

## PREFACE

Systems analysis is an approach to studying the behavior or performance of systems. The approach focuses on entire systems rather than on their separate components, and typically involves the development and use of computer-based optimization and simulation models and programs. These tools are useful aids for those involved in a search for better ways to plan, design or operate, i.e. manage multi-component systems. Water resource systems managers were introduced to systems analysis approaches in the late 1950's and early 1960's. During the almost three decades since then, a substantial body of theory has been developed, and some of that theory has been successfully implemented in practice. Yet there remains a gap between the theory that is published and that which is practiced.

It seems to us appropriate to address the gap between theory and practice during this Third Scientific Assembly of the International Association of Hydrological Sciences. We therefore proposed this Symposium titled "Closing the Gap Between Theory and Practice." We asked all authors submitting papers to this Symposium to address this topic, i.e. to describe what has worked, or not worked, and to speculate why. For this Symposium, we were not looking for new theory, as most symposia or conferences do, but for essays telling us how either new or old theory had been implemented in practice. We were looking for papers that would provide new perspectives, based on actual experiences, on how systems research can be made more useful to professionals in practice. As one surprised author put it: "...do you really want us to write non-academic short stories?"

Most who respond to calls for papers for symposia such as this one are involved in research. Researchers (and we include ourselves) use these opportunities to write papers describing and advocating the use of the latest results of our research. Most of the papers in this proceedings continue that tradition. However, every paper in this proceedings addresses, at least to a limited extent, some of the issues involving the transfer of research to practice.

We expect most of the readers of this symposium proceedings will be like most of the contributors: researchers. Those involved in research are naturally interested in developing new and improved theory and methods for studying, in our case, the management of water resource systems. If there were not a gap between the theory that is developed and advocated by researchers and the theory that is actually used by practitioners, either the research community would be very ineffective or the practitioners would have discovered ways to read, assimilate and evaluate that research and change established and accepted institutional procedures at rates far faster than anyone has yet dared to imagine.

Since systems analysis is aimed at helping practitioners make better decisions, it seems to us that all involved in systems research should reflect, occasionally, on how effective our work is to those in practice. How can we present or help apply our research so as to reduce the time it takes for new ideas and approaches to be used in practice? Clearly, practitioners are not likely to accept a new approach unless it is obvious that it will improve the performance of their system. And that system, very importantly, includes the practitioners themselves. Will some new model or computer program make it easier for practitioners to carry out their responsibilities? If it will, there is a chance, it seems to us, that the model

or program might get implemented, eventually. Eventual implementation, after all, is the ultimate test of the value of the products produced by those involved in systems research.

Rather than attempting, without success, to close the gap between theory and practice, both researchers and practitioners should be concerned at least about how to narrow or span this gap. We could have, and perhaps should have, therefore subtitled this proceedings "Bridging the Gap." This bridge-building involves finding ways to increase the beneficial impacts of research and to reduce the time required to observe those impacts in the practice of water resources management. Training future professional practitioners at universities, providing continuing education opportunities, convening conferences and symposia such as this one, developing systems tools and approaches in user-friendly environments, improving communication (including interpersonal skills) among analysts and managers, and even producing better research, are among many obvious factors that can help bridge the gap. These factors are discussed in more detail in the papers that follow.

The papers in this proceedings, published prior to the Symposium itself, offer a variety of opinions concerning how to close or bridge the gap. Most authors argue for a particular new, and often more complex or comprehensive, modeling approach as a means of addressing a particular water resources management problem. Others suggest that the simpler modeling approaches have been, and are likely to be, implemented in practice. Some authors describe their solutions to a particular problem as optimal or perhaps efficient as contrasted to the solution selected by the decision-making process. Other authors view systems models as information generators, to be used to support the often very subjective, uncertain, and largely qualitative multiobjective decision-making process. One author who is actively involved in both research and practice indicates his agency focuses on applying rather than publishing their work, and hence in that way helps to bridge the gap. We are not the first to lament that not enough practitioners take the time to publish their experiences. If they did, many of us involved mostly in research would learn more about the state-of-the-art in the practice of systems analysis, and about how we might make our research more useful to practitioners. We are pleased that some have done so for this Symposium.

The papers that follow are divided into three groups. These groups -- experiences, case studies and methodology -- are not rigid. Some papers could easily be included in more than one group. Nevertheless, we hope the readers of these papers will learn as much as we have in editing and compiling this proceedings. We also hope our editing and retyping of the papers has not resulted in any errors of fact, or even in spelling. If this has occurred, it was not our intention and we offer our apologies. We especially want to thank the organizers of this Symposium, Dr. A. Ivan Johnson in particular, and our secretary and administrative aide, Ms. Patricia Apgar, for all the support they have given us.

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