

The background of the slide features a dense arrangement of green leaves, likely from a tree or shrub, with prominent veins. Below the leaves, there are ripples on a body of water, suggesting a wetland or aquatic environment. The overall color palette is various shades of green and blue.

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.”



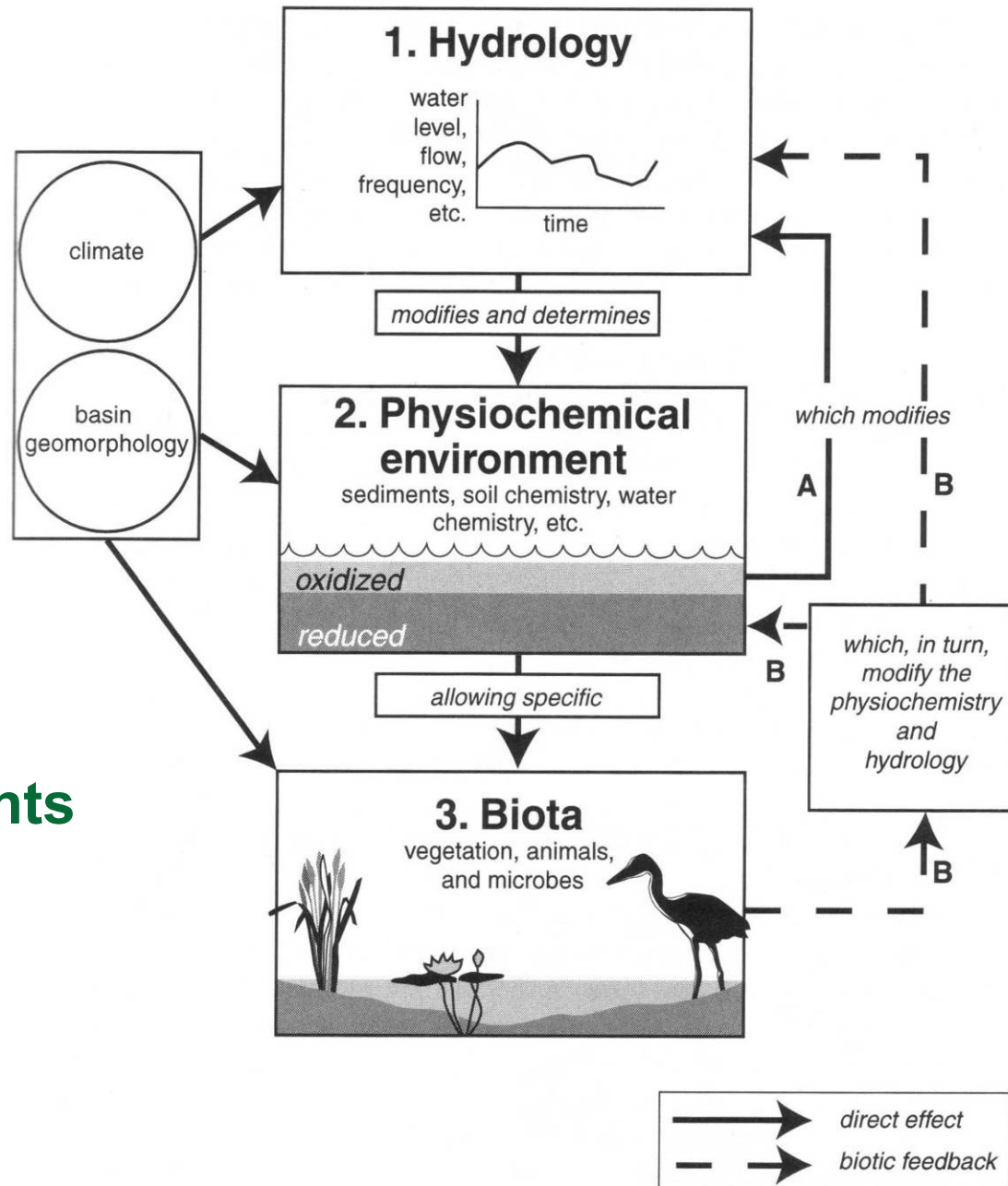
Wetland Definitions

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



habitat

Water
storage



Nutrient retention



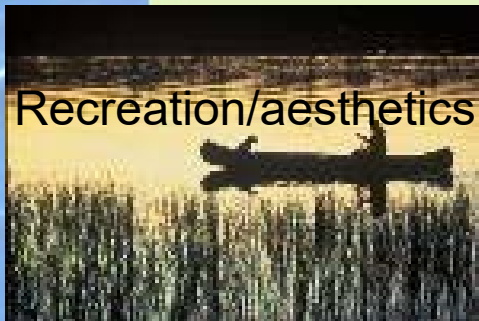
GRCA



Fiber
production



Grazing



Recreation/aesthetics



Biodiversity
hotspot



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

Services provided by the world's ecosystems

Ecosystem type	US\$ per hectare per yr
Estuaries	22,832
Swamps/floodplains	19,580
Coastal sea grass beds	19,004
Tidal marsh/mangrove	9,990
Lakes/rivers	8,498
Coral reefs	6,075
Tropical forests	2,007
Continental shelf	1,610
Temperate/boreal forests	302
Open oceans	252

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

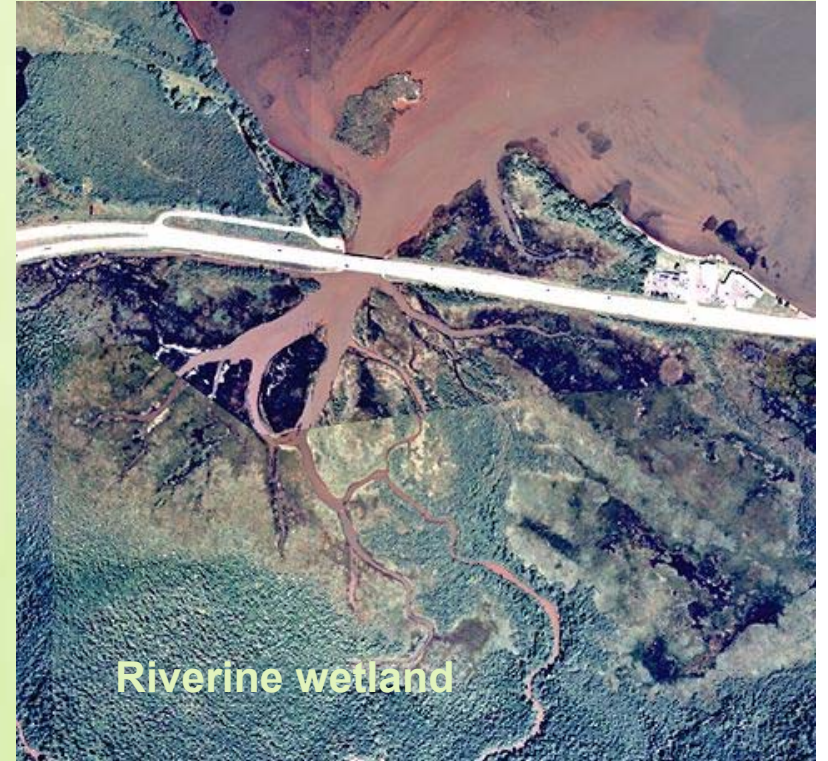
- Extremely diverse
 - Prairie potholes, Texas/New Mexico playas
 - Meadows, shallow marshes, deep marshes
 - Great Lakes coastal wetlands
 - Vary in size from tiny to immense
- Soils are not acidic and are mineral in composition
- Vegetation is dominated by grasses, reeds, sedges, & floating aquatic plants.

Great Lakes Coastal Wetlands

Open-coast wetland



Riverine wetland



Protected wetland / high energy shoreline



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-leaved aquatic plants
- Very high bird and plant diversity

Tidal Freshwater Marsh

Chesapeake Bay



Neuse River, N.C.



Chesapeake Bay



James River, Virginia

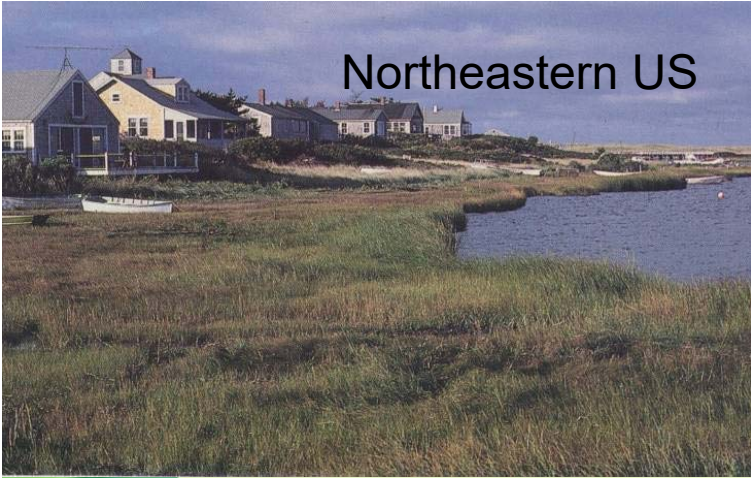


Salt marsh

- 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

Salt Marsh

Northeastern US



Texas coast



Florida coast



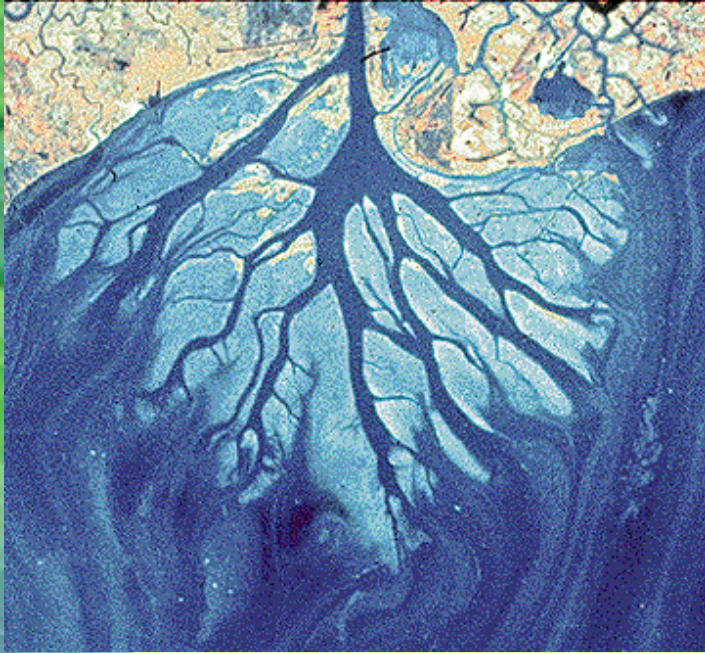
Coastal Georgia



San Francisco Bay



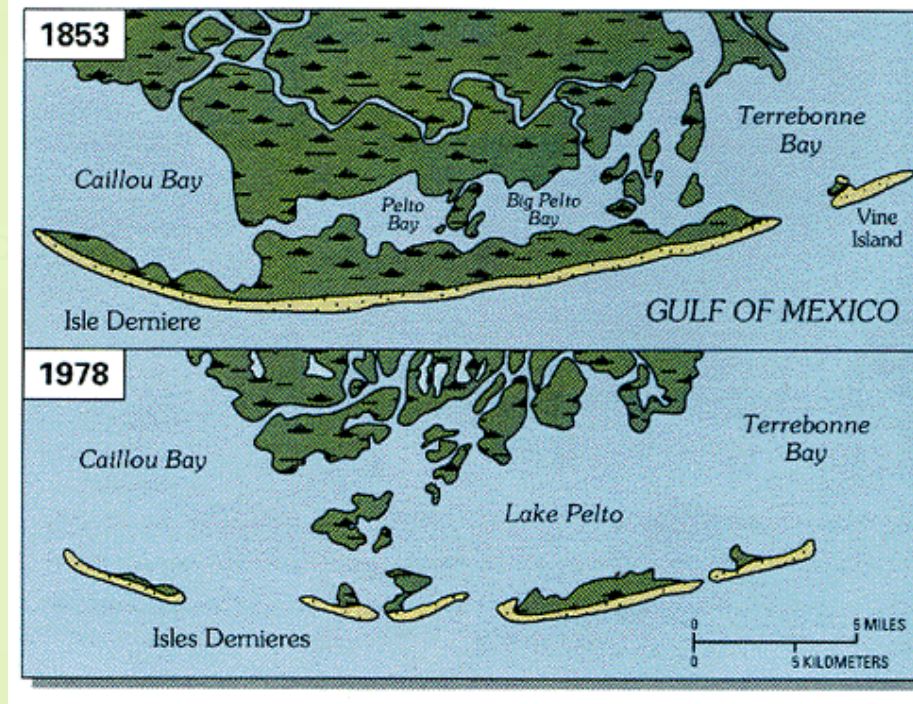
Coastal Louisiana Wetlands



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

<http://www.nwrc.usgs.gov/special/landloss.htm>

Isles Dernieres

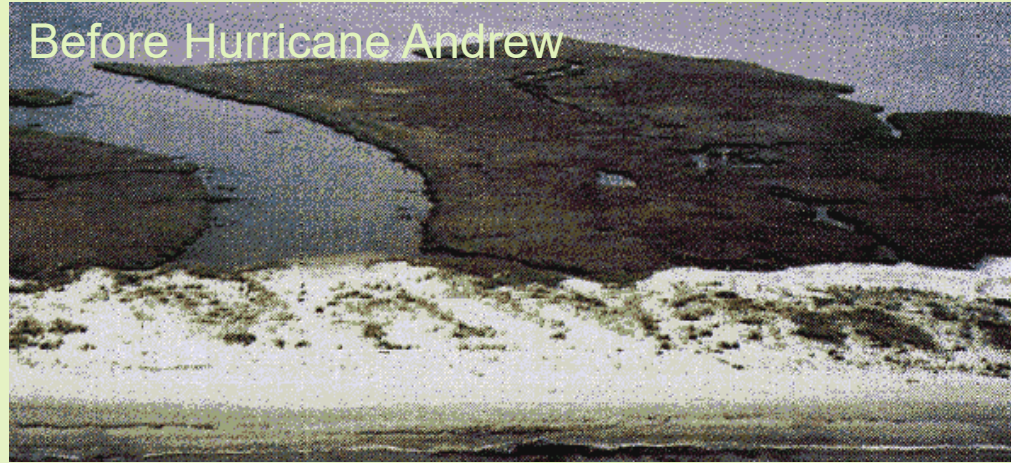


Google Earth ~2017



Isles Dernieres

Before Hurricane Andrew



After Hurricane Andrew



After Hurricane Katrina





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



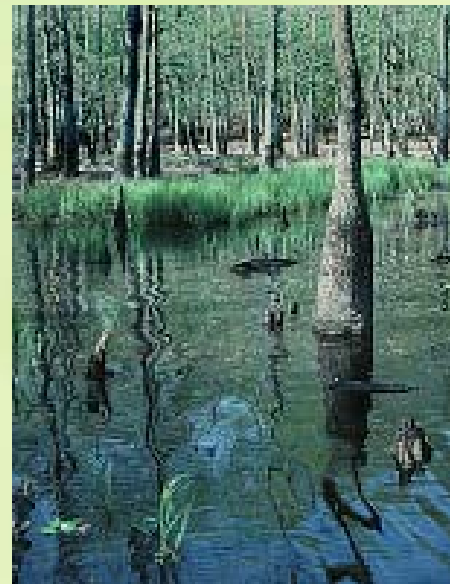
Bald cypress



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

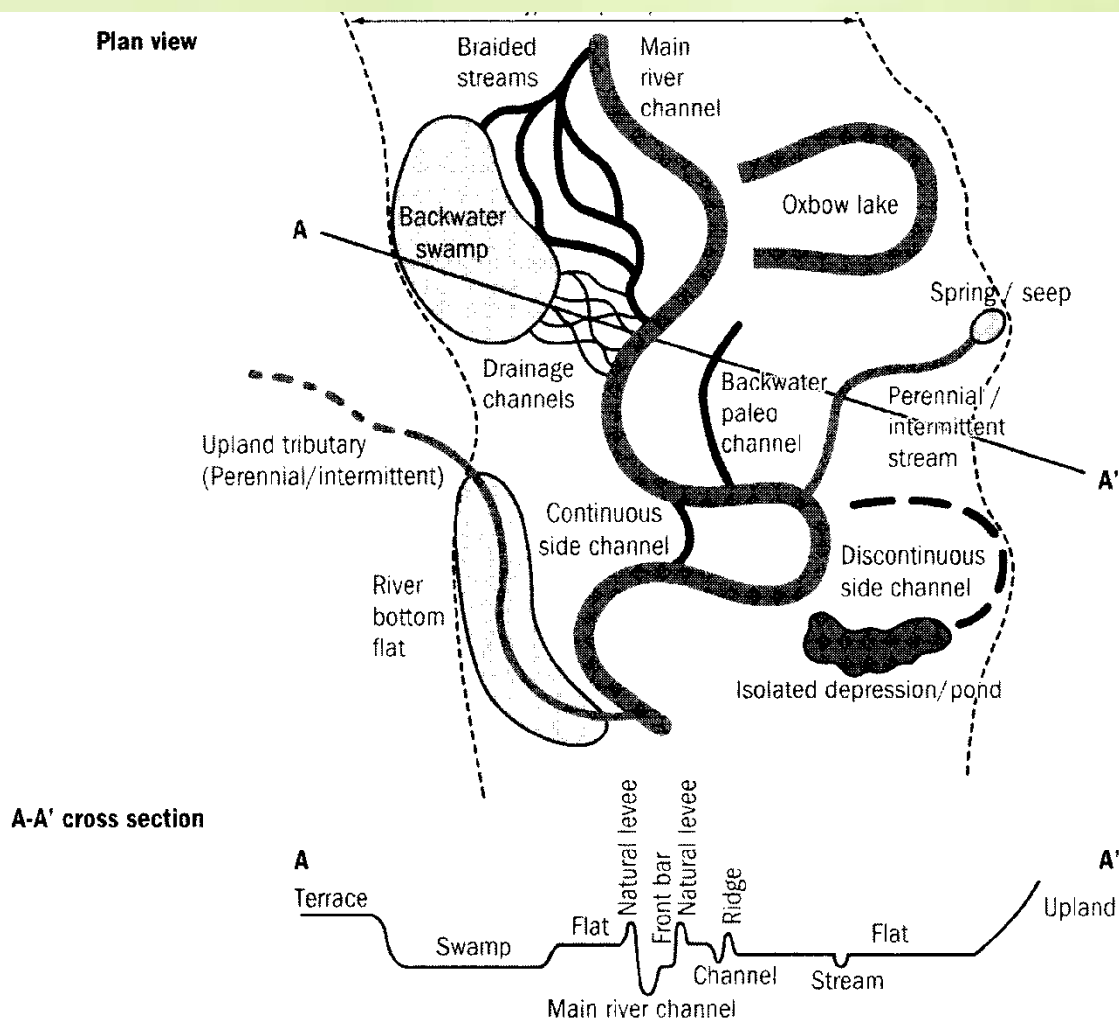


FIGURE 3.11

Varieties of floodplain wetland features. Figure courtesy of Masato Miwa, Hydrologist, International Paper. Modified from Mitsch and Gosselink (2000) and Hodges (1998).

Riparian Wetlands



Pinelands, Florida



San Pedro River, Tx



Lower Klamath River



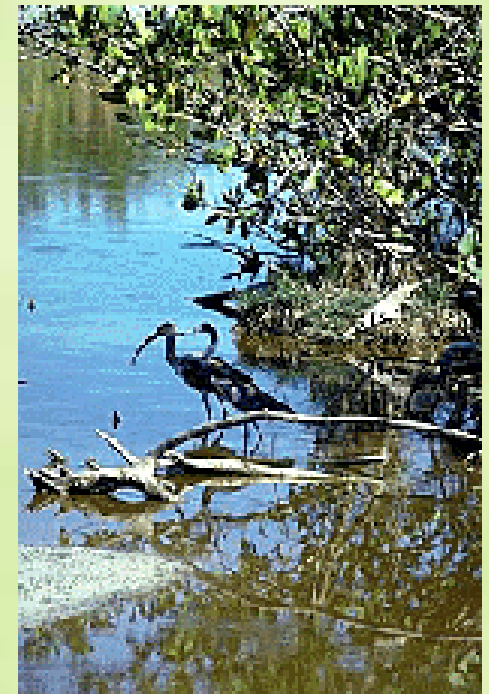
San Pedro River, Tx

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



Ireland





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