Integrating Stakeholder Engagement, Scenario Analysis, & Ecosystem-service Mapping for Conservation Planning in the Albemarle-Pamlico Basin

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Identify Track
Ballroom C
4:15-4:45pm

Albemarle-Pamlico
Ecosystem
Symposium
Embarking on a New Voyage

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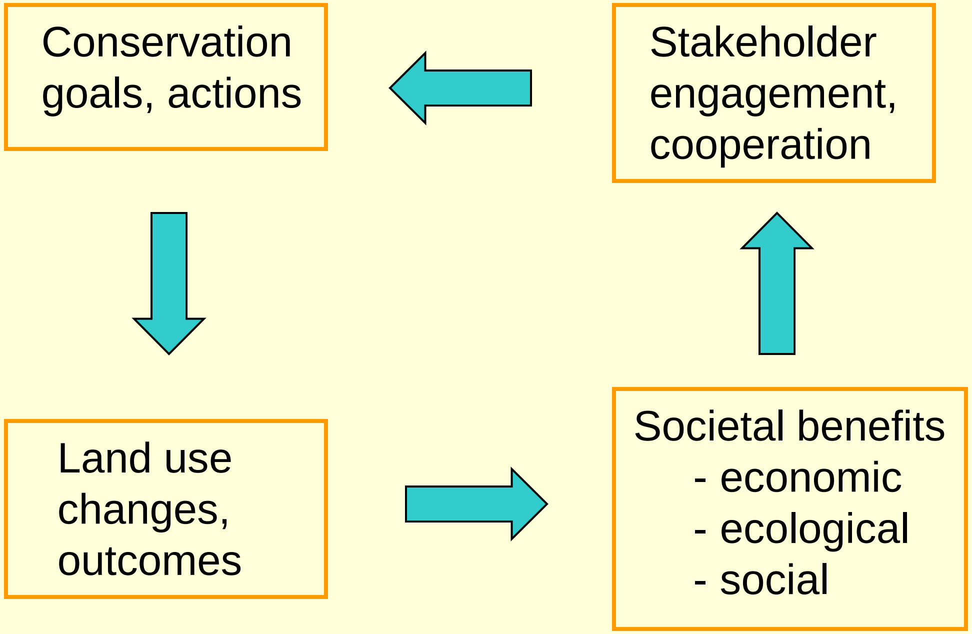
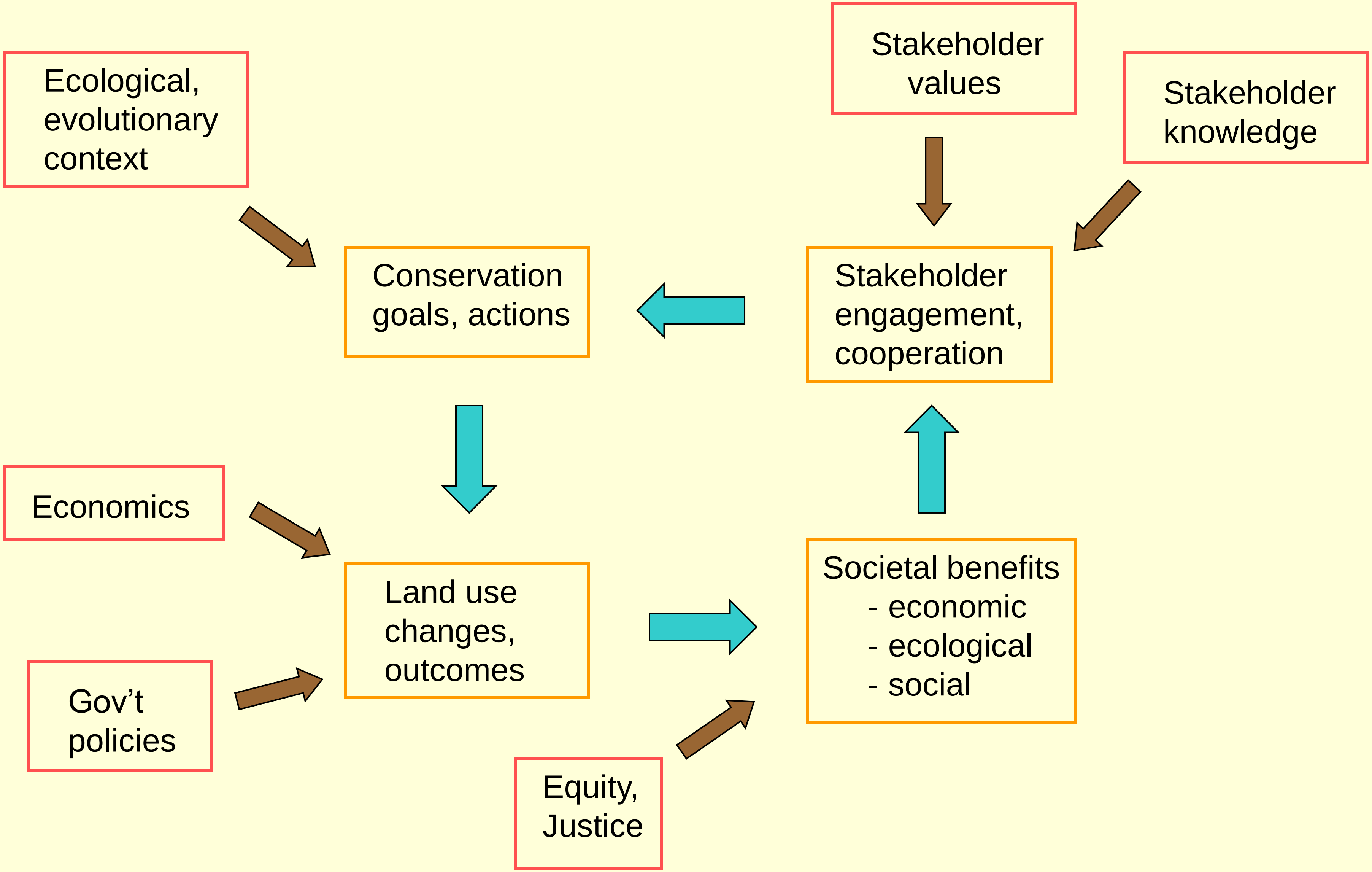
- Craig Giesecke, Geoffrey Chan (University of Maryland)
- USGS Aquatic Gap Analysis Program
- APNEP (D. Carpenter), TNC (C. Peoples)
- Many participants at Stakeholder Workshops

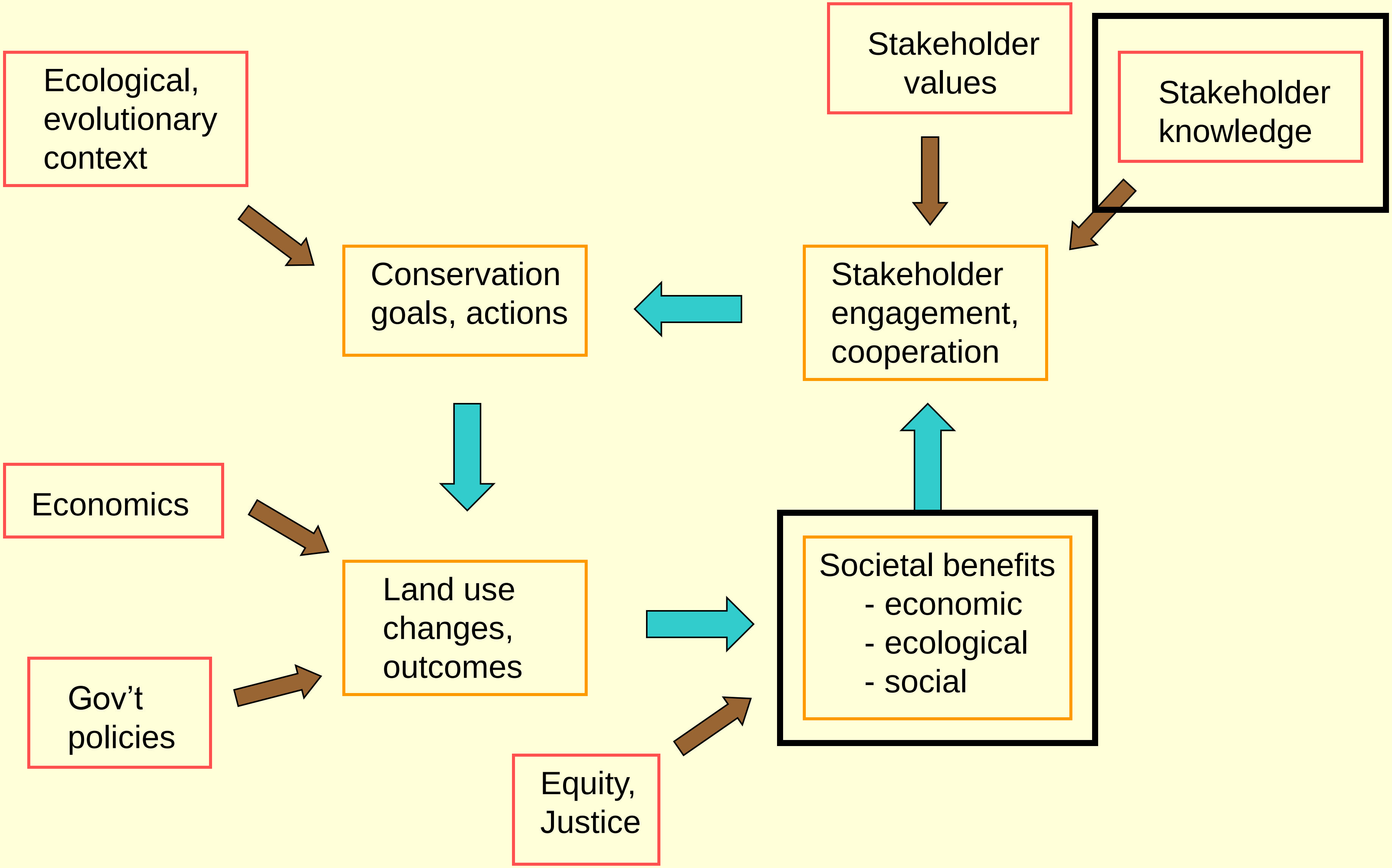
Regional Conservation Planning



Regional Conservation Planning



Regional Conservation Planning



Ecosystem Services (ES)

- Benefits people derive from ecosystems
  - Water quality regulation
  - Water supply
  - Habitat for biodiversity
  - Food production
  - Flood modulation
  - Recreation
- Bridge between ecosystem condition and human well-being (HWB)
- Useful framework for measuring, mapping, analyzing public benefits
- Promotes insight into tradeoffs associated with landscape management choices

Ecosystem Service Delivery Terms

ES Capacity -- inherent ability of an ecosystem to provide a service; determined by biophysical and social factors

ES Flow -- extent to which a service is used by or benefits people; can exceed capacity

ES Demand -- extent to which an ES would be (or is) used if available; can exceed capacity

Ecological pressure – anthropog. or natural alteration of ES cap'y or flow; forces ecosystem to "work" harder to provide service

Data layers

land cover/use, soil type, topography, hydrology, precipitation, temperature, geomorphology, species distribution, pop'n density

Today’s Objectives

Describe our approach to analyzing ES delivery and engaging stakeholders

Summarize outcomes of stakeholder workshops

Reflect on lessons learned from our stakeholder engagement

Focal Aquatic Ecosystem Services

Provisioning Services
- Water supply

Regulating Services
- Water purification
- Nitrogen regulation

Cultural Services
- Wildlife-based recreation (bird-watching, fishing)

Key Questions to Address for ES Analysis

How is the service produced and delivered?

Who and where are the beneficiaries?

What and where are the ecological pressures?

What data are required, at what resolution?

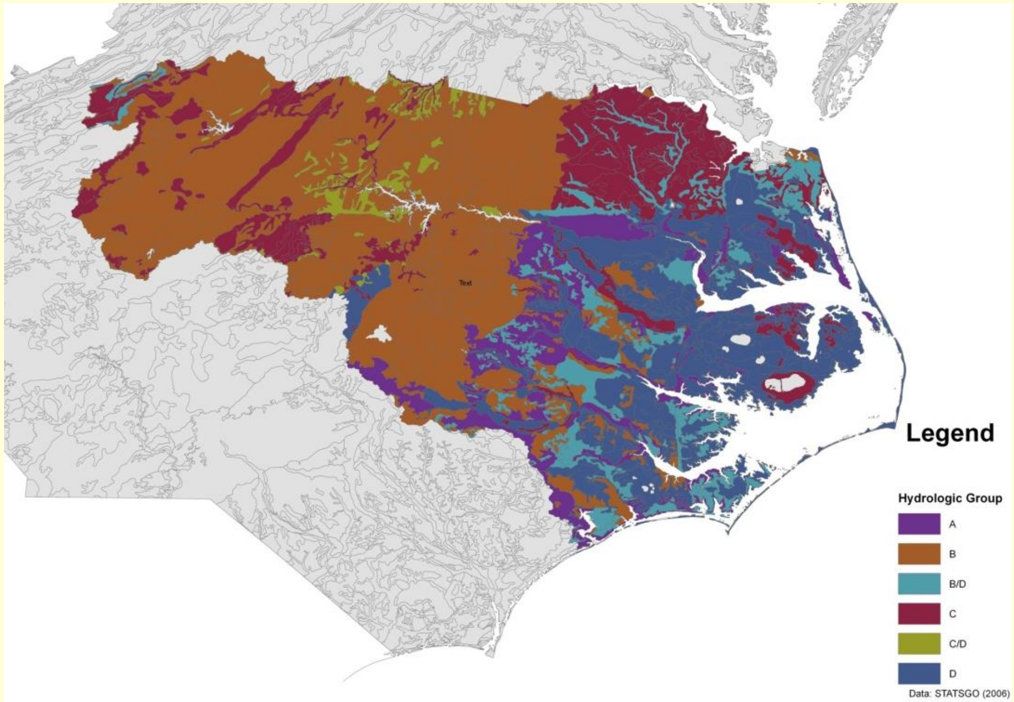
What data are available?

General Approach for Mapping Ecosystem Services

Infer ES capacity from biophysical features of landscape
– not empirically measured

Use watershed-framework to account for spatial linkages among ES

Estimate ES flow and demand based on distribution of people
and/or intensity of use



How We Estimate ES Capacities

1. Identify key factors contributing to ES production
   - conceptual model of biophysical processes & components

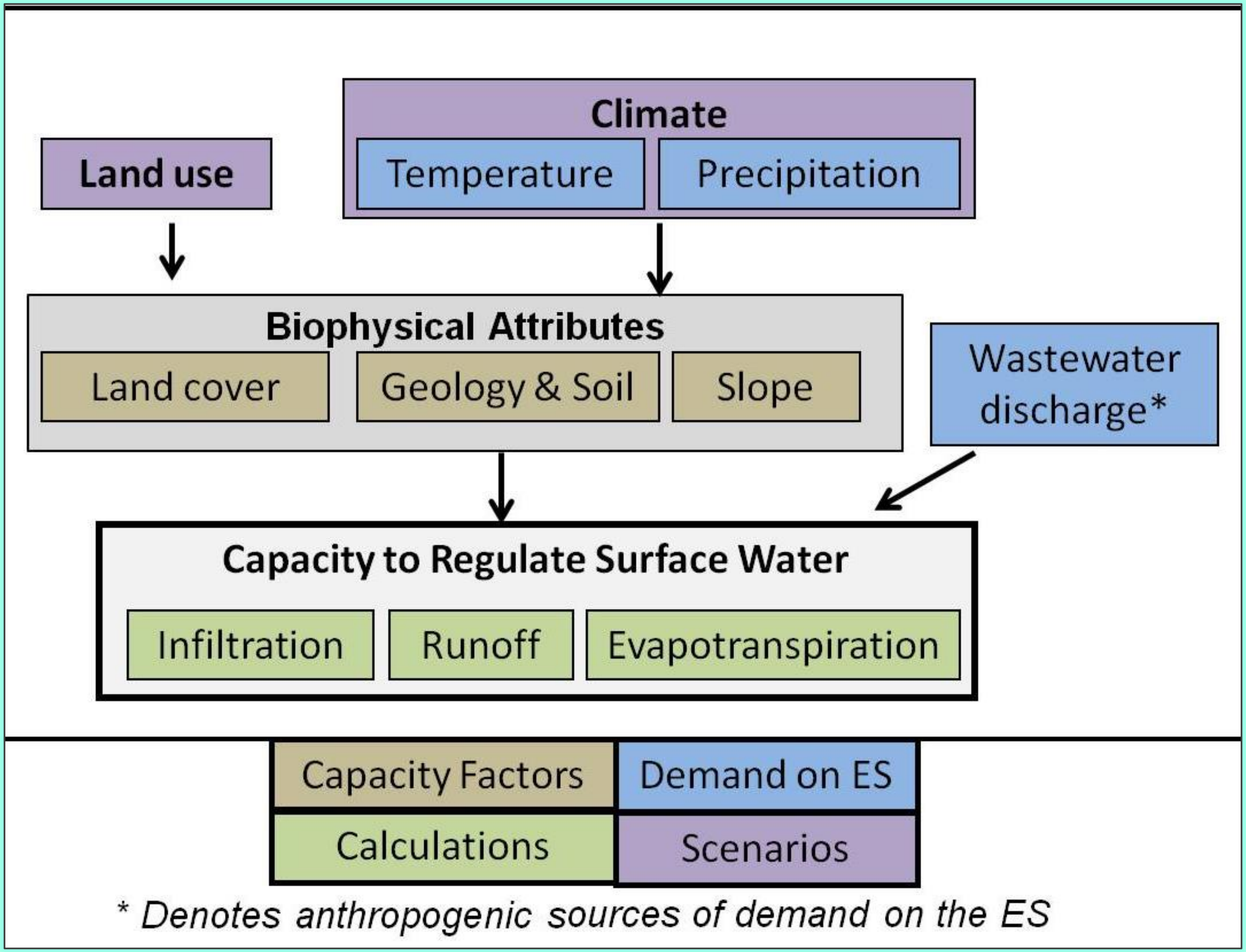
2. Develop and apply equations to represent processes

3. Identify and compile spatial and non-spatial data layers
   available to map key factors

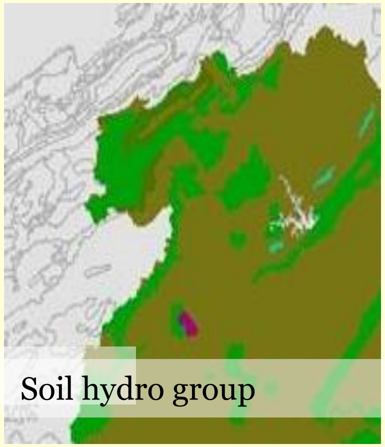
4. Calculate ES capacity in spatial framework (watershed)

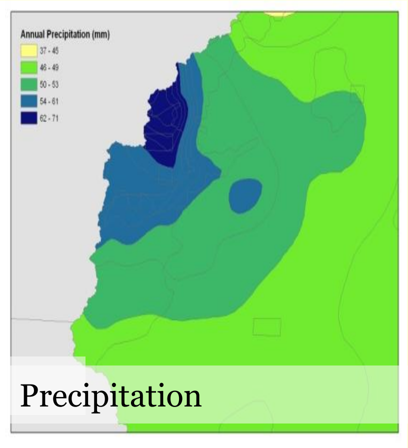
6. Produce maps to visualize spatial patterns of ES capacity

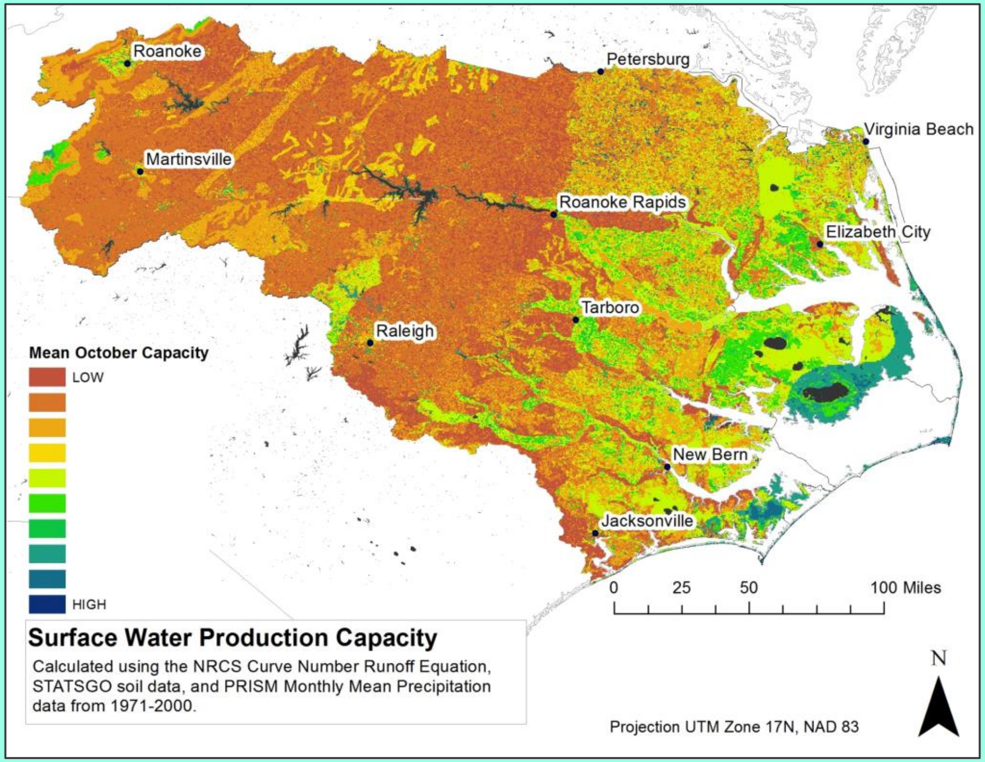
Conceptual Model of Water Supply Capacity



Mapping Surface Water Production Capacity







Stakeholder Engagement Via Workshops

Teach concepts, data needs, applications associated with ES, HWB

Co-develop conceptual models of how the APB “works”
- Refine definitions of factors
- Critique mappable metrics

Co-frame key environmental issues germane to ES
- Incorporate stakeholder hopes, fears
- Characterize key factors of HWB

Co-develop future scenarios for analysis
- Plausible (not predicted) future conditions
- Critique maps, analyses of ES, HWB

Facilitate applications to conservation planning
- Present findings to stakeholders
- Discuss how knowledge of ES, HWB might affect planning

Stakeholder Composition at Workshops

27 conservation-oriented organizations

- APB–wide organizations
- Sub-basin organizations
- Federal government agencies
- State government agencies
- Nation-wide non-profit organizations
- State-wide non-profit organizations

Most groups worked in both states

Scenario Analysis Objectives

- Build understanding of and support for incorporating ES concepts in environmental management and conservation planning
- Develop plausible future scenarios that illustrate shifts in ES supply and delivery and in HWB
- Enhance understanding of tradeoffs among ES and stakeholders as landscapes respond to management decisions

Key Stakeholder Issues

Hopes

Effective regulation, management, and restoration of APB resources

Management plans reflecting holistic APB-wide solutions

Greater social equity

Fears

Degradation of current ecological & socioeconomic conditions

A future reflecting reactive, poorly planned responses to envir. problems

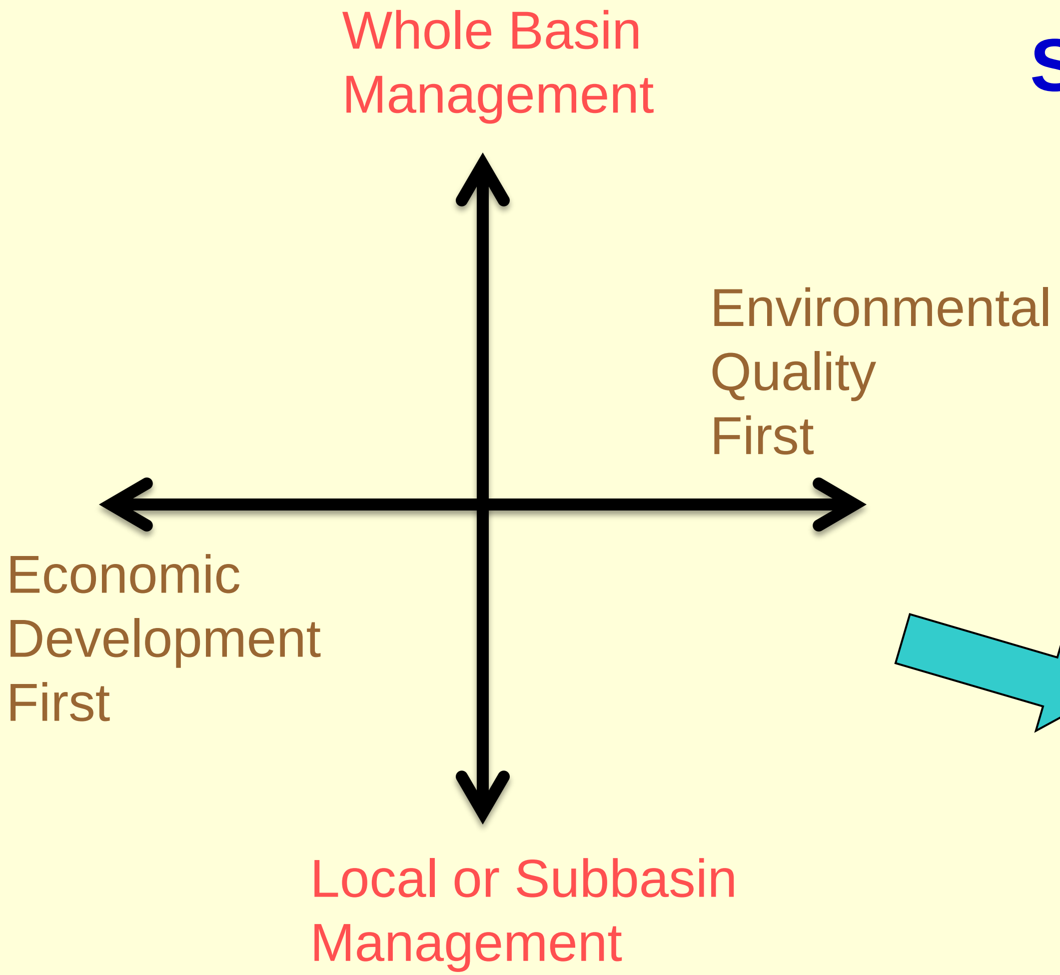
Focal questions

How do socioeconomic and political conditions influence delivery of ES?

How does environmental regulation (or lack) affect ES capacity?

How might ecological surprises / disasters affect ES delivery?

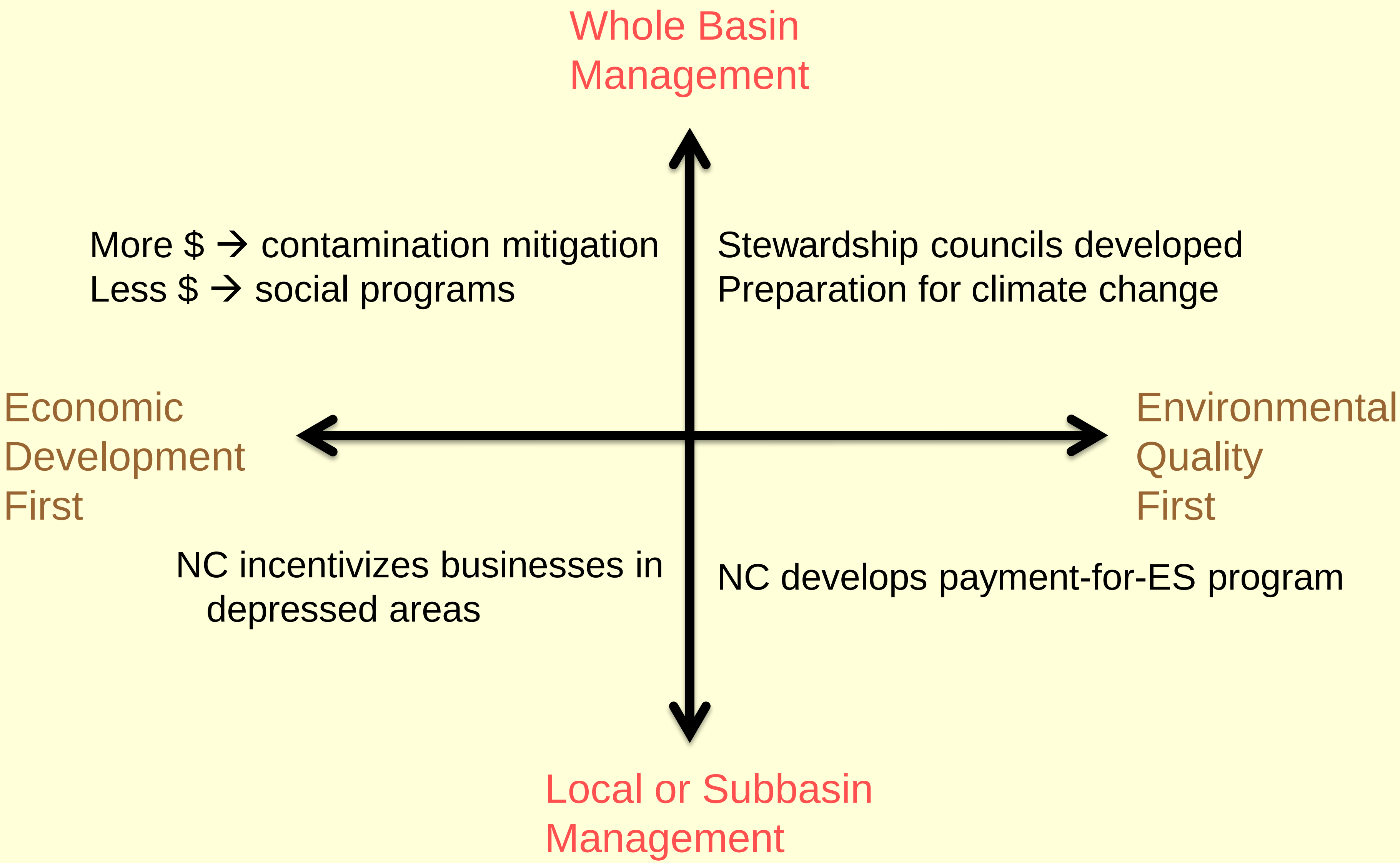
Scenario Contrasts



Text narratives
- stimulus
- response

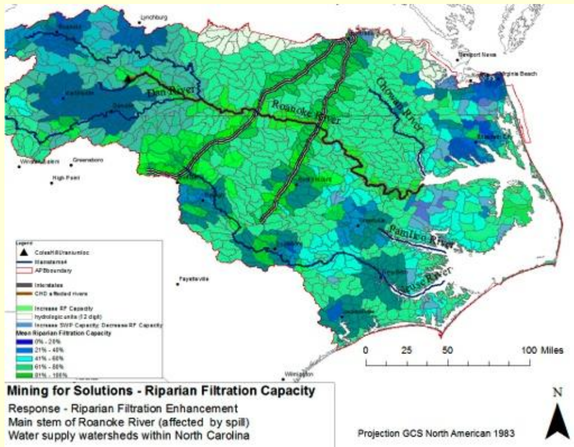
Explicit maps (ES, HWB)
Trend charts (ES, HWB)

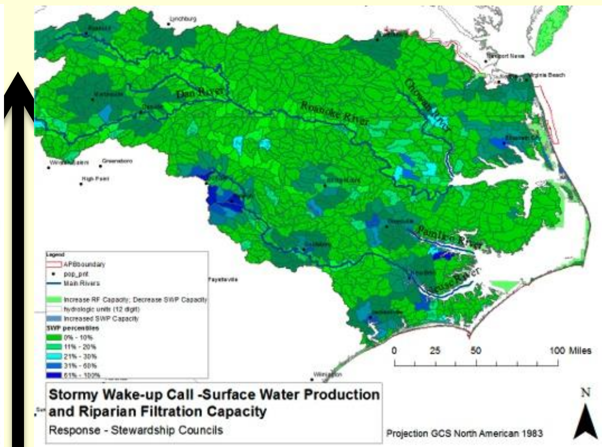
Scenario Contrasts -- response interpretation



Scenario Contrasts -- response mapping

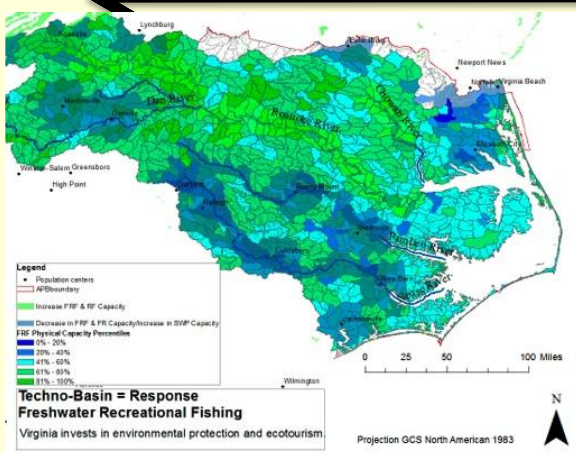
Whole Basin Management

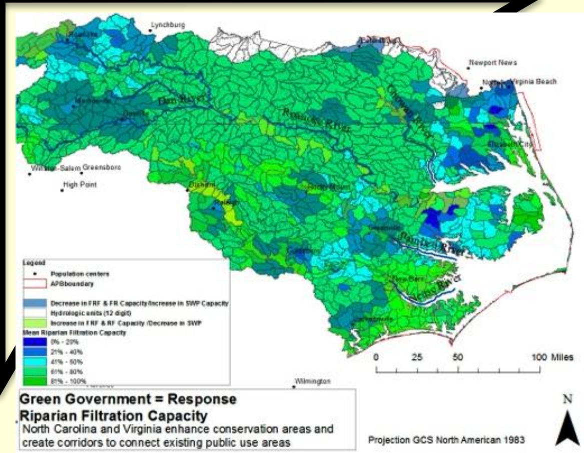




Economic Development First

Environmental Quality First





Local or Subbasin Management

Effects of Ecosystem Services on Human Well-being

- Many direct and indirect effects of ES on HWB

ECOSYSTEM SERVICES

- **Provisioning**
- **Regulating**
- **Cultural**
- **(Supporting*)**

→

HUMAN WELL-BEING

•Basic materials for good life
•Security
•Health
•Good social relationships

- Yet changes in HWB rarely analyzed with landscape changes affecting ES delivery
  - » Economic valuation
  - » Biophysical assessments

Sustainable Livelihoods Framework

Developed to

• evaluate trade-offs associated with international development

• link local outcomes to regional policy and institutional changes

Adaptability

• SLF comprises 5 core components (capital assets) that provide *objective* measures of HWB

• Metrics of each capital asset are selected and weighted based on *subjective* perspectives of the target community

• Our metrics and weights are based on stakeholder surveys

Estimating Human Well-being

Sustainable Livelihoods Framework
(5 capitals; 2 metrics each; in order of weights)

Natural capital
- Access to green space or open land!
- Proximity to rivers or lakes

Social capital
- Recreation opportunities
- Education attainment

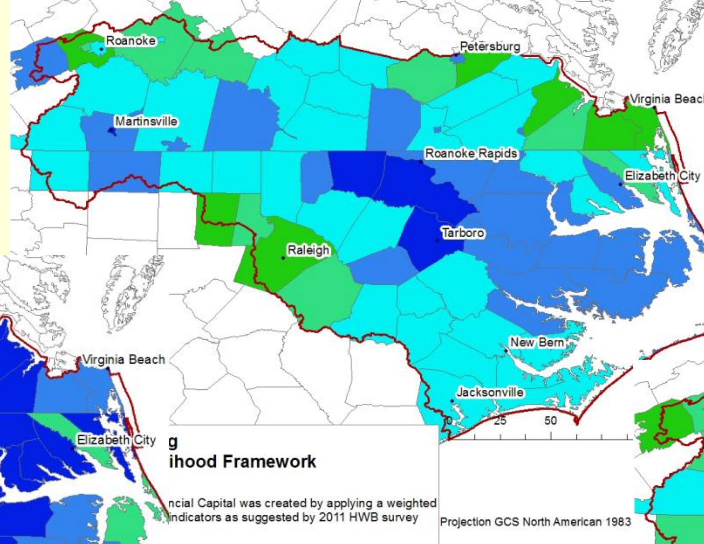
Human capital
- Life expectancy
- Number of healthy days/person

Financial capital
- Annual income
- Employment rate

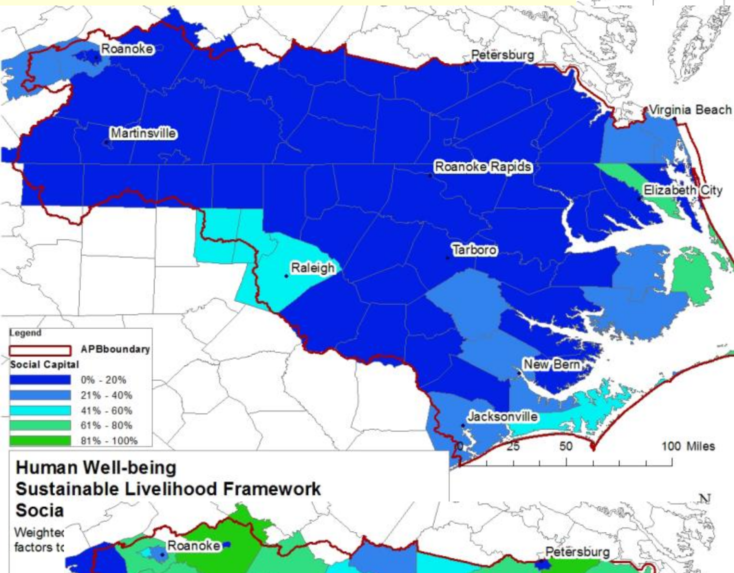
Physical capital
- Affordable housing
- Affordable electricity

HWB Capitals

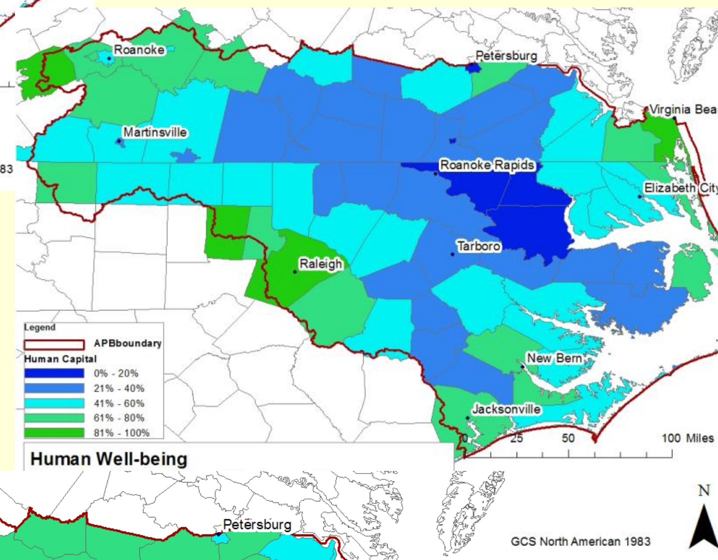
Financial



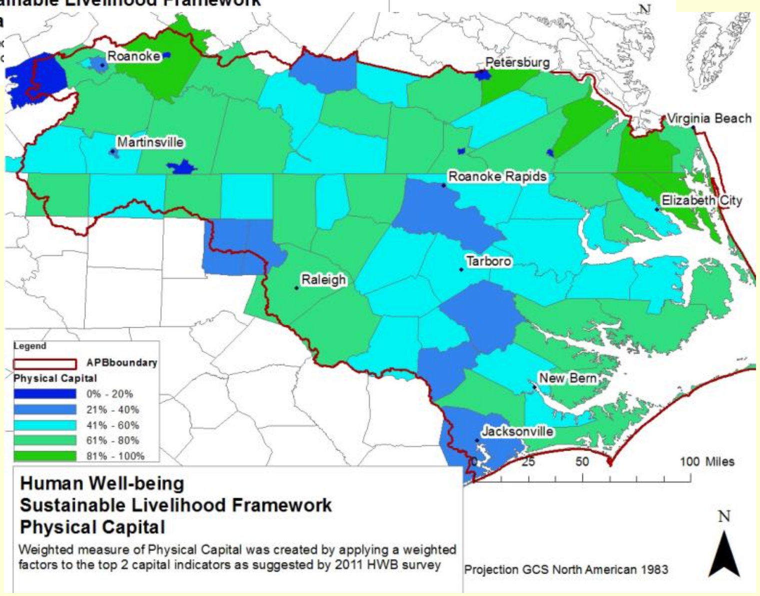
Social



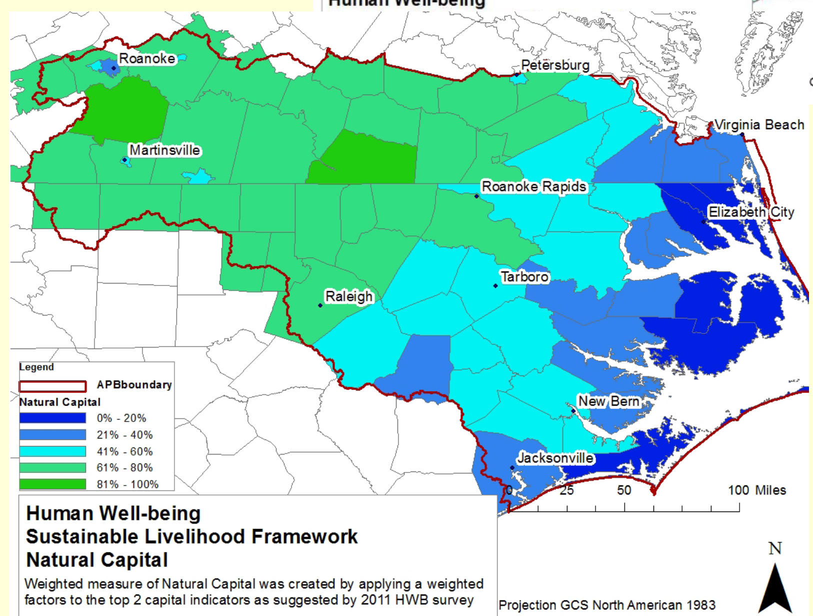
Human



Physical

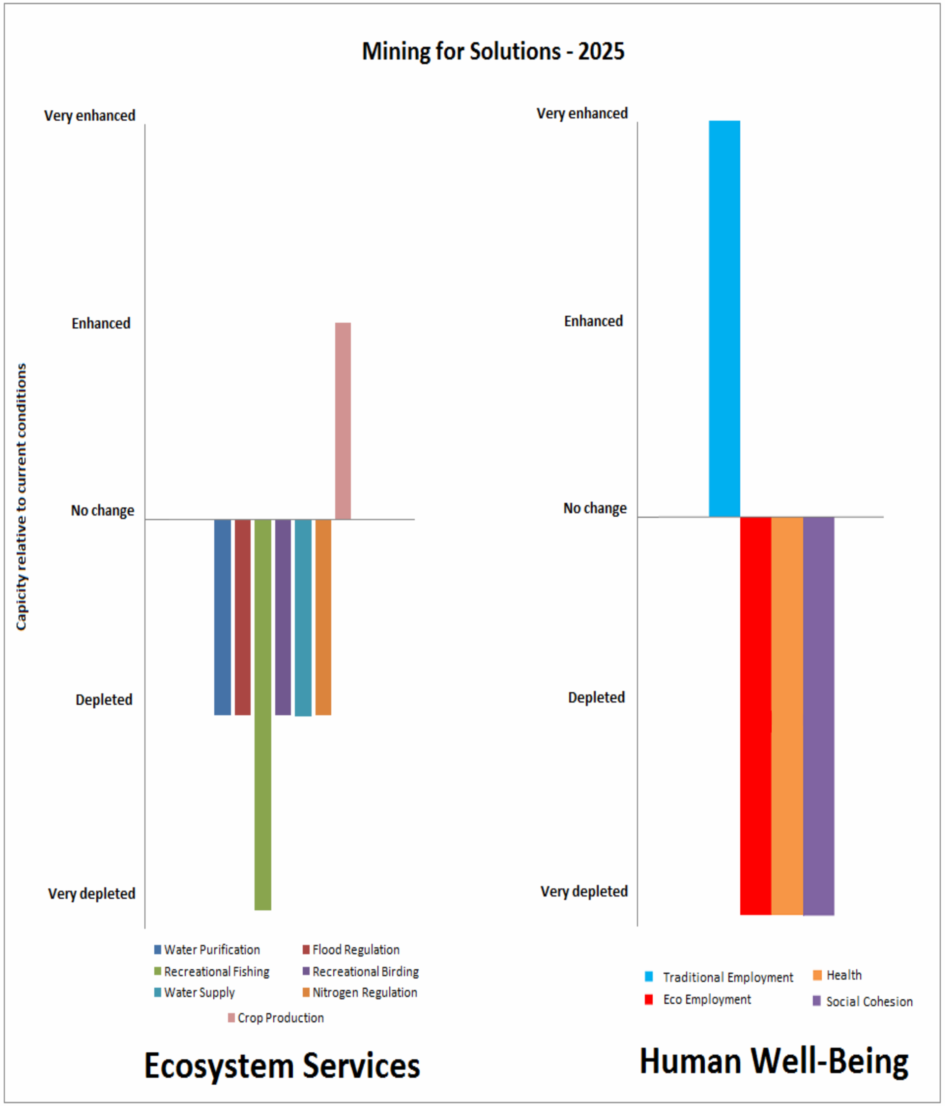


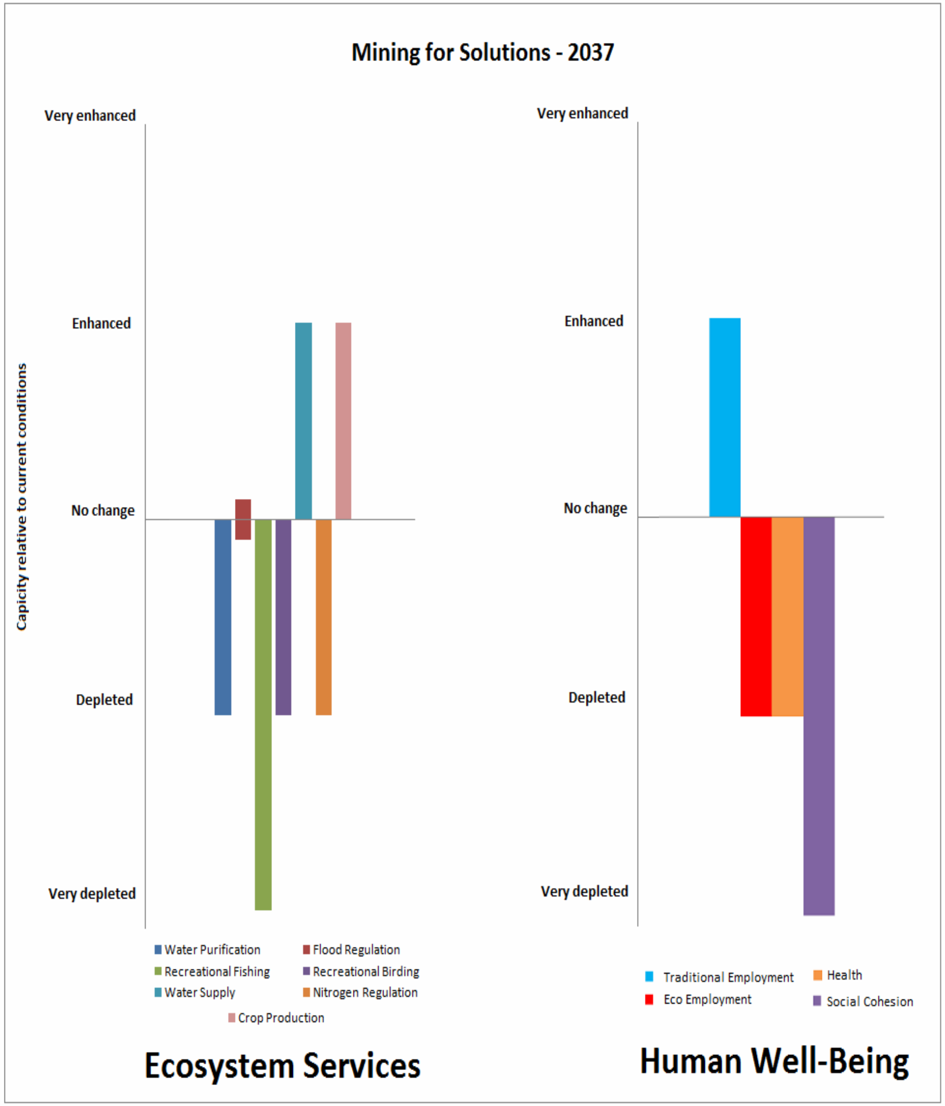
Natural



Scenario Contrasts – trend charts

Whole Basin Management, Economic Development First
(upper left)





Workshop Outcomes

We learned

Stakeholder understanding of ES, HWB is nuanced, varied

Biophysical, social underpinnings of ES delivery are complex

Social, political underpinnings of HWB are complex

Data for HWB metrics are difficult to obtain

They gained

New detailed understanding of ES, HWB

Neutral venue for discussing contentious environmental issues

Opportunities to network, collaborate with additional partners

Opportunities to think about applying ES concepts in their work

Lessons Learned for Scientists Engaging Stakeholders

Substantial learning occurs in both directions

General scientific concepts (eg, ES, HWB) often not very useful

Local, detailed knowledge is essential
- issues, values, constraints, opportunities

Research questions and analyses need to be stakeholder-driven
(come down from the ivory tower)

Being effective (ie, making a difference in conservation) requires
long-term, iterative communication, collaboration

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Questions or Comments?