Nutrient Pathways

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Nutrient Pathways Framework Components

- Nutrient Pathways: routes by which nutrients move through a system.

- Charge to group:

Input and Transport Questions

- What are the types of nutrient sources, levels of inputs and loads over space and time?
- What are the dominant processes affecting transport over space and time?
- How are biota interacting with nutrients?

Pathways Questions

- What are the primary pathways that affect nutrient transport and fate?
- How are source categories and system components partitioned?
- What are the transfer rates between system components?
- What parts of the system components act as nutrient sinks?

Ecosystem Compartments for Nutrient Pathways

- Atmosphere
  - Rain
  - Dry deposition
- Water
  - Groundwater
  - Surface water
  - Water column
- Sediment
  - Porewater
  - Bottom sediments
- Biota
  - Nutrient Consumption/assimilation
  - Release
  - Deposition to sediment

Nutrient Inputs and Loading

- Nitrogen Inputs
- Isotopic measurements
- C:N ratio
- Event Mean Concentration
- National Hydrography Dataset and Bathymetry
- Tidal and Non-tidal Gaging
- Groundwater

Nutrient Pathways

- LOICZ Box Models

Nutrient Transport
Primary Controlling Factors

Variables	**Measurement**
Wind	Direction, speed
Waves	Height, length, period, direction
Tides	Water level @ high and low tides
Currents	Direction, speed
Water levels	Depth
Bathymetry	Elevation
Flow	Velocity, residence time
Stratification	Surface and bottom water temp, salinity

Nutrient Fate

- Connect to hydrologic cycle
- Relate to effects on metabolic instability of the ecosystem
- Relate effects of land use on higher trophic levels
- Estimate incorporation into food web

Study Design Questions

- What compartments (water column, sediment, biota, atmosphere) should be measured ‘routinely’ and which less frequently or based on empirical relationships or modeling?
- What processes (sedimentation, denitrification, remineralization) should be measured ‘routinely’ and which less frequently or based on empirical relationships or modeling?
- What flux rates should be measured ‘routinely’ and which less frequently or based on empirical relationships or modeling?

Typology

- Would the type of estuary make a difference for the inclusion of specific pathway component?