The Changing Landscapes Initiative

Supporting Decision-making for Change on Northwestern Virginia's Landscape

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Smithsonian Conservation Biology Institute (SCBI) & The Changing Landscapes Initiative (CLI)

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The CLI produces objective information on the potential impacts of land use change on the local landscape

The CLI's Goals:

- Conserve Biodiversity
- Protect Human Livelihood
- Ensure Sustainable Living

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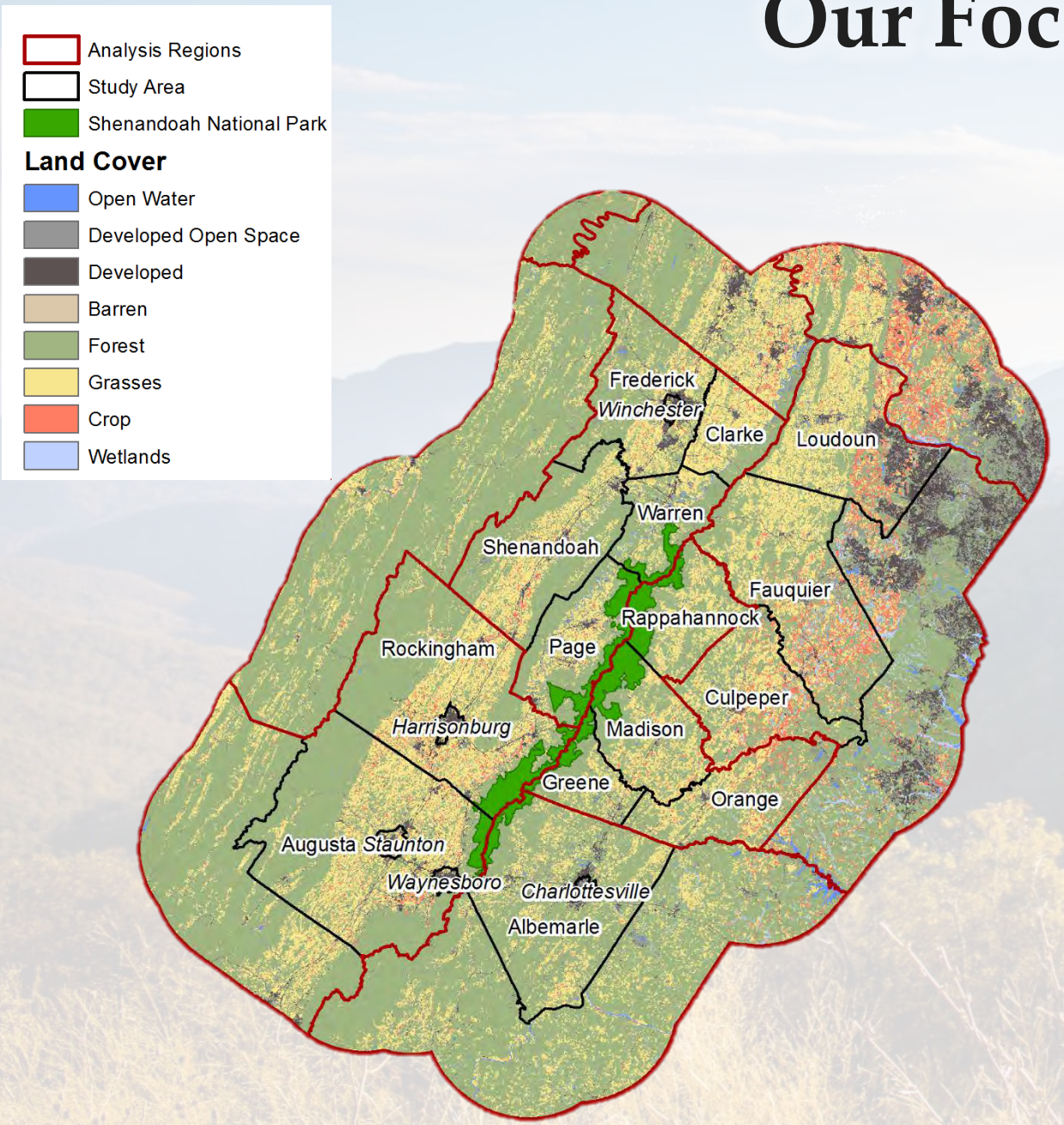
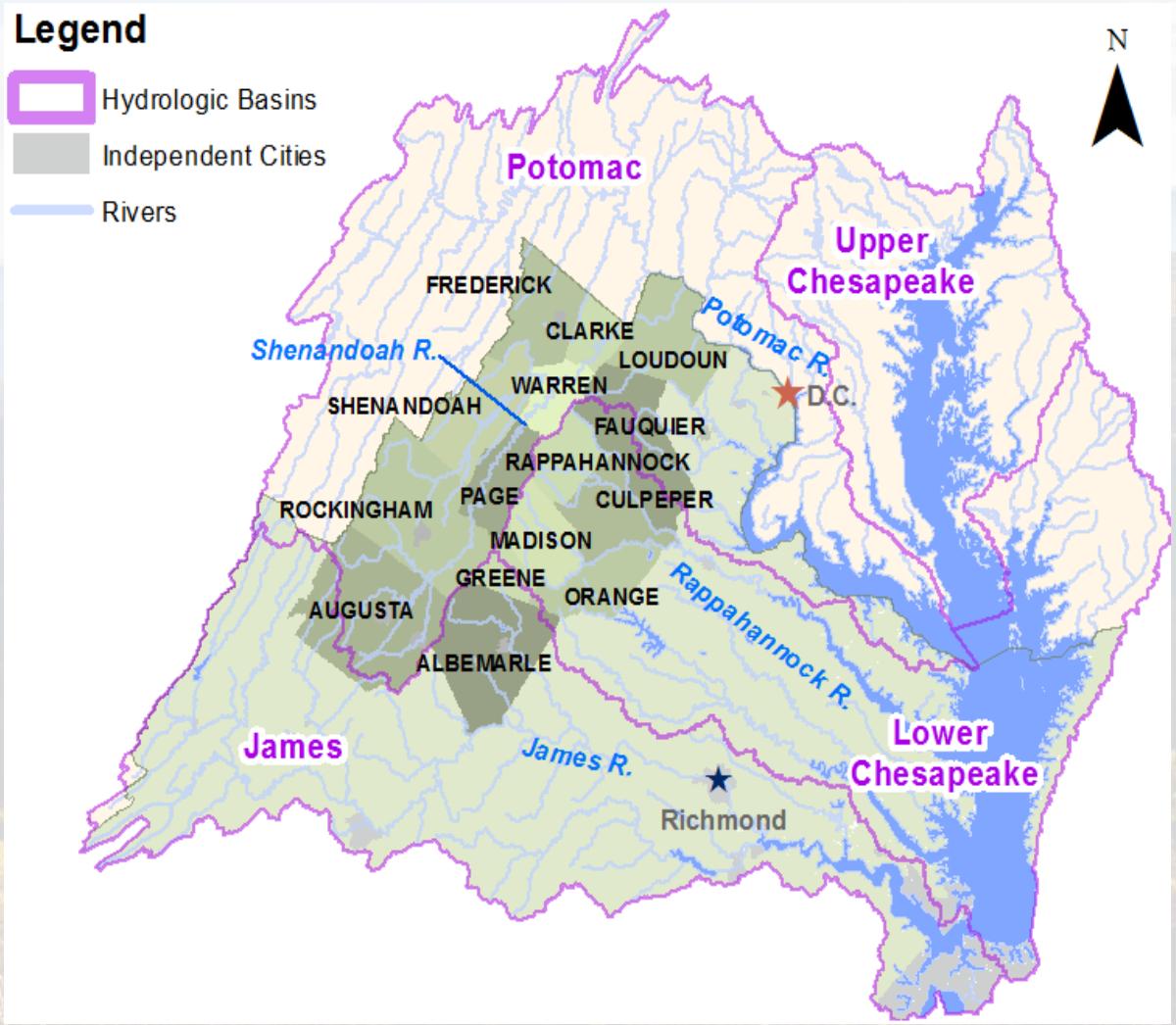
Our Focal Region





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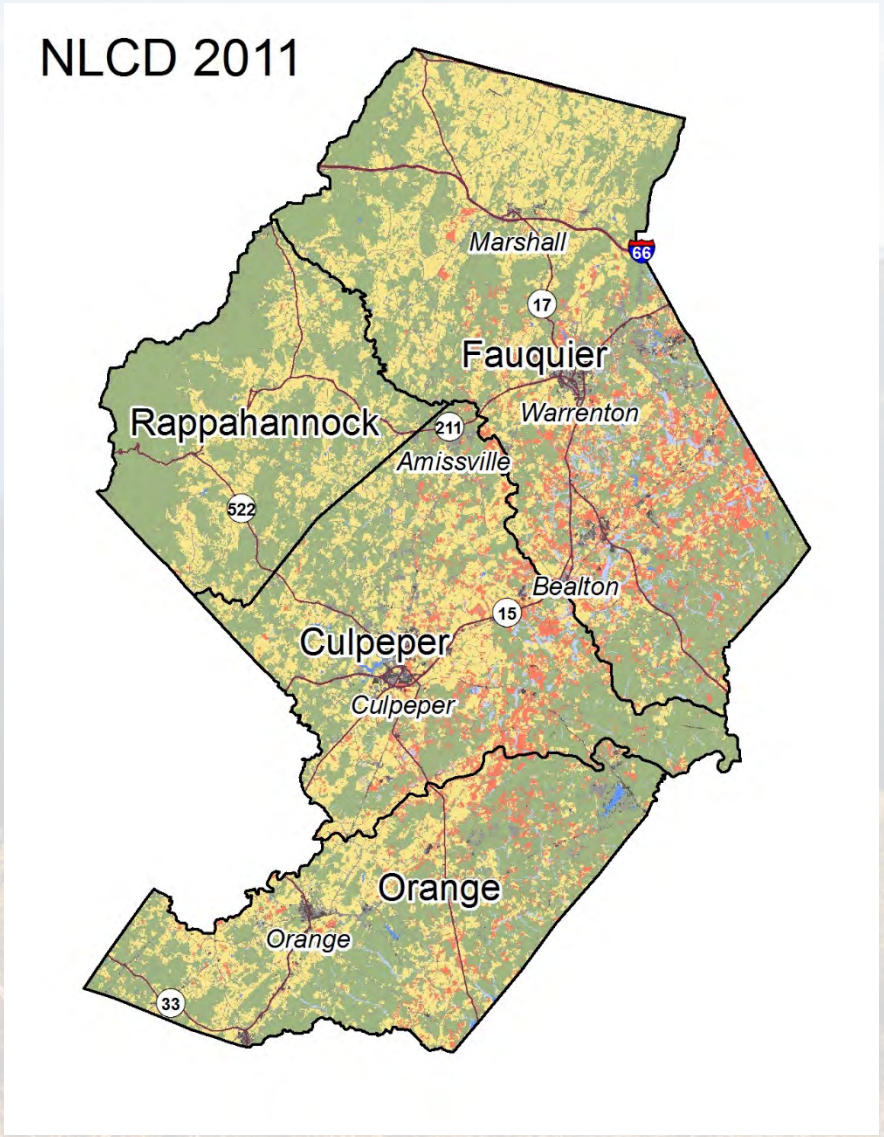
Land Use on the Current Landscape

13,022 acres
Development

486,512 acres
Forest

73,702 acres
Crop

331,008 acres
Grass



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Ecosystem Services

Ecosystem service: the many and varied benefits that humans freely gain from the natural environment and from properly- functioning ecosystems

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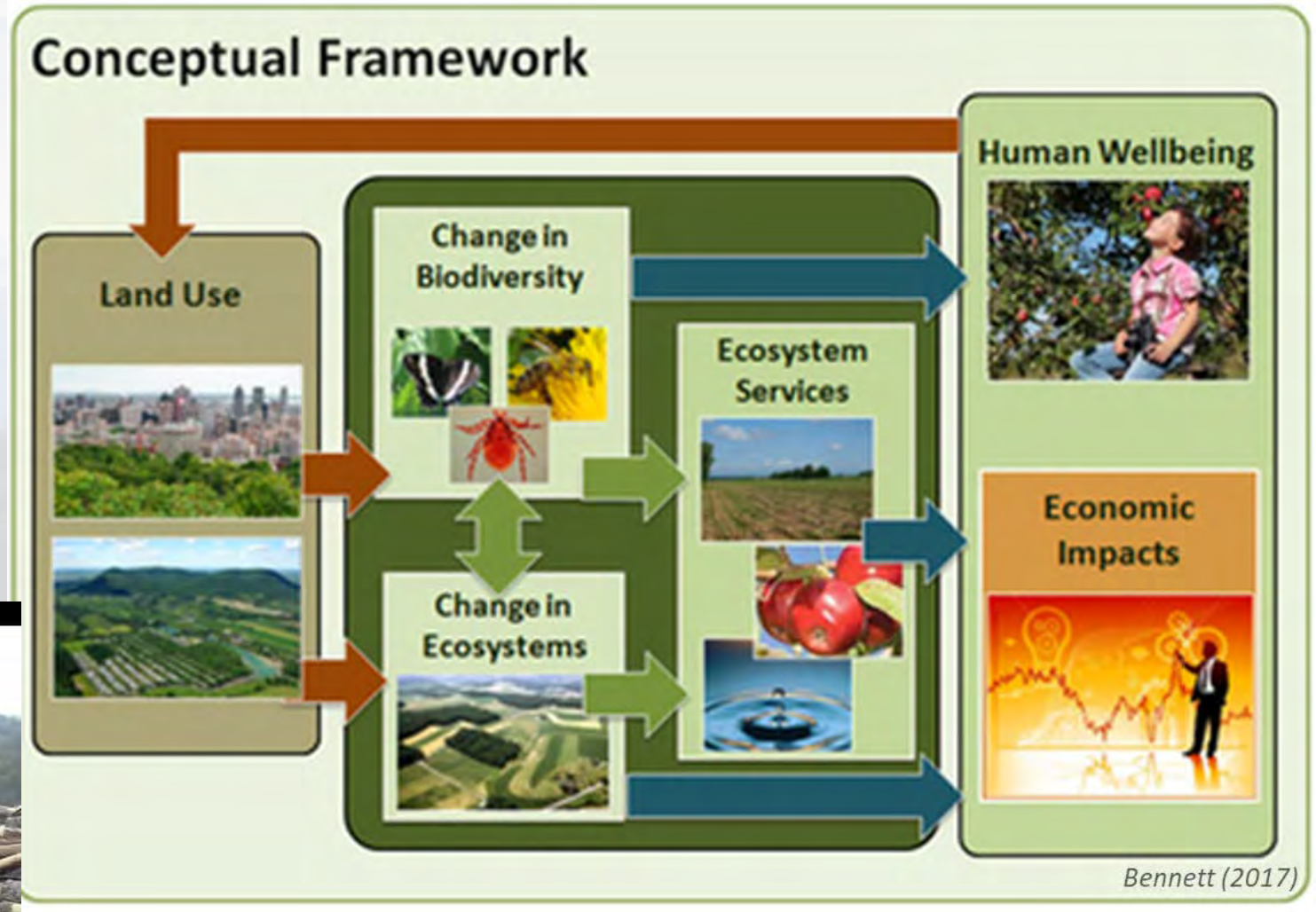
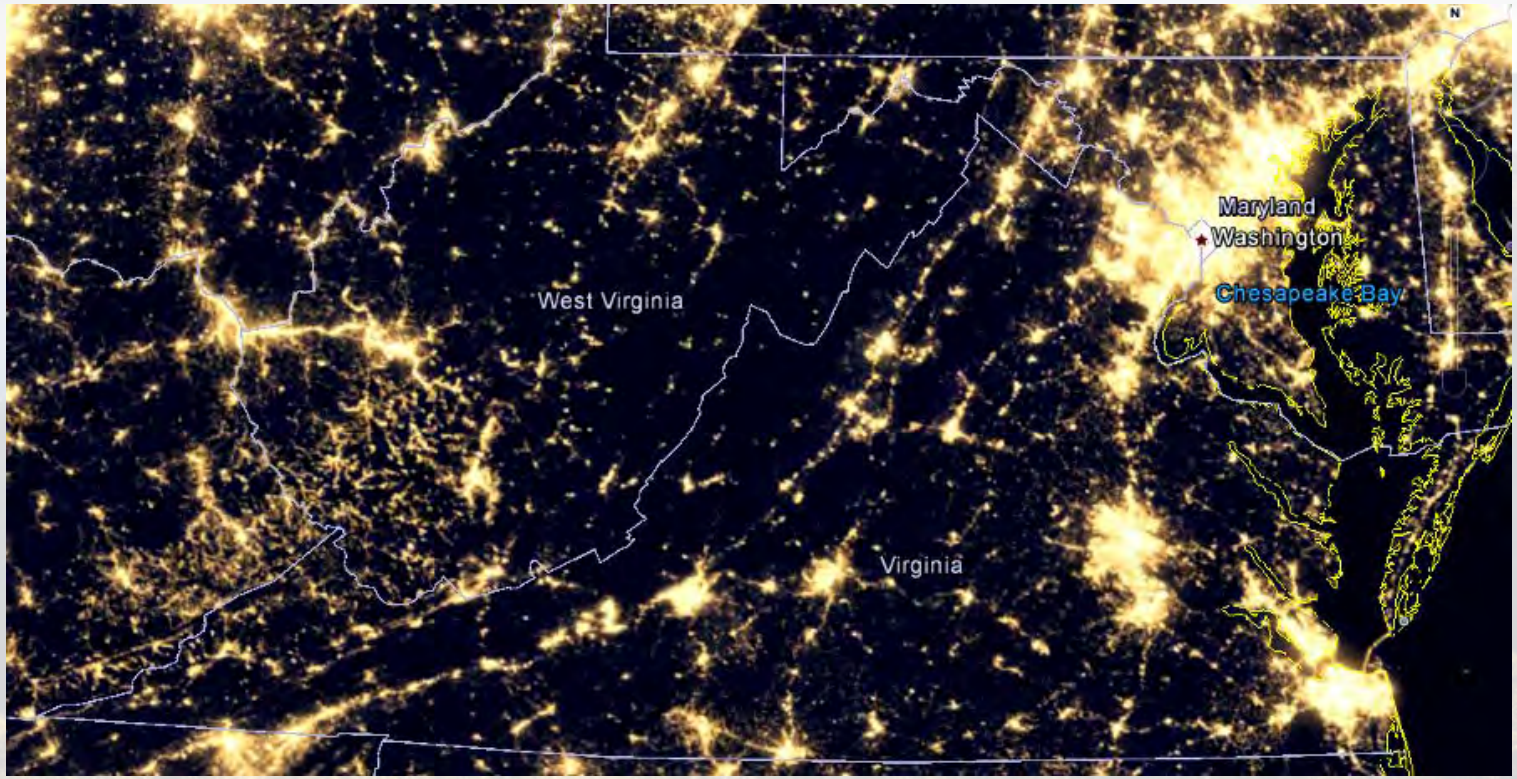
Improved Understanding of Land Use Impacts on Ecosystem Services

- Land use change most influential force in driving change to natural processes & ecosystem services
- Improved understanding of feedback loop/relationship between economy, environment, land use, ecosystem services, and human well-being
- ID gaps in data/knowledge that need to be addressed



- VA is rapidly changing—projected to be the 10th most populous state by 2040
- What will that change look like?
- Currently, few resources to help us understand how land use decisions combined with population growth will play out on landscape



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3 Pillars of Our Approach

LEGITIMACY

Whether or not the process in a system is unbiased and meeting standards of political or procedural fairness

CREDIBILITY:

Meeting the standards of scientific plausibility & technical adequacy

SALIENCE

Relevance of information for the choices that affect a decision-maker

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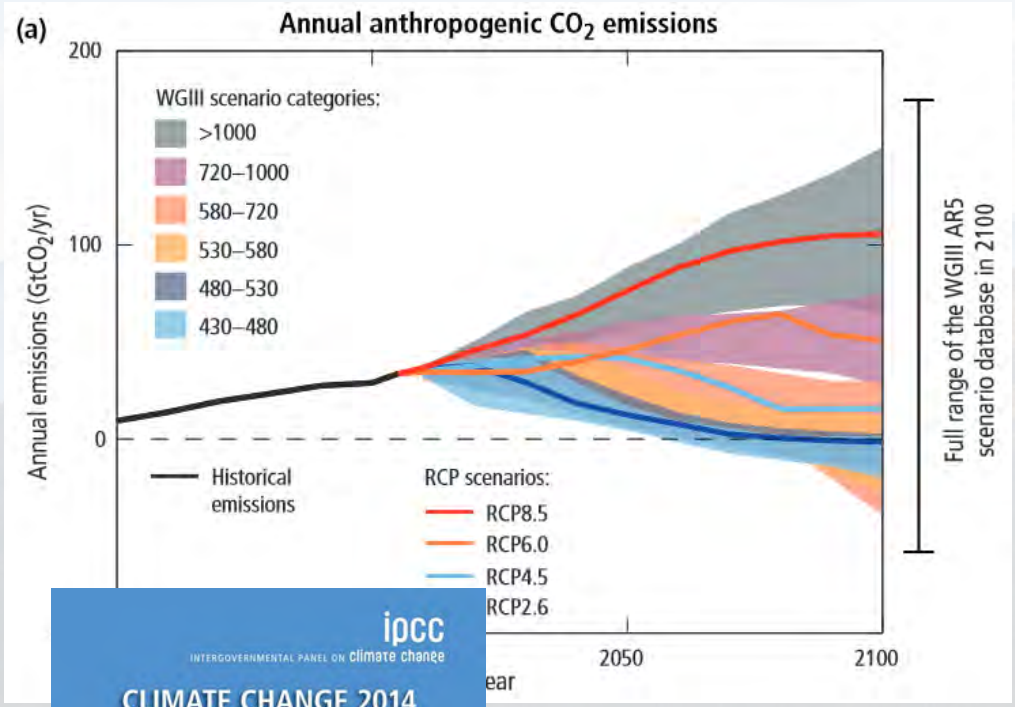
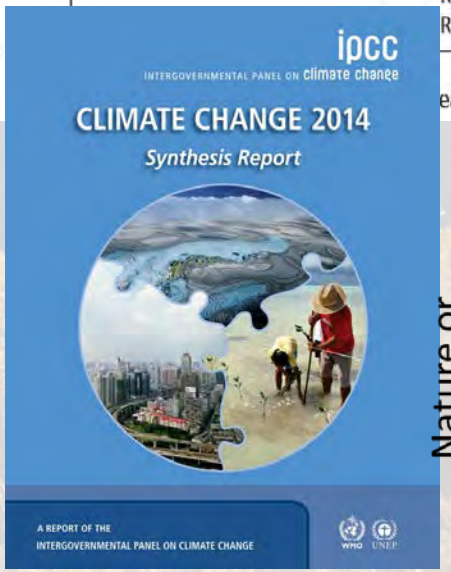
Supporting Decision-making: Scenario Planning

Scenario Planning is a strategic forecasting method that accounts for inherent uncertainties, guiding organizations in making flexible, long-term plans

- Prepare for the unexpected yet potentially highly impactful change on our landscape





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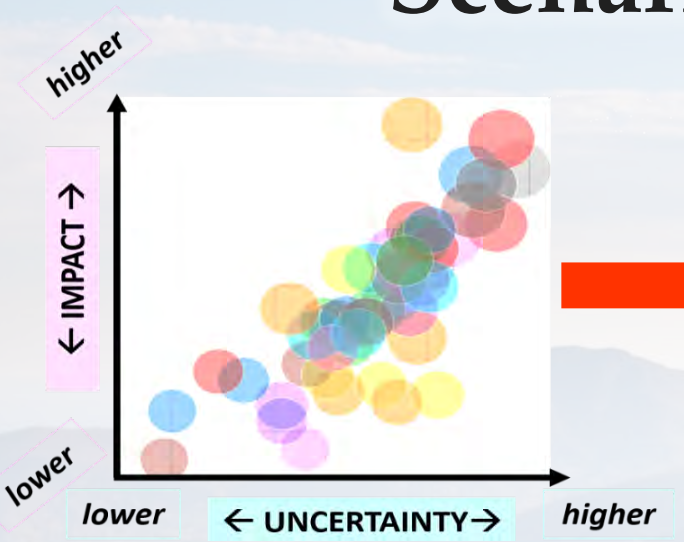
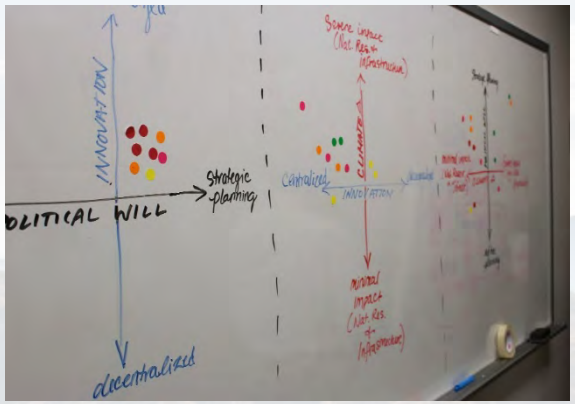
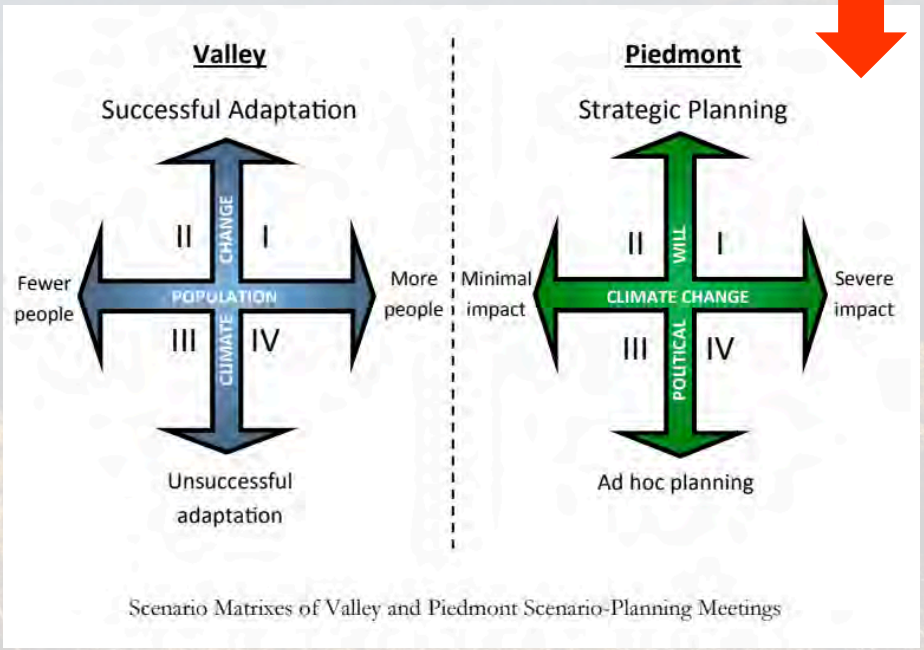
Scenario Building with Stakeholders





- Regional decision-makers, scientists, conservationists
- Develop a small number of scenarios—stories about how the future might unfold and affect the issues we care about
- "I've learned that our perceptions of land use are different than reality"



Scenario Matrixes of Valley and Piedmont Scenario-Planning Meetings

High Population

Scenario 2: Development occurring along roadways with increased parcelization, increasing forest loss and fragmentation

Scenario 1: Development is focused around urban centers, agriculture is maintained or increased, resulting in a flourishing job market

Reactive Planning

Scenario 2

Scenario 1

Strategic Planning

Scenario 3

Scenario 4

Scenario 3: Large multinational agricultural and forestry companies use land for intensive production. This results in decreased water quality and quantity

Scenario 4: Movement of younger generations from rural areas, reducing need for new infrastructure. Though, strategic planning preserves open space, forests, and family farms

Low Population

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Developing a Recent Trends Model

Transitioning Land Use

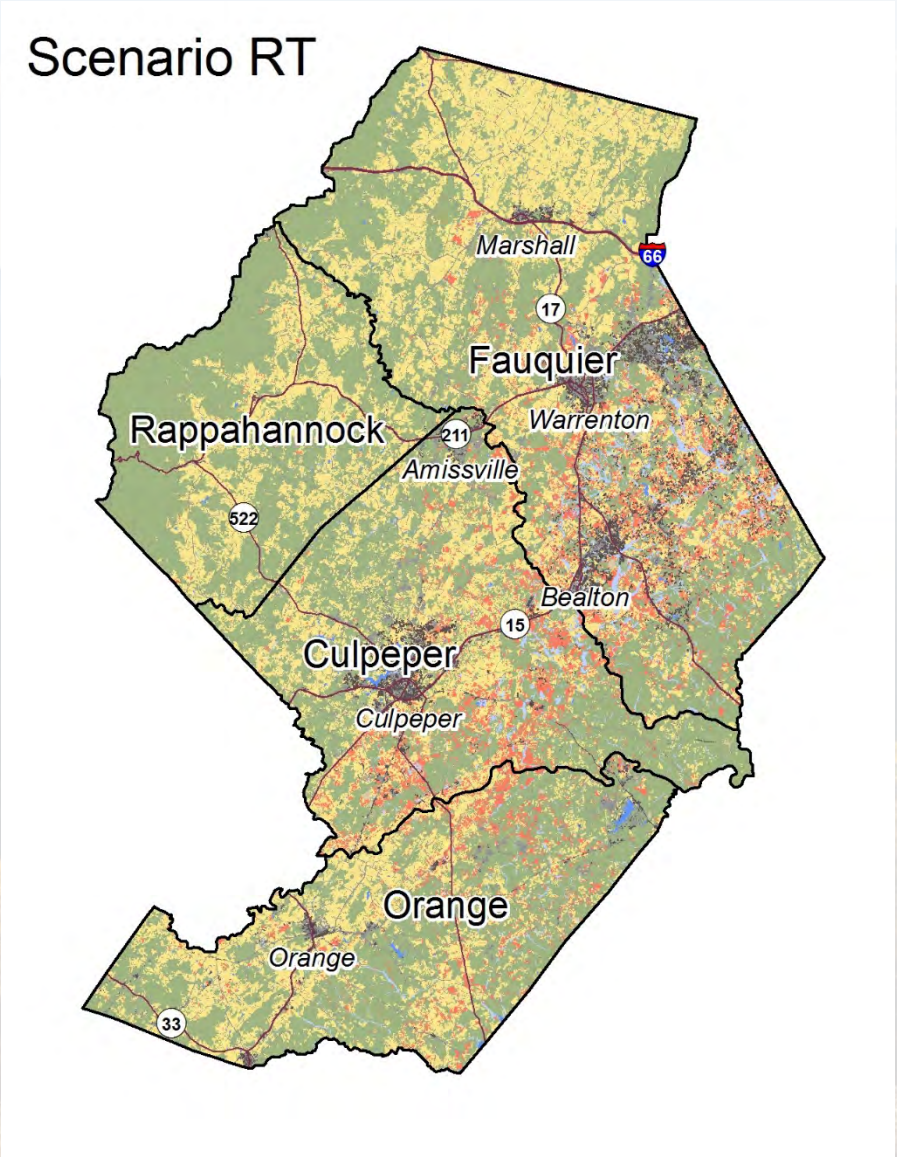
Forest → Forest

Grasses → Grasses

Crops → Crops

Development

Development	1,3021.87 acres	Development +21,171 acres
Forest	486,512.4 acres	Forest −17,399 acres
Grass	331,007.5 acres	Grass +2,761 acres
Crop	73,702.43 acres	Crop −6,533 acres



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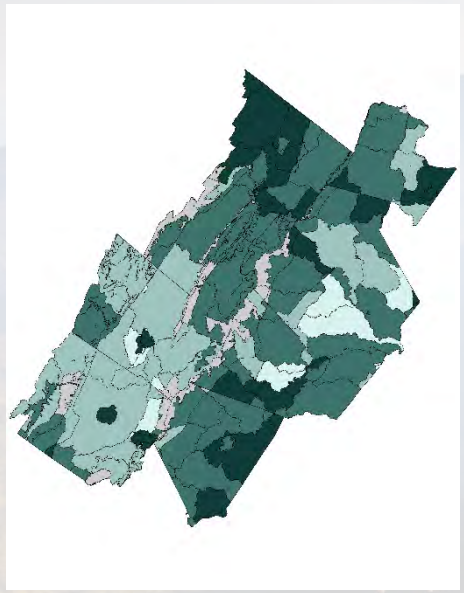
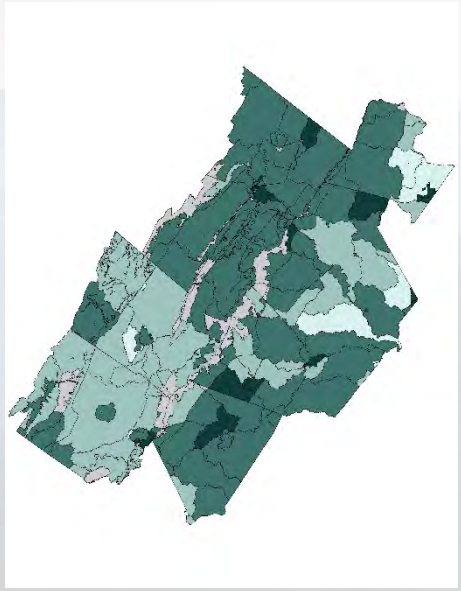
Connecting Recent Trends Model to Ecosystem Services Impacts: Water Quality and Quantity

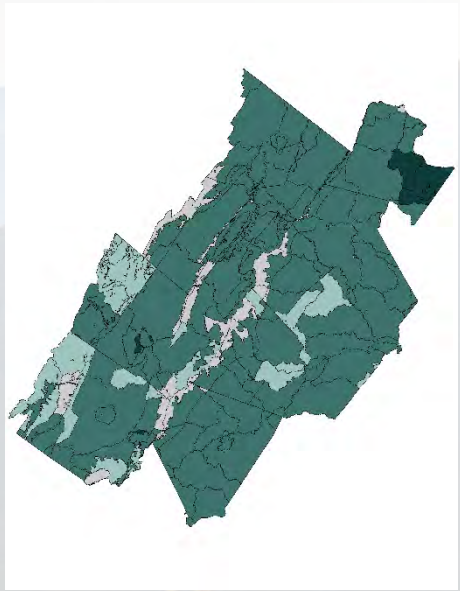
Total Suspended Solids



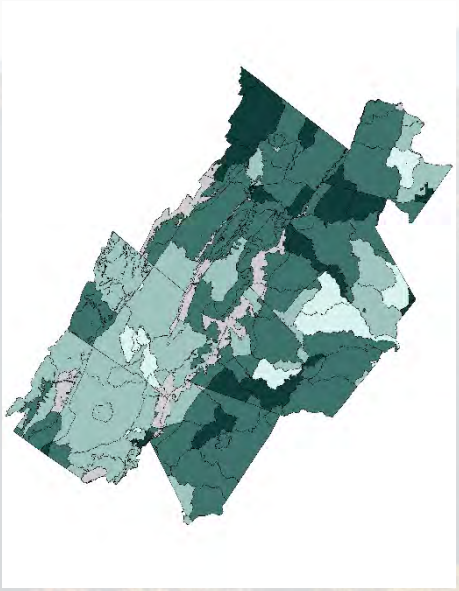
Total Nitrogen



Runoff Volume



Total Phosphorus



< -5% -5 - 0% 0% 0 - 5% > 5%

0 25 50 Miles

0 50 100 Kilometers

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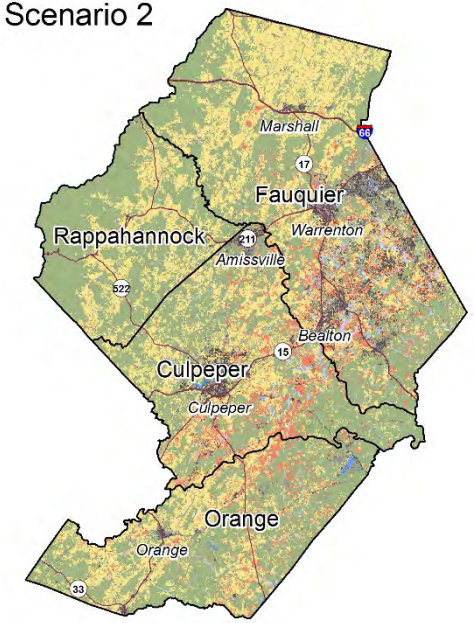
Scenario 2



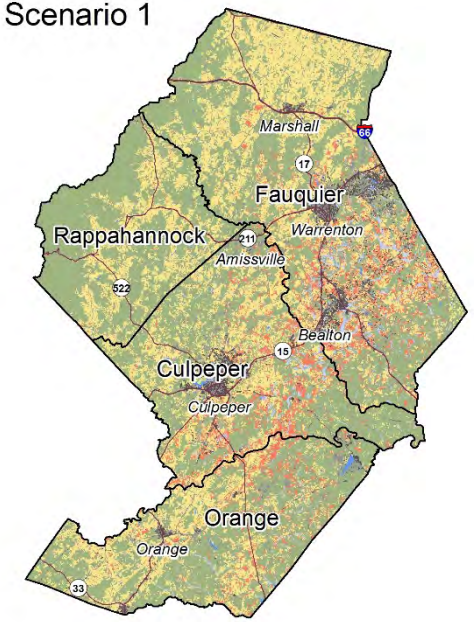
Development
27,341 acres

Forest
-20,779 acres

Grass
+1,678 acres

Crop
-8,239 acres

Scenario 1



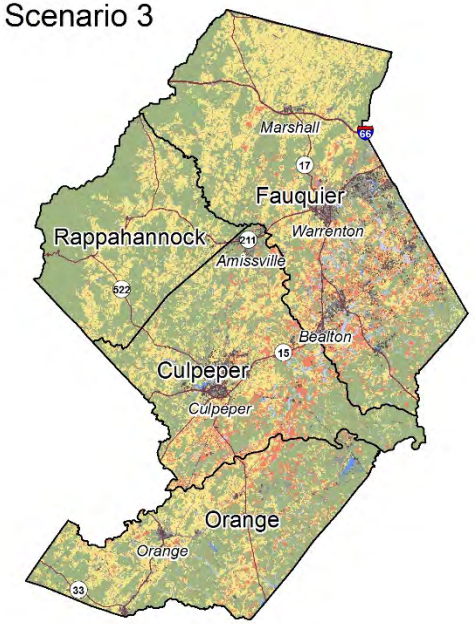
Development
+16,825 acres

Forest
-14,799 acres

Grass
+4,167 acres

Crop
-6,193 acres

Scenario 3



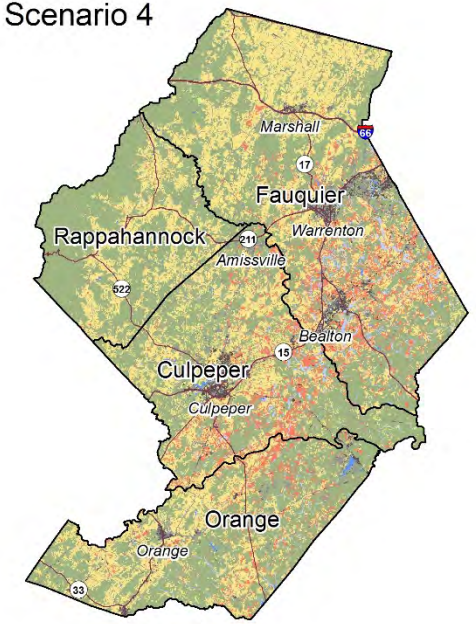
Development
+15,632 acres

Forest
-16,894 acres

Grass
+6,327 acres

Crop
-5,064 acres

Scenario 4



Development
+9,076 acres

Forest
-13,470 acres

Grass
+7,402 acres

Crop
-3,007 acres

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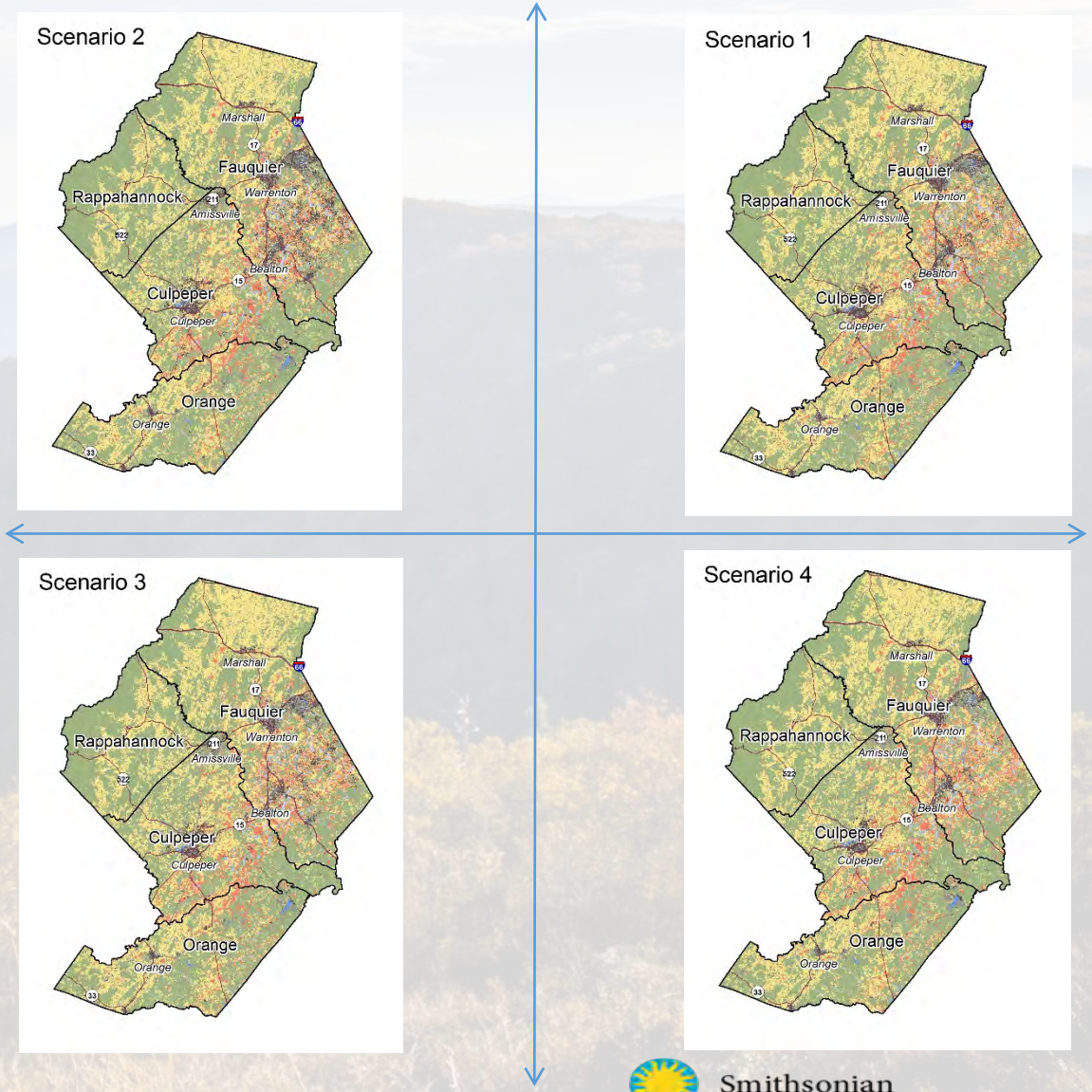
Slider of RRRC Region

https://si.maps.arcgis.com/apps/StorytellingSwipe/index.html?appid=a1d484c7ef4a4b9e8214d3bf4b7af881

Connecting Scenario Model Outputs to Ecosystem Services Impacts

What questions can we answer now?

- What is the potential change in land use?
  - Availability of agricultural land over the next 50 years
  - Where is the biggest threat of agricultural land being turned to other land uses
  - What does the land use look like now?
  - Potential pressure points of development
  - Where do projections overlap with Chesapeake Bay Model (feedback needed)



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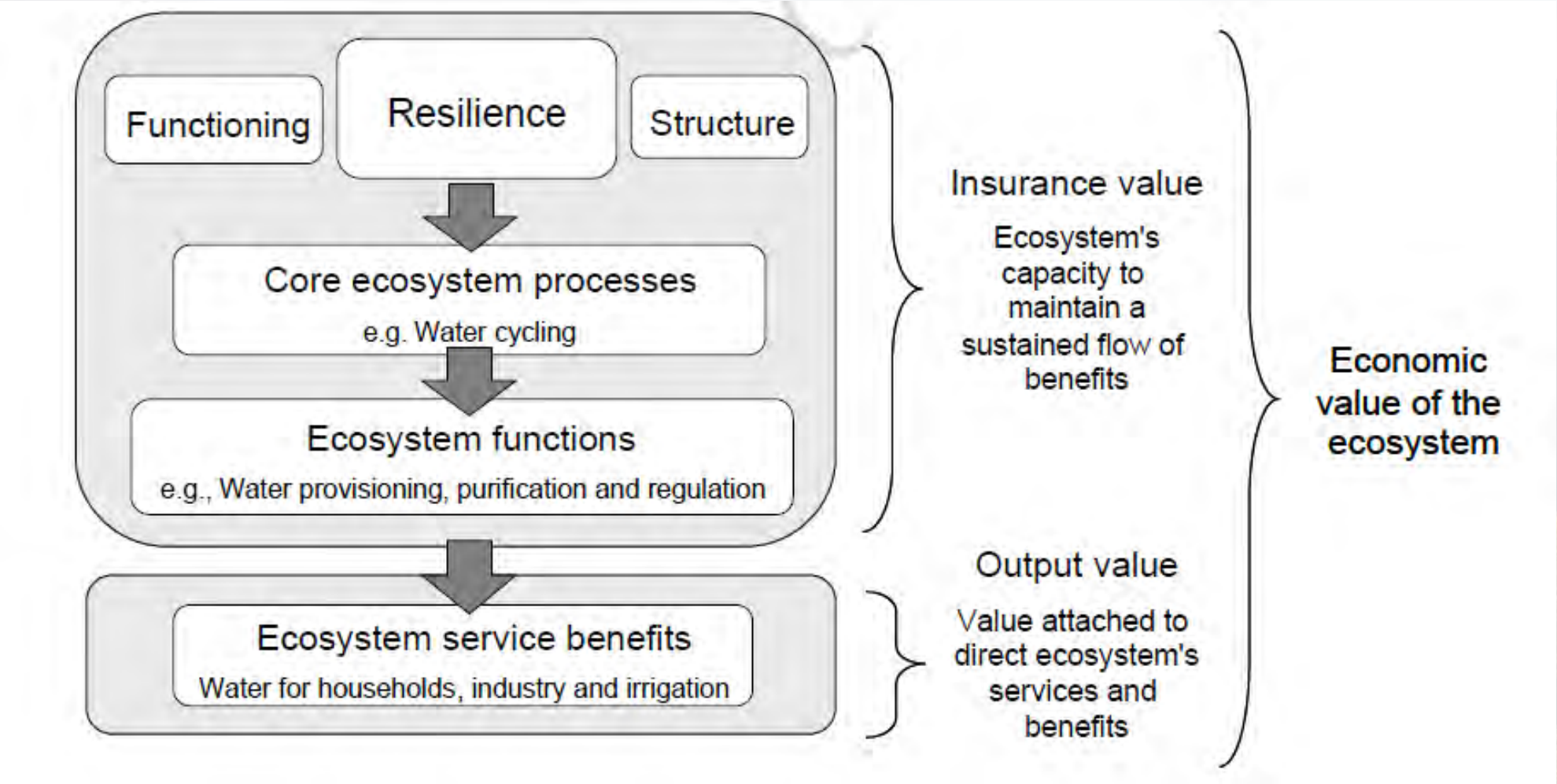
Connecting Scenario Outputs to Ecosystem Services Impacts

What questions will we be able to answer in the future?

- What is relationship b/w Land use and Wildlife? Pollinators?
- Between land use and forest health?
- Between land Use and Water Quality?
- What is land use around protected areas?
- Between land use and wildlife corridors?
- Risk assessment
- Conservation pays – economic impact of each scenario

Conservation Pays

Economic Valuation of Services



2019 Workshop – Discussing Implications and Strategies

- Evaluate impacts for each scenario
- Identify key turning points and signals of movement towards a scenario
- Identify strategies for each scenario

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Thank you!

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