
Evaluation, Assessment, and Restoration
First International Meeting
on Wetlands
Mexico City

Purpose of Presentation

Part 1

- To provide basic information on wetlands evaluation, assessment, and restoration thereby setting the stage for the panel discussion on these topics.

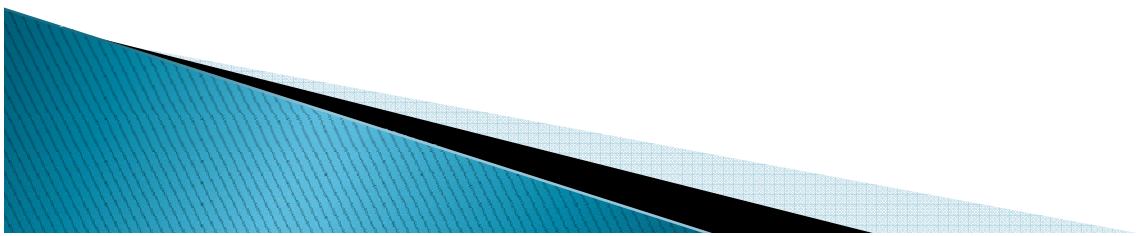
Purpose of Presentation

Part 2

- To prepare panel discussion to answer 3 basic questions
  - How many types of evaluation/assessment of wetlands exist and what is the purpose of the evaluation/assessments?
  - How are the evaluation/assessments designed and used as a system to monitor wetlands?
  - What are the basic criteria to define the scope of a project to restore wetlands?

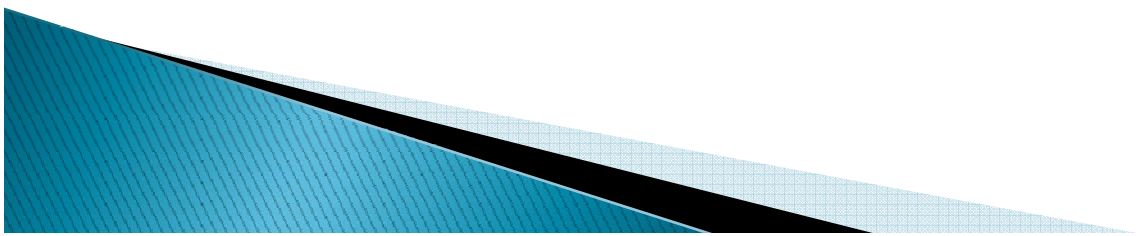
What is wetland evaluation, assessment, and monitoring?

- Tools that provide a definitive procedure for identifying, characterizing, and measuring ecological functions or wetland condition.
- Basically provide models or guidelines to rate function or determine condition.



Why do we use it?

- Watershed approach to wetlands management
- Improve plans for monitoring, protecting and restoring biological condition
- Prioritize wetlands for protection and restoration
- Evaluate the performance of restoration and other mitigation activities
- Evaluate best management practices.
- Track the effects of permitting decisions at the landscape- or watershed-scale
- Improve water quality certifications



Factors Influencing Wetlands Monitoring and Assessment

- Objectives
  - What is/are the objective(s) for wetlands monitoring and assessment?
    - Develop assessment of current wetland condition
    - Gain baseline information on wetland resources
    - Aid in developing management prioritization
  - Do all wetland types need assessment?
    - How many sites assessed per wetland type?
    - How reporting? All wetlands (all wetlands in the area) or by each wetland type (i.e., estuarine wetlands, forested wetlands)
    - How are the sites selected? Randomized selection; dictate informational layers (strata)
  - Objective can dictate level of resource commitment

Factors Influencing Wetlands Monitoring and Assessment

- Resources
  - Technical capacity
    - Trained staff
    - Physical equipment/materials – i.e., GIS, high altitude imagery
  - Time
    - Level 1 – least time intensive; ½ hr at desk
    - Level 3 – most time intensive; full day in field possible follow up lab work
  - Money
    - Level 1 – less costly, approximately 500 USD
    - Level 3 – most costly, 5-8K USD

EPA 3-Level Technical Approach

Level 1 - Landscape Assessment

Use GIS and remote sensing to gain a **landscape view of watershed and wetland condition.** Typical indicators include wetland coverage (NWI), land use, land cover, and landscape emergy.

Level 2 – Rapid Wetland Assessment

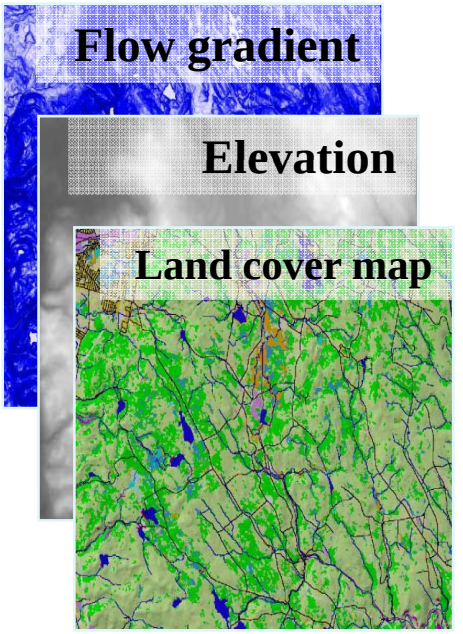
Evaluate the **general condition of individual wetlands using relatively simple field indicators**. Assessments often include evaluating stressors known to limit wetland function (e.g., road crossings, tile drainage, ditching, pollutant loading).

Level 3 – Intensive Site Assessment

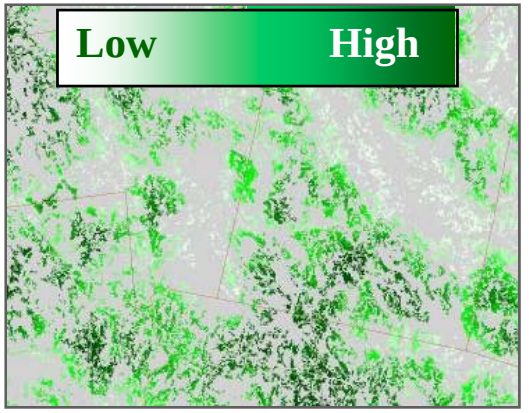
Produce quantitative data with known certainty of wetland condition within an assessment area. Used to refine rapid wetland assessment methods and diagnose the causes of wetland degradation. Typically accomplished using biological indicators, physical soil properties, and detailed hydrology data.

Level 1: Landscape Assessment

- Desktop assessment (GIS and aerial photography)
- Landscape-level assessment based on anthropogenic stressor metrics
- Metrics are calibrated to predict ecological condition
- Used to prioritize watershed planning, restoration and conservation efforts

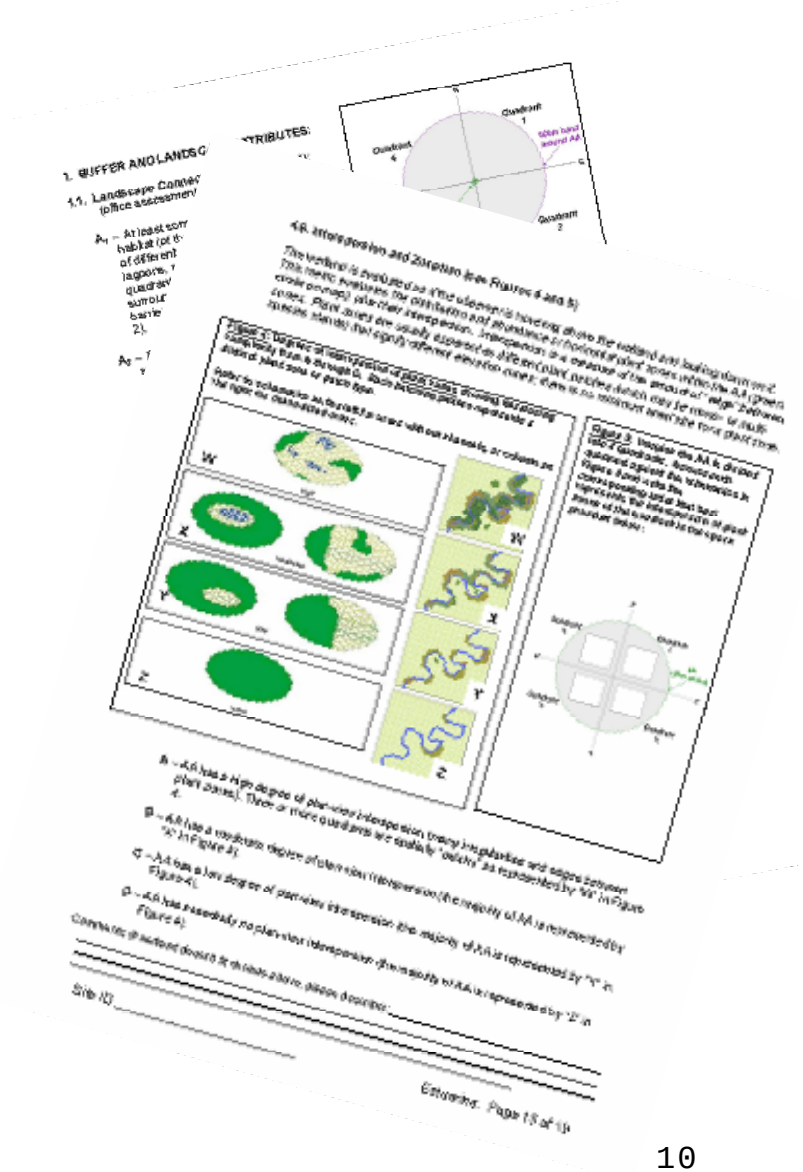


Wetland Quality Score



Level 2 – Rapid Assessment Methods (RAM)

- Evaluate the general condition of individual wetlands using relatively simple indicators
- Validate Level 1 assessments
- Rapidly assess impact sites for regulatory analysis (1-2 hrs) use BPJ
- Determine where more intensive monitoring is needed to develop detailed restoration plans



Level 3 Intensive Site Assessments

- Comprehensive data on individual wetlands (1 day field + lab work)
- Evaluate and refine the landscape and rapid assessments
- Diagnose causes and sources of degradation
- Evaluate mitigation performance and develop standards

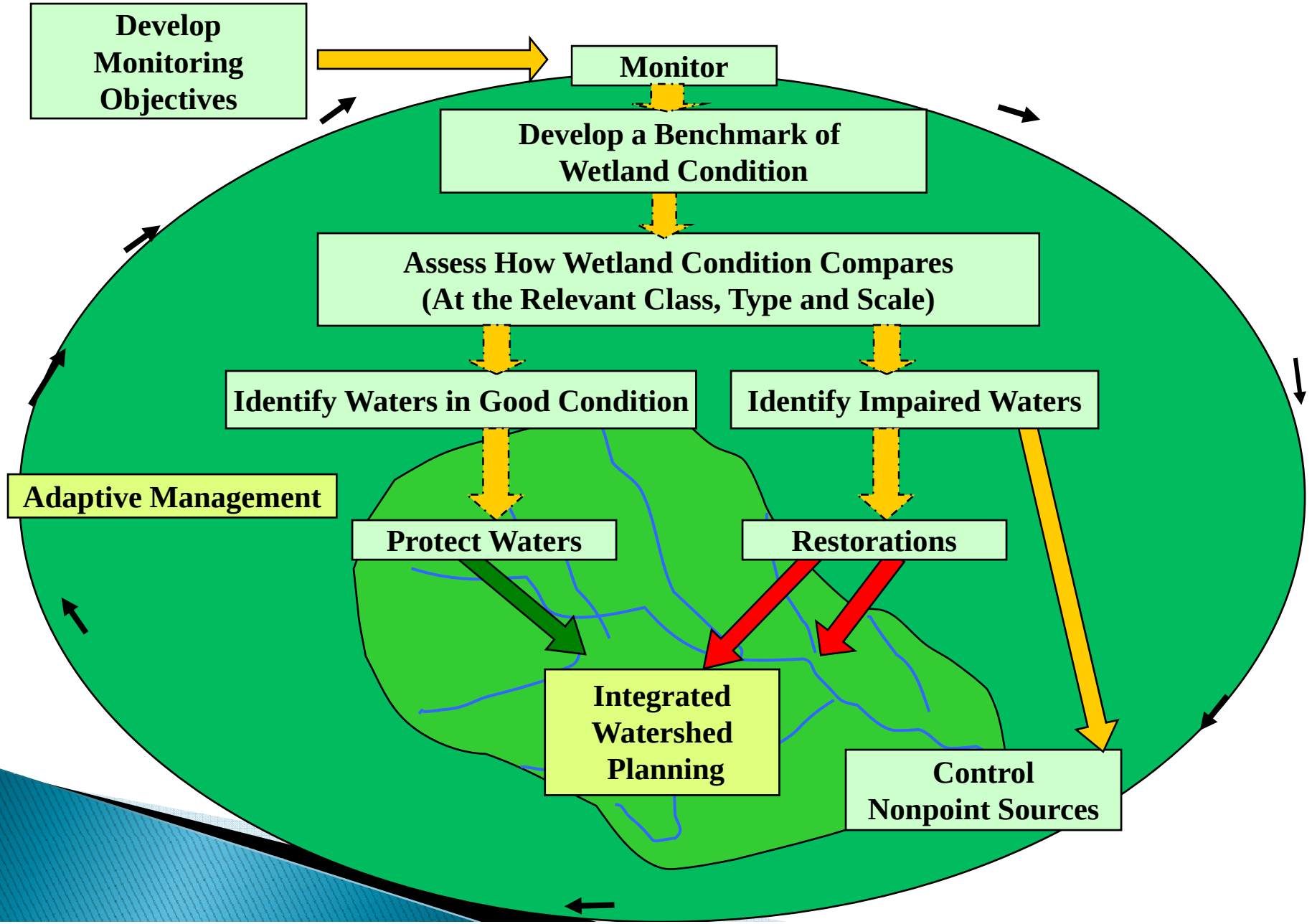
Examples of Wetland Assessment Methodologies

- Best Professional Judgment (BPJ)
- Wetland Rapid Assessment Method (WRAP)
  - Developed by Florida to provide a consistent, timely regulatory tool to assess freshwater restored wetlands.
- Habitat Evaluation Procedure (HEP)
  - Developed by USFWS (1980) to document quality and quantity of available habitat for selected wildlife species. More involved; team of experts, agree on selection of indicator species, and assess site using models for selected species.
- Hydrogeomorphic Approach (HGM Approach)
  - Developed by US Corps of Engineers (1995) to primarily assess functions in the Wetlands Regulatory Program. Comparable level of effort to HEP
- Index of Biological Integrity (IBI)
  - Developed by James Karr for streams and wetlands

Assessment and Monitoring Basics

- Developing Wetland Benchmark
  - Assessment of condition at selected wetland reference sites (randomized or targeted selected)
- Comparison of wetland condition
  - Type: estuarine v estuarine, forested v forested
  - Scale: country (Mexico), region (Gulf Coast), watershed
    - Precision is greater smaller the scale
- Identify Wetlands in Good or Impaired Condition
  - Good = protect waters
  - Impaired = restoration or control stressor
- Management and land use implications
  - i.e., Integrated Watershed Planning

Monitoring Supports Decision-Making



Lessons Learned

- <u>Clear Objectives</u>
  - What is the purpose of the monitoring and assessment
  - What are we reporting
- Statistical design selection of sites is a less resource intensive means of sampling
  - All sites (census) v. Representative sample of sites (statistical)
- Prioritize use of resources by using all three assessment approaches
  - Efficiency
    - Level 1 – screen; identify difficult sites
    - Level 2 – finer screen; separate most difficult sites
    - Level 3 – confirmation
- Collaboration with State, local, academics, NGOs for technical expertise

Wetlands and Riparian Restoration Concerns

- Goals/Objectives
- Climate Change
- Wetland Response to Sea Level Rise
- Carbon Sequestration
- Western Riparian
  - Managed Flow
  - Ground Water Interactions

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Impacts to Wetlands

- Invasive Species
- Hydrologic Modification
- Climate Change
  - Brown Marsh Dieback
  - Sedimentation
  - Agriculture Use
  - Habitat Alteration
  - Sea Level Rise

Western Riparian Issues

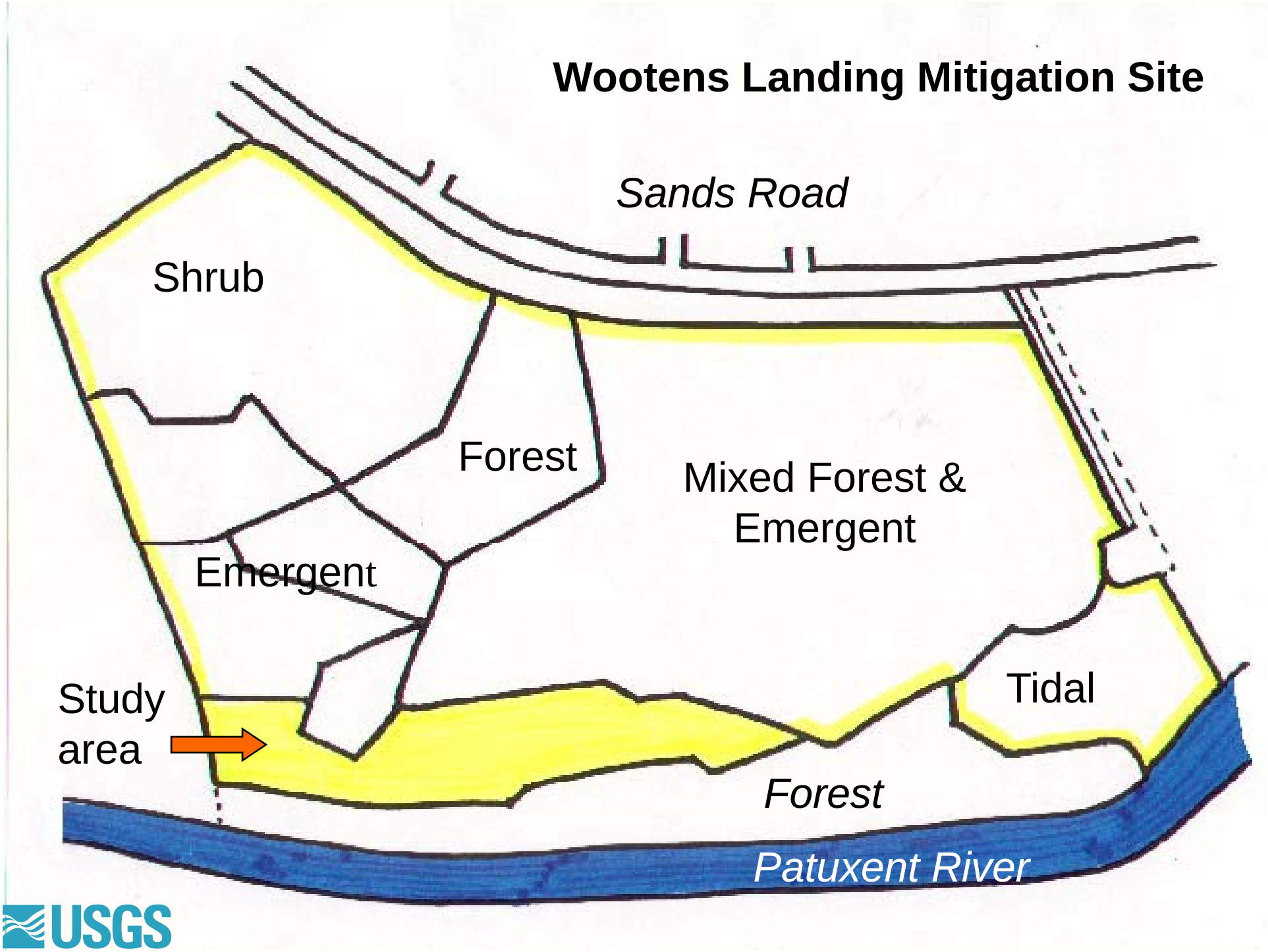
- Lack of Seasonal Variation
  - High Spring Flows
- Loss of Riparian Habitat
- Dam Removal
- Climate Change

Wetland Restoration Benefits

•Water quality
• Flood retention

•Coastal Protection
• Fisheries Enhancement
• Habitat

Wetland Mitigation/Restoration


Wootens Landing Mitigation Site
Sands Road
Shrub
Forest
Mixed Forest &
Emergent
Emergent
Study
area
Tidal
Forest
Patuxent River

Construction Phase


Restored Vegetated Emergent – Shrub Wetland
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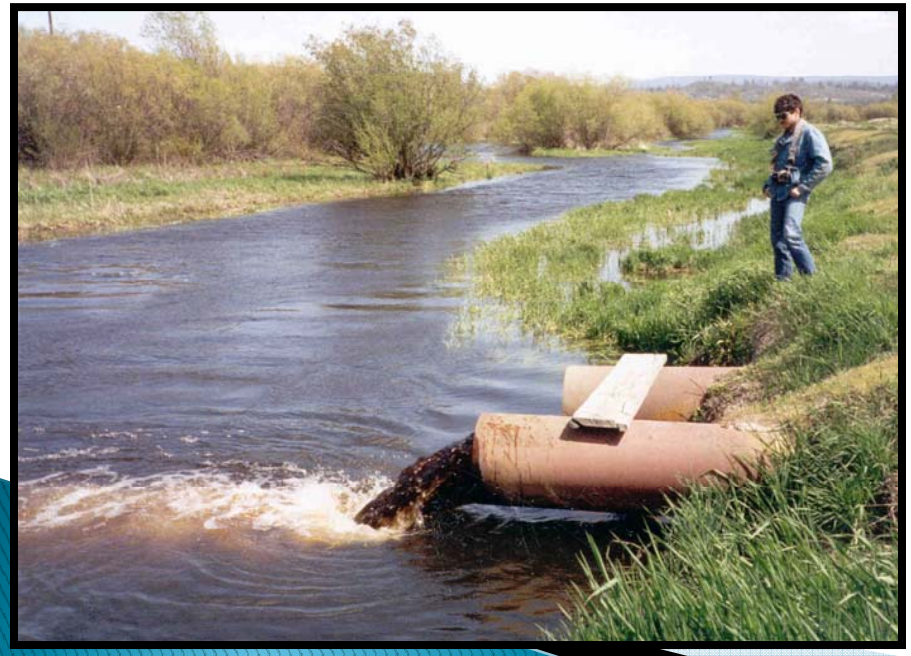

Former wetlands are annually flooded, drained, and farmed, resulting in the decomposition of thick beds of peat.

Nutrients released from these peats are drained into UKL, which enriches the lake's bottom sediments with phosphorus.

Enriched bottom sediments release phosphorus during the summer months, feeding large algal blooms.

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Coastal Wetlands

- *Sea Level Rise*

- Determine rates of relative sea level rise and marsh response

- Evaluate response of marsh to sea level rise and management actions to offset subsidence

- Impacts of biota on coastal marshes experiencing subsidence

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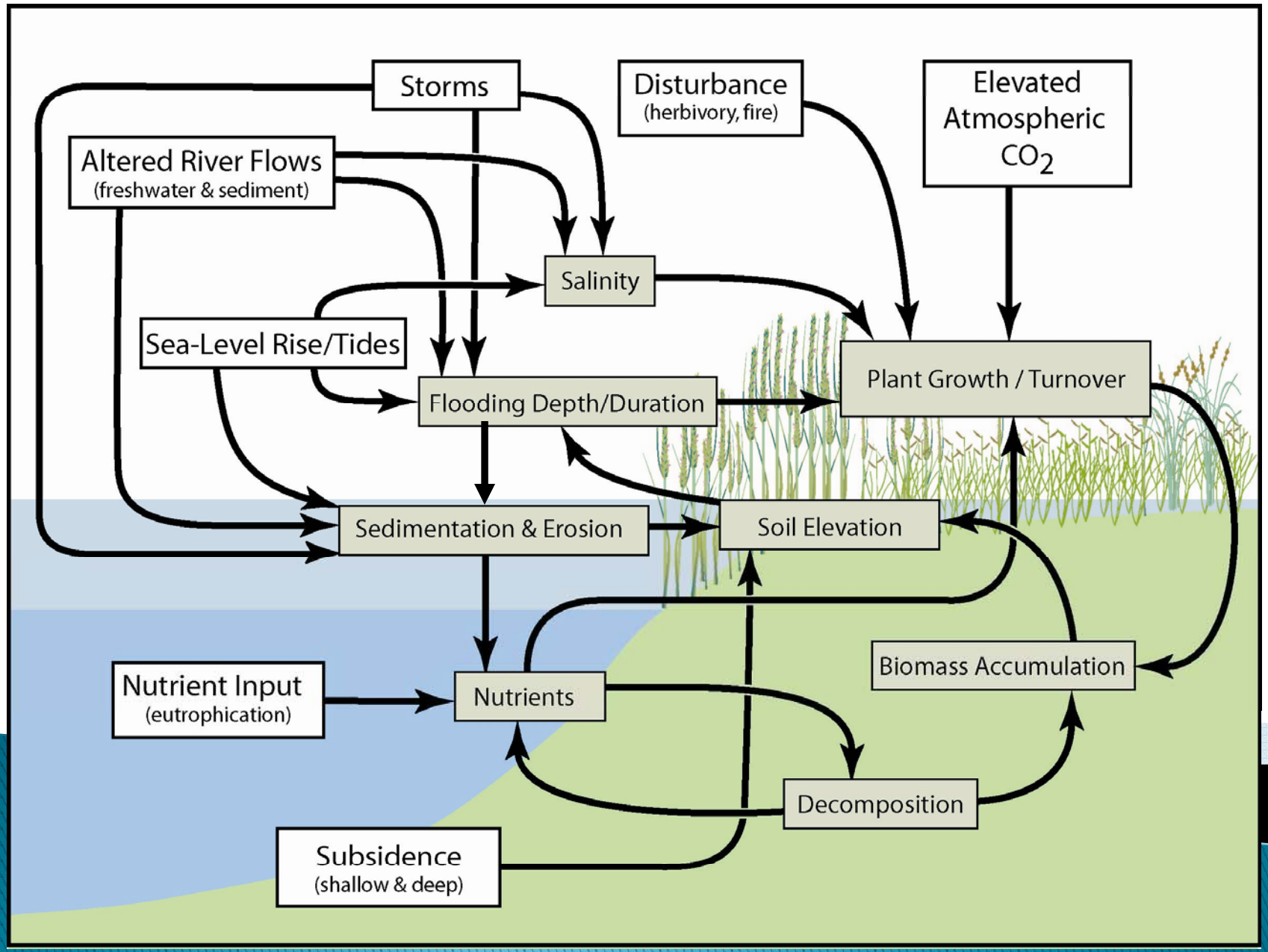
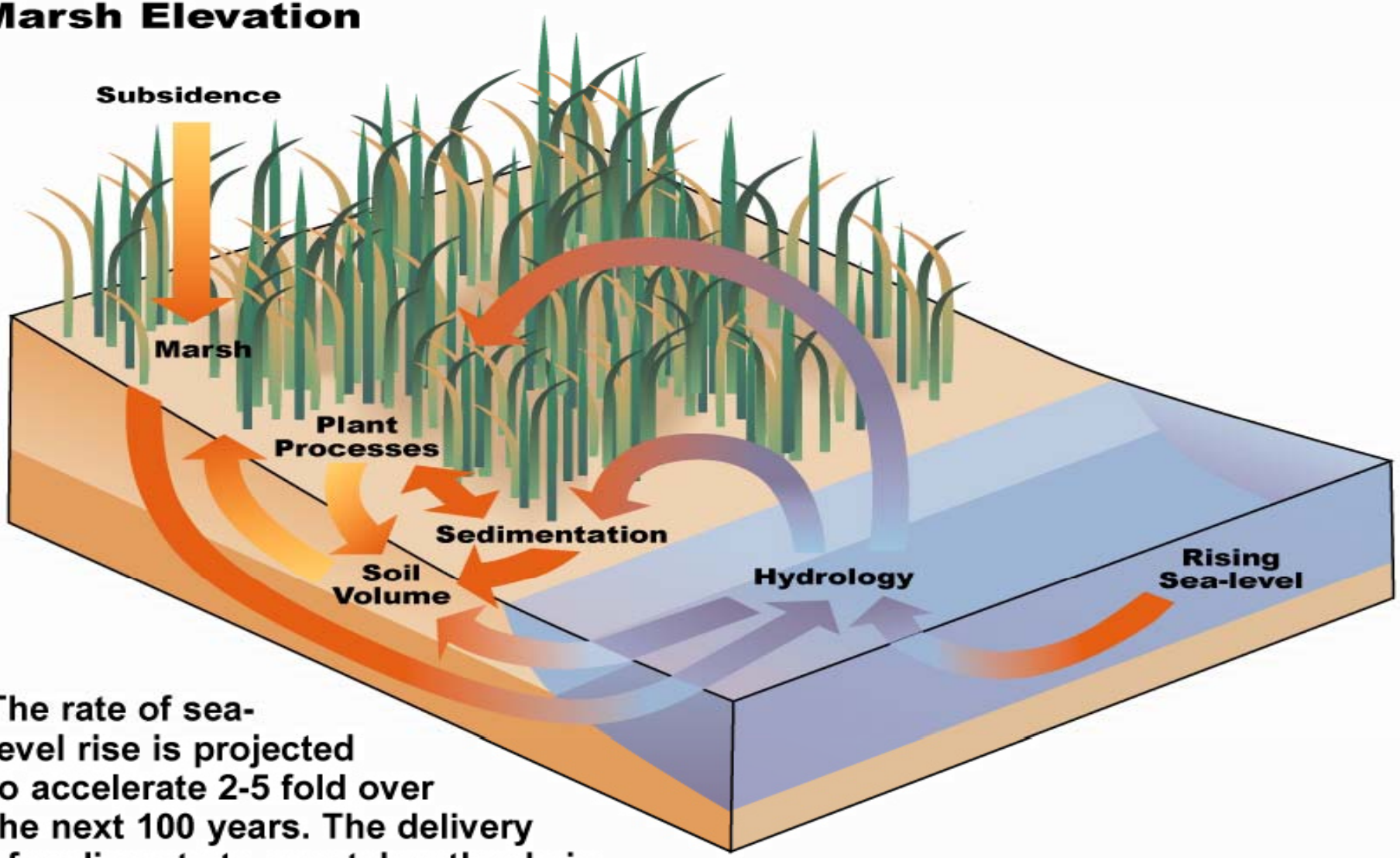


From Cahoon et al. in prep. Coastal wetland sustainability. CCSP SAP 4.1

Processes Affecting Marsh Elevation



The rate of sea-level rise is projected to accelerate 2-5 fold over the next 100 years. The delivery of sediments to coastal wetlands is extremely important in determining the potential of these systems to maintain themselves in the face of current and future sea-level changes.

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Gateway NRA, Sandy Hook Unit

Bruce Lane

Jim Lynch

Rod Surface Elevation Table (RSET)

Cryogenic soil coring of artificial soil marker horizon

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Questions:

- How many types of evaluation methodologies exist?
- How do you design monitoring program of wetlands?
- Which are the basic criteria to define the goals/objectives of a restoration and/or conservation project?

http://assessmentmethods.nbii.gov/