Foreword

by
Larry W. Mays

The concepts of risk, risk analysis, reliability, and reliability analysis take on very different meanings, even in closely related fields to water resources. This issue of Water Resources Update is focused on risk in water resources. The different uses of the concepts of risk in this issue are not all conclusive but do give an indication of the diversity of the risk concepts. Paul Slovic in his paper points out that in the context of health, safety, and environmental decisions that the concept of risk involves value judgements that reflect must more than probabilities and consequences of the occurrences of events. He conceptualizes risk as a game with socially negotiated rules. Keith Harrington discusses the risk-management dilemma of human-induced climate change for water managers and policy makers. His risk management framework consists of four elements: risk contexts, risk perception, risk analysis, and risk management. Robert Lackey's paper discusses challenges to using ecological risk assessment to implement ecosystem management. He states that the principle technical limitation to wider use of risk assessment in ecological policy is to better define societal values and preferences in credible ways and then defines four specific research needs to over come the limitation. In contrast to these three papers, the four papers by David Moser, Yeou-Koung Tung, Kevin Lansey, and Larry Mays are related to water resources engineering type projects where the concepts of risk analysis are quantified to define probabilities and/or risk-cost tradeoffs. David Moser describes the U.S. Army Corps of Engineers usage of risk analysis which involves the development of risk-costs and risk-net benefit tradeoffs. The approaches presented by Mays, Tung, and Lansey concentrate even more on the detailed analysis of quantifying the uncertainties for design and operation of water resources projects and the calculation of risk as a probability of failure and reliability as a probability of non-failure. Tung's paper presents an overview of the various methods for quantifying uncertainties and risk and reliability. Mays' paper presents an overview of the role of risk analysis in water resources engineering design defining the concepts of loading and resistance as they relate to these projects. Lansey's paper presents an application to water distribution networks in order to quantify the uncertainty of model results based on the uncertainty of model input.

No matter what the definition of risk or type of risk analysis that is used, the use of risk in water resources is still in its infancy. Even with the sophisticated techniques that have been developed for uncertainty and risk analysis that can be applied to water resources project design, analysis, and operation we still have a long way to go in implementation. In many cases the U.S. government has not taken the leadership role in developing methodologies and promoting their use such as in water resources project design. In other cases they have probably gone too far in that "most of the environmental risks are so small or indistinguishable that their existence cannot be proven" (see Choices in Risk Assessment, prepared by a nonprofit research group and released by the Department of Energy). In summary risk analysis in water resources is an exciting field with a lot to be accomplished. Hopefully the papers in this issue will spark your interest in this topic.