What are Wetlands?

Wetland Ecology Fall 2017
Ingredients to make a wetland

- Water
- Topography
- Soil
- Plants
- Animals
Definitions

Transition zone between upland and permanently flooded ecosystems

Isolated basins with no inflow or outflow
Definitions are varied:

Common elements:

- Presence of water at the surface or rooting zone
- Unique soil conditions
- Support unique vegetative communities
An example definition

• From Keddy, 2000, pg. 3.

• “A wetland is an ecosystem that arises when inundation by water produces soils dominated by anaerobic processes and forces the biota, particularly rooted plants, to exhibit adaptations to tolerate flooding.”
Wetland Definitions

U.S. National Academy of Sciences:

“A wetland is an ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or near the surface and the presence of physical, chemical, and biological features reflective of recurrent, sustained inundation or saturation. Common diagnostic features of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic, or anthropogenic factors have removed them or prevented their development.”
U.S. Army Corps of Engineers:

“The term ‘wetlands’ means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”

(33 CFR 328.3(b); 1984)
Structuring Elements of Wetlands

Wetland Types

– Inland Wetlands
  • Freshwater marsh
  • Peatland
  • Freshwater swamp
  • Riparian wetland
  • Vernal / temporary pool

– Coastal Wetlands
  • Tidal salt marsh
  • Tidal freshwater marsh
  • Mangrove wetland
Wetland Services

- Food production
- Nutrient retention
- Grazing
- Recreation/aesthetics
- Biodiversity hotspot
- Water storage
- Habitat
Wetland Services

- Habitat (high biodiversity value)
- Water supply (groundwater recharge)
- Flood storage
- Nutrient and sediment retention
- Shoreline protection
- Food production (rice, cranberries, cattle grazing, aquaculture)
- Fiber (paper pulp, baskets)
- Energy production (peat)
- Horticultural products (peat)
- Construction material (mud; thatch)
- Aesthetics
- Recreation
## Value of Wetland Services

<table>
<thead>
<tr>
<th>Ecosystem type</th>
<th>US$ per hectare per yr</th>
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<tr>
<td>Estuaries</td>
<td>22,832</td>
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<tr>
<td>Swamps/floodplains</td>
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<td>Coastal sea grass beds</td>
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<td>Tidal marsh/mangrove</td>
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<td>Lakes/rivers</td>
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<td>Coral reefs</td>
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<td>Continental shelf</td>
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<td>Temperate/boreal forests</td>
<td>302</td>
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<tr>
<td>Open oceans</td>
<td>252</td>
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</tbody>
</table>

From: Batzer and Sharitz, 2006, pg 3.
Threats to Wetlands

- Wetland drainage
- Water regulation, dredging
- Development, agriculture
- Nutrient inputs
- Climate change
- Invasive species, aquaculture
- Cumulative impacts ("to die by a thousand cuts")

Draining the Everglades

Water regulation

Purple loosestrife
Freshwater marsh

- Extremely diverse
  - Prairie potholes, Texas/New Mexico playas
  - Meadows, shallow marshes, deep marshes
  - Great Lakes coastal wetlands
  - Vary in size from tiny to immense

- Soils are not acidic and are mineral in composition

- Vegetation is dominated by grasses, reeds, sedges, & floating aquatic plants.
Great Lakes Coastal Wetlands

Open-coast wetland

Protected wetland / high energy shoreline

Riverine wetland
Freshwater marsh

Wet prairies & meadows

Prairie Pothole

Great Lakes marshes, riverine marshes

Everglades
Tidal Freshwater Marsh

• Combine features of salt marshes and freshwater inland marshes
• Reduced salt stress leads to higher diversity than salt marshes
• Dominated by grasses and annual / perennial broad-leafed aquatic plants
• Very high bird and plant diversity
Tidal Freshwater Marsh

Chesapeake Bay

Neuse River, N.C.

Chesapeake Bay

James River, Virginia
Salt marsh

• Coastal salt marshes are generally found in:
  – Intertidal areas
  – Along gentle shorelines
  – In protected areas (limited wave/storm action)

• Two general development patterns
  – Marine-dominated (e.g., N. Atlantic coastline)
  – River-dominated (e.g., Mississippi Delta)

• Features:
  – Halophytic vegetation (grassland-style)
  – Tidal influence
  – Temperature extremes
Coastal Louisiana Wetlands

- 3 million acres of wetlands, losing 75 sq km per yr (Louisiana)
- $1 billion per year seafood industry (pre-Katrina)

Isles Dernieres

Google Earth ~2017
Freshwater Swamp

• Freshwater forested wetlands, e.g., cypress, gum/tupelo, red maple, Atlantic white cedar.
• Southeastern US or Northeastern US
• Perennially flooded or alluvial swamps flooded by adjacent streams and rivers.
• Trees have unique adaptations for survival in flooded environments.
• M&G do not include temporarily flooded bottomland forests in this definition.
Freshwater Swamp

- Bald cypress
- Maple swamp
- White cedar
- Swamp tupelo
Riparian Wetlands

- Soil and soil moisture are influenced by adjacent river or stream.
- Process energy and material from upstream systems.
- Include bottomland forests in SE US, riparian corridors in the Western US.
- Regionally variable in terms of their hydrology
Floodplain wetland features

**Figure 3.11**
Riparian Wetlands

Pinelands, Florida

San Pedro River, Tx

Lower Klamath River

San Pedro River, Tx
Mangrove swamp

- Mangroves grow primarily in the tropics and subtropics
- Plant = mangrove; community = mangal
- Mangroves replace tidal salt marshes in the tropics
- Occur where there is protection from high-energy wave action
- Characteristically have low vegetation species diversity
Mangrove
Peatlands

- Also known as moors or mires
- Require a positive water balance and peat accumulation (resulting from anoxic conditions).
- Large carbon sinks
- Bogs & Fens:
  - Differ in hydrology and dominant vegetation
- Geographic range in cold, temperate climates, but some occur in the coastal plain.
- Archaeological treasures.

Young female bog body, dubbed the “Yde Girl” because she was found next to the village of Yde in the Netherlands. Credit: Drents Museum, Carnegie Museum of Natural History
http://www.livescience.com/php/multimedia/imagedisplay/
Peatland

Canada

New Zealand

Ireland

Florida – savannah fen
Vernal/temporary Wetlands

- Shallow, intermittently (seasonally) flooded
- Vegetation varies from wet meadow to forested
- Highly diverse flora and fauna in some regions (esp. Northeastern & Midwestern US)
Vernal/temporary

Cloquet, MN

Northern IL

Grand Rapids, MN

Duluth, MN