

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

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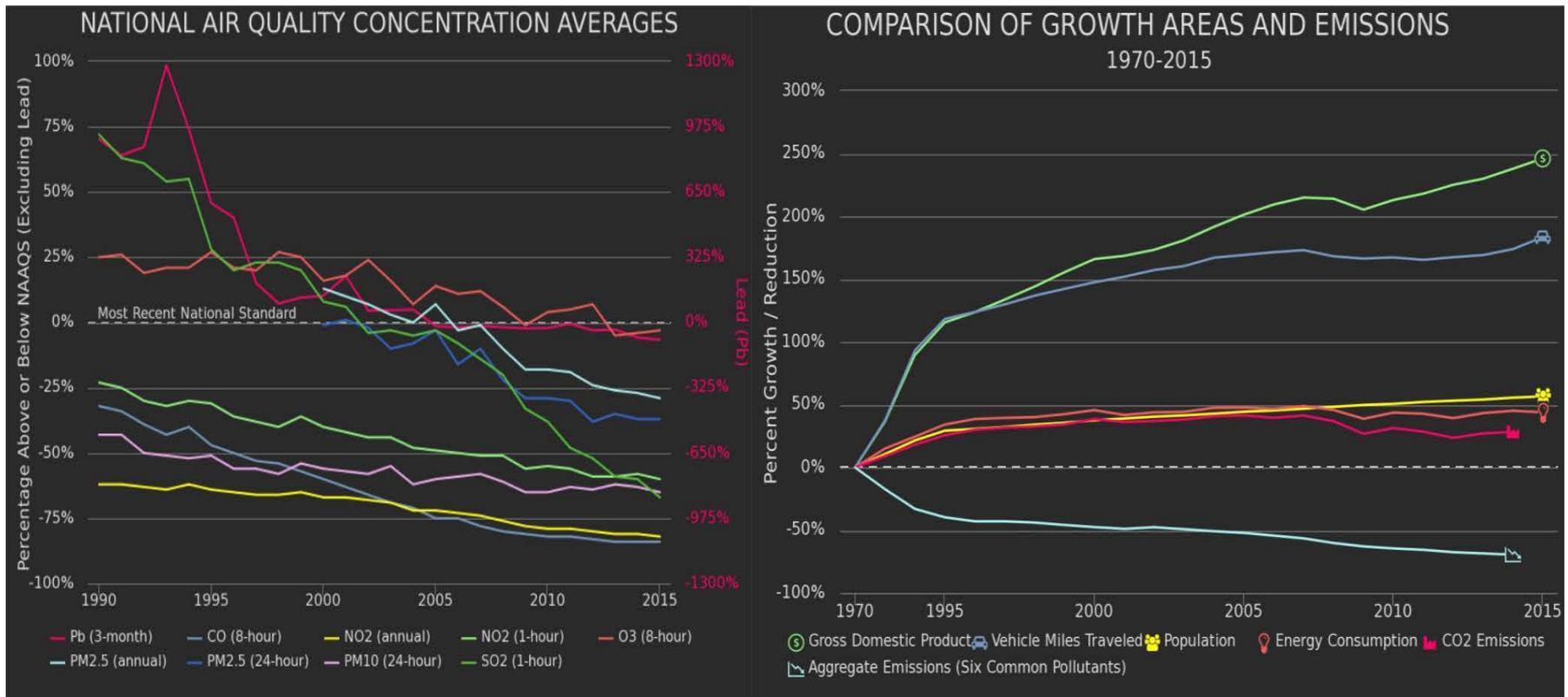
What a ride...



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



Source: EPA. Our Nation's Air—Status and trends through 2015. <https://gispub.epa.gov/air/trendsreport/2016/>

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...



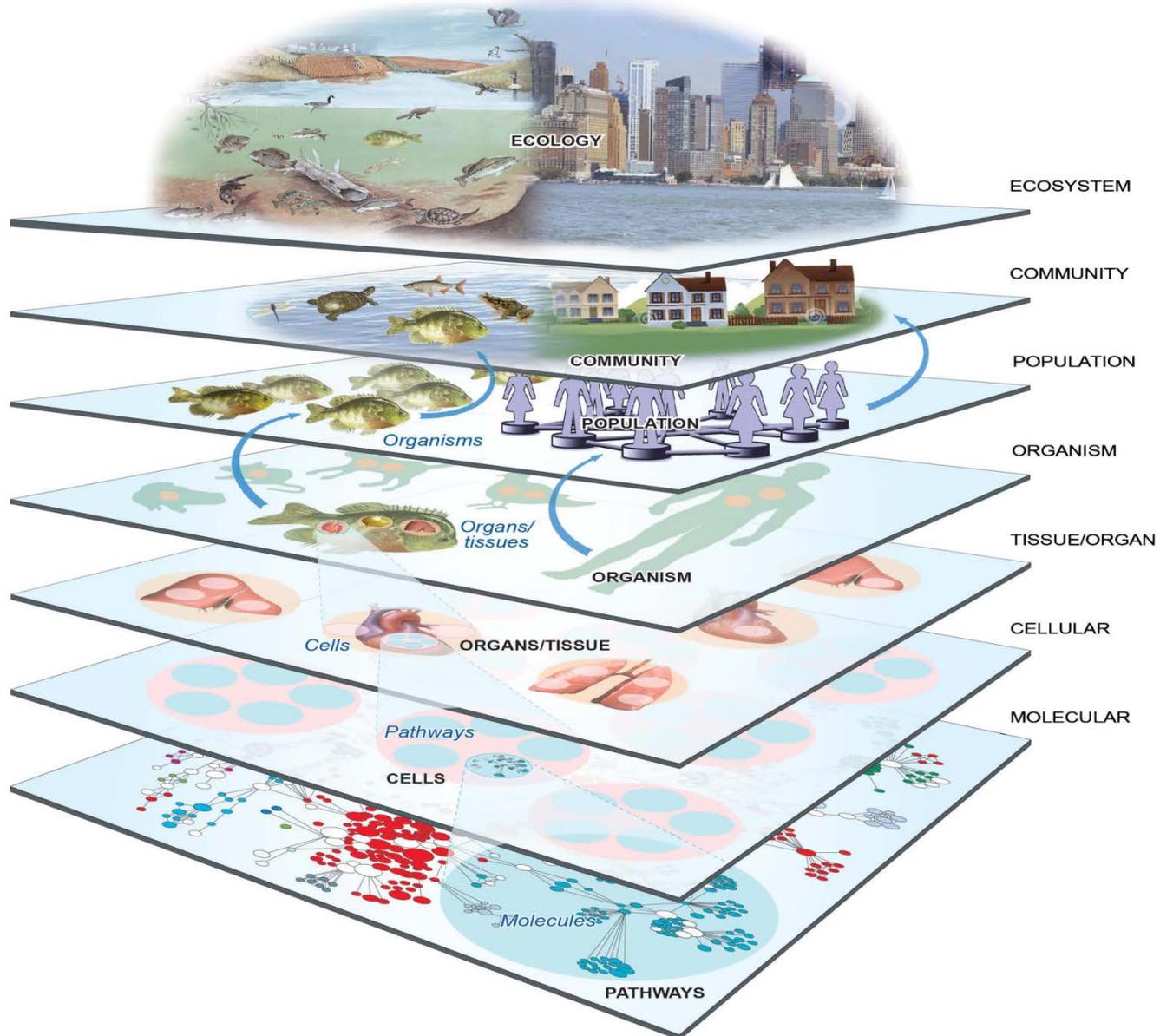
Is it time to rethink the approach?

- 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 different 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