

# Establishing Metrics for Environmental Benefits Analysis

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# Overview

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- Acknowledgements:
  - Environmental Benefits Research: Craig Fischenich, Andy Casper, Dick Cole, Sarah Miller, Glenn Rhett
  - Metrics Workshop: Alan Covich, Bruce Pruitt, Melissa Kenney, Mark Harberg, John Boland
- Presentation Overview:
  - Restoration Benefits
  - What are metrics?
  - State-of-the-Practice
  - Metric Development

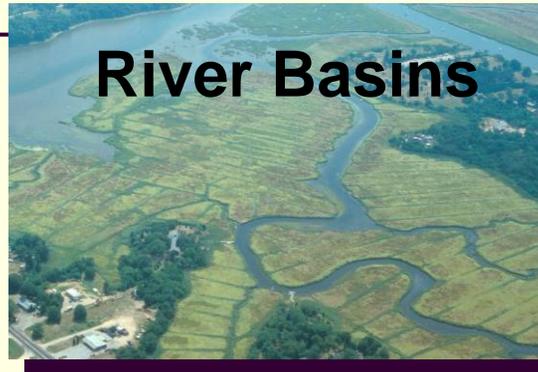


# Ecosystem Restoration in the Corps

**Wetlands**



**River Basins**



**SAV**



**Seagrass**



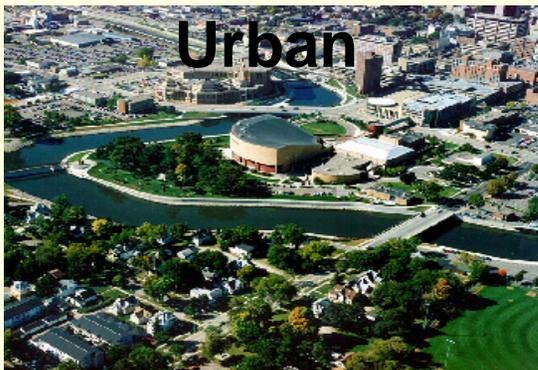
**Coastal**



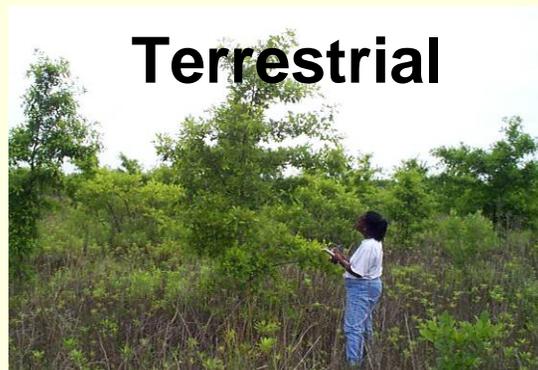
**Stream Corridors**



**Urban**



**Terrestrial**



**Reservoirs**



# Environmental Benefits Research

## ■ Research Topics

- Conceptual models
- Metrics
- Ecological evaluation and forecasting
- Decision analysis
- Benefits quantification
- Ecosystem services
- Programmatic assessment

## ■ Research Process

- Full participation by external experts
- Active and continual critical peer review
- Partnering of Corps labs, HQ, Districts, & Divisions
- Proactive methods for tech-transfer



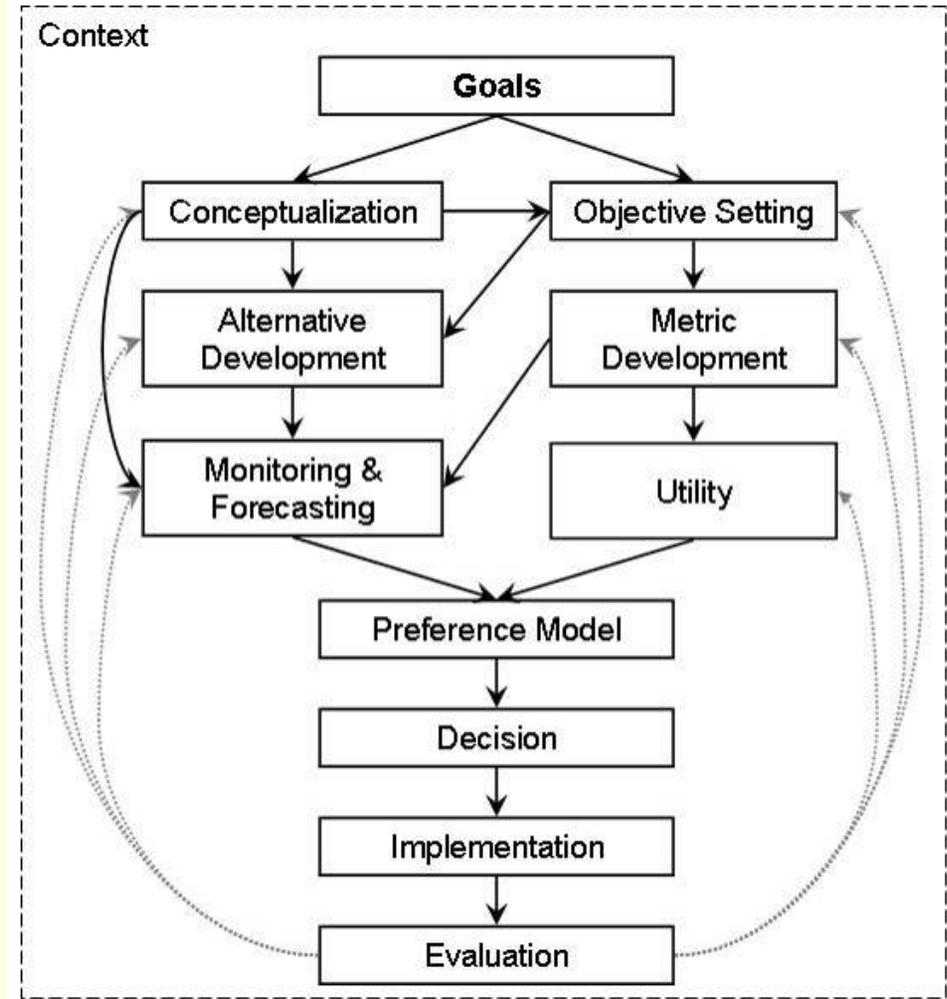
# What is a metric?

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- A metric is a measurable system property used to quantify the degree of achieving objectives
  
- National Economic Development (NED)
  - Economic Focus (often \$)
  - Cost-Benefit Analysis
  
- National Ecosystem Restoration (NER)
  - Purpose: "...to restore significant ecosystem function, structure, and dynamic processes that have been degraded"
  - Environmental focus (Non-monetary metrics)
  - Cost Effectiveness & Incremental Cost

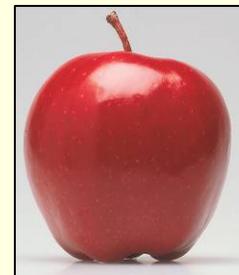
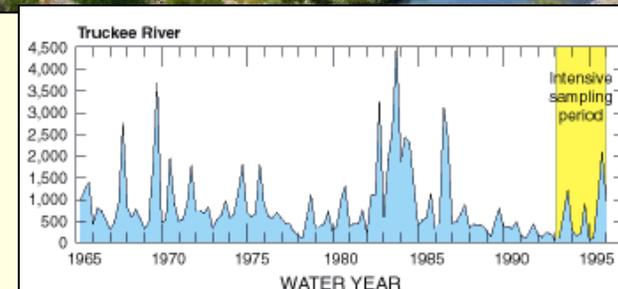
# How are metrics used?

- Metrics are needed for:
  - Project alternative comparison
  - Project performance monitoring
  - Regional assessment
  - National assessment and portfolio management

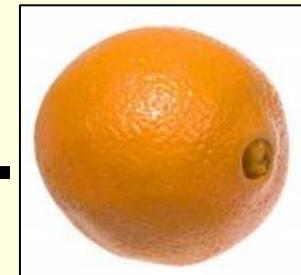


# Why are metrics hard to develop?

- Eco-centric v. Socio-centric
- Universal v. Flexible
- Static v. Process
- Abiotic v. Biotic
- Spatio-temporal issues
  - Scaling
  - Non-linearity
  - External shifts
  - Dynamic Endpoints
- Ecosystem specific constraints
- Risk and Uncertainty
  - Stochastic Ecosystems
  - Professional judgment
- Scientific v. Societal Value
- Comparison and combination of dissimilar metrics



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# State-of-the-Practice

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Metrics are often:

- Not clearly mapped to objectives
- Focused on one aspect of restoration (habitat quantity)
- Poorly documented
- Difficult to translate from project to program
- Different throughout the project life cycle

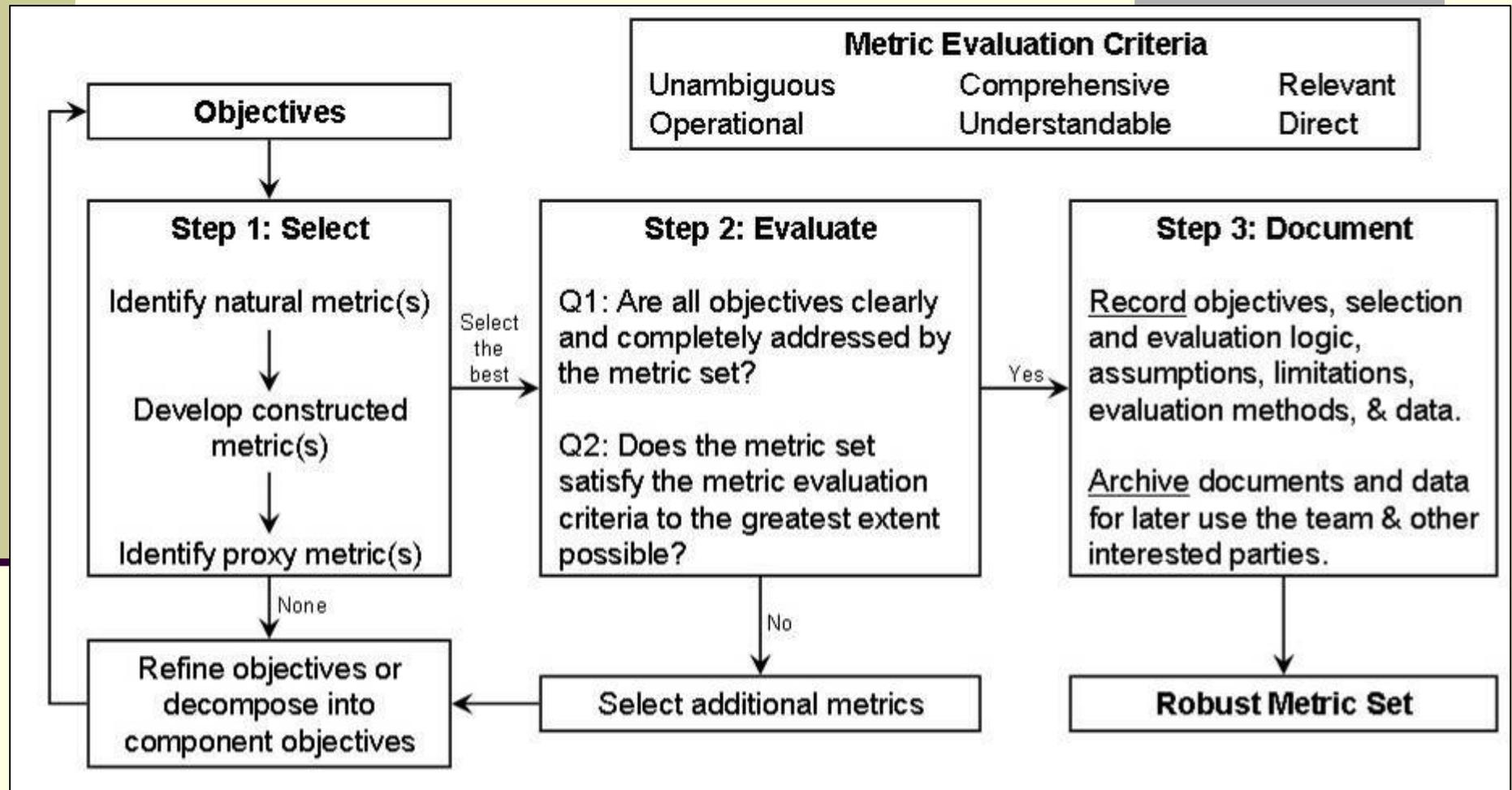


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# Metric Development Process



# Key Take-away Points

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- Environmental benefits are tough to quantify!
- Metrics measure objectives
- Setting well-defined, complete, and clear objectives is critical to restoration projects
- From a good list of objectives, a metric set may be identified using the proposed framework



# Questions and Feedback

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## Contact Information

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## Environmental Benefits Analysis Research Program Website

<http://cw-environment.usace.army.mil/eba/>

## Current and Forthcoming Publications:

McKay, Pruitt, and Covich. (2009). Monitoring Ecosystem Integrity. 2009 Georgia Water Resources Conference, Athens, GA.

Covich, McKay, Kenney, Pruitt, Harberg, Fischenich, and Boland. Enhancing Aquatic Ecosystem Integrity with Effective Objectives and Metrics for Restoration. In prep for *Ecological Restoration*.

McKay, Pruitt, Harberg, Covich, Kenney, Miller, and Fischenich. Metric Development and Application for Environmental Benefits Analysis. ERDC TN-EBA.