

# Comparative Risk Assessment and Environmental Decision Making

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# Comparative Risk Assessment and Environmental Decision Making

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## PREFACE

Decision-making in environmental projects is typically a complex and confusing process characterized by trade-offs between socio-political, environmental, and economic impacts. In many situations, decision makers have little incentive or ability to consider scientific assessments of project alternatives, and therefore select options that are promoted by the most influential stakeholders or politicians, thus disregarding the less dominant stakeholders and sometimes even degrading the environment. A framework is therefore needed that integrates risk assessment and engineering options; generates performance standards; compares options for risk reduction; communicates uncertainty; and effectively allows integration of stakeholder opinions in the decision-making process.

The idea for this book was conceived at the NATO Advanced Research Workshop (ARW) on “Assessment and Management of Environmental Risks: Cost-efficient Methods and Applications<sup>1</sup>” (Lisbon, Portugal, October 2000). The goal of the Lisbon workshop was to present risk assessment as a unified technique for providing a scientific basis for environmentally sound and cost-efficient policies, strategies, and solutions for various environmental problems. One of the workshop suggestions was to organize a more focused topical meeting on the application of specific risk-based techniques in developing Mediterranean countries.

The NATO Advanced Research Workshop in Italy was an important step in the development and application of comparative risk assessment (CRA) and other risk-based decision-analytical tools in environmental management. Comparative Risk Assessment (CRA) is a methodology applied to facilitate decision-making when various activities compete for limited resources. CRA has become an increasingly accepted research tool and has helped to characterize environmental profiles and priorities on the regional and national level. CRA may be considered as part of the more general but as yet quite academic field of multi criteria decision analysis (MCDA). Considerable research in the area of MCDA has made available methods for applying scientific decision theoretical approaches to multi-criteria problems, but its applications, especially in environmental areas, are still limited.

The papers presented in this book discuss issues ranging from specific and local studies (specific site, ecosystem, pollutant) to global decision and management frameworks (watersheds, regions, integration of multiple pollutants and stressors); they develop a range of approaches starting from specific methods to widely applied public policies. The papers show that the use of comparative risk assessment can provide the scientific basis for environmentally sound and cost-efficient policies, strategies, and solutions to our environmental challenges.

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<sup>1</sup> Linkov, I., Palma Oliveira, J.M., eds “Assessment and Management of Environmental Risks,” Kluwer, Amsterdam 2001.

The organization of the book reflects sessions and discussions during the workshop. The papers in the introductory Chapter review and summarize developments in the fields of CRA and MCDA. They provide the necessary theoretical foundation as well as examples of applying these tools in environmental settings. Two topical chapters of the book summarize the results of discussions in working groups and plenary sessions. Each chapter reviews achievements, identifies gaps in current knowledge, and suggests priorities for future research in topical areas. Group reports written by group chairs and rapporteurs present a number of consensus principles and initiatives that were suggested during the group discussions.

The third chapter illustrates the application of risk and environmental assessments in different countries. Many papers in this chapter cannot be classified strictly as risk assessments, but they present the interpretation and perception of risks by individual scientists as well as illustrate a wide variety of environmental problems in developing countries.

An important objective of the workshop was to identify specific initiatives that could be developed by those in attendance and their broader network of institutions to enhance the progress of environmental risk assessment in developing countries. ARW participants represented a variety of organizations, from government agencies, industry, and research institutes to private consulting firms and academia. This group jointly proposed a number of specific recommendations relating to more effectively developing, using, and sharing information – including environmental data, assessment methods, and results. Highlights of these recommendations are presented in the working group reports in this book.

The workshop received high approval ratings from participants, with many commenting on the excellent opportunities for discussion. Instead of following the standard format of plenary and technical sessions dominated by speaker presentations, which typically allows little time for group synthesis, the agenda and activities were organized to foster interaction. Although 19 countries were represented, the number of participants was relatively small and allowed fruitful discussions throughout, from the working groups to the joint exercise and panel-facilitated topical segments. The meeting gave participants new insights and contacts, and many formal and informal collaborations were established.

Igor Linkov and Abou Bakr Ramadan  
October 2003.

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