

Linking Science to Decision Making at the U.S. EPA Region III

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Cincinnati, OH

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Region III Focus and Interests



- **Use science in decision/policy making.**
 - Better utilize existing research (e.g., fate and transport modeling) in decision making.
 - Better utilize economic and social data/information in decision making.
- **Address the impact of uncertainty on decision making** (science and other).
- **Stakeholder participation/inclusion in decision making processes.**
- **Demonstrate accountability.**
- **Take steps toward sustainability** (define/debate issues, include stakeholders, demonstrate/achieve concrete results) via EPA available programs/tools and other collaborative means.

Region III's Approach



- Combines quantitative information (science) in a qualitative process (Decision making)
- Prioritizing work based on science
- Prioritizing work based on resources
- Facilitates the Sustainability discussion

Multi-criteria Integrated Resource Assessment (MIRA)



- Transparent
- Stakeholder inclusive
- Learning-based
- Uses indicators to prioritize outcomes (link to program activities via logic models)

Region III Modified Logic Models



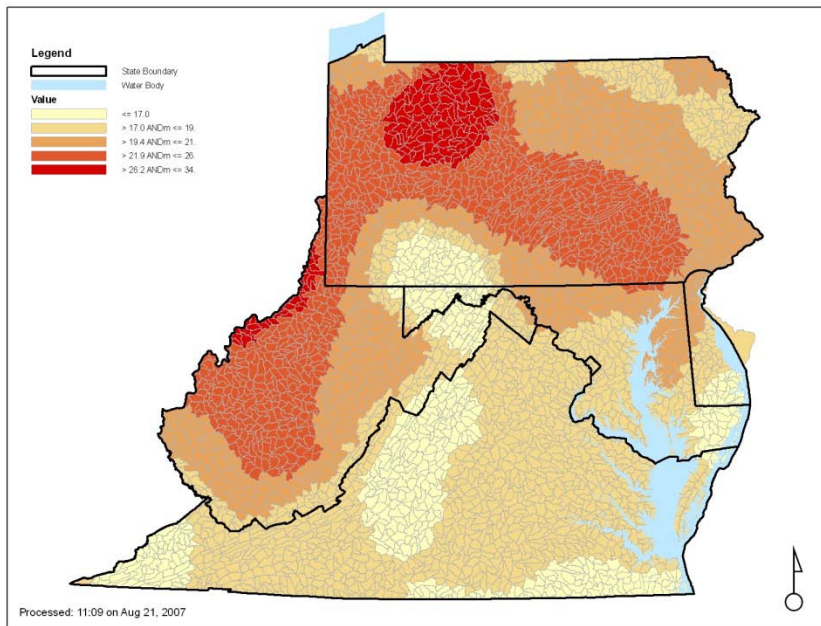
- Not purely Kellogg logic models
 - Customized by Region III for environmental and EPA goals.
- Link program activities to environmental (and other) outcomes.
- Pair with MIRA for prioritization of activities based on outcomes.

MIRA Terminology

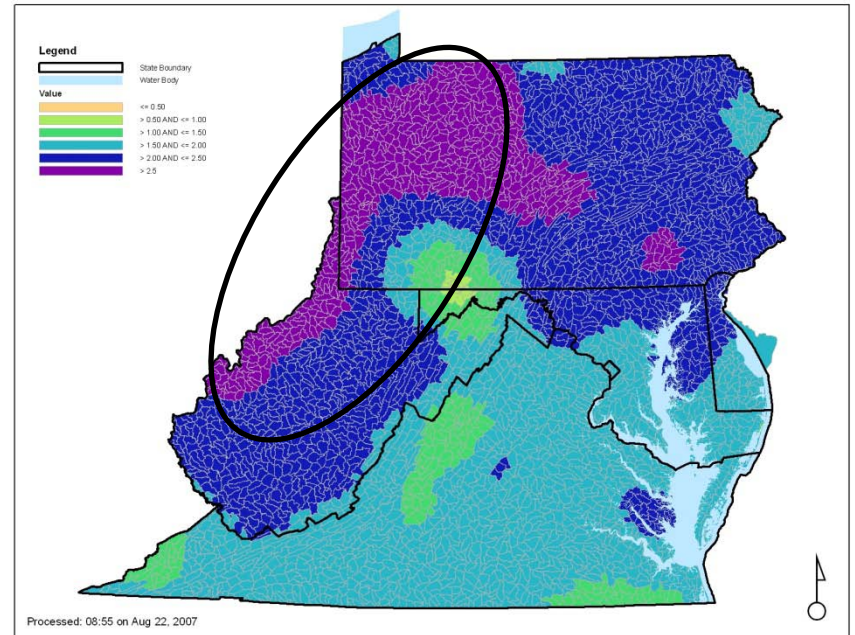


- **Indexing** = placing all decision criteria values on the same decision scale.
- **Preferencing** = determining the relative importance of all criteria; represents a value set.
- **Criteria Sum** = “Index”; a composite index that is a linear weighted sum of all indexed criteria data and preference weights.

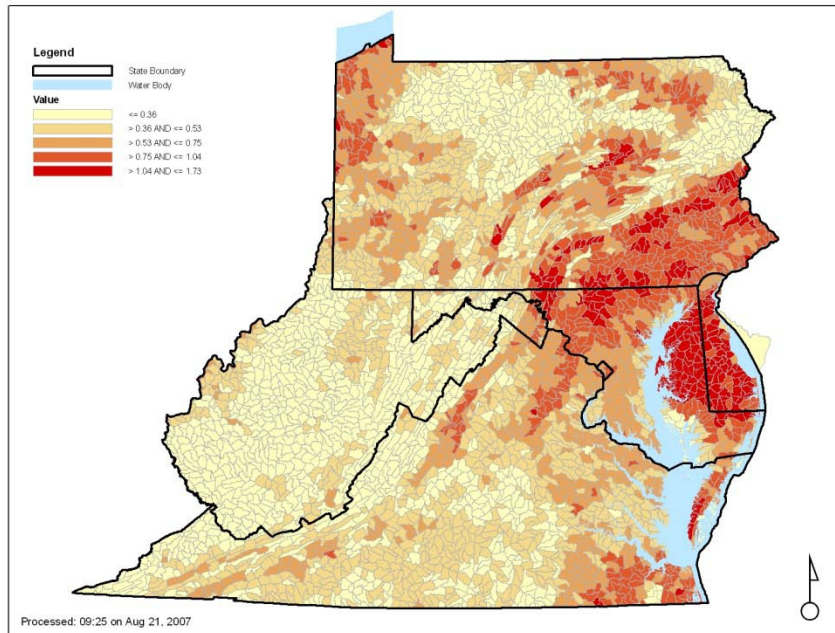
Sulfur Deposition Raw Data



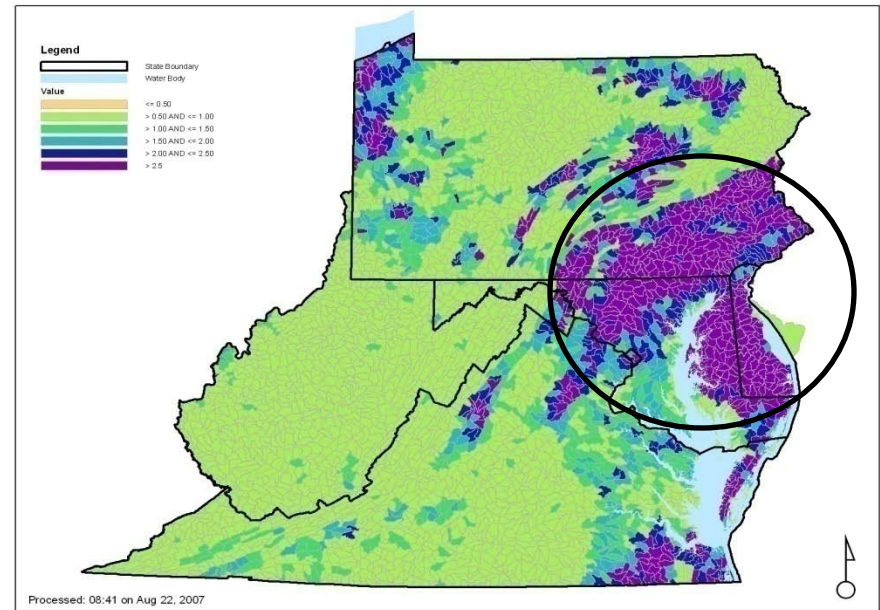
S_Dep Indexed



Phosphorus Loading Raw Data

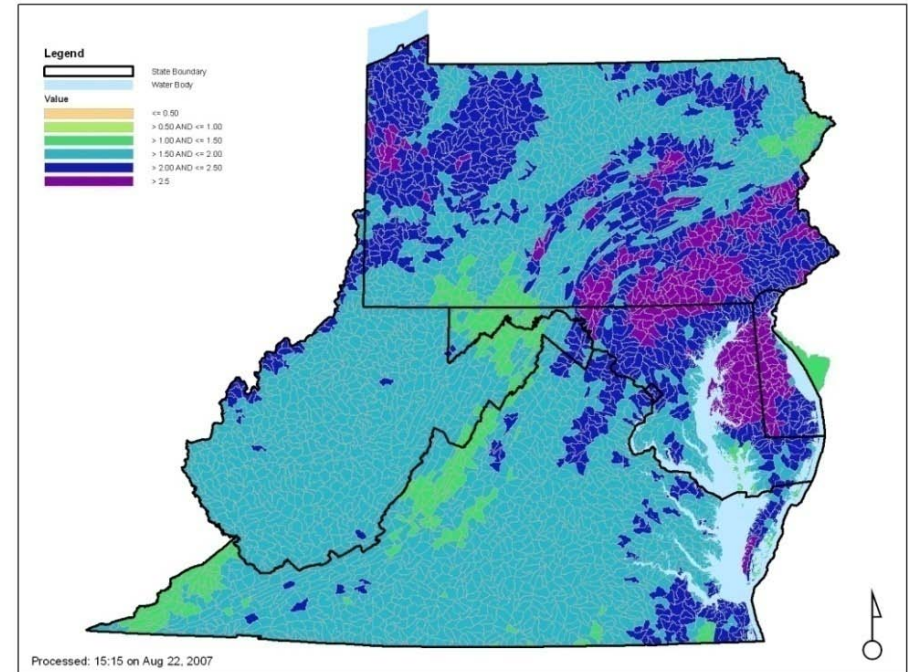
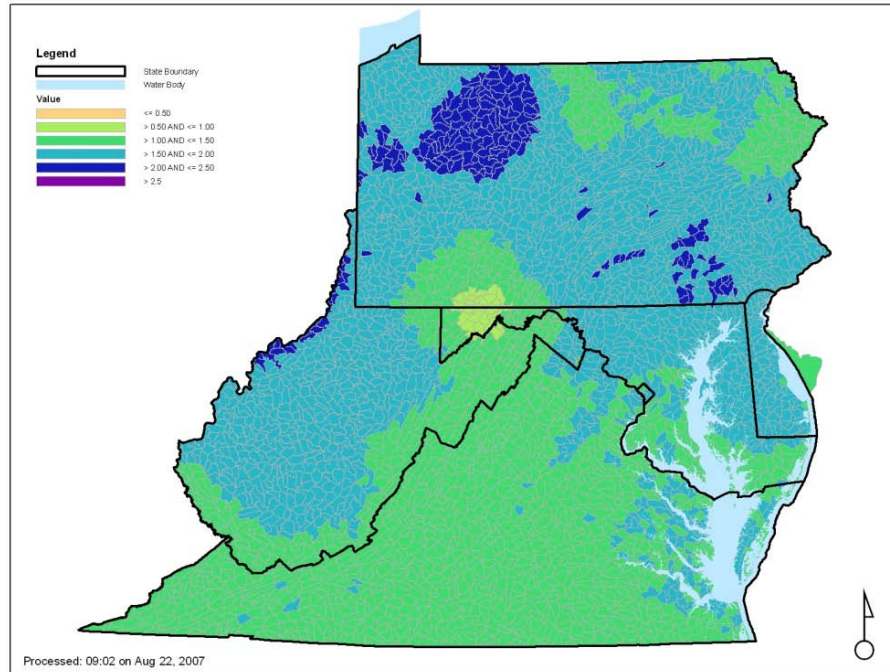


P_Load Indexed



P_Load and S_Dep Combined (**equally** important)

80% P_Load, 20% S_Dep



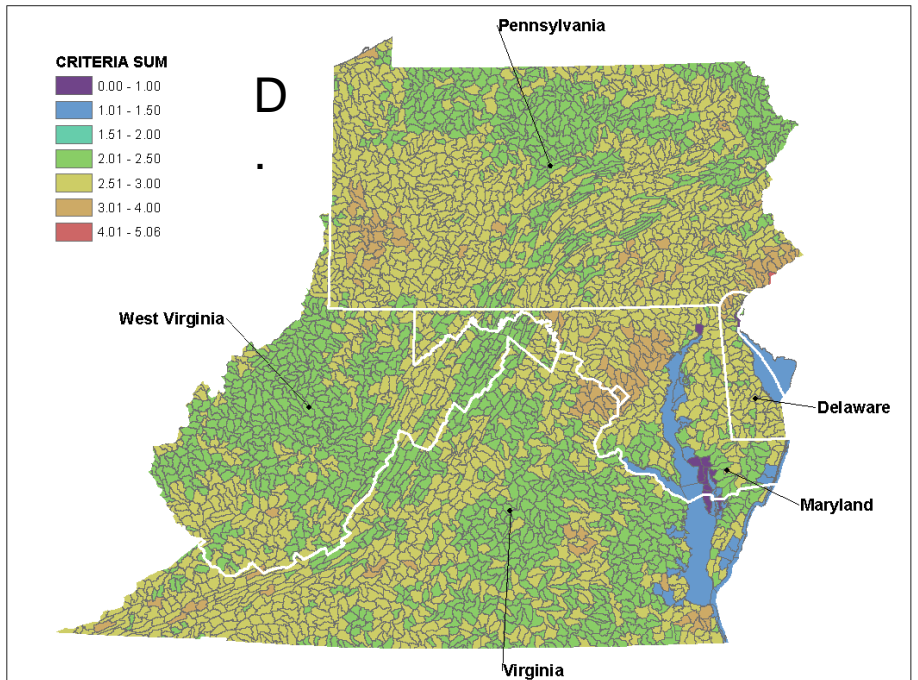
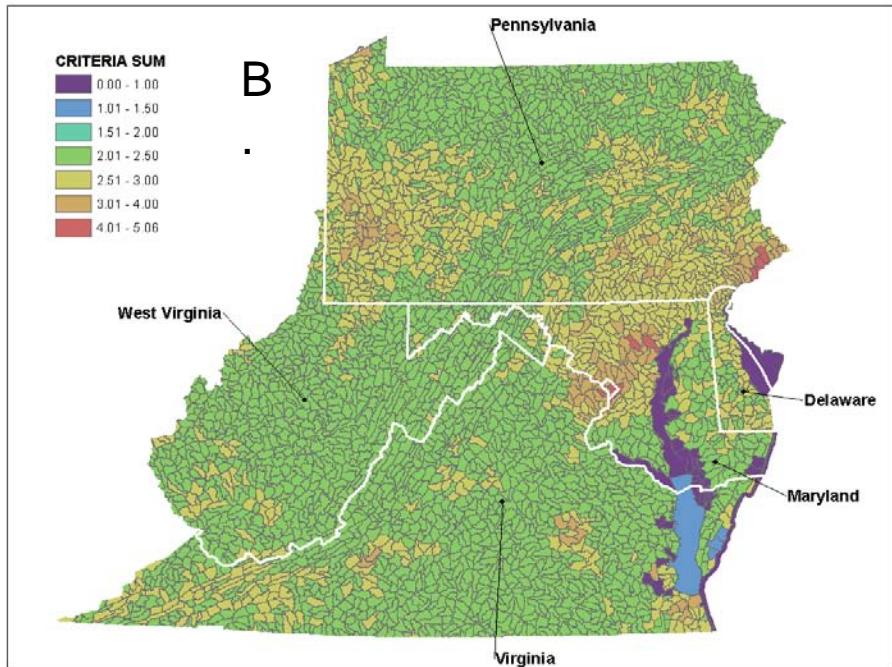
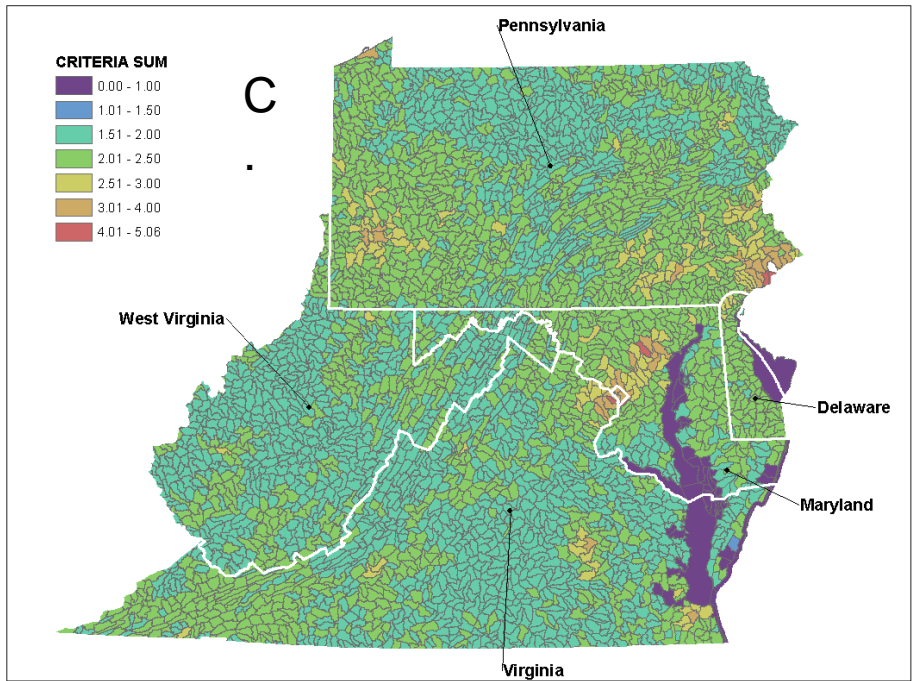
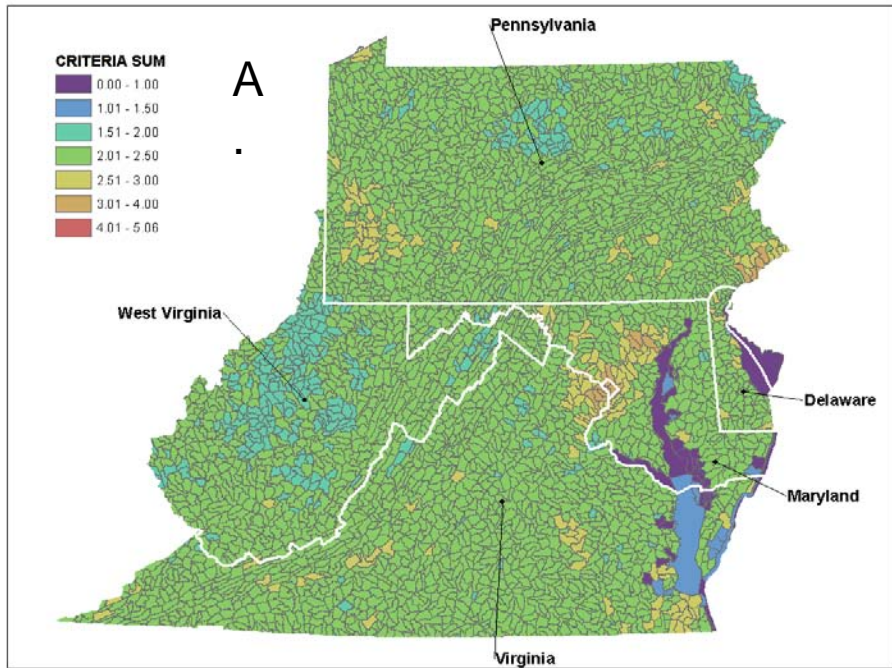
- S_Dep hot spot (NW PA) determined to be **more scientifically significant** than P_Load hot spot (Delmarva Peninsula).

- **Science** significance stays the same.
- Decision maker judgments alter priorities but decision process is **transparent**.

2010 Budget Case Study Example



- Criteria sum used to rank HUC12's – on map (poor to good condition watersheds based on 187 indicators)
 - Maps look different with identical data – depends on values (how the indicators were combined into the criteria sum)
- Criteria sums for each indicator across the entire region compared – to show “drivers” of environmental condition.
 - Bar graphs



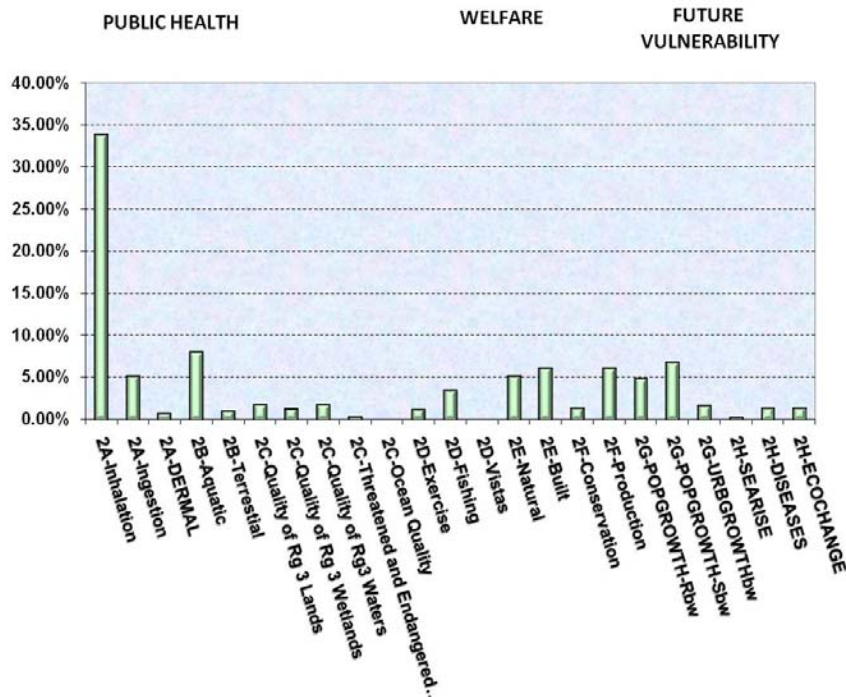
Science Drivers Differ Depending on Value Set



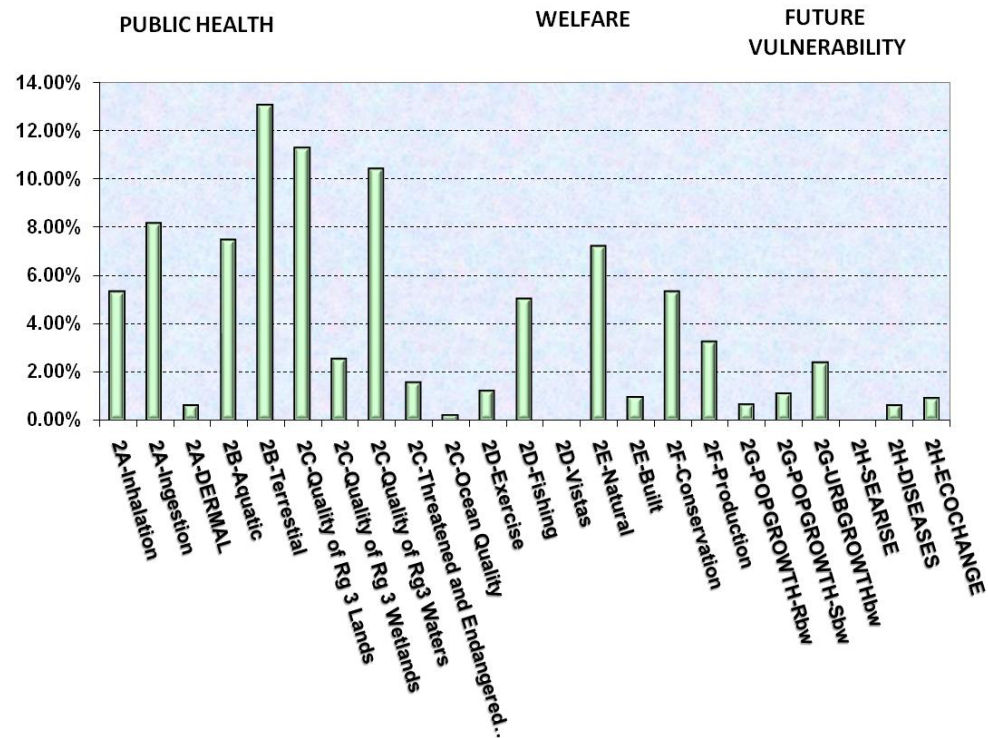
Health-focused Value set*

Welfare-focused Value set*

RELATIVE ENVIRONMENTAL IMPORTANCE



RELATIVE ENVIRONMENTAL IMPORTANCE



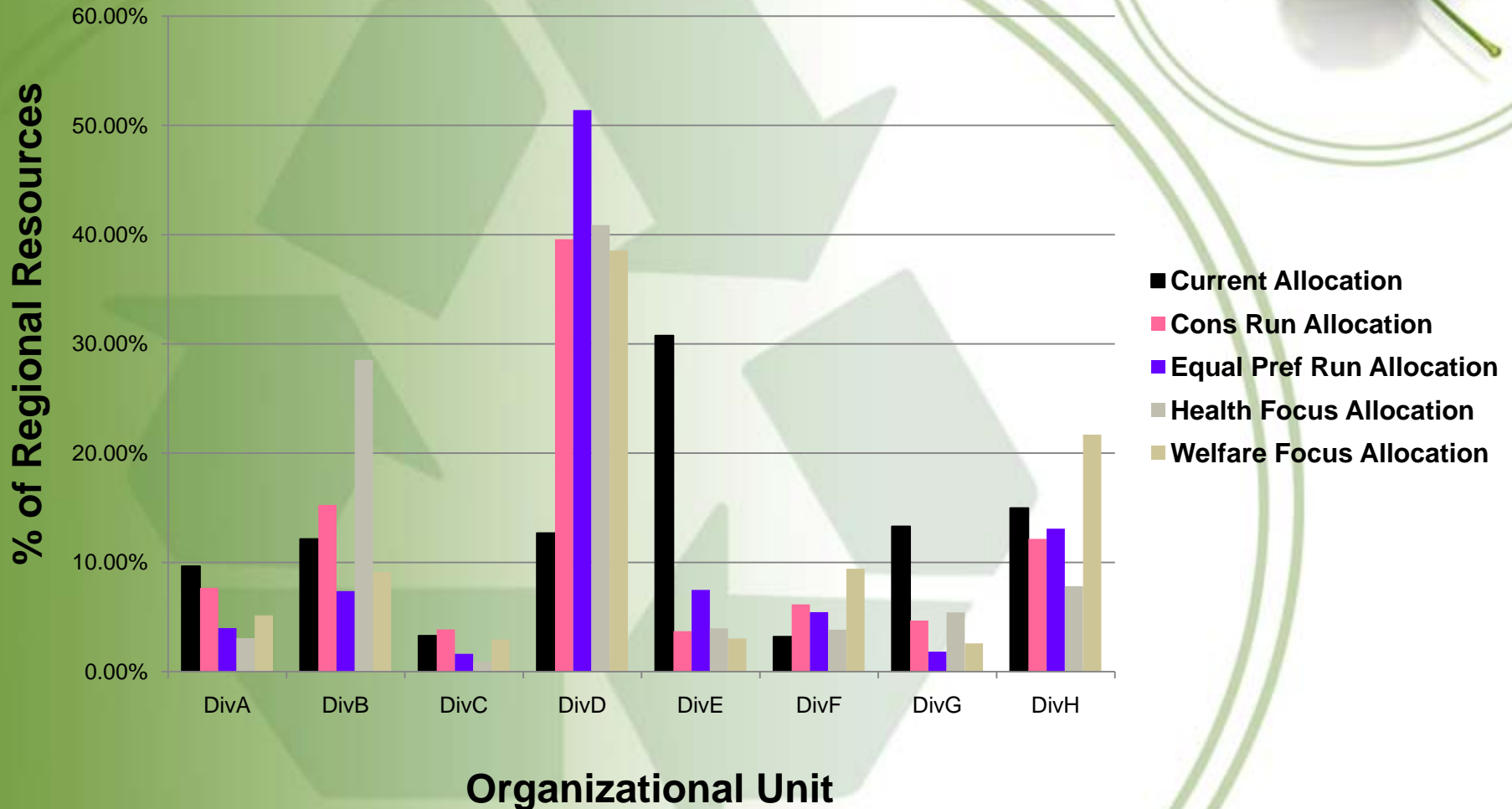
*Data is Identical.

2010 Case Study



- Grouping of indicators into 2010 Priority areas: Healthy Air, Healthy Waters, Community Health, Natural Infrastructure, Energy
 - Priority area teams formed (some were existing 2008 or 2009 teams that were re-focused)
- Capability built but not used: linking Division-based FTEs to each indicator to estimate how many FTEs are used to support those programs represented by that indicator
 - Managers not comfortable with quality of FTE data

Current and Potential Resource Allocation Schemes Based on 4 Different Value Sets (compared with the current allocation scheme)



What has Region III learned so far?

- Science is not enough.
- Process is most important.
- We don't do much/any policy or decision analysis.
 - Wrong data collected.
 - Wrong indicators for decision making.
- We need to embrace our social science friends.



Misconceptions



- Methodological decision analysis makes making decisions easier.
 - Not necessarily but it increases the chances of success (less conflict, more informed, less regret)
- Science is objective.
 - Science requires judgments (expert for significance; non-expert for how it's viewed).
- Present completed analysis to decision makers for decision making.
 - Involve decision makers in entire process (formulating the question to deliberating options).

Region III Applications



- Determine 8-hour ozone nonattainment areas.
- Assess ozone monitoring network.
- Determine decision impact of uncertainty.
- Propose Region III 2010 Budget based on science priorities.
- Demonstrate PM2.5 program accountability via public health policies based on multiple organizational goals (in process).
- Evaluate agricultural/energy policies for the Chesapeake Bay watershed based on environmental, social, and economic criteria (in process).
- Evaluate environment/policies sensitive to endocrine disruption compound concerns (starting).

Region III Next Steps



- **Refine regional analysis/Build analytical capability**
 - Better data/indicators, address information gaps, address issues of scale
- **Regional projects**
 - Follow up on previously identified priority areas (2010)
- **Improve usability of tools**
 - Automation of mechanistic portions of MIRA
 - Automation of mechanistic portions of modified logic models
- **Stakeholder inclusiveness**
 - Improve stakeholder participation/facilitation aspects of the process.
- **Build collaborations/partnerships**
 - Develop/expand capability to do different kinds of applications/analyses.

More information



- <http://www.epa.gov/reg3esd1/data/mira.htm>
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