

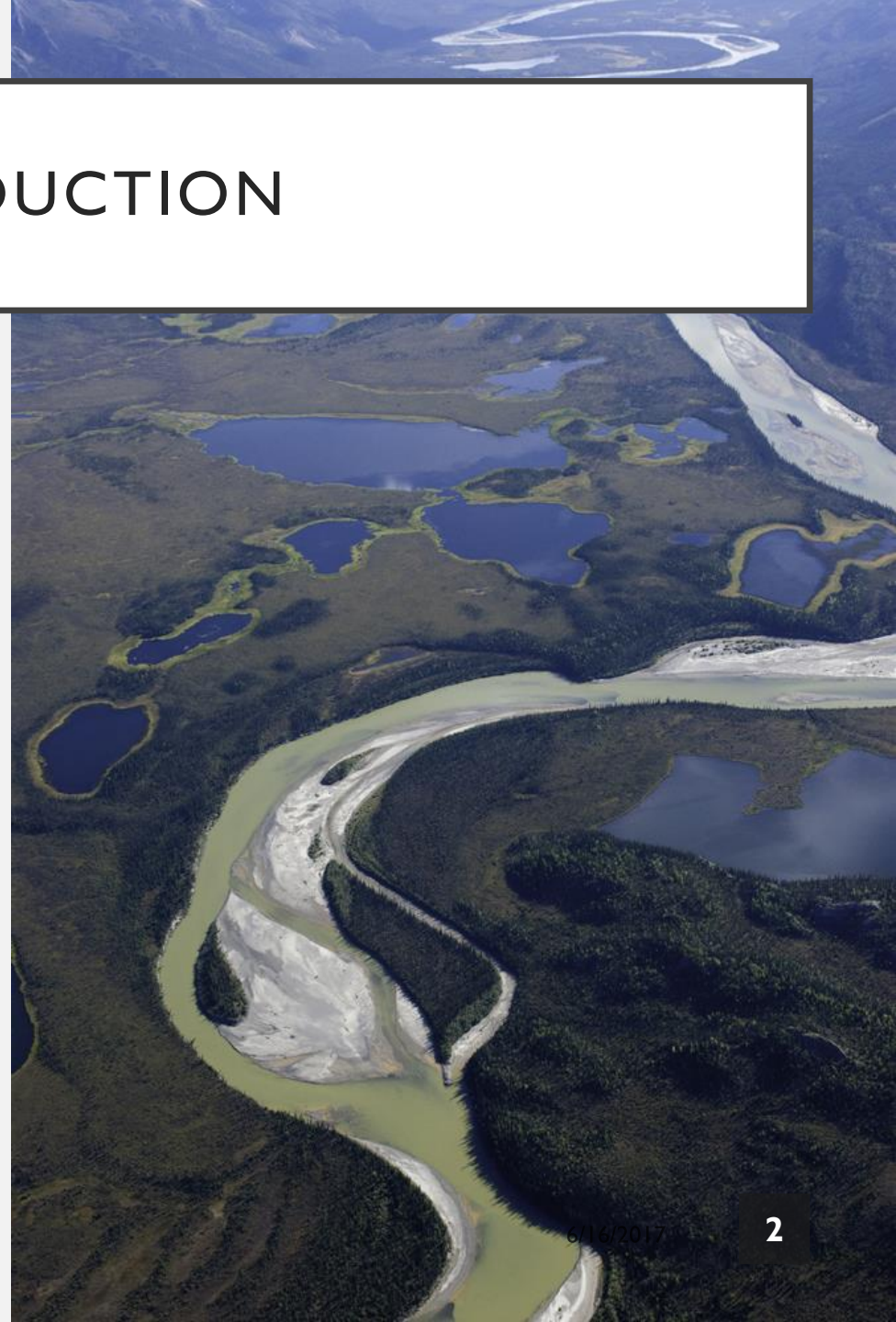
TODAY'S GOALS

- Rivers and streams
 - River system functions
 - Physical features of a river system
 - Flow
 - Fluvial geomorphology: forming a river
 - River and stream ecology
- At the end of the lecture, we should be able to understand how weather and humans have an effect on water resources and the water cycle.

INTRODUCTION

Rivers and streams

- Comparable to human veins and arteries – carrying nutrients, oxygen, salts, etc.
- Provide food and water
- Irrigation for crops
- Transportation of goods and people
- Power production
- Natural defense barriers



RIVER SYSTEM FUNCTIONS

Examples of river system functions

- Purification of water and wastes as they are moved through wetlands and riparian areas in the floodplain
- Mitigation of flood flows by providing low places for water to fill, slowing down the flow and promoting infiltration and percolation of the water to groundwater
- Providing habitat and breeding sites for all kinds of animals
- Mitigating drought by capturing runoff and increasing groundwater storage
- Maintaining soil fertility with sediment deposits during flooding and by carrying sediments to deltas and estuaries – keeping them healthy and fertile
- Maintaining salinity gradients of estuaries and deltas that are necessary to promote the rich diversity of life in these areas
- Preserving biodiversity or genetic diversity

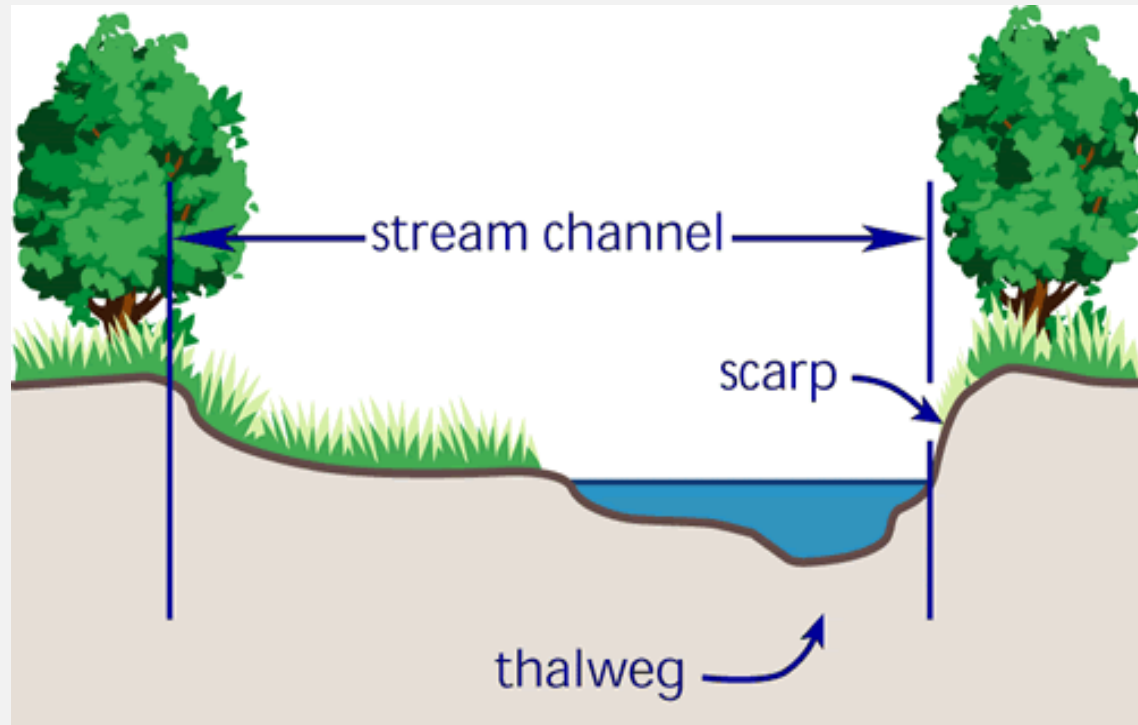
PHYSICAL FEATURES OF A RIVER SYSTEM

River system scale

- Classifications
 - Region – geographical area with similar climate and human-caused alterations
 - Examples: a particular mountain range, an African grassland
 - Landscape – the smaller river system scale
 - Examples: a forest, a city
- Divided into three parts
 1. Channel
 2. Floodplain
 3. Upland transition zone

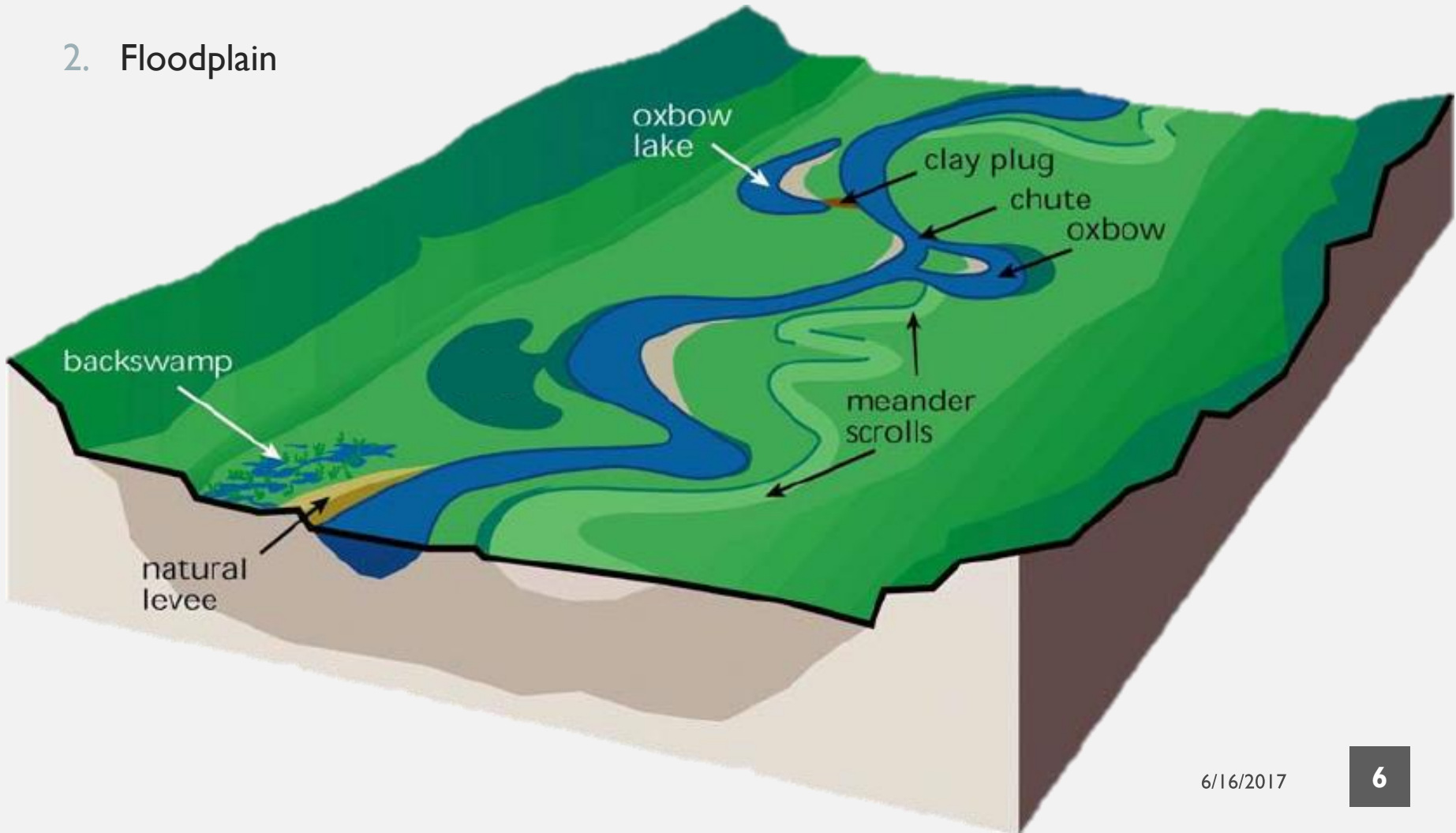
PHYSICAL FEATURES OF A RIVER SYSTEM

- I. Channel – the outline of a path of flowing water, will vary in size and shape over time
 - Thalweg – deepest part of a river
 - Scarp or escarpment – steep, sloped bank section
 - Headwaters – the water that is the source of the flowing water
 - Melting glaciers, wet meadows, springs, outflow of a lake, etc.
 - Riparian area – riverbank
 - Riparian buffers – vegetated land on the edge of the river



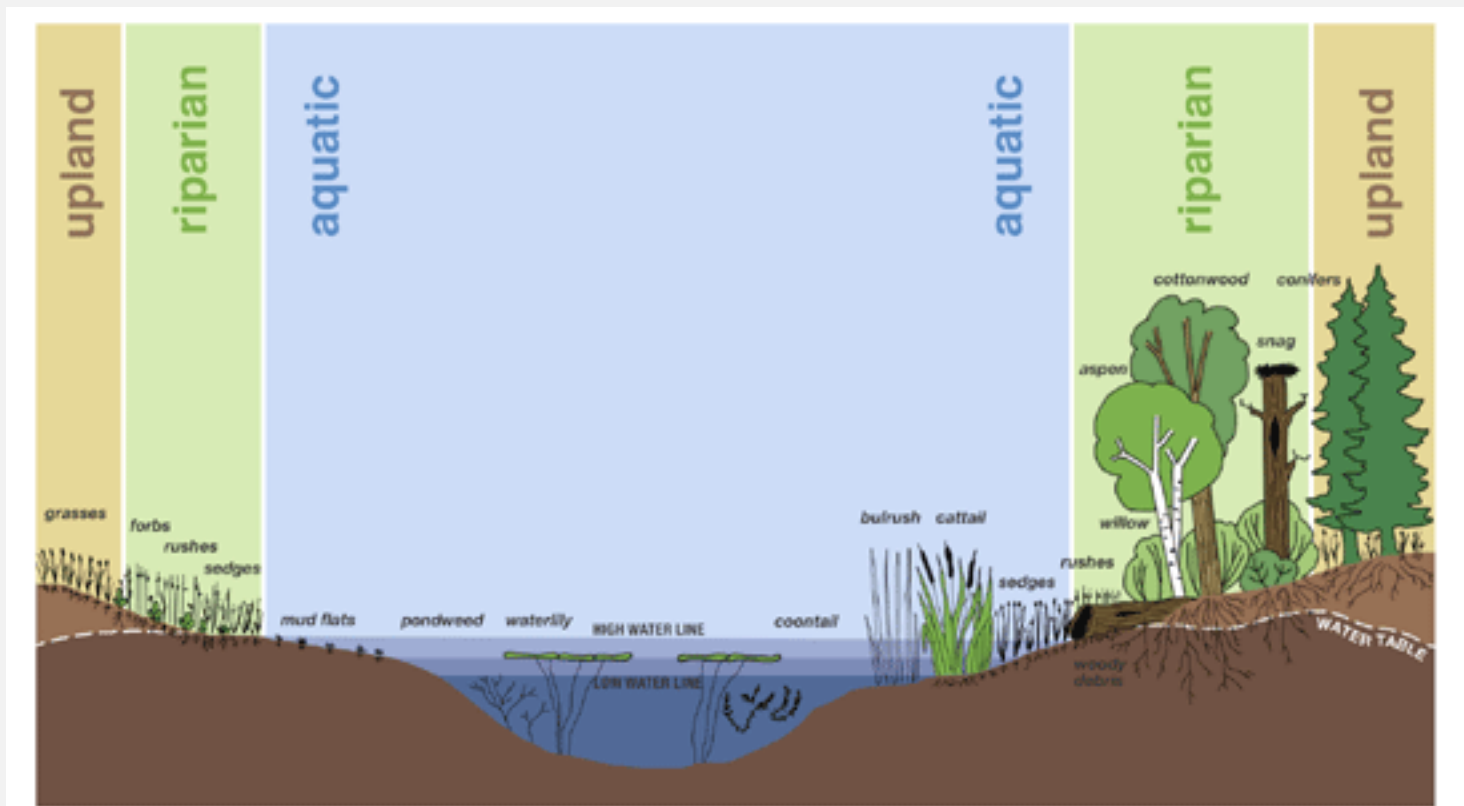
PHYSICAL FEATURES OF A RIVER SYSTEM

2. Floodplain



PHYSICAL FEATURES OF A RIVER SYSTEM

3. Upland transition zone – the area leading into uplands or higher ground
 - Can be flat, sloped at any angle, even vertical



RIVER FLOW

- Lotic – flowing water systems
- Lentic – still water systems
- Three types of runoff
 1. Surface or overland flow
 - When precipitation exceeds evaporation caused by sudden and heavy rain (no time for the rain to seep into the ground)
 2. Shallow subsurface flow (also called throughflow)
 - Horizontal flow of water through the ground
 3. Saturated surface or overland flow
 - When soil is saturated with water, the excess flows directly to the river

FLUVIAL GEOMORPHOLOGY: FORMING A RIVER

- Fluvial geomorphology – the study of sediment and how it affects river channel characteristics, function and maintenance
 - Where the sediment originates
 - Where it goes
 - How it is stored
 - What moves it
 - When it moves
 - What happens over time
- Geomorphic processes associated with flow – erosion, sediment transport, and sediment deposition

RIVER AND STREAM ECOLOGY

Energy source - nutrients

- Obtained mostly from the watershed

Organisms and habitats

- Diverse and located in all parts of the river
- Autotrophs – green plants, diatoms, algae, and protists that use energy from the sun and nutrients from the water to make food
- Heterotrophs – fish, amphibians, and waterfowl that use organic matter produced by autotrophs or that as washed into the river
- Residence time – the time a nutrient stays in one place
 - Nutrients that enter a river is immediately transported downstream
 - Organisms must have an opportunity to intercept the nutrients