

Indicator Development for US EPA's Report on the Environment

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APNEP-STAC Environmental Indicators Workshop
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EPA's Report on the Environment

- Initiated by Administrator Whitman in 2001
- Continuing priority for Administrators Leavitt and Johnson
- Currently being updated for 2006 (ROE06)



Purposes of the ROE

- Periodically report to the public on trends in the environment and human health that are relevant to its mission
 - Lay out the questions that EPA thinks are important to answer
 - Answer the questions using available indicators and describing their limitations
 - Identify critical gaps where indicators are unavailable or inadequate to answer the questions
 - Update the set of indicators as new science and data permit, and expand it to report at multiple geographic scales.
- Provide input into EPA's Strategic Planning process



2003 Draft ROE

- Sent out an Agency-wide call for candidate indicators and questions
- Submitters filled out extensive data information forms identifying data that would be used to develop a proposed indicator.
- Proposals were peer reviewed.
- Indicators questions and write-ups were developed for proposed indicators that passed peer review.



Review of 2003 Draft ROE

- Establish a sound conceptual model for the questions and indicators
- Revise the questions to make them more consistent.
- Revise the indicator definition and criteria and apply them more consistently.
- Take steps toward “scaling” indicators

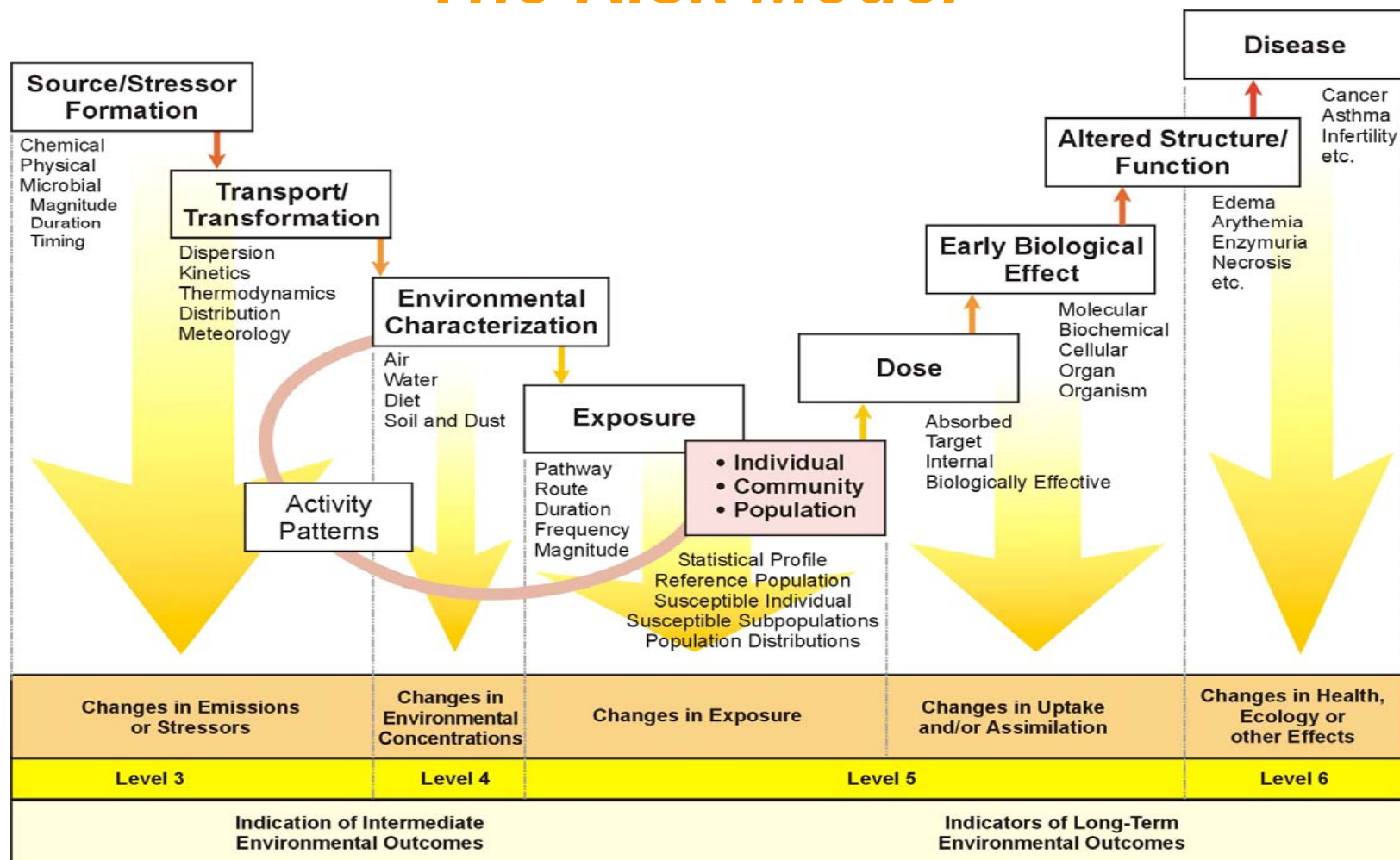


Possible conceptual models

- Risk Assessment/Physical model
- Logic model (evaluation)
- Pressure-State-Response
- Chesapeake Bay indicator hierarchy



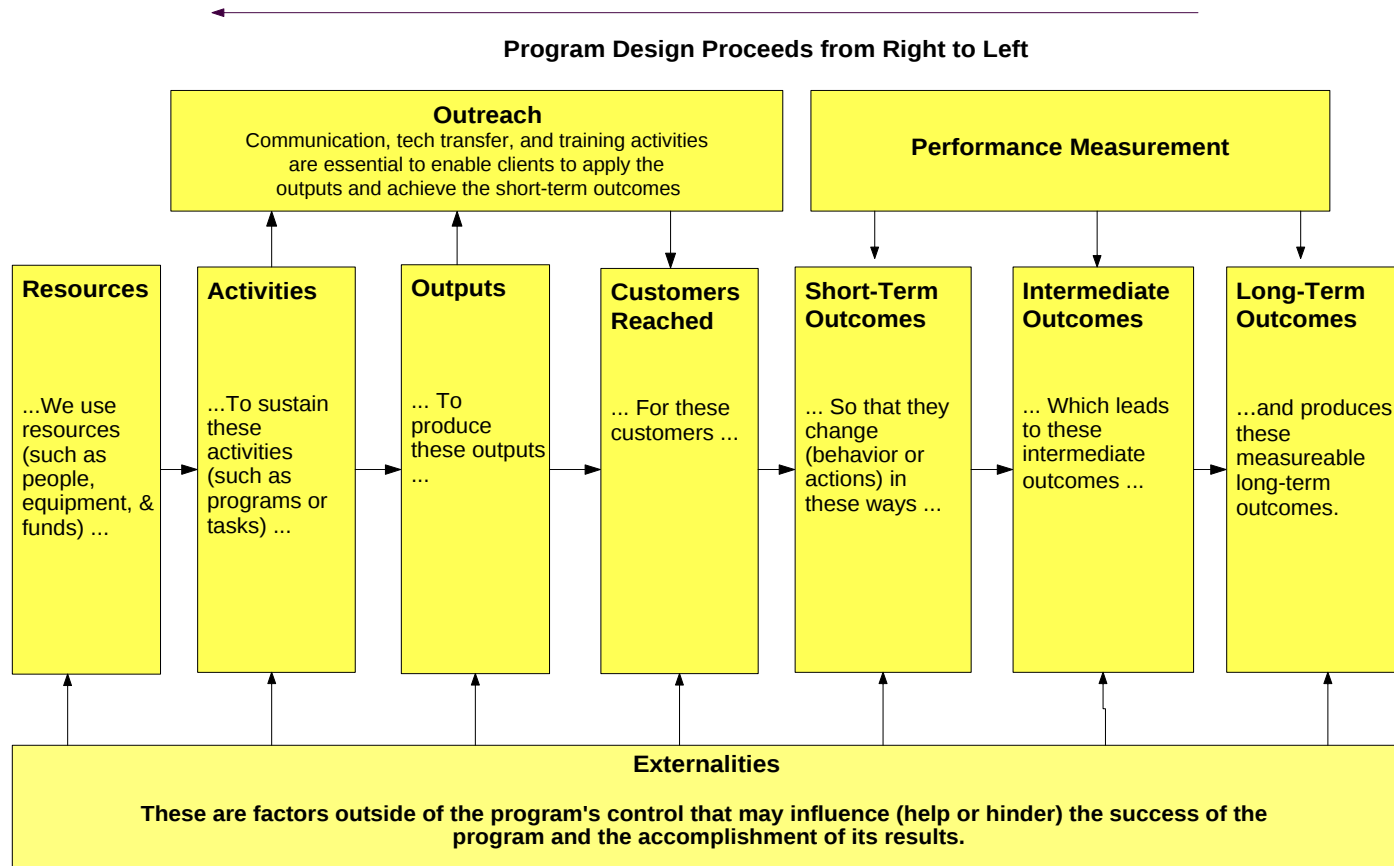
The Risk Model



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The Logic Model



→ Program Evaluation Proceeds from Left to Right

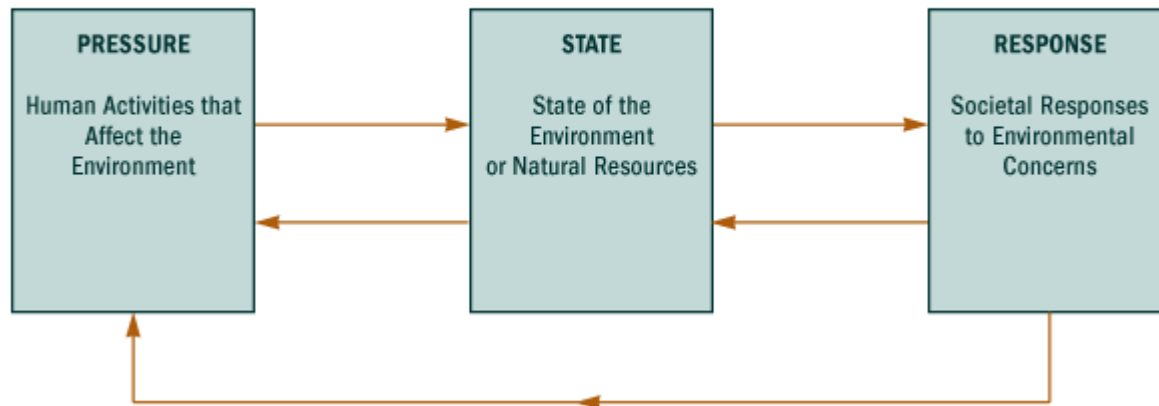


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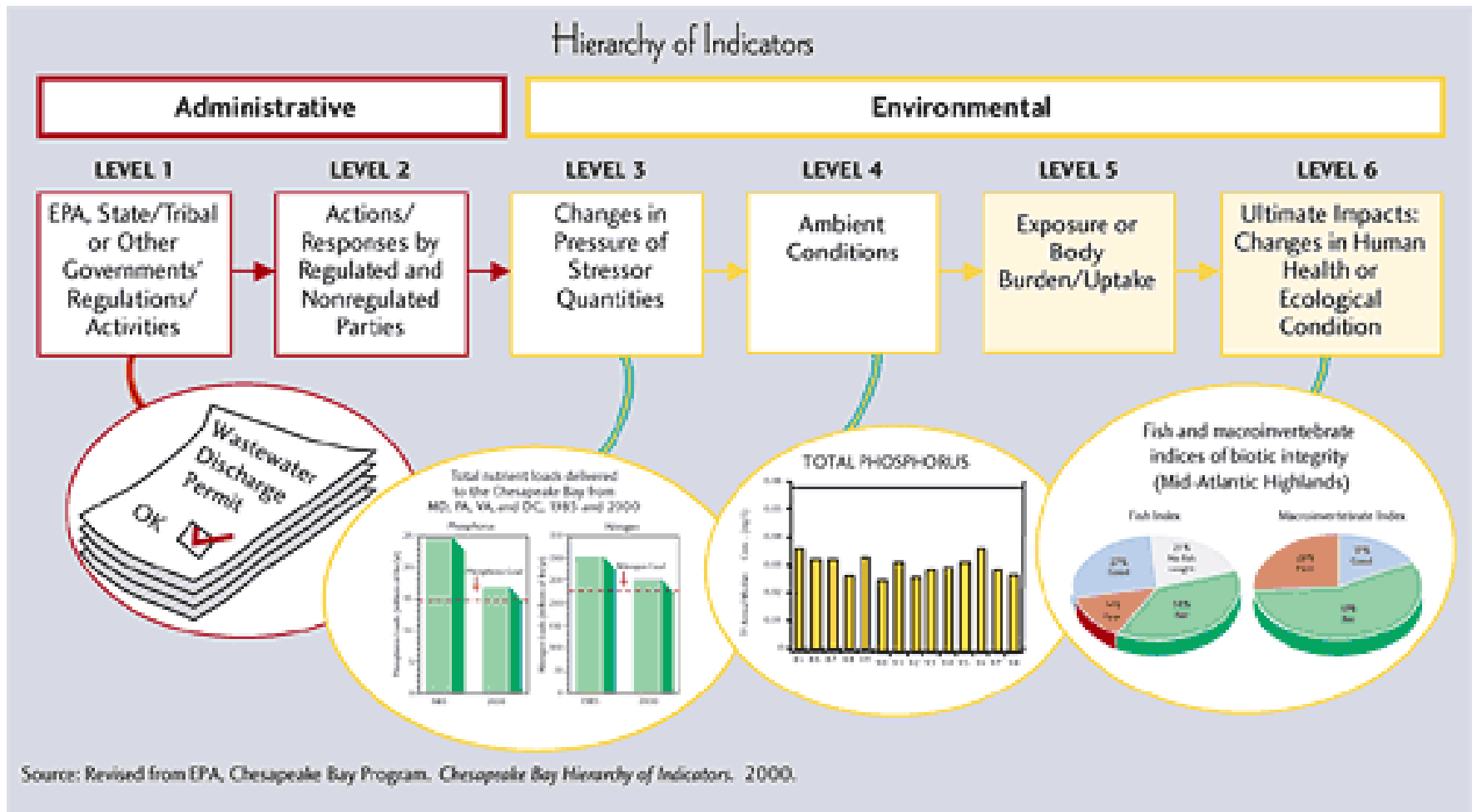
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Pressure-State-Response

Figure 2.1. Pressure-State-Response Framework



Indicator Hierarchy



ROE Indicator Definition

For EPA's Report on the Environment, an indicator is a numerical value derived from actual measurements of a pressure, state or ambient condition, exposure, or human health or ecological condition over a specified geographic domain, whose trends over time represent or draw attention to underlying trends in the condition of the environment.



ROE Indicator Criteria

- The indicator is useful. It answers (or makes an important contribution to answering) a question in the ROE.
- The indicator is objective. It is developed and presented in an accurate, clear, complete, and unbiased manner.
- The underlying data are characterized by sound collection methodologies, data management systems to protect its integrity, and quality assurance procedures.
- Data are available to describe changes or trends and the latest available data are timely.
- The data are comparable across time and space, and representative of the target population. Trends depicted in this indicator accurately represent the underlying trends in the target population.
- The indicator is transparent and reproducible. The specific data used and the specific assumptions, analytic methods, and statistical procedures employed are clearly stated.



ROE Indicator Peer Review

1. Assess whether each proposed indicator is appropriate, adequate, and useful for evaluating trends in the environment and human health.
2. Evaluate the importance of each proposed indicator with respect to answering the associated question(s).
3. Evaluate each proposed indicator and its underlying data with respect to the ROE indicator definition and criteria.
4. Identify any additional national indicators that would score highly on these three items and for which materials could be developed quickly.



ROE indicator Peer Review

Meeting the Indicator Definition and Criteria:

It is critical that all indicators fully meet the indicator definition. However, EPA recognizes that few indicators fully meet all six indicator criteria. Therefore, peer reviewers are asked to judge each indicator specifically according to the definition, and to make an overall recommendation based on a balanced judgment with respect to the criteria.



Indicator Scaling

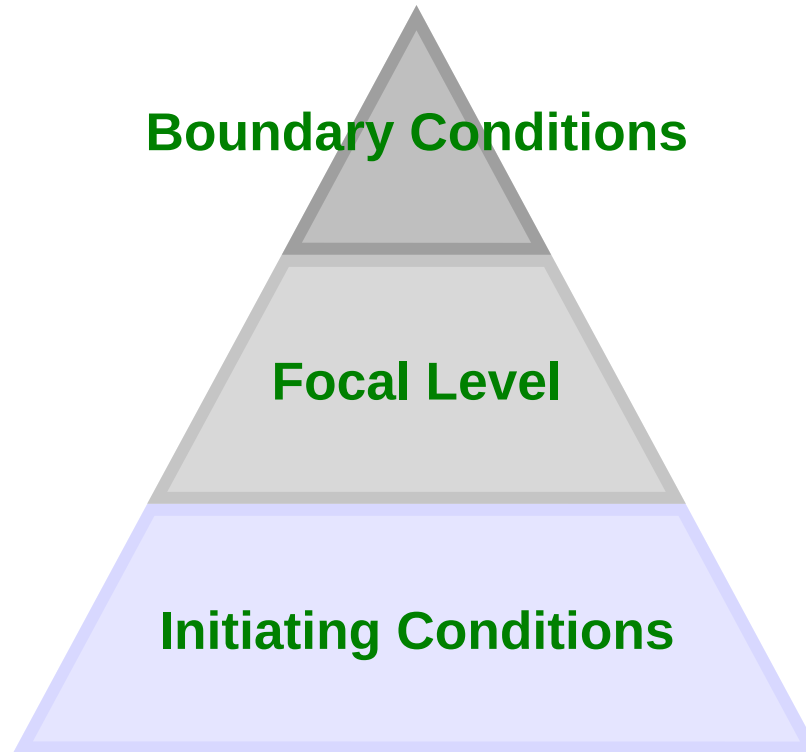
- Are we measuring performance
 - For a family?
 - For a community?
 - For a State or Region?
 - For the Nation?
 - For the globe?
- Each target is likely to require an indicator with a different time and space scale.



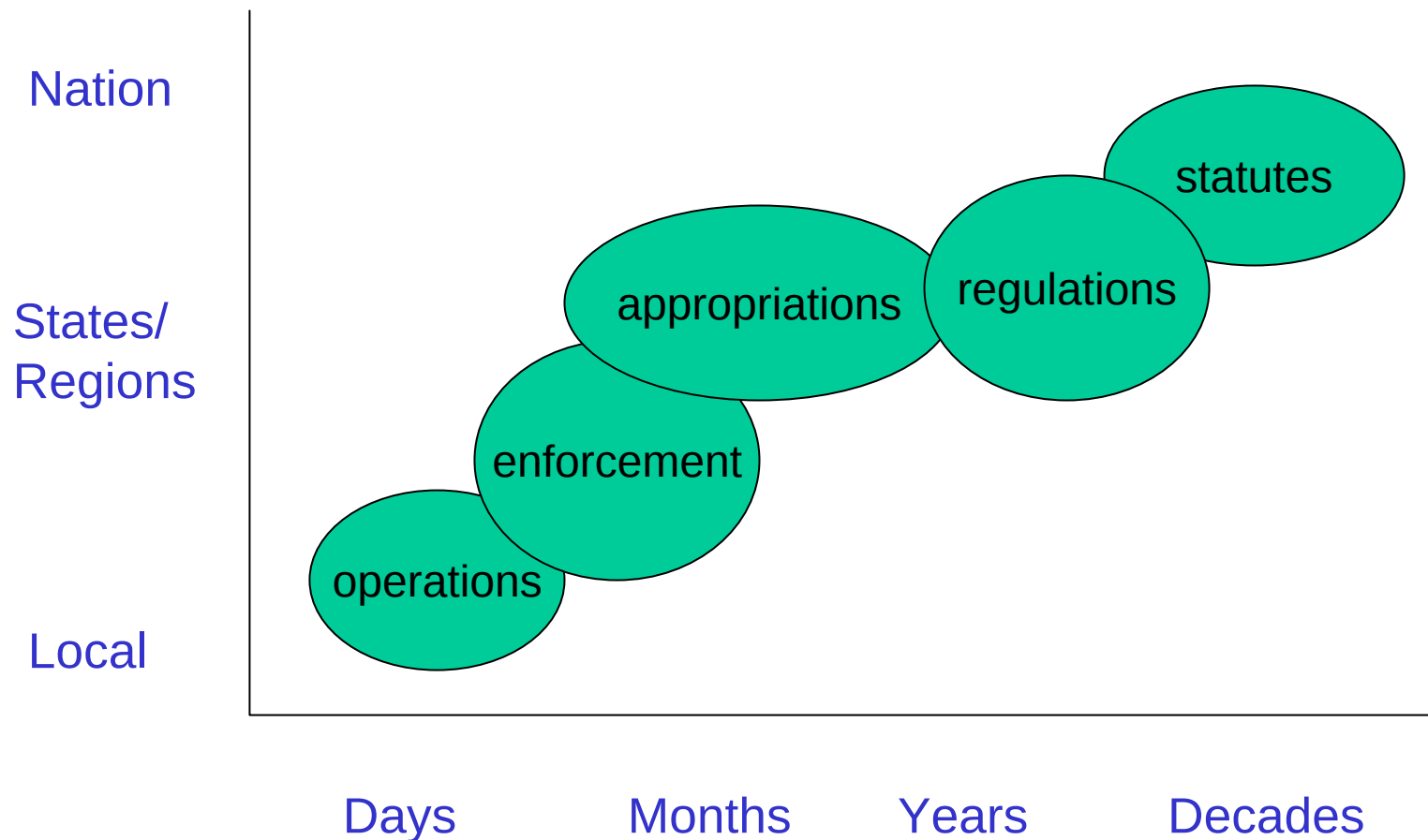
Scale

- Physical dimensions of an observation - time and space
- Grain size – smallest dimensions in an observation set
- Extent – total area or time over which observations are made

Scaling vs Levels – Is There an Indicator Hierarchy?



Hierarchy and Scale



Recommendations

- Establish indicator definition and criteria based on an agreed-upon conceptual framework
- Establish indicators across the hierarchy help to close the gap between actions and outcomes
- Make gaps and limitations transparent
- Show that indicators make a difference – it is the key to investment

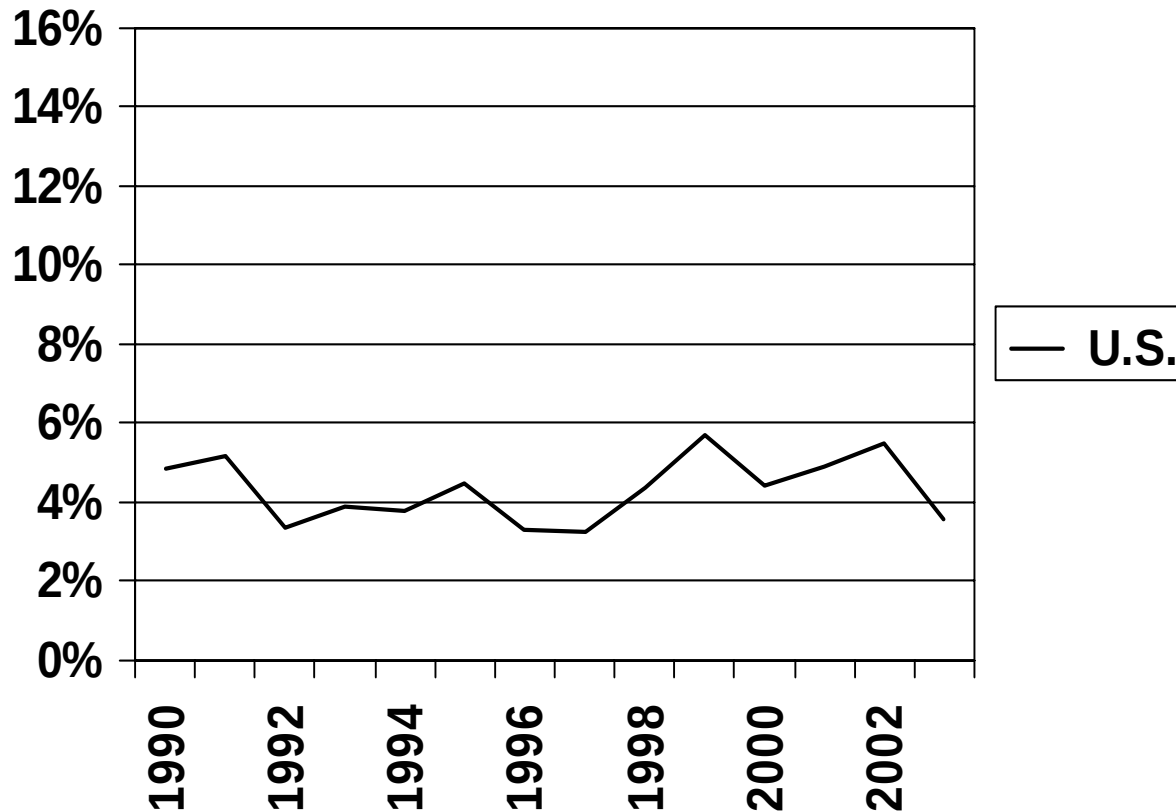


Indicators - are they worth it?

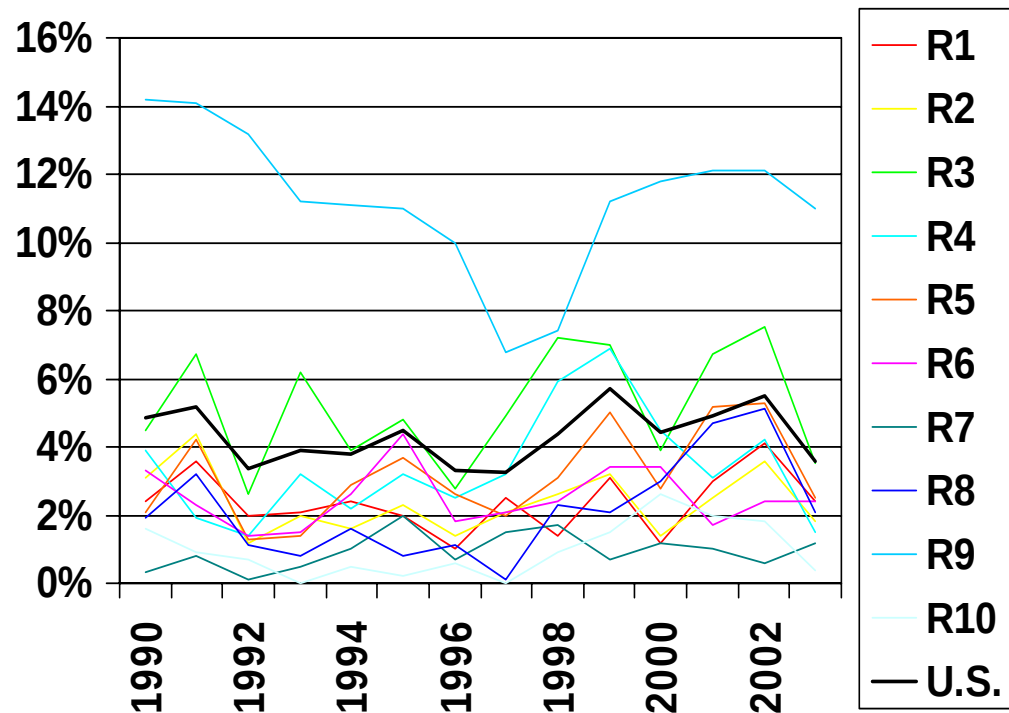
- Indicators enhance the public dialog about the state of the environment
- Indicators focus the need for more in-depth analysis of program performance.



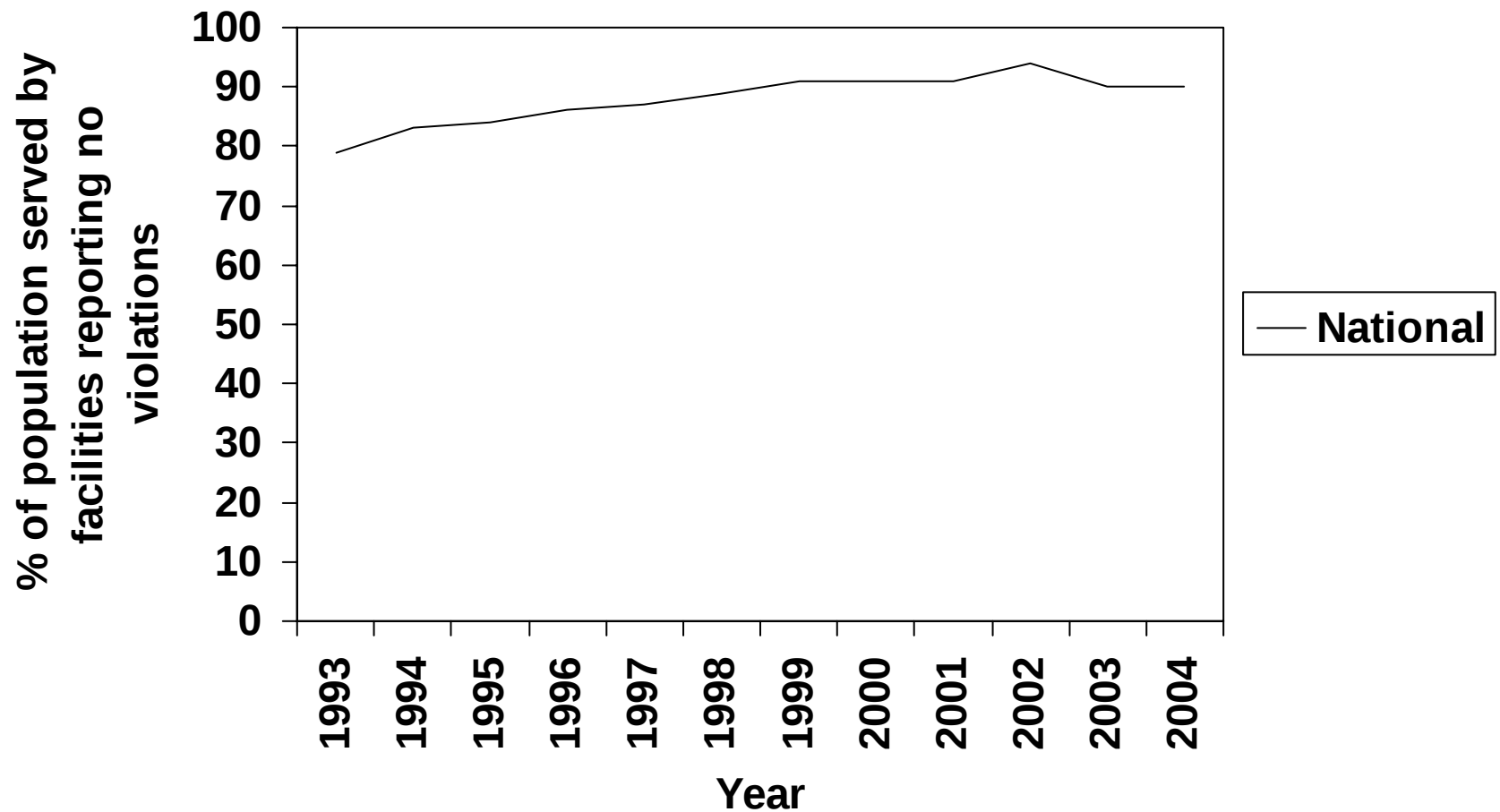
Trends in Percentage of MSA-Days AQI>100



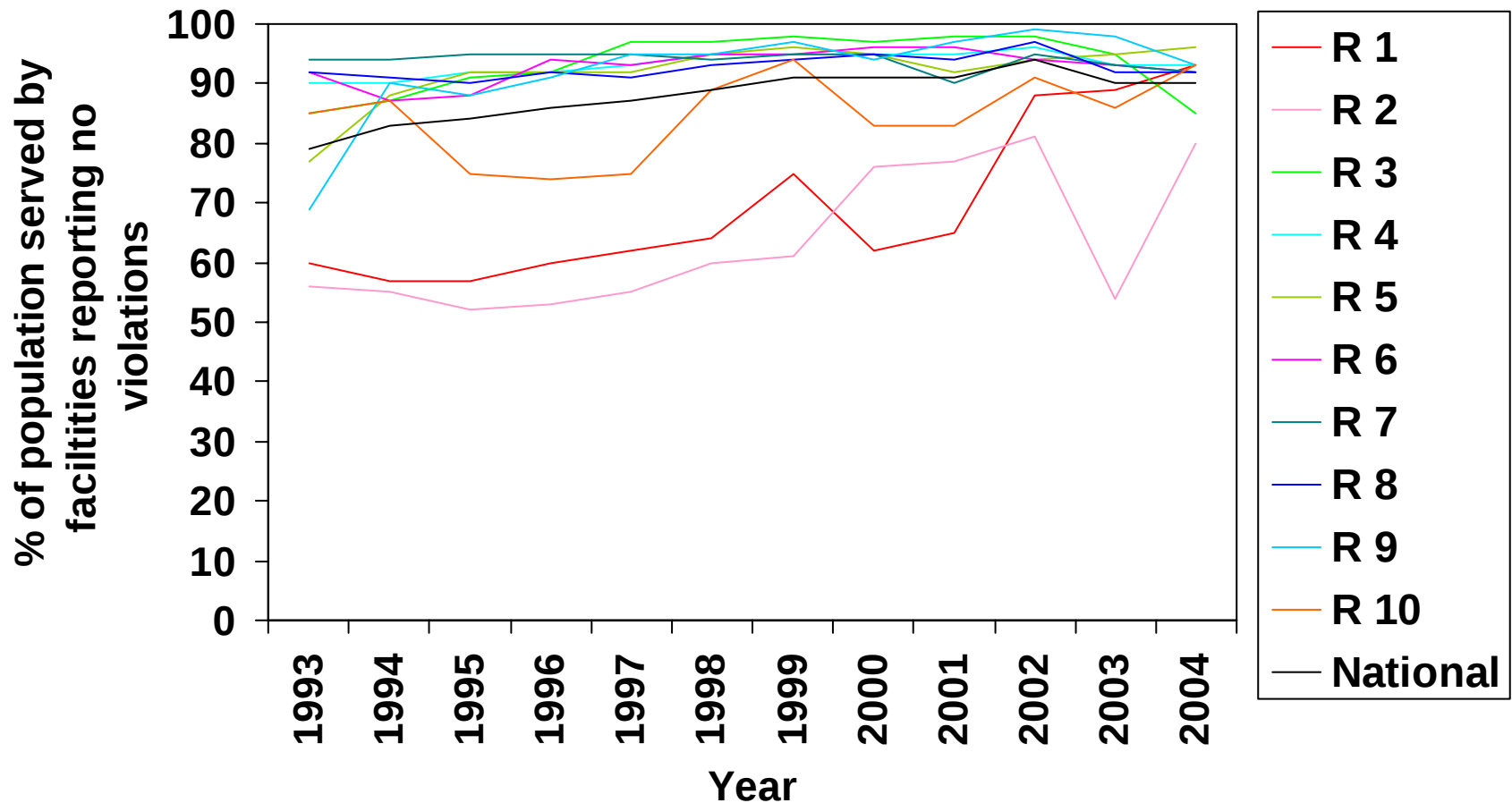
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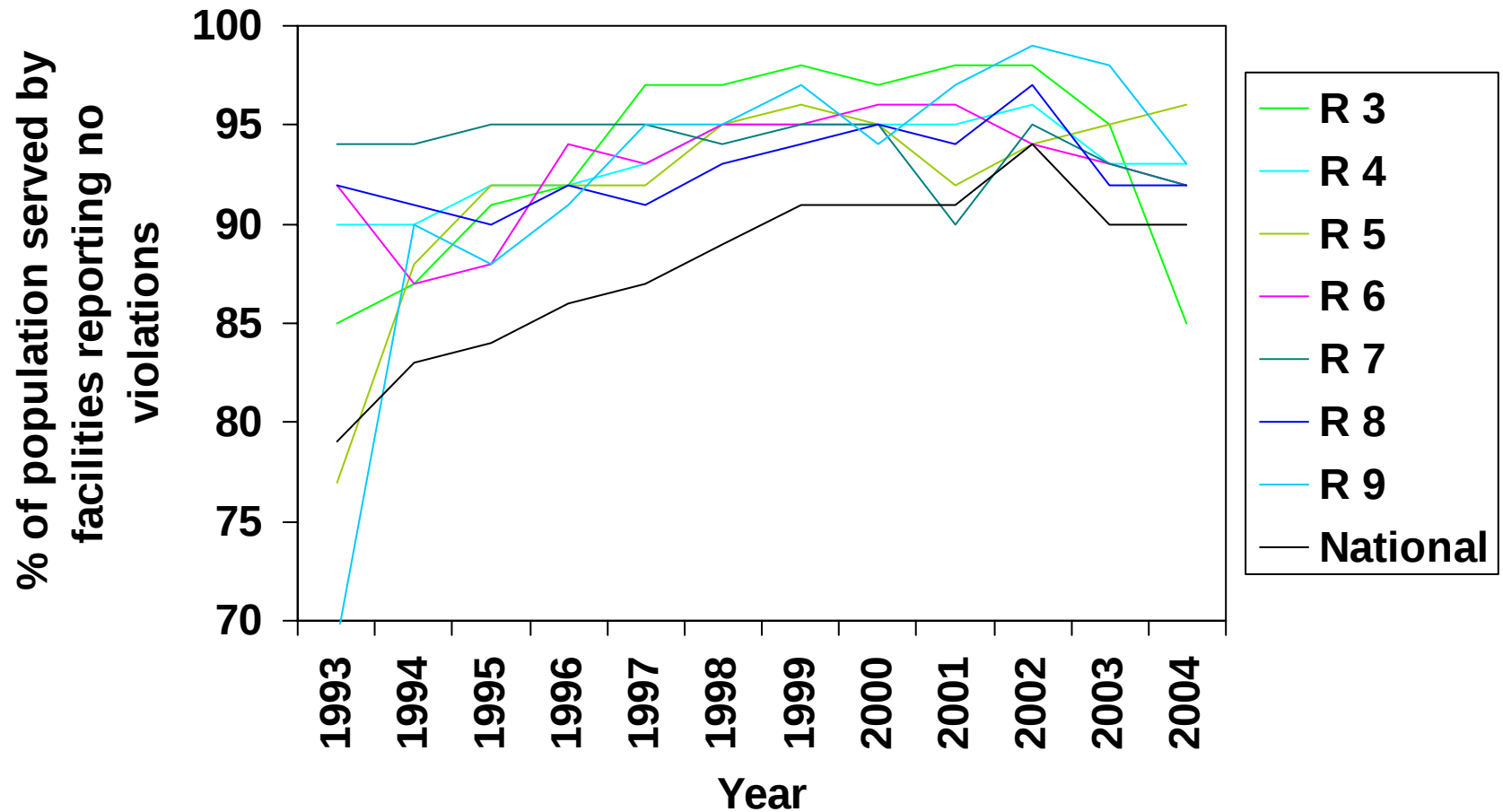
Trends in Health-based Violations at Community Water Systems



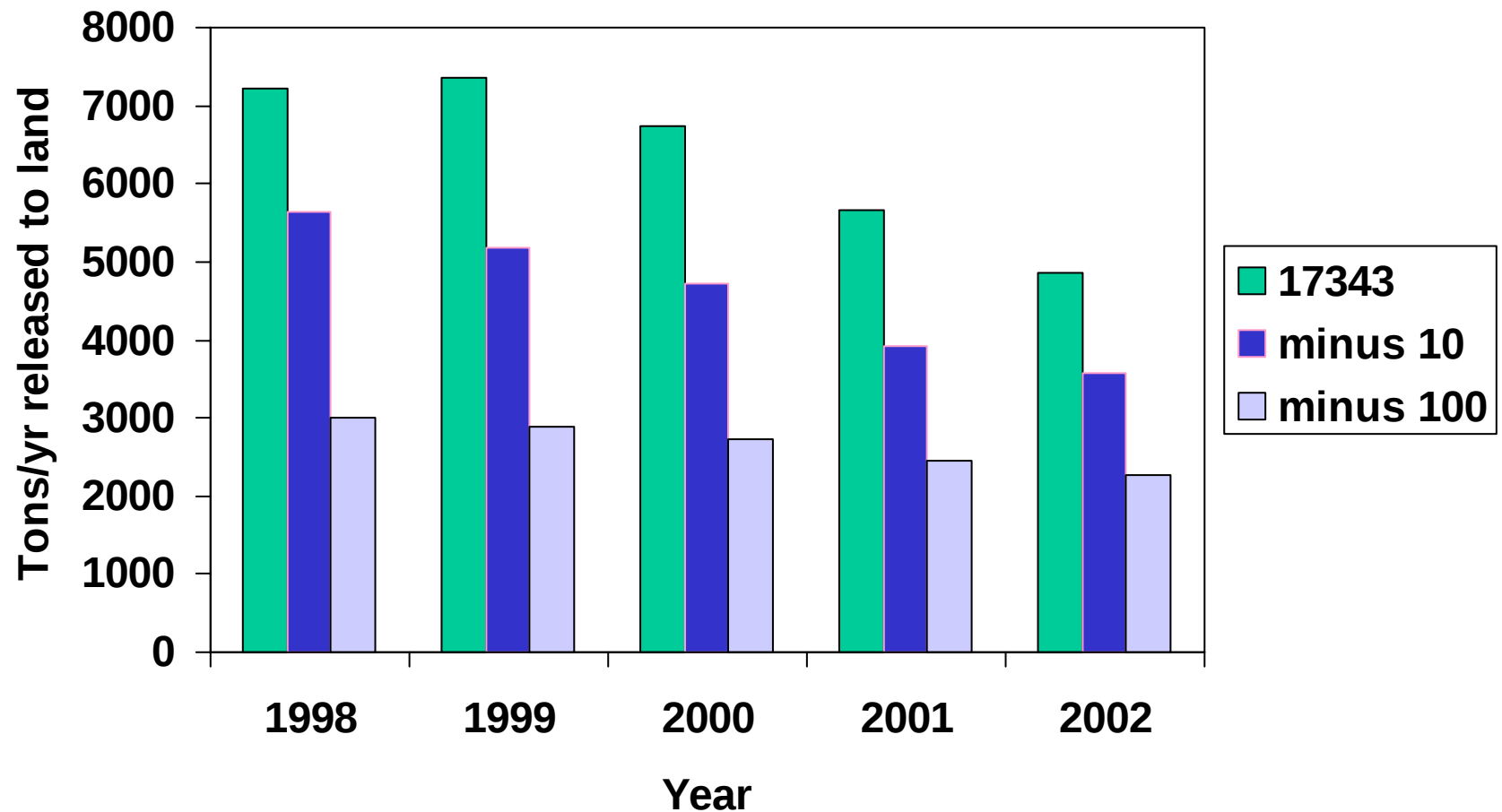
Trends in Health-based Violations at Community Water Systems



Trends in Health-based Violations at Community Water Systems



Trends in TRI Releases to Land (1988 core chemicals)



Trends in Health-Based Violations at Community Water Systems

