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Evaluating the performance of natural and nature-based coastal protection solutions for natural capital accounting in Chesapeake Bay

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Degradation of coastal ecosystems

- Coastal ecosystems are degrading at an accelerated pace due to various stressors
- Loss of essential services such as shoreline protection, fisheries support, and tourism jobs
- Profound impacts on people and economies

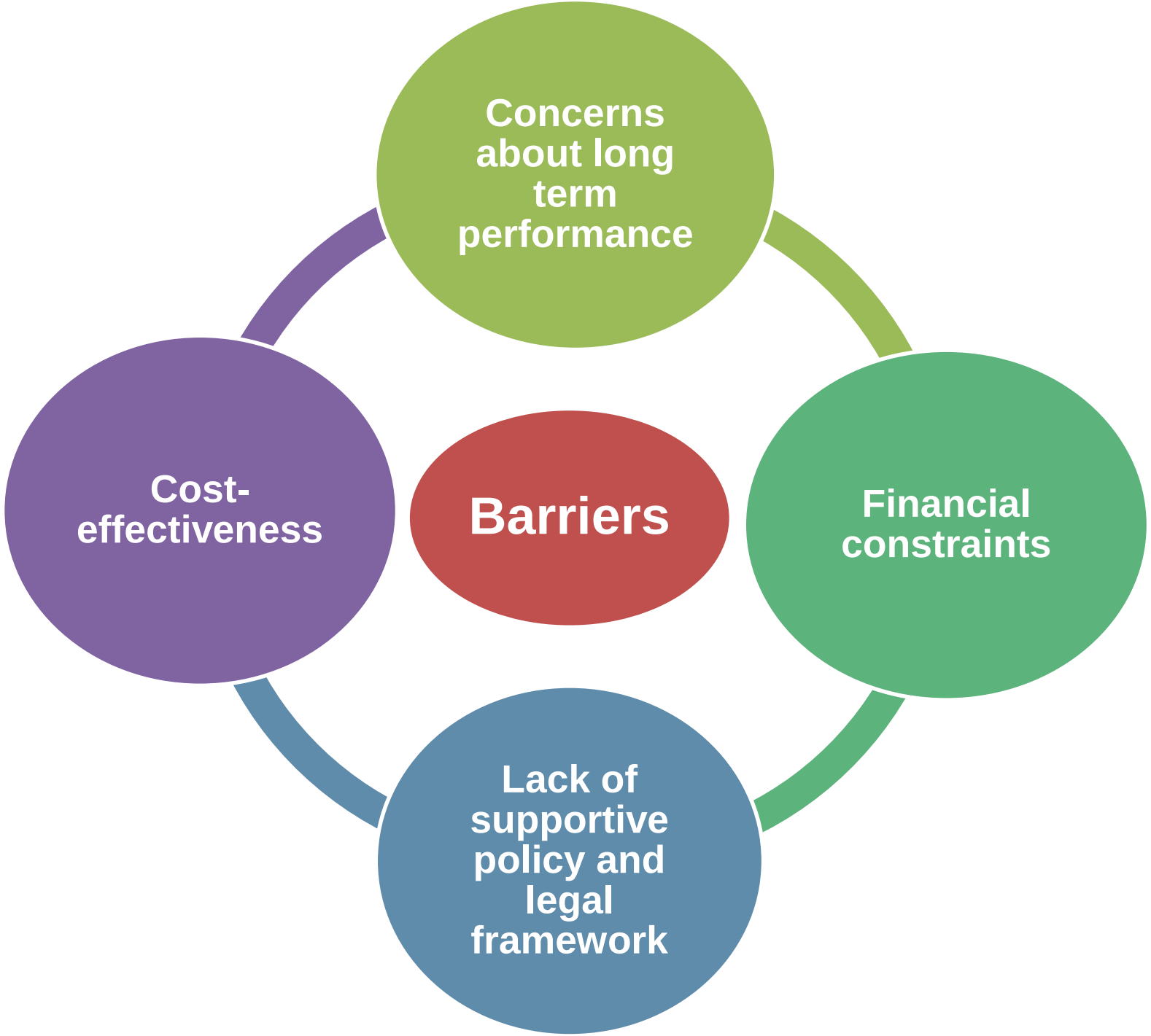
NNBS (Nature and Nature-Based Solutions)

…”Strategies that utilize natural coastal ecosystems like dunes, wetlands, mangroves, and oyster reefs to protect coastlines from erosion, flooding, and other hazards, while also providing ecological and social benefits”

Oyster reefs

Living shoreline

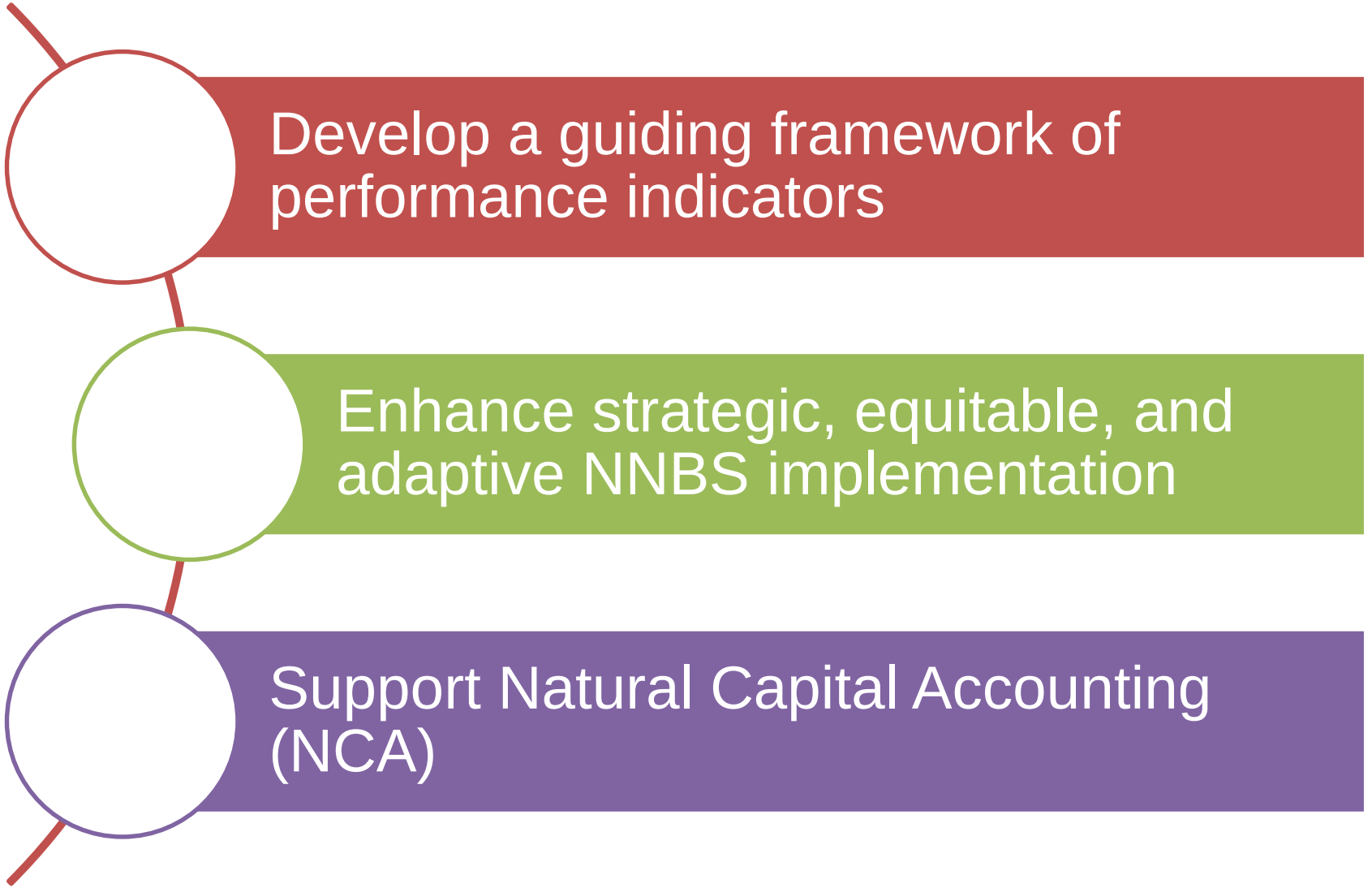
Marsh restoration


Concerns about long term performance
Financial constraints
Lack of supportive policy and legal framework
Cost-effectiveness
Barriers

Need for a unified, standardized evaluation framework

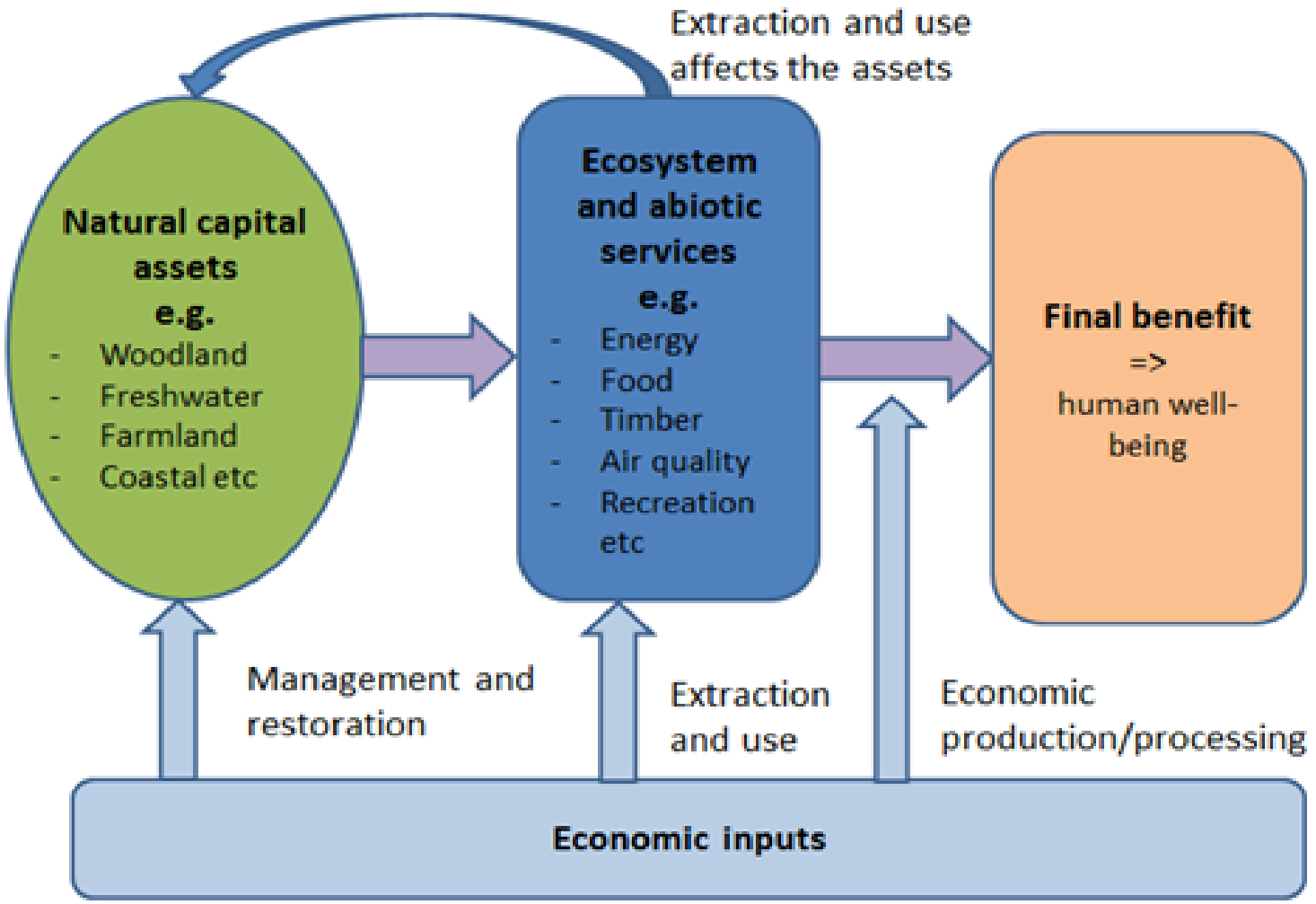
- Lack of qualitative and quantitative performance metrics to measure NNBS outcomes
- Multitude of methods leads to a “paradox of choice”
- Performance metrics are difficult to develop and standardize without good post-implementation data
- Lack of assessment and comparison of NNBS outcomes

Project Goals



What is Natural Capital Accounting (NCA)?

- A standardized method for tracking and valuing natural assets
- Helps quantify how changes in ecosystems impact our well-being and economy
- Supports data-driven decision-making for resource management



Introduction to the System of Environmental and Economic Accounting (SEEA)

1 Ecosystem Extent

The model start by identifying a natural asset, i.e., marshes, that can be measure by its changes in extent.

2 Ecosystem Condition

Identify the condition of natural asset (marshes) in terms selected characteristics.

3 Ecosystem Services

Record the supply of ecosystem services and the use of those services by economic units, including local communities and business

4 Monetary Account

Model stocks growth and changes in stocks of natural assets

The Need for Natural Capital Accounting

Support local communities and business understanding their dependencies on natural assets

Quantify how impacts on nature relate to monetary investments

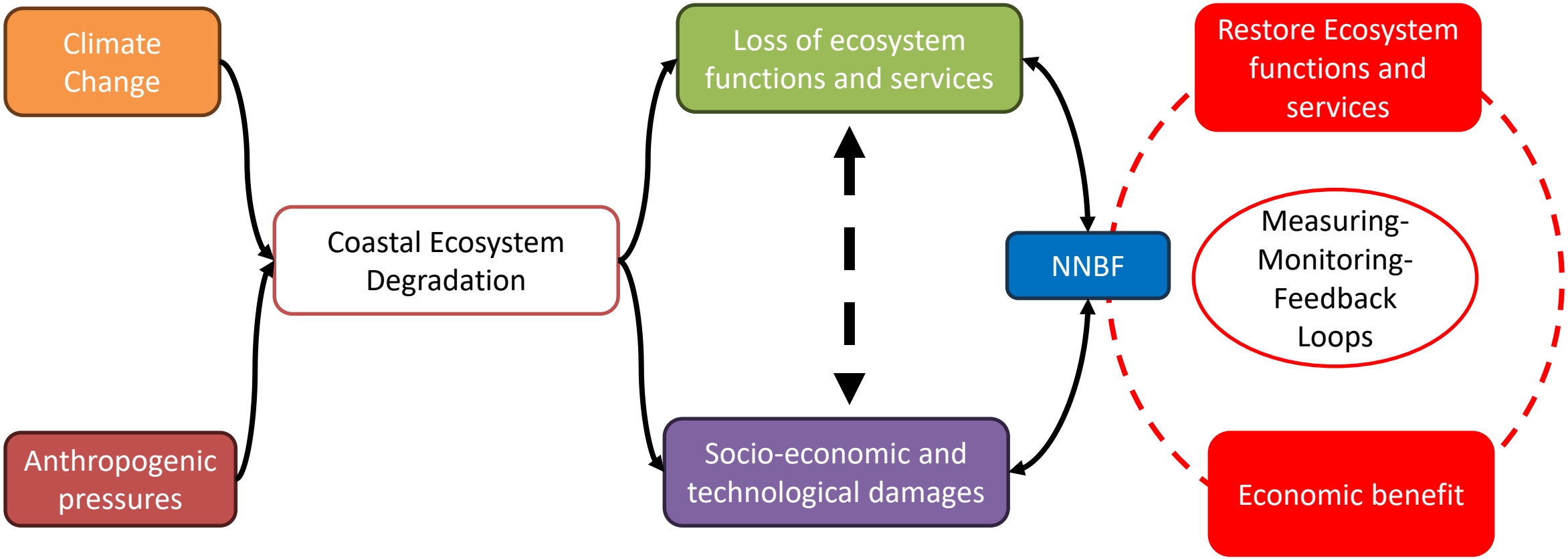
Support nature-based adaptation strategies

Support private sector to identify and manage nature-related risks, turning them into opportunities

Contribution to STAC mission

- Building on existing research, tools, data, and methods to address gaps in the assessment and monitoring of NNBS.
- Practical guide for local communities, equipping policymakers and coastal zone managers with evidence-based tools to make informed decisions.
- Enhance resilient adaptation strategies in Chesapeake Bay, maximizing economic and environmental benefits of future NNBS projects.

Conceptual Framework



Objective 1: Synthesis of Tools & Data

Task 1

- Systematic review of:
  - Chesapeake Bay modeling tools
  - Literature & existing indicators
  - Partner datasets
  - Creation of NNBS classification matrix
- Quantitative data (water quality, wave energy, marsh elevation, sediment accretion)
- Qualitative data (aerial imagery, habitat connectivity, field evaluation and community feedback)

Expected Outcome

- Develop a comprehensive matrix to categorize:
  - geographical areas
  - environmental conditions
  - NNBS types
  - monitored variables
- Highlight the interdependencies between community-economic, biophysical-ecological, and technological-engineered systems

Objective 2: Identify Gaps

Task 2

- Identify Gaps based on data from Task 1
  - Assessment of Geographical & environmental gaps
  - Types of NNBS and variables monitored
  - Community participation and benefit distribution
- Inform Natural Capital Accounting

Expected Outcome

- Workshop with stakeholders including (landowners, municipalities, nonprofits, academics and coastal zone managers)
- Tailor the indicators to meet community and environmental needs, ensuring that the metrics resonate with various participant perspectives and objectives.

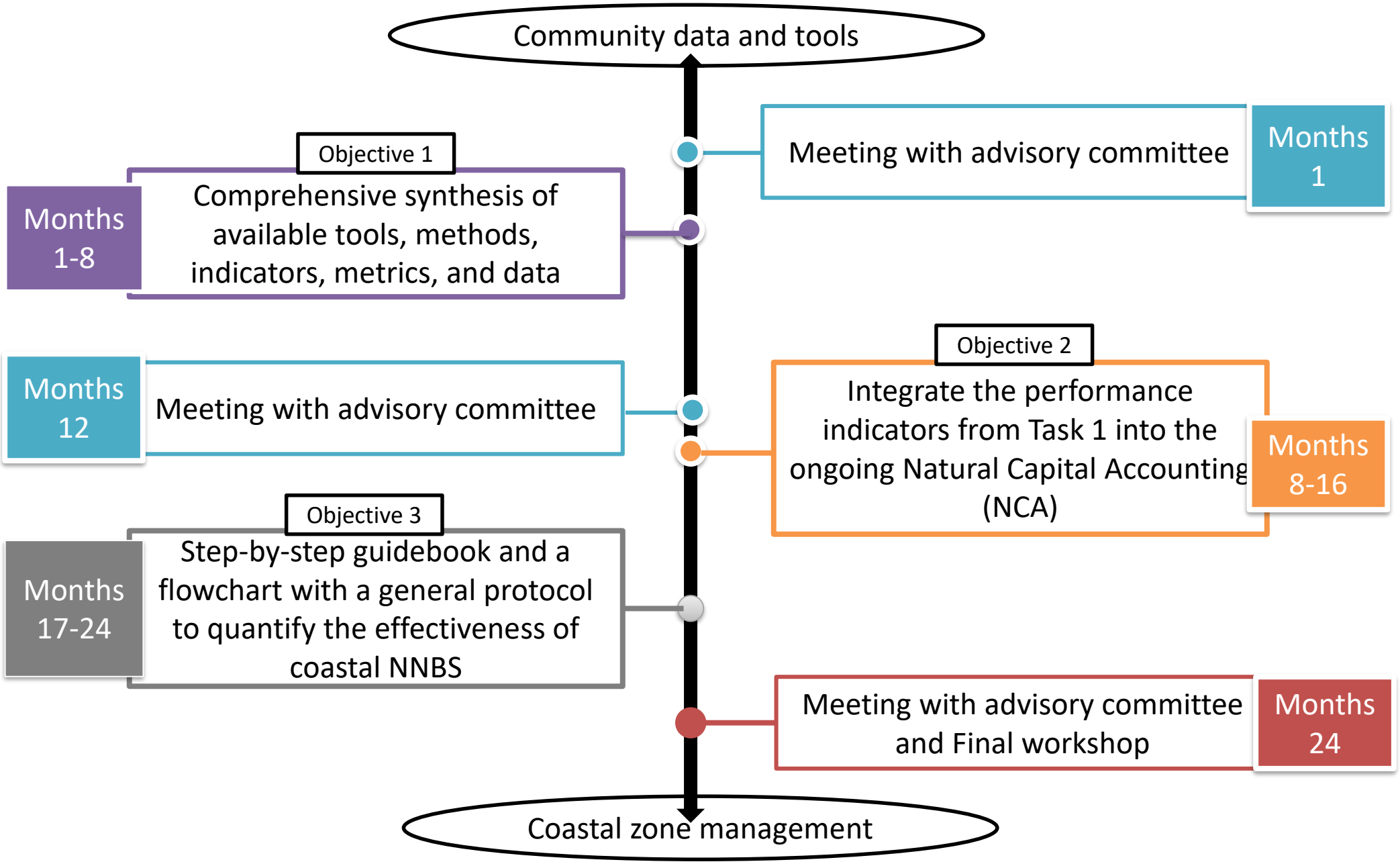
Objective 3: Framework Development

Task 3

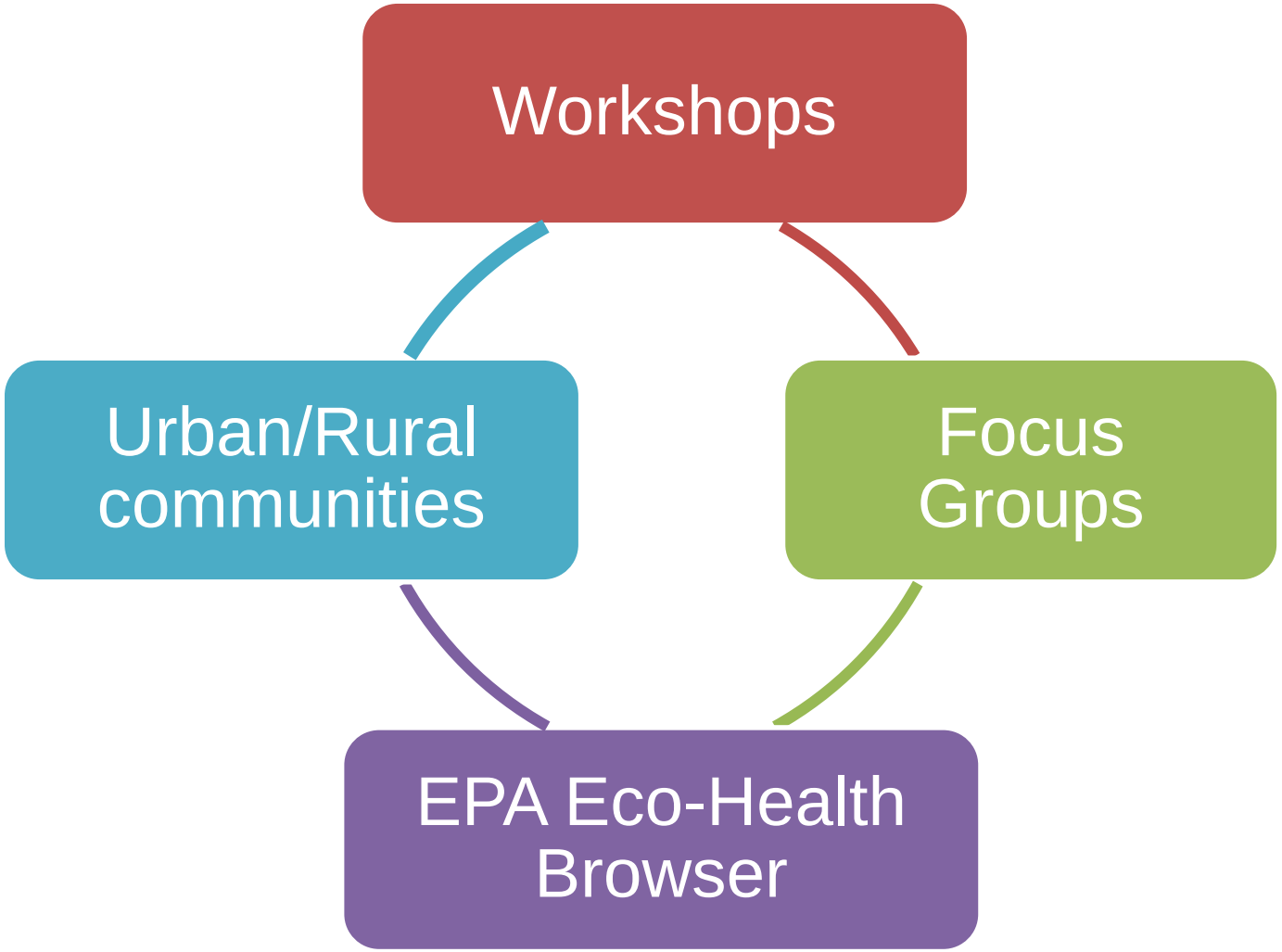
- Literature-informed, coastal zone community-guided framework to integrate the identified performance metrics into the ongoing NCA project for the Chesapeake Bay
- Propose a comprehensive post-implementation monitoring approach for future NNBS projects

Expected Outcome

- Step-by-step guidebook and flowchart with a general protocol to quantify the effectiveness of coastal NNBS based on available data and tools
- Final workshop
- National Conferences
- Scientific publications


Community data and tools
Meeting with advisory committee
Months 1
Objective 1
Months 1-8
Comprehensive synthesis of available tools, methods, indicators, metrics, and data
Objective 2
Integrate the performance indicators from Task 1 into the ongoing Natural Capital Accounting (NCA)
Months 8-16
Months 12
Meeting with advisory committee
Objective 3
Months 17-24
Step-by-step guidebook and a flowchart with a general protocol to quantify the effectiveness of coastal NNBS
Meeting with advisory committee and Final workshop
Months 24
Coastal zone management

Stakeholder Engagement



Expected Outcomes

- Standardized indicator framework
- Integration with NCA in Chesapeake
- Increased adoption of NNBS
- Peer-reviewed publications and national presentation venues

Broader Impacts

- Benefits to policymakers and coastal managers
- Contribution to job creation and community resilience
- Transferable model beyond Chesapeake Bay

Thank You

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