What Makes an Ecosystem "Critical"?

- **Condition**

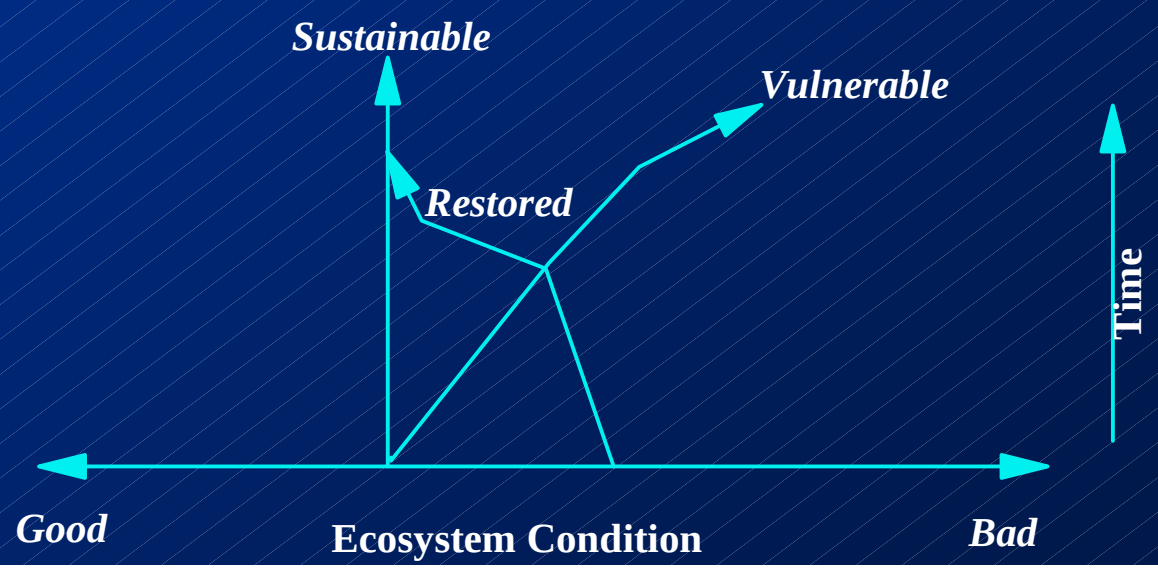
  Pristine, Good, Recoverable?

- **Sustainability**

  f (ecosystem sensitivity, resiliency; stressors affecting)

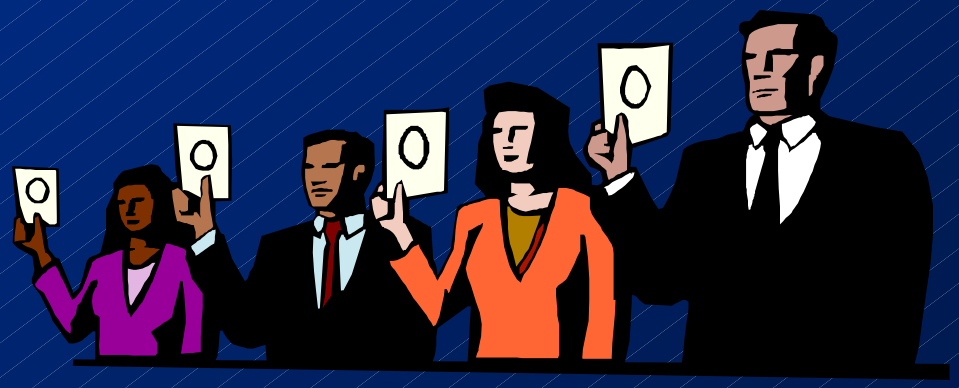
- **Value to Society**

  Aesthetics, Economic Opportunities, Goods and Services?



How are Decisions Made to Protect/ Reduce Risk for Critical Ecosystems?

- **Multiple Criteria**
  - **Stakeholder Input, Politics, Economics, Feasibility**
- **Evaluation of Trade-offs**



What ReVA Offers

- Development of *multiple* approaches to assess ecosystem vulnerability
- Improved trade-off analyses through alternative future scenarios
- Flexible framework to integrate existing data on condition, sensitivity, and stressor distributions

ReVA
Regional Vulnerability Assessment

ReVA: Targeting Critical Ecosystems

- **Monitoring Data**

  Remotely Sensed Data, EMAP, NAWQA, FHM, other

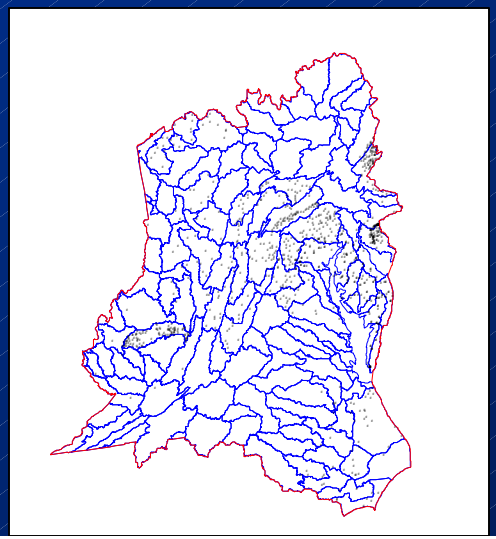
- **Empirical Landscape Models**

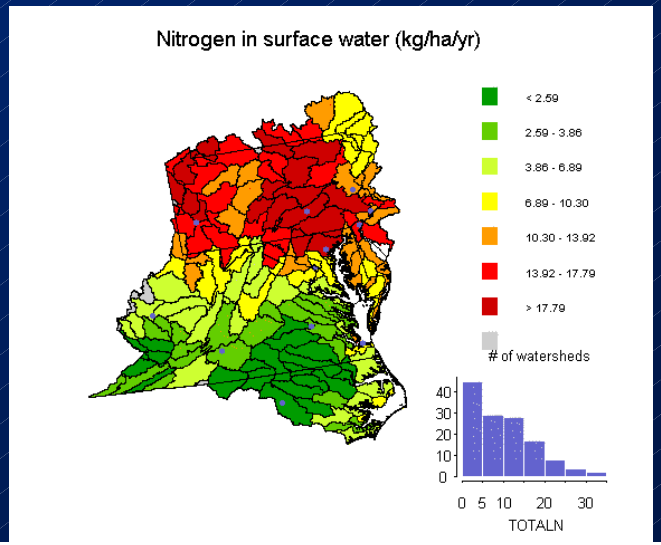
  Spatially-explicit estimates of condition

  Developed over broad scales to capture spatial variability

  Applicable to fine scales, across entire region

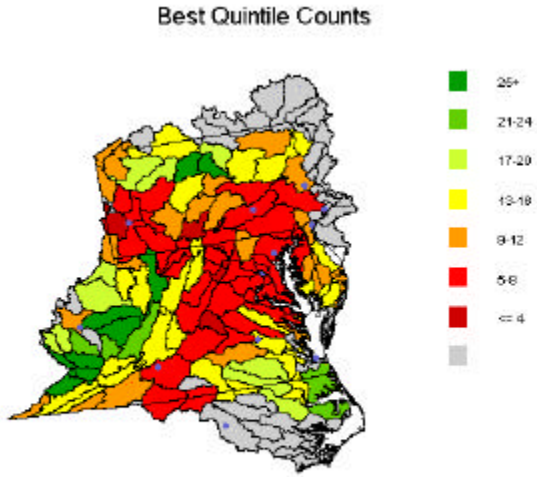
  Estimates of uncertainty and error



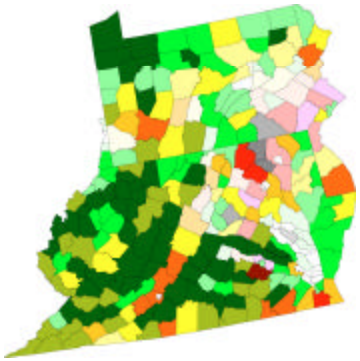


Multiple Integration Methods

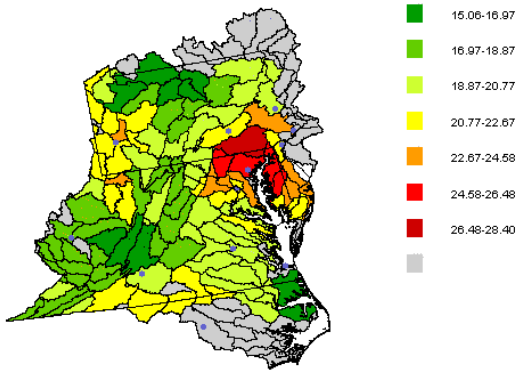
- **Ranking Methods**
  - **Quantiles, Equal Weights, Sum of Ranks, AHP**
- **Distance from Good**
  - **PCA, State Space, Criticality**
- **Grouping of Like Units**
  - **Cluster Analysis, Self-Organizing Maps**
- **Overlay of stressors/resources**



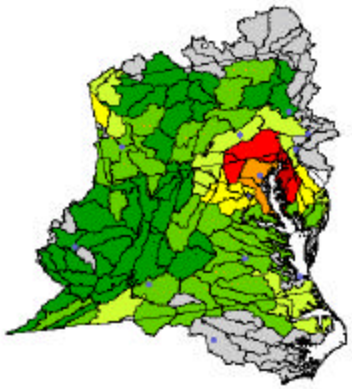
Overlay



Radar Area Summary

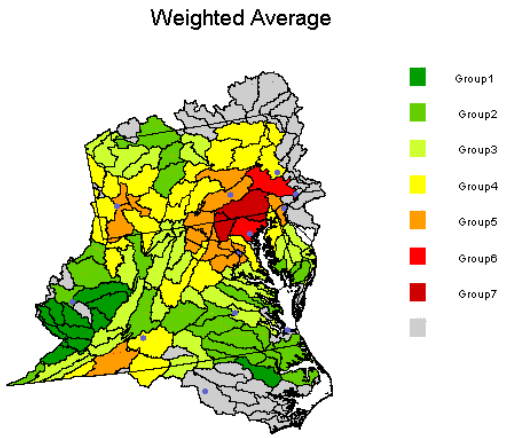


State Space

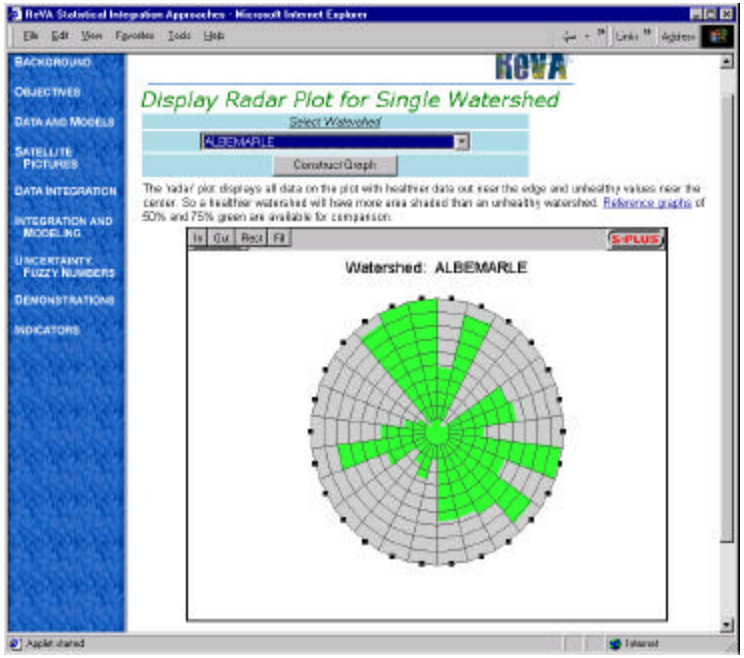


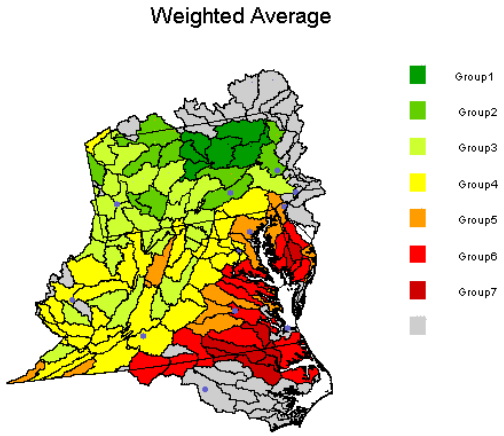
Communication/Comparison of Results

- **Maps of Results**
- **Radar Plots for Individual Units**
- **User-specified Weightings**



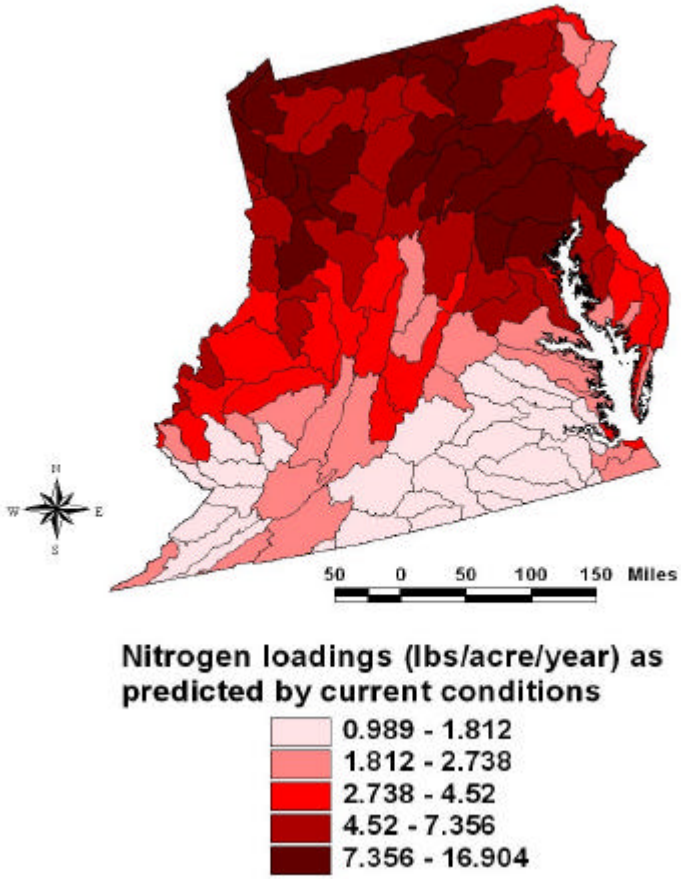
Focus on Aquatic Indicators

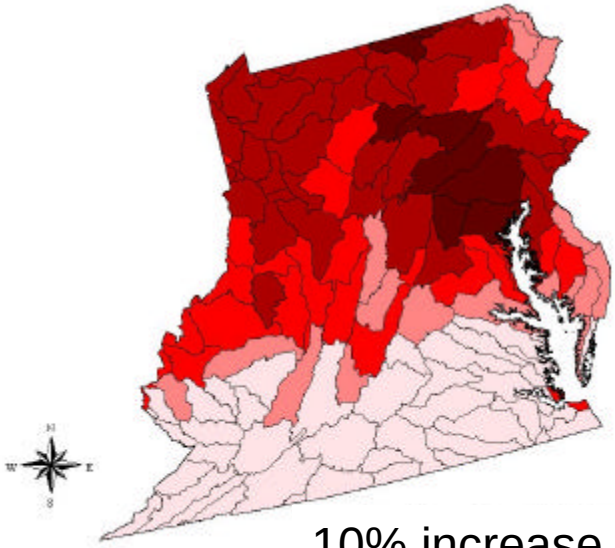




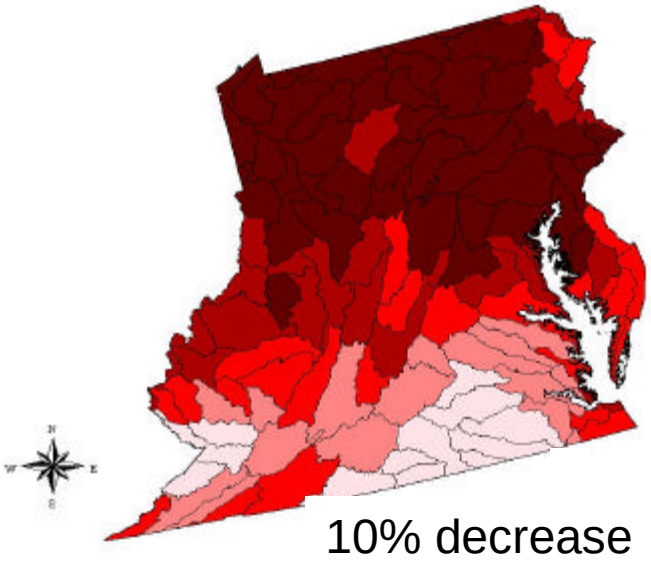
Focus on Human Health

Alternative Future Scenarios: Evaluating Trade-offs





10% increase



10% decrease

How do changes in the amount of riparian forest affect nitrogen loadings in streams?