

From the Editors

What Is the Scope of the Journal *Risk Analysis*?

The articles in this issue of *Risk Analysis* illustrate the wide-ranging interests, approaches and applications characteristic of the field of risk analysis. They illuminate aspects of risk perception and communication via social, behavioral, and decision sciences; provide techniques for assessing health, safety and environmental risks and uncertainties in various applications, including natural hazards and terrorism; discuss quantitative definitions and representations of risks; and suggest approaches for improving risk management decision-making and policy analysis.

What ties these diverse topics together? More generally, what defines the scope and focus of *Risk Analysis: An International Journal*? What kinds of articles are most appropriate for this journal, as opposed to others in economics, operations research and management science, decision analysis, engineering, finance, insurance, actuarial mathematics, biostatistics, psychology, philosophy, public health, epidemiology, artificial intelligence, or applied mathematics that also deal extensively with many aspects of risk and uncertainty?

We believe that articles in *Risk Analysis: An International Journal* are distinguished by the following five characteristics.

1. *Emphasis on human health, safety, and wellbeing and environmental consequences, as well as economic implications, of decisions and policies.* The plurality of our articles focus on assessing and managing the risks of activities and decisions with potential consequences for health, safety, security, or the environment. They address social, psychological, and perceptual aspects of risks and risk management interventions, including economic and ethical impacts, such as who benefits and who does not, or which regions gain and lose jobs and regional products.
2. *Broadly applicable methods and frameworks for understanding and improving risk assess-*

ment and risk management decisions and policies. *Risk Analysis: An International Journal* addresses the needs of practitioners and risk managers seeking practical methods for improving risk management decisions in the real world of incomplete data and flawed information, uncertain knowledge of cause and effect, and conflicting interests, priorities, and objectives. Many of our articles offer critiques of existing approaches and propose innovative approaches, illustrated by specific applications that are of interest and value to a broad spectrum of risk assessors and managers.

3. *Demonstrably improved risk management decisions.* A continuing goal and challenge for both the journal and the field of risk analysis is to develop methods of risk assessment, risk communication, and risk management that demonstrably improve risk management decisions and policies, and to diffuse these across the globe. The goal of risk analysis is not just to help decision-makers learn how to do *something* about risks, but to help show them that they can do something *better* than they would without risk analysis. Demonstrating that a new method or framework has led to better decisions—for example, to decisions that really are more likely to produce desired or intended consequences and less likely to produce undesired ones—is especially challenging for rare or hard-to-measure adverse consequences, and when the causal relation between actions and probable consequences is uncertain. Our journal continues to emphasize approaches for doing *better*, rather than just doing *something*, to manage risks. Our desire to present successful applications or describe how some approaches fail becomes more important as the world rapidly globalizes and risk-related challenges proliferate.

4. *Explicit, transparent risk models.* Although risk analysis is similar to operations research and management science (OR/MS) in its emphasis on improving decisions under uncertainty, it often is (or should be) carried out in full public view, with different interest groups and stakeholders scrutinizing—and perhaps contesting—its data, assumptions, and models. Therefore, the use of explicit, well-documented, clearly explained and derived risk assessment models and calculation methods is especially critical in risk analysis. Different stakeholders should be able to independently confirm risk calculations and conclusions from presented risk models and documentation, no matter what their prior beliefs, interests, preferences, and values. It has become unacceptable for a health, safety, security, or environmental risk manager to be satisfied that a risk model that is being used to set priorities, allocate resources, or justify a hazardous undertaking correctly incorporates her/his own subjective beliefs. Rather, publically available, transparent risk models and calculations are the life blood of most risk assessment applications.
5. *Multidisciplinary knowledge.* Risk models typically include scientific methods, published data values, and formulas drawn from engineering, toxicology, microbiology, epidemiology, ecology, behavioral and social decision sciences, and related disciplines. Risk assessment seeks to link causal relations from relevant disciplines into clearly explained risk models that predict the probable consequences of alternative risk management decisions or policies. This model-based approach to combining knowledge from multiple disciplines and applying it to improve risk management decisions is a defining feature of applied risk analysis. In addition to distilling the technical knowledge incorporated into predictive risk assessment models, risk analysts must also apply knowledge of human psychology and behavior (especially, judgment, decisions, and behavior under uncertainty), economics, ethics, law, and sociology to understand risky behaviors; to

elicit information about concerns and values effectively; and to improve risk communication in risk assessment, decision making, and policy processes.

These five characteristics help to define and distinguish *Risk Analysis* articles from other articles that also contribute to the foundations and applications of risk science. For example, a paper that deals exclusively with improved statistical methods for estimating default probabilities on loans, or a brilliant breakthrough in toxicology that clarifies a particular disease mechanism, would probably better appear in a statistics (or finance or econometrics) journal and in a toxicology or biological sciences journal, respectively. On the other hand, a paper that applies such recent advances to create a broadly applicable risk model—especially one that demonstrably improves risk management decisions—would be very appropriate for *Risk Analysis: An International Journal*.

Risk analysis—both the field and the journal—have grown greatly in diversity, sophistication, and impact over the past two decades. We expect these trends to continue. The touchstones of *Risk Analysis* articles suggested here—development of broadly applicable, explicit methods and models, incorporating causal knowledge from multiple relevant disciplines, that demonstrably improve risk management decisions—has proven highly useful to public and private sector decision-makers. We expect their value to increase as the world becomes more complex, contentious, and knowledge-rich. Distilling and applying increasing knowledge to better manage the unknowns that continue to affect our lives is the essence of risk analysis, and the opportunities and need to do so well will only increase in future. We welcome your reactions to this editorial.

L. Anthony Cox, Jr.
Michael R. Greenberg

Ann Bostrom
Charles Haas
Yacov Haimes
Wayne Landis
Karen W. Lowrie
Suresh Moolgavkar
Warner North