Framework for Assessing the Public Health Impacts of Risk Management Decisions and Initial Steps for Implementation

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B·O·S·C HUMAN HEALTH PROGRAM REVIEW | RESEARCH TRIANGLE PARK, NORTH CAROLINA JANUARY 13-15 2009 | RESEARCH & DEVELOPMENT

LTG 4 Poster 02

Science Questions

What are the drivers for research on assessing the outcomes of risk management decisions?

What research is necessary to link EPA regulatory and other risk mitigation / health promotion actions to changes in exposure to environmental pollutants and public health outcomes?

Will research to identify indicators along the source to exposure to outcome paradigm provide the necessary information to assess the outcomes of risk management decisions?

What are the relative roles of laboratory research on biomarkers and bioindicators and population-based (epidemiological) research?

Research Goals

- Identify and track trends in human disease and conditions for which environmental contaminants may be risk factors.
- Capture these trends in both susceptible subpopulations and geographic locations.
- Develop indicators that enable the evaluation of linkages between sources and outcomes.
- Assess the impact of environmental decisions.

Purpose of the Framework:
To provide an understanding of the research needed to develop and validate indicators of the source-to–exposure-to–effect paradigm. These indicators will be essential for developing subsequent approaches to assess the public health impacts of risk management decisions.

Findings and Conclusions

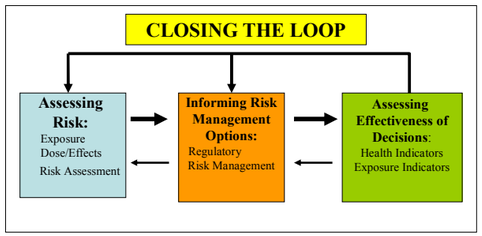
Key Product:
Framework for Assessing the Public Health Impacts of Risk Management Decisions. US EPA, Office of Research and Development, 2007. http://www.epa.gov/hhrp/files/hhrp-framework.pdf

Key Product:
Meeting summary from Workshop on Research Approaches To Assessing Public Health Impacts of Risk Management Decisions. US EPA, Office of Research and Development, 2008. http://es.epa.gov/ncer/publications/workshop/human health_riskmanagement_031308.pdf

Key Product:
RfA on Development of Environmental Health Outcome Indicators. These indicators will clarify the public health benefits associated with further incremental changes in the environment. The use of such indicators requires a clear understanding of the sequence of events that links changes in the environment to health outcomes (e.g., disease).

Methods/Approach

What are the drivers for research on assessing the outcomes of risk management decisions?



Internal and External Strategic Drivers

1997 NRC	"…confirm that environmental policies are having the desired effect"
2001 ORD Strategic Plan	How can we conduct research to evaluate the consequences of risk management decisions on public health?
2001 US EPA	Environmental Indicators Initiative
2003 EPA Strategic Plan	Evaluate the scientific validity of environmental indicators; evaluations of public health outcomes resulting from risk management decisions
2003 ORD Human Health Research Strategy	Research to enable evaluation of public health outcomes from risk management decisions
2004 GAO	EPA should "…identify specific milestones, resources, and other requirements for developing and using environmental indicators …"

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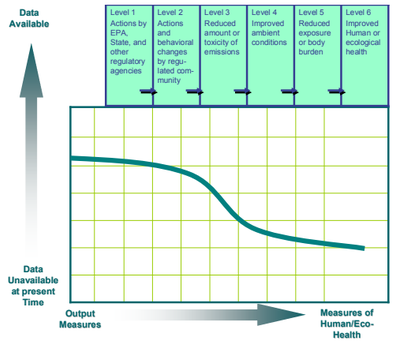
What research is necessary to link EPA regulatory and other risk mitigation / health promotion actions to changes in exposure to environmental pollutants and public health outcomes?

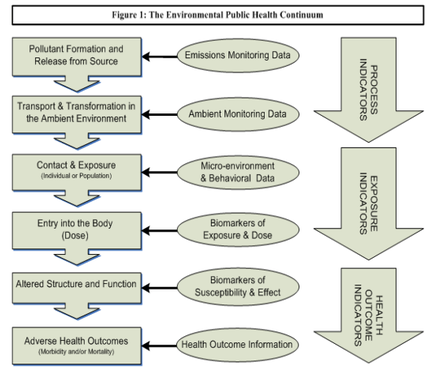
- Develop, evaluate, and link indicators that can be used to demonstrate the effectiveness of risk reduction and risk management decisions.
- The *Framework for Assessing the Public Health Impacts of Risk Management Decisions* lays out that:
  - Assessing the impact of a risk management decision is seen as an integral part of the risk assessment and risk management paradigm
  - Understanding linkages in the source-to-exposure-to effects paradigm is essential to developing valid indicators of health outcomes.
  - The development of indicators should follow clear criteria.
  - Indicators should be ranked by levels based on the relationship of the indicator to a health outcome, with the highest level given to health effects data linked to environmental exposures and sources.



Data Needs: Comparing data availability across the source to effects continuum reveals a dramatic drop in data availability as one moves from left to right through the continuum

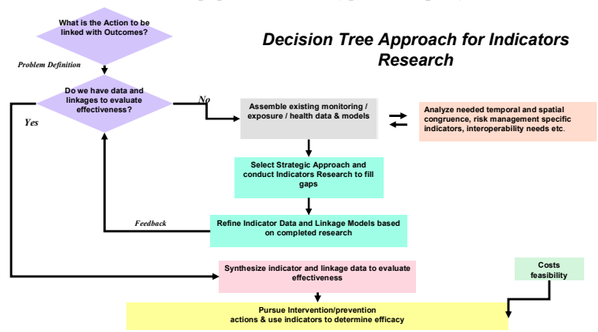
Criteria for the development of useful indicators would include:
- Utility: the indicator answers or makes an important contribution to answering a question
- Objectivity: the indicator is developed and presented in an accurate, clear, complete and unbiased manner
- Rigor: The underlying data are characterized by sound collection methods, data management systems, and quality assurance
- Timeliness: The data and indicators describe changes or trends; the latest available data is timely

Will research to identify indicators along the source to exposure to outcome paradigm provide the necessary information to assess the outcomes of risk management decisions?



Synthesis projects like the carbamate and pyrethroid projects described in LTG 2 and work underway to link arsenic exposure research with the PBPK and effects described in LTG 1 are intramural projects that link source or exposure indicators to surrogates for health outcomes.

What are the relative roles of laboratory research on biomarkers and bioindicators and population-based (epidemiological) research?



Strict problem formulation will help to define which approach is most appropriate to a given problem

Impact and Outcomes

Implementation through ORD's Science To Achieve Results (STAR) grants program:

- Two Requests for Applications (RfAs) for research to develop indicators that signal trends in exposure and environmental human health.

Examples of the funded research include the following:

- Statistical models for estimating improvements in environmental health outcomes at a national scale (e.g., the number of adverse health events prevented by the PM National Ambient Air Quality Standard).
- Models to predict acute respiratory morbidity using three near-real time data sets.
- The quantification of source-to-receptor relationships using existing data and models to identify emission reduction strategies that target emission sources having the greatest impact on exposures and environmental justice.
- Improved indicators of mobile source emissions outcomes on air quality and cardiovascular health.
- Outcome-based environmental health indicators for measuring and tracking the impacts on exposure and health of local and national PM emissions reduction initiatives in the Minneapolis-St. Paul area and Olmsted County.

Implementation through ORD's intramural program:

- Pilot projects (Posters LTG 4–03 and LTG 4-04)
- Initial steps for research linking environmental quality and health indicators
- Ecological epidemiology studies
- Source to outcome synthesis projects

Future Directions

Challenges identified at Jan 2008 Workshop *Research Approaches to Assessing Public Health Impacts of Risk Management Decisions:*
- Modeling exposure and effects with a paucity of data. This included the huge differences the exist between air and water monitoring data, issues of addressing the outcomes of risk management actions when there is little health signal, as in the case of most pesticides, or when the health signal may be difficult to separate from background levels, as for arsenic in drinking water.
- The potential for community based participatory research combined with the tools of molecular epidemiology to produce data on biomarkers of exposures, route of exposure, and the efficacy of risk mitigation strategies.
- The source to outcome continuum provides a framework that is flexible and that communities are comfortable with in terms of identifying and ameliorating environmental health risks. It can provide a framework for designing and assessing risk mitigation strategies for both known risks and emerging issues.

Evaluation of Risk Management Decisions