The Future of Environmental Science: A View From the Front Lines

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What a ride...
Just a few observations

• Nobody knew how complicated environmental protection is....

• There are lots of interests questioning the science.

• Bright lines don’t work on the front lines.

• If we lose the science “it’s game over”
Kudos First: Air Quality Progress

But, the times are really changing

- The end of traditional regulatory approaches
- Questions about the conduct and credibility of science
- Costs and jobs
- The shift from regulation to information
- Budgets for research and monitoring and enforcement
- State and local roles
- Expanding science on health impacts
- Public health protection: Are we there yet?
Environmental Science/Policy Challenges

Politics and Policy

• Threats to science and EPA in transition
• The future of the field
• Stakeholder influence
• Support for education and research
• The budget and science infrastructure
• State and local capacity
• Environmental protection is public health!

Science

• Portfolio of risk assessment – new science, acceptable risk, uncertainty
• Presentation of evidence
• Social sciences, economics
• The causality debate - epidemiology, cancer and non-cancer effects
• Research for the long term, answers right away...
• A systems approach
These are tough times...
Is it time to rethink the approach?

• What is the problem we are trying to solve?

• Bright lines for the nation

• One pollutant at a time

• A public health approach?
Cumulative risk assessment

• EPA is increasingly asked to address broad public-health and environmental-health issues that stakeholder groups often consider inadequately captured by current risk assessments
  – multiple exposures
  – complex mixtures
  – vulnerability of exposed populations

• There is a need for cumulative risk assessments that include
  – combined risks posed by exposure to multiple agents or stressors
  – aggregate exposure to a given agent or stressor
    • all routes, pathways, and sources of exposure
  – consideration of chemical, biologic, radiologic, physical, and psychologic stressors
A Systems Approach to Environmental Health
A New Approach?

• that begins with strong problem formulation;
• relies on systems approaches and tools to integrate different types of data from multiple disciplines;
• draws on information generated from new technologies;
• and considers novel sources of data, such as citizen science.
A Public Health Approach

- Define the problem
- Measure the magnitude of the problem
- Develop a framework for key determinants, including:
  - Biologic
  - Epidemiologic
  - Social
  - Cultural
  - Economic
  - Political factors
- Identify and develop intervention and prevention strategies
- Set priorities and recommend policies
- Implement programs and evaluate

We need a public health approach

• Strong up-front problem formulation
• Systems approaches and tools
• Techniques and tools to integrate difference types of data from multiple disciplines (e.g., ecological risk assessment, human health, social sciences)
• Draw on new technologies (e.g., high throughput chemical screening)
• Consider novel techniques (e.g., citizen science)
• New approaches and frameworks??
  – Health risk assessment
  – Ecological risk assessment
  – Lifecycle assessment
  – Health impact assessment
Time to think...

- Change presents opportunity
- Reconnect with core objectives
- Address the most vulnerable
- New technology, methods, and translation
- Systems thinking and public health approach