistic problems in water resource planning for individual river basins

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