



Barriers and Bridges to Integrating Health and Ecological Risk Assessment: A Workshop

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Abstract

Environmental managers must make decisions that are protective of human health and the environment. These decisions should be, but rarely are, based upon information that integrates both health and ecological risk assessments. A workshop was held to bring together scientists practicing in the areas of health and ecological risk assessment to explore similarities and differences in their respective approaches, enhance the dialogue between these two practices, and explore tools that can promote more integrated risk assessments. The workshop was held in October of 2000, and was jointly sponsored by the Research Triangle Chapter of the Society for Risk Analysis (SRA) and the Carolinas Chapter of the Society of Environmental Toxicology and Chemistry (SETAC). Participants represented state and federal government, academia, industry, and consulting firms.

The workshop began by providing participants with an overview of the "state of the science" in both health risk assessment and ecological risk assessment. This was followed by presentations of case studies that highlight the ecological and human health approaches in two different contexts; chemical-specific versus site-specific risk assessments. The next presentation discussed a new "Framework for the Integration of Health and Ecological Risk Assessment." A series of presentations and discussions followed to allow a more detailed examination of specific topics, with one presenter discussing the ecological risk perspective and the other discussing the health risk perspective. These topics included: fate and transport / bioavailability / dosimetry, scale / level of analysis, indicators / adverse effects, extrapolation, uncertainty, and risk communication. The workshop concluded with a panel discussion based on questions submitted by the attendees. This poster will present observations on the process as well as summarize the key issues for the individual disciplines and challenge of integration.

Objectives

- Promote integrated risk assessments
- Provide platform for dialogue: Evaluate

- Terminology
- Tools
 - Differences
 - Similarities

Approach

Day One: "Contexts"

- Set the stage and describe the current state of practice
- Highlight chemical-specific vs. site-specific attributes
- Give examples from actual case studies involving both health and ecological assessment
- Present new "framework" as a potential construct for better integration

Overview of Ecological Risk Assessment: Charlie Menzie (Menzie-Cura Assoc.)
 Overview of Health Risk Assessment: William Greenlee (CIIT)
 Case Study: Chemical-specific risk assessment: Ellen Mihaich and Betsy Carlton (Rhodia)
 Case Study: Site-specific risk assessment: Jeff Margolin and Mary Sorensen (ARCADIS)
 Framework for the Integration of Health and Ecological Risk Assessment: Glenn Suter (US EPA)

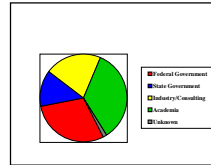
Day Two: "Comparisons and Controversies"

- Focus on specific topics
- Two speakers per topic: Ecological vs. health back-to-back to illustrate differences / similarities
- Planned discussion period after each topic
- Panel discussion to conclude program and summarize

Fate & Transport / Bioavailability/ Dosimetry: Damian Shea (NCSU) / Harvey Clewell (ICF)
 Scale / Level of Analysis: Alan Johnson (Clemson Univ.) / Tim Fennell (CIIT)
 Extrapolation: Fred Miller (CIIT) / Mark Johnson (US Army)
 Uncertainty: Rory Conolly (CIIT) / Charlie Menzie (Menzie-Cura Assoc.)
 Risk Communication: Doug Crawford-Brown (UNC CH) / Lynn Maguire (Duke Univ.)
 Panel Discussion

Analysis

Who is Interested in Integration? Meeting Attendees (n = 75)



Barriers

- Overview — Major differences between Health Risk Assessment (HRA) and Ecological Risk Assessment (ERA)**
- Receptors: Complex array of receptors for ERA (species, habitats, trophic levels, etc.) vs. HRA (sensitive human population).
 - Effects: Benchmarks of effects for ERA (water / sediment quality criteria, residue levels) vs. HRA (RfCs / RfDs, acute effects, carcinogenicity).
 - Stressors / Exposure Potential: ERA has a much more complex problem of defining spatial scales and exposure pathways compared to HRA.
 - Study Design: Types and amounts of data collected are considerably different for ERA compared to HRA.

Chemical or Site Specific Risk Assessments

- Complex choice of remedial action with sometimes conflicting benefits between human health and the ecosystem.
- Difficult to extrapolate from ecosystem effects to human health effects. Difficult to decide which species and what endpoints to monitor in ERA.

Models (fate & transport / dosimetry)

- Differences in simplifying assumptions and in spatial and temporal scale
- ERA models focus on fate and transport, HRA models focus on mode of action and dosimetry (where data are often lacking in ERA)

Indicators / Adverse Effects

- ERA focus on populations / communities, complex systems, gradients of condition vs. HRA focus on individuals, single species, morbidity and mortality.

Uncertainty

- Major challenge to both ERA and HRA to explicitly state the variability and uncertainty, to reducing uncertainty, and to developing a mechanistically based predictive and extrapolating capability.



Bridges

Overview

- Basic similarity in approach to conducting the risk assessment with problem formulation, exposure assessment, risk characterization

Incentives to Integration

- Coherent expression of ecological and health risk, identification of "sentinel" organisms, biomarkers of exposure / effect / susceptibility, improvement in quality of science and interdisciplinary sharing, gains in efficiency, more balanced consideration of ecological risks.

Common tools

- Similarities in conceptual and mathematical approaches in modeling. Computational biology is sufficiently advanced. Rapidly growing interest in better databases of physiological parameters for species of interest, better access to models (e.g., via the web), more integrated models, and more individuals trained in modeling.

Workshops Needed

- To further develop integrated approaches and more formally address risk management options and other barriers to integration
- To define and harmonize (when possible) terminology and underlying assumptions, and to facilitate multidisciplinary approaches.
- To define common biomarkers and indicators of effects and exposure.

Lessons Learned

Logistical

- Diversity of speakers was most appreciated aspect
- Many risk assessment professionals and students (not just the "experts") have ideas and expertise to share — Need to create a venue to elicit those discussions
- "Breakout" groups suggested as a way to foster interaction and more discussion

Technical

- Differences in terminology are a barrier that can be readily overcome if dialogue developed
- Sharing of models and parameters is one level of integration that can be attained easily
- Differences in receptors and endpoints of concern will remain
- Concern that environment may be destroyed to "save the humans" — Equity in valuation an issue
- Presentation of health and ecological assessments "together", even if arrived at separately, will provide platform to encourage integration

Future Directions

- Additional workshops to "brainstorm" ways to attain integration of health and ecological risk assessment — Use small breakout groups to focus on specific topic or example problem
- Need to consider stressors other than chemicals, develop biomarkers
- Need physiological and anatomical data for various receptor species

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Program Committee

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