

Ecosystems Goods and Services Relating to Natural and Nature- Based Infrastructure (NBI)

Presented by Elizabeth Murray, Kelly Burks-Copes and Lisa Wainger

based on work of three PTDs, names included in subsections



“Providing Solutions To Tomorrow’s Environmental Challenges”

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Webinar Overview

Elizabeth Murray

Co-PI of Work unit for incorporating EGS into Planning Process

Kelly Burks-Copes

Team Lead for EGS portion of NACCS, focused on developing qualitative and quantitative performance metrics for NACCS

Lisa Wainger

Environmental Economist developing EGS planning framework and case studies for NACCS

- I. Introduction to ecosystem goods & services
 - Overview of the guiding concepts and approach
- II. Developing ecosystem goods and service metrics for Natural and Nature-based Infrastructure to support the NACCS
 - Strategies to identify and measure benefits in a tiered services approach
- III. Application of ecosystem goods and services assessment to coastal restoration projects
 - Transferable methods and national data sources for rating projects



Introduction: A Framework for Identifying and Assessing Ecosystem Goods and Services Produced by NBI

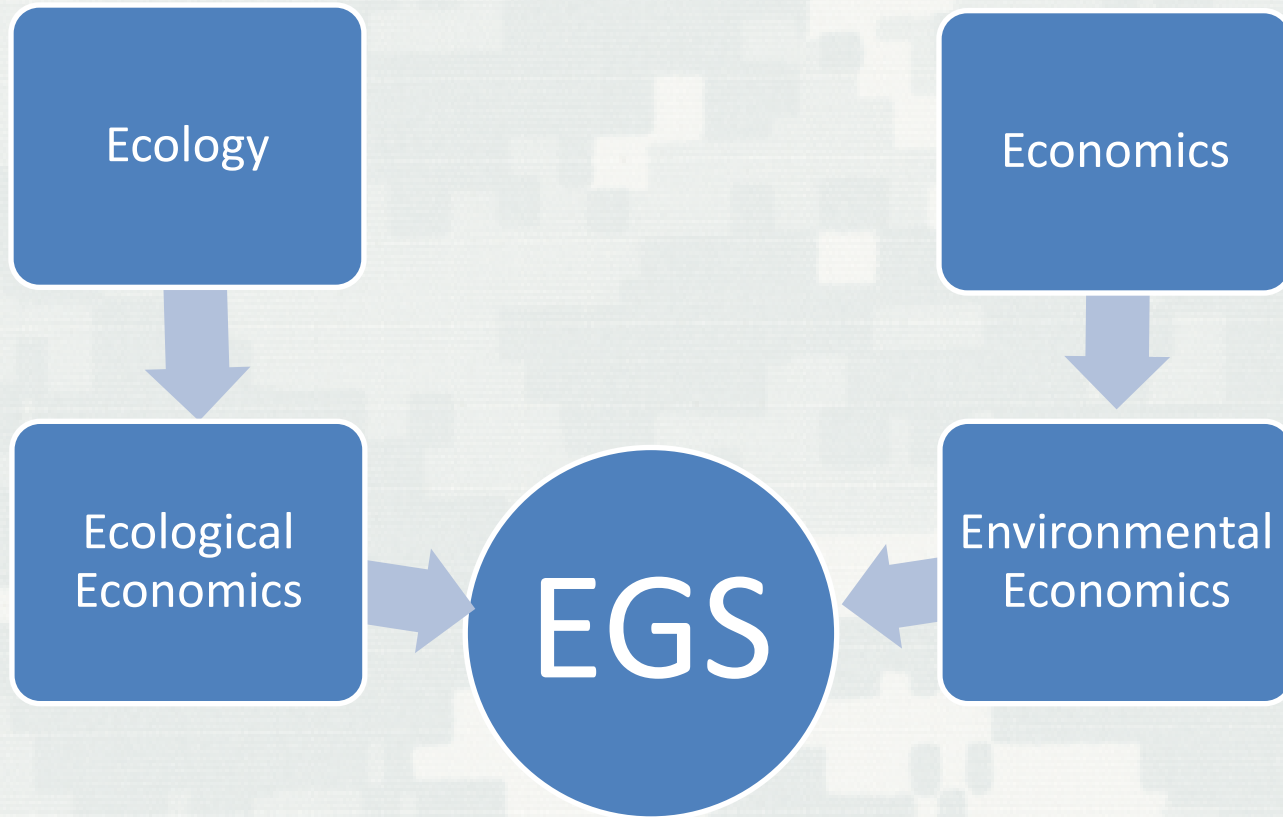
Presented by Elizabeth Murray

Based on the publications by
Elizabeth Murray, Janet Cushing, Lisa Wainger, Dave Tazik

Additional PDT Members: Guillermo Mendoza, Paul Wagner, Lynn Martin, Shawn Komlos (IWR); Tim Lewis (ERDC); Margaret Palmer & Hannah Griscom (U of Maryland); Denise Reed (The Water Institute); Tomma Barnes (SAW); Chuck Theiling (MVR), Doug Gorecki (LRB); Denise Kammerer-Cody (NAE); Kat McCain (MVS); Frank Casey (USGS)



Ecosystem Goods and Services



Ecosystem Goods and Services

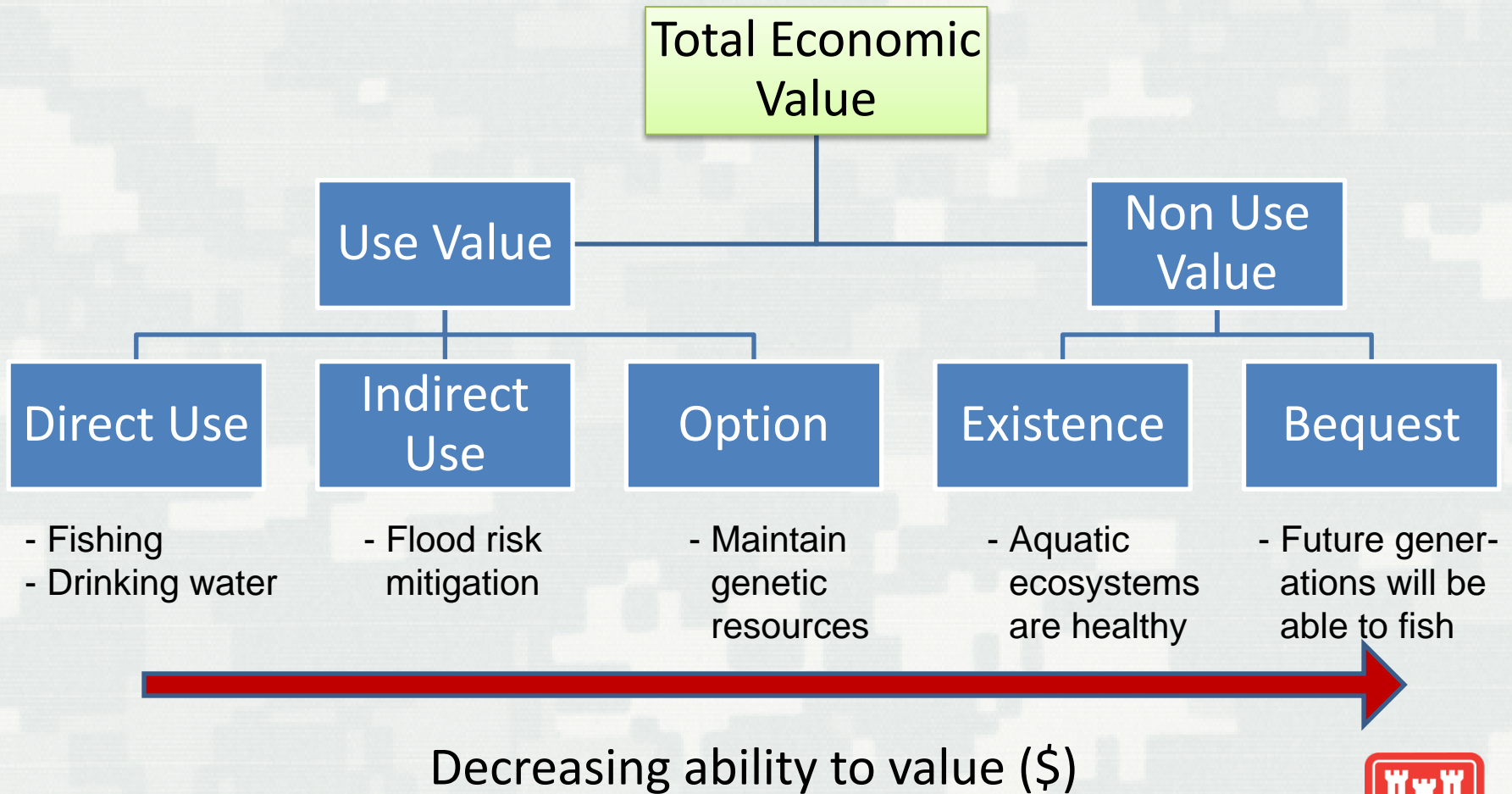
Recommended USACE Working Definition:

Ecosystem goods and services are socially valued aspects or outputs of ecosystems that depend on self-regulating or managed ecosystem structures and processes.



Total Economic Value

Sum of use and non-use values



Characteristics of Intermediate vs. Final Goods & Services

Ecosystem Structure or Function

- Nutrient cycling
- Sedimentation rate
- Water depth
- Biodiversity

- Often quantifiable
- Often academic

• Components of intermediate or final services

- Independent of demand

Intermediate Good or Service

- Quality of water
- Water supply capacity
- Species preservation

- Often elusive
- Often intuitive

• Components of final services

- Relation to potential demand

Final Good or Service

- Drinking water supply
- Flood risk management
- Commercial fisheries
- Aesthetics

- Often quantifiable
- Often recognizable

• Contributes to society

- Relation to or reliant on demand

Joint Production and Trade Offs

Complementary vs. Competing Services –

Complementary services (e.g., waterfowl habitat and flood protection) can be simultaneously maximized at a site by considering *joint production*.

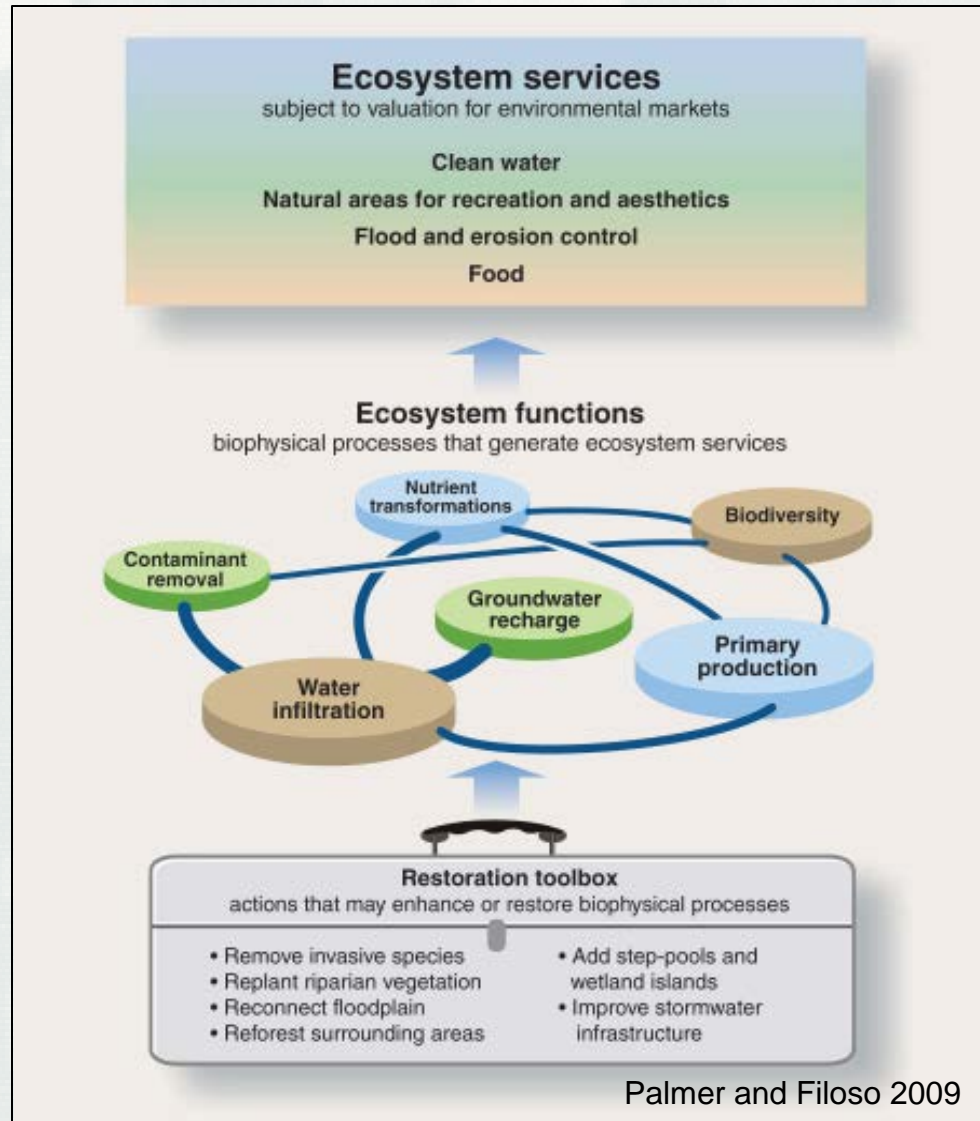
Competing services cannot be simultaneously maximized at a site, and require making *trade-offs* among services (e.g., waterfront-views (aesthetics) vs. dune restoration (storm surge protection))



Ecosystem Service Categories	Corps' Influence on Service
Ecosystem Sustainability/Habitat	Ecosystem impacts and restoration
Water Supply and Regulation	Stream restoration; reforestation; impervious surface creation
Natural Hazard Mitigation, Property & Infrastructure Protection, Human Safety (storms, floods, landslides, fires & droughts)	Tidal wetland restoration; invasive species control; alteration of hydrology, landforms, and plant communities
Navigation	Riparian restoration, erosion control, distribution of dredge material
Recreation	Wetland, riparian & stream restoration; revegetation; alteration of water and land resources
Cultural, Spiritual , & Educational Support	Revegetation; invasive species control
Aesthetics	Wetland, riparian & stream restoration; revegetation; location, design and operation of built structures
Food Provisioning: Wild foods (fish, game, grains) and aquaculture	Water management; revegetation; impact on fisheries habitat
Raw Goods & Materials Provisioning	Subsidence prevention; ecosystem improvements; In-water structures; invasive species control
Water Purification and waste treatment	Ecosystem restoration; water management; riparian restoration; channel configuration
Climate Regulation, Carbon Sequestration	Reforestation; wetland restoration
Human Health	Pathogen and contaminant processing and dilution via wetland and river restoration

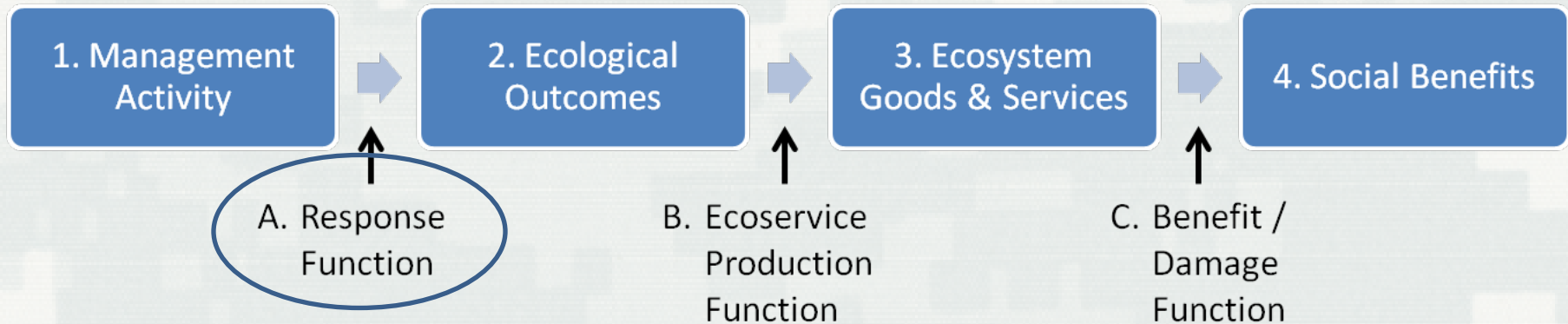
Linking Ecosystems to Human Welfare

Conceptual models link changes in the ecosystem resulting from restoration activities or nature based infrastructure to Ecosystem Services that benefit humans.



Framework

Conceptual Model for developing EGS Assessment

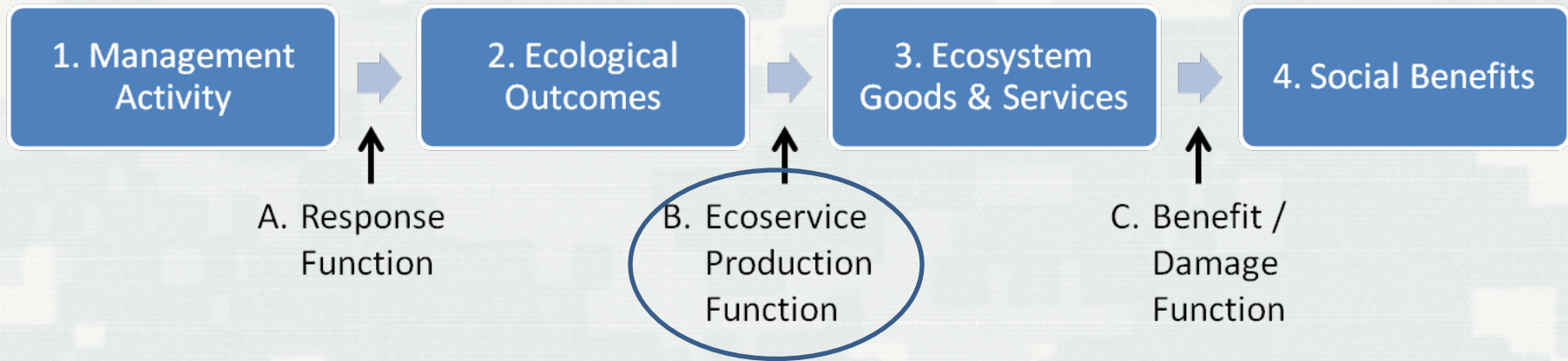


The *Response Function* estimates the expected changes in ecological outcomes when conditions and stressors change. How might the change in flow regime affect fish movement and productivity downstream? How might restoring a wetland slow floodwaters? Significant data and information gaps must be identified and addressed (NRC 2005).



Framework

Conceptual Model for developing EGS Assessment

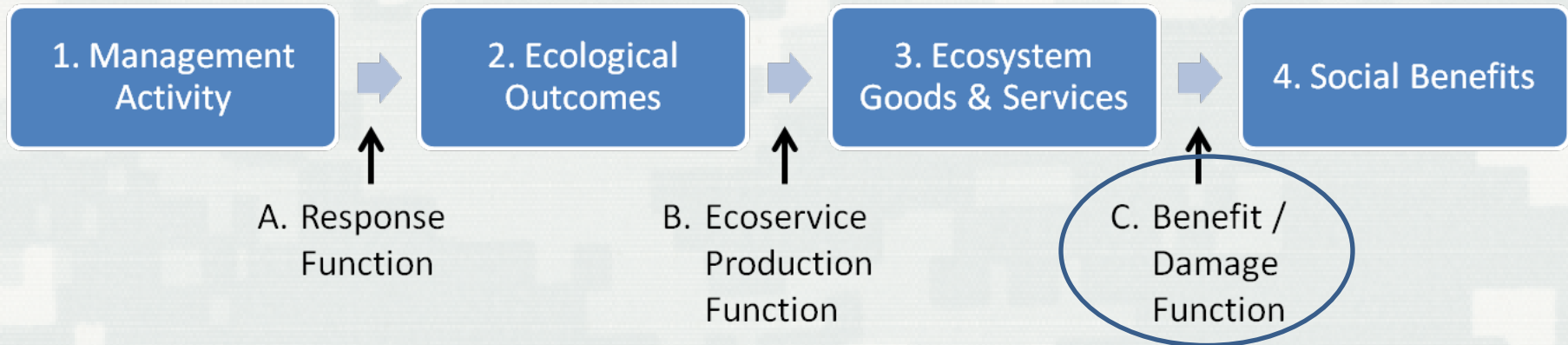


The *Ecoservice Production Function* determines whether services are produced. Does the change determined by the *Response Function* result in greater recreational opportunities such as boating and fishing? Does the slowing of water result in actual protection of flooding to downstream towns or crops.



Framework

Conceptual Model for developing EGS Assessment



The *Benefit/Damage Function* determines the value of the change in services. While the Ecosystem Goods and Services might be additional angler days per mile of river, or houses outside the 5-year floodplain, the Social Benefits are the monetary value of those services. As long as the EGS incorporates a human perspective, monetizing is not always necessary or even desirable.

