Foreword

by

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This issue of *Water Resources Update* illustrates both the complexity of problems and conflicts surrounding the development, use and protection of water resources, and the varied forms used to facilitate solutions. The frequent use of terms such as 'integrated management', 'conjunctive use' and 'holistic management' signify a growing realization of the need to consider surface and ground water as a continuous hydrologic system in order to meet water resource needs for the future.

Much of the science and technology needed to provide the underpinnings for integrated water management has already been developed. Faculty at UCOWR member universities have long provided the scientific and engineering leadership to overcome technical problems associated with the physical and chemical aspects of water management. However, the emergence of increasing numbers of stakeholders in water resource conflicts demands that integrated management must evolve to include elements of biology, sociology and political science if it is to be successful. This new reality also argues for the need for broadly trained water resource professionals, a need that UCOWR member institutions are well qualified to fill.

This issue of *Update* contains papers presented at UCOWR '96, the organization's annual meeting which took place July 30 to August 2, 1996 in San Antonio, Texas. The professional tour of the region and the concurrent publicity surrounding conflicts in management of the Edwards Aquifer provided an excellent setting for the meeting's theme "Integrated Management of Surface and Ground Water." The evolution of integrated water management in the United States and suggestions for future involvement for academic institutions and their faculties are developed by Viessman in his overview. Legal and institutional impediments to integrated water resource management are discussed by Tellman, Richardson, Benson and Raines with illustrations from Arizona, Idaho and Virginia. The interplay among stakeholders in the Edwards Aquifer controversy served to illustrate the complexity of issues that must be resolved for integrated management to become reality. The regional hydrologic systems of which the Edwards Aquifer is a part are described by Grubb, followed by Schenkkan's discussion of recent judicial and legislative solutions to aquifer management. Longley and Jordan discuss how the Endangered Species Act influenced action to protect spring flows and ultimately force legislative action to create a management entity with authority to regulate pumpage from the aquifer. Simulation models as management tools for the Edwards Aquifer and contributing watersheds are discussed by Wanakule, and impacts of reduced irrigation and farm policy are analyzed by Keplinger *et. al.* and Chowdhury *et. al.*. The issue concludes with illustrations of successful applications of integrated water management concepts by Philbrick and Kitamidis, Templer and Urban, Castro, and Wurbs to solve problems of surface and ground water production allocations, regional water planning, aquifer storage and recovery and regional salt reduction, respectively.

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