

PREFACE

The process of integration, in the broadest sense, has been a characteristic feature of the development of politics, economics and specific economic and technological fields in the last thirty years. The greater the necessity for relationships between functionally interdependent elements, and the more easily these relationships can be realized, the sooner have systems been formed from these elements. The large-scale systems developed in economics, energetics, transportation, and, since the sixties, water management, require a qualitatively new approach and treatment.

The modern engineer, now and in the future, has to supplement individual reasoning and creative work with a scientific approach to engineering tasks. Basically, the research-scientist investigates and explains existing natural phenomena and the relationships between them; the engineer creates something which is new and which will become useful. Their activities mutually influence each other. In earlier times engineering was more closely related to art, since engineering and art have the element of creation in common; now engineering is closer to science.

In accordance with social needs, the research scientist is trained to demonstrate theoretically the possibility of constructing a technical creations as a new, not yet existing, reality and to bring it into existence. The classification of creative work in applied research and development as scientific activity can be adopted without hesitation. The relationship science–development–implementation conceives of science as an integral part of production.

If issues of water resource systems are to be treated at the contemporary level of scientific knowledge, the appropriate, related scientific fields, such as systems analysis, the probability theory, operations research etc. need to be understood.

The aim of this book, which deals with water management, is to present the basic facts on complex water resource systems using the systems approach. Since no final interpretation of the basic terms and concepts is available, they have been defined in relation to another application of systems science, namely economics.

The fundamentals of the new, related scientific disciplines, the results of which are used in complex water resource systems, have been included in the book to facilitate reading and reduce the number of necessary reference books. The references included in this book are intended for further study. The examples serve to show the application of the general theory. Knowledge of the elements of theory of probability, mathematical statistics, computer programming, hydrology and water management has been assumed.

The book concentrates mainly on the problems of effective water supply and water

resource conservation in water resource systems. The issue of water quality in water-courses and the special issues of waterworks, sewerage, navigation and hydroelectric power generation have not been analysed in detail apart from the aspect of water resource management.

More attention should be paid to the subsystem of flood control, its relationship to the environment and its technical and economic relationships to water supply-demand integration. A reference for more detailed investigation is given.

In the branches of science which deal with systems many issues and questions have to be answered. This is also true of those disciplines where the systems approach and the application of systems sciences were first introduced, e.g. automatic control and economics; it naturally applies to the problems of water management, as proved, for example, by five international symposia – “Water Resource Systems” held in Czechoslovakia, first in Karlovy Vary, 1972, and the last in Znojmo, 1987.

The book sets out to offer the reader a set of principles and methods for dealing with water resource systems on a scientific basis. It is hoped that, along with the basic facts, it will provide an impetus to the further development of promising progressive methods of dealing with the problems of water management by means of a systems approach.

The theme of this book won a place in a competition held by the Czech Society of Engineers and the Publishers of Technical Literature. The authors are indebted to these institutes for the publication of this book.

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