

TODAY'S GOALS

- Wetlands
 - Wetland features
 - Wetland types
 - Wetland classification
 - Trends in wetlands
- At the end of the lecture, we should be able to understand the physical properties of wetlands and how they fit into the water cycle.

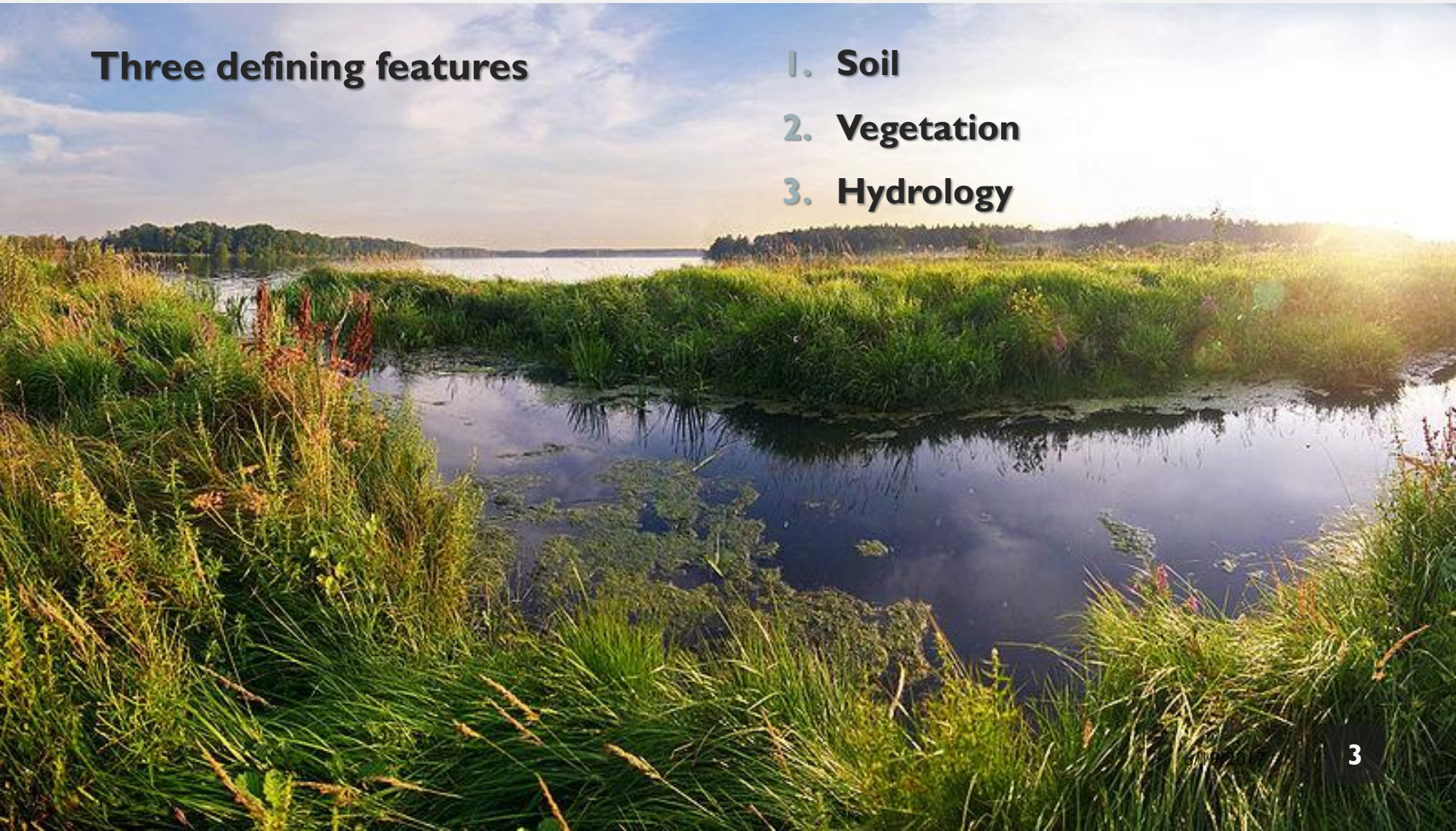
INTRODUCTION

- Wetlands
 - Lands which are transitional between terrestrial and aquatic systems
 - Land where the water table is usually at or near the surface or the land is covered by shallow water
 - Varied and can be forested, grassed, etc.
 - No swamp monsters, just alligators
 - Occur worldwide, on every continent but Antarctica
 - Wetland in Russia – largest in the world
 - United States has about 6% of the world's wetlands

WETLAND FEATURES

Three defining features

- 1. Soil**
- 2. Vegetation**
- 3. Hydrology**



WETLAND FEATURES

- Wetlands must have one or more of the following properties
 1. At least periodically, the land supports predominantly hydrophytes (a plant that grows in only water)
 2. The substrate (ground) is predominantly undrained hydric soil
 3. The land is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year

WETLAND FEATURES

I. Soils

- Hydric soils – soils that are formed under conditions of continuous saturation, flooding, or ponding long enough during the growing season to develop anaerobic (without oxygen) conditions in the upper part of the soil
- Can be mineral or organic
- Indicators (usually color of soil) are used to identify and classify types of soil
 - Color is dependent on the chemical processes that are occurring in the soil and the parent material
 - Weathering of geologic material
 - Chemistry of oxidation-reduction reactions
 - Biochemistry of the decomposition of organic matter
- Summary of hydric soil indicators: red of oxidized iron (rust), white/gray indicates loss of iron and manganese, gray of reduced iron, blacks of decomposing organic matter

WETLAND FEATURES

2. Vegetation

- Hydrophytic vegetation can grow in saturated conditions
- Categories of wetlands based on the type of vegetation it supports
 - Obligate wetland – contains plants that almost always occur in wetlands (99% of the time)
 - Facultative wetland – contains plants that usually occur in wetlands (67-99% of the time)
 - Facultative – includes plants that are just as likely to occur in non wetland or non-wetland areas (34-66% of the time)
 - Facultative upland – contains plants that occasionally occur in wetlands (1-33% of the time)
 - Upland – contains plant that almost always occur in uplands (99% of the time)

WETLAND FEATURES

3. Hydrology

- Many possible sources of water: groundwater, precipitation, snowmelt, surface runoff, flooding, etc.
- Field signs of hydrology (wetness), not a complete list
 - Water accumulation on or near the soil surface
 - Sediment staining is present on plants or leaves after water levels decline
 - Entrusted detritus (example: muddy twigs, leaves, and debris)
 - Buttressed trees show morphological adaptation to wetness



WETLAND TYPES

- There is a need for standardized terminology
- So far, the scientific community has come up with seven:
 1. Tidal salt marshes
 2. Tidal freshwater marshes
 3. Mangrove wetlands
 4. Northern peatlands
 5. Inland marshes
 6. Southern deep water swamps
 7. Riparian wetlands

WETLAND CLASSIFICATION

- Typically, classification takes the following into account:
 - Landscape position
 - Hydrology as a water source
 - Depth
 - Duration
 - Energy
 - Hydrophilic plant community
 - Mineral or organic soil
 - Organic matter accumulation

WETLAND CLASSIFICATION

- Hydrogeomorphic classification – considers hydrology and geomorphology and relate them to wetland functions

Table 2.1 Common terms used for various wetland types in the world

Billabong—Australian term for a riparian wetland that is periodically flooded by the adjacent stream or river.

Bog—A peat-accumulating wetland that has no significant inflows or outflows and supports acidophilic mosses, particularly *Sphagnum*.

Bottomland—Lowland along streams and rivers, usually on alluvial floodplains, that is periodically flooded. When forested, it is called a bottomland hardwood forest in the southeastern and eastern United States.

Carr—Term used in Europe for forested wetlands characterized by alders (*Alnus*) and willows (*Salix*).

Cumbungi swamp—Cattail (*Typha*) marsh in Australia.

Dambo—A seasonally waterlogged and grass-covered linear depression in headwater zone of rivers with no marked stream channel or woodland vegetation. The term is from the ChiChewa (Central Africa) dialect meaning “meadow grazing.”

Delta—A wetland-river-upland complex located where a river forms distributaries as it merges with the sea; there are also examples of inland deltas, such as the Peace-Athabasca Delta in Canada and the Okavango Delta in Botswana (see Chapter 3: “Wetlands of the World”).

Fen—A peat-accumulating wetland that receives some drainage from surrounding mineral soil and usually supports marshlike vegetation.

Lagoon—Term frequently used in Europe to denote a deepwater enclosed or partially opened aquatic system, especially in coastal delta regions.

Mangal—Same as mangrove.

Mangrove—Subtropical and tropical coastal ecosystem dominated by halophytic trees, shrubs, and other plants growing in brackish to saline tidal waters. The word mangrove also refers to the dozens of tree and shrub species that dominate mangrove wetlands.

Marsh—A frequently or continually inundated wetland characterized by emergent herbaceous vegetation adapted to saturated soil conditions. In European terminology, a marsh has a mineral soil substrate and does not accumulate peat. See also *tidal freshwater marsh* and *salt marsh*.

Mire—Synonymous with any peat-accumulating wetland (European definition); from the Norse word *myrr*. The Danish and Swedish word for peatland is now *mose*.

Moor—Synonymous with peatland (European definition). A highmoor is a raised bog; a lowmoor is a peatland in a basin or depression that is not elevated above its perimeter. The primitive sense of the Old Norse root is “dead” or barren land.

Muskeg—Large expanse of peatlands or bogs; particularly used in Canada and Alaska.

Oxbow—Abandoned river channel, often developing into a swamp or marsh.

Pakihi—Peatland in southwestern New Zealand dominated by sedges, rushes, ferns, and scattered shrubs. Most pakihi form on terraces or plains of glacial or fluvial outwash origin and are acid and exceedingly infertile.

Peatland—A generic term of any wetland that accumulates partially decayed plant matter (peat).

Playa—An arid- to semiarid-region wetland that has distinct wet and dry seasons. Term is used for shallow depression recharge wetlands occurring in the Great Plains region of North America “that are formed through a combination of wind, wave, and dissolution processes” (Smith, 2003).

Pocosin—Peat-accumulating, nonriparian freshwater wetland, generally dominated by evergreen shrubs and trees and found on the southeastern coastal plain of the United States. The term comes from the Algonquin for “swamp on a hill.”

Pokelogan—Northeastern U.S. marshy or stagnant water that has branched off from a stream or lake.

Pothole—Shallow marshlike pond, particularly as found in the Dakotas and central Canadian provinces, the so-called prairie pothole region.

Raupo swamp—Cattail (*Typha*) marsh in New Zealand.

Reedmace swamp—Cattail (*Typha*) marsh in the United Kingdom.

Reedswamp—Marsh dominated by *Phragmites* (common reed); term used particularly in Europe.

Table 2.1 (Continued)

Riparian ecosystem—Ecosystem with a high water table because of proximity to an aquatic ecosystem, usually a stream or river. Also called bottomland hardwood forest, floodplain forest, bosque, riparian buffer, and streamside vegetation strip.

Salt marsh—A halophytic grassland on alluvial sediments bordering saline water bodies where water level fluctuates either tidally or nontidally.

Sedge meadow—Very shallow wetland dominated by several species of sedges (e.g., *Carex*, *Scirpus*, *Cyperus*).

Shrub-Scrub Swamp—A freshwater wetland transitional between a forested swamp and a wet meadow or marsh, dominated by shrubs, with trees having less than 20 percent cover and less than 10 m height.

Slough—An elongated swamp or shallow lake system, often adjacent to a river or stream. A slowly flowing shallow swamp or marsh in the southeastern United States (e.g., cypress slough). From the Old English word *slōh*, meaning a watercourse running in a hollow.

Strand—Similar to a slough; a slow-flowing riverine/wetland system, often forested, found especially in south Florida, where gradients are low.

Swamp—Wetland dominated by trees or shrubs (U.S. definition). In Europe, forested fens and wetlands dominated by reed grass (*Phragmites*) are also called swamps (see *reedswamp*).

Tidal freshwater marsh—Marsh along rivers and estuaries close enough to the coastline to experience significant tides by nonsaline water. Vegetation is often similar to nontidal freshwater marshes.

Turlough—Areas seasonally flooded by karst groundwater with sufficient frequency and duration to produce wetland characteristics. They generally flood in winter and are dry in summer and fill and empty through underground passages. Term is specific for these types of wetlands found mostly in western Ireland.

Várzea—A seasonally flooded forest in the Amazon River Basin. It usually refers to forests flooded by whitewater (sediment-laden) river water.

Vernal pool—Shallow, intermittently flooded wet meadow, generally typical of Mediterranean climate with dry season for most of the summer and fall. Term is now used to indicate wetlands temporarily flooded in the spring throughout the United States.

Vleis—Seasonal wetland similar to a dambo; term used in southern Africa.

Wad (pl. wadden)—Unvegetated tidal flat originally referring to the northern Netherlands and northwestern German coastline. Now used throughout the world for coastal areas.

Wet meadow—Grassland with waterlogged soil near the surface but without standing water for most of the year.

Wet prairie—Similar to a marsh, but with water levels usually intermediate between a marsh and a wet meadow.

WETLAND CLASSIFICATION

Wetland functions

- **Biological-habitat functions**
 - Provides a diversity of habitats
 - Maintains a plant community
 - Serves as nurseries and feeding areas for young fish
 - Provides nutrients that make up the base of the food web
- **Biogeochemical functions**
 - Process organic matter and nutrients
 - Help maintain water quality by filtering sediments and contaminants
 - Serve as natural buffer and transition areas for streams, lakes, and rivers

WETLAND CLASSIFICATION

More wetland functions

- Physical-hydrologic functions
 - Attenuate floodwaters and slow the rate of flow of waters going into streams/rivers
 - Replenish groundwater by providing a place for surface water to have time to permeate the ground
 - Protect coasts and other areas from excessive erosion
- Recreational value
 - Provide open space and aesthetic value
 - Provide special areas for recreation birdwatching, hunting fishing, walking, photography, etc.
 - Serve as educational and research area to study the widely diverse wildlife, plants and animals

TRENDS IN WETLANDS

- The US suffers from an annual loss of wetland of 59,000 acres – that is an area of land larger than the city of Seattle!
- Wetland losses in the USD are attributed to:
 - 30% - urban development
 - 26% - agriculture
 - 23% - deforestation
 - 21% - rural development

