RISK-BASED DECISIONMAKING IN WATER RESOURCES X

PROCEEDINGS OF THE TENTH CONFERENCE

November 3–8, 2002
Santa Barbara, California

SPONSORED BY
United Engineering Foundation

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Universities Council on Water Resources

Water and Environmental Planning and Management Committee
Environmental and Water Resources Institute (EWRI) of the American Society of Civil Engineers (ASCE)

SUPPORTED BY
National Science Foundation

US Army Corps of Engineers, Institute for Water Resources

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Published by American Society of Civil Engineers

Library of Congress Cataloging-in-Publication Data

United Engineering Foundation Conference on Risk-Based Decisionmaking in Water Resources (10th : 2002 : Santa Barbara, Calif.)
Risk-based decisionmaking in water resources X : proceedings of the tenth conference, November 3-8, 2002, Santa Barbara, California / edited by Yacov Y. Haimes, David Moser, Eugene Z. Stakhiv ; sponsored by United Engineering Foundation ... [et al.].
p. cm.
Includes bibliographical references and index.
ISBN 0-7844-0694-4
1. Water resources development--Decision making--Congresses. 2. Risk assessment--Congresses. 3. Water-supply--Security measures--United States--Congresses. 4. Terrorism--United States--Prevention--Congresses. I. Title: Risk-based decisionmaking in water resources X. II. Haimes, Yacov Y. III. Moser, David A. IV. Stakhiv, Eugene Z. V. United Engineering Foundation (U.S.) VI. Title.

TC401.U5354 2002
363.6'1--dc22 2003057744

American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, Virginia, 20191-4400

www.pubs.asce.org

Library of Congress Catalog Card No: 2003057744
ISBN 0-7844-0694-4
Manufactured in the United States of America.

Preface

The first United Engineering Foundation Conference on Risk-Based Decisionmaking in Water Resources was held at the Asilomar Conference Grounds, Pacific Grove, California on September 21-26, 1980. Twenty-two years later, the tenth conference assembled on November 3-8, 2002 in Santa Barbara, California. Although significant social, political, and technological changes have taken place during the last two decades, many of the issues that were on the agenda in 1980 remained relevant in 2002. The major exception was a stronger focus on terrorism at the tenth conference, although this subject was also on the agenda of the eighth and ninth conferences.

These proceedings of the Tenth United Engineering Foundation Conference on Risk-Based Decisionmaking in Water Resources illustrate that our original objectives and goals, as well as the issues raised, remain relevant, important, and timely. Influenced by the terrorist attacks on the US on September 11, 2001, the theme of the tenth conference was *Risk of Terrorism.* Indeed, the entire first day was devoted to the risk and vulnerabilities to terrorism of the homeland's water resources system of systems. The second day addressed the same topic from the methodological perspectives of risk of extreme events. The third day examined the interconnectedness and interdependencies between the water resource system of systems and other infrastructures. The sessions on the fourth day focused on institutional and organizational structuring associated with risks of terrorism. As always, the session on the last day (Friday morning) was devoted to reflections on the participants' responses to the questionnaires. Recognizing that these are the tenth such proceedings, we have compiled the responses to the same three questions from all ten conferences and included them at the end of this book. We have begun analyzing the trends that emerged, and the results should make an important contribution to the field of risk-based decisionmaking in water resources.

Following is a brief summation of the major themes of past conferences:

The second conference, in November 1985, expanded on the 1980 theme. It was "geared toward balancing issues of practical concern as well as understanding some of the philosophical underpinnings and theoretical premises of risk analysis."

In the preface to the third conference, held in November 1987, we asked: "What has changed during the past decade to warrant yet another conference?" To answer this question, we stated that the conference's goals and objectives were to:

1) familiarize the participants with the state of the art in risk/benefit analysis,
2) explore the feasibility of using risk/benefit analysis in water resources planning and management,
3) provide a medium conducive to the exchange of information on the conference theme among educators, analysts, managers, and policy makers, and
4) identify and articulate future desired actions designed to alleviate some of the present problems we face in risk/benefit analysis and risk assessment in general.

What had changed in 1987 was that in this still-new professional niche, we had matured.

During the fourth conference in October 1989, we searched for the driving forces leading to the growing popularity of risk-based decisionmaking. We attributed the increasing popularity and prominence of risk analysis to two basic factors: society and technology.

At the opening of the fifth conference in November 1991, we quoted a chief executive officer who told his board of directors: "Our role is to manage change; if we can't manage change, we must change management." Noting that "the field of risk analysis is changing fast and we must not be left behind," we stated:

- We meet in these conferences to exchange information and knowledge on the changes that are taking place in the field.
- We must facilitate the process of listening to each other in these meetings by getting to know each other on a personal basis.
- We must create an environment that is conducive to dialogue and communications: fewer lectures and more discussions.
- We must open new lines of communication.
- We must be able to challenge ourselves and let others challenge our old assumptions.
- We must free ourselves of prejudices.
- We must be ready to reexamine our biases—professional, personal, and other biases.
- We must be able to learn from each other, to discover what new theories and methodologies have been developed and where they have been applied—either successfully or with less success.
- We should be ready to accept the premise that risk management must be an integral part of a total systems management, and adopt a holistic philosophy.

The sixth conference, held in 1993, continued to reinforce the Socratic culture that had evolved in these meetings. Although some of the papers covered topics presented previously, the discussions were more substantive and in greater depth. Methodologies were more closely related to theory, and at the same time the relevance of their applications to emerging natural and man-made hazards became stronger and more convincing. Such topics as uncertainties in data, models, and forecasts and their influences on risk analysis have, in some sense, an eternal life of their own; yet the level of discussion epitomized the growth and maturity in the field.

The seventh conference, in October 1995, augmented the technical discussion with policy issues and the implications of recent legislative initiatives in risk assessment. It attempted to address the connectedness among such emerging trends and ideas as the management of our environment, physical infrastructure, response to possible climate change, the desire to embrace the concept of sustainable development in its broader sense, and the explosion of communications opportunities and their impacts on informed decisionmaking.

The eighth conference, held in October 1997, continued exploring these themes, and also focused on the climatic effects of El Niño.

In the ninth conference, in October 2000, we continued exploring these themes and reviewed our approaches to risk and uncertainty during the past 20 years. We addressed the economic dimensions of risk analysis, continued the search for answers to the survivability of our critical infrastructures under natural and willful threats, and explored new approaches to risk of extreme and rare events. In 2000, at the start of a new millennium, those of us involved in risk-based decisionmaking continued to experience the same evolutionary process that systems analysts and systems engineers went through earlier. However, as in 1987, there remained many who saw risk analysis as simply a specialized extension of the body of knowledge and evaluation perspectives that had come to be associated with systems analysis.

In 2000 and again in 2002, we were even more certain that risk assessment and management must be an integral part of the decisionmaking process, rather than a gratuitous add-on technical analysis. Some of us are becoming more and more convinced of the grave limitations of the traditional and commonly-used expected value concept, and are complementing and supplementing this concept with conditional expectations, where decisions about extreme and catastrophic events are not averaged out with more commonly occurring high-frequency/low-consequence events.

Today, more than two decades after the first conference in 1980 in Asilomar, California, there is a strong public awareness of the subject of risk: environmental risks, technological and natural risks, human health and safety risks, and risks to our critical infrastructure and to cyberspace. The professional community is responding much more forcefully and knowledgeably as well, and in many instances, leading what has ultimately come to be a political debate. We are more critical of the tools that we have developed, because we recognize their ultimate importance and usefulness in the resolution of critical societal problems. We are more willing to accept the premise that in most cases, a truly effective risk analysis study must be cross-disciplinary, relying on social and behavioral scientists, engineers, regulators, and lawyers.

These are some of the trends that have distinguished the conferences since 1980, and continue today. We hope that the interest in these United Engineering Foundation conferences remains as high as it has been in the past and we look forward to the eleventh conference in 2004.

Several organizations and individuals were instrumental in making this conference possible. Thanks to Dr. Douglas James of the National Science Foundation for his support of this conference. Bob Pietrowsky, Director of the US Army Corps of Engineers Institute for Water Resources, and Jerry Foster, Engineering and Construction Division, Headquarters, US Army Corps of Engineers, Washington, DC, were generous in providing financial support for the conference, as was Dr. Charles Freiman of the United Engineering Foundation. We also thank Richard Fein, the

Engineering Foundation Conference Liaison, and Antoinette Chartier, the Engineering Foundation Conference Local Coordinator.
In addition, we thank the ASCE Task Committee on Risk-Based Decisionmaking and the Universities Council on Water Resources for again co-sponsoring this conference and enabling a large number of prominent speakers and participants to present and exchange ideas. Ultimately, the value of such a conference lies in the influence that these ideas and their presenters have on the vital issues and frequently extraordinary events occurring in our rapidly changing world.

All papers have been reviewed, edited, and accepted for publication in these proceedings by the editors. The papers are eligible for discussion in the *Journal of Water Resources Planning and Management* and also eligible for ASCE awards.

Finally, we acknowledge the invaluable editorial and computer work provided by Grace and Burton Zisk, the significant contributions of our colleague James H. Lambert to the organization of the conference, the administrative assistance provided by Della Dirickson, Manager, Center for Risk Management of Engineering Systems, University of Virginia, Barbara Hickernell and the staff of the United Engineering Foundation, as well as Donna Dickert and the ASCE staff for their hard work in bringing these proceedings to their final printed form. Thanks also to Joost Santos, Ruth Dicdican, and Kenneth Crowther for their contributions in compiling the responses to the questionnaire.

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