

Introduction to Erosion Control & Shoreland Property Management Part 1

What is erosion on a lakeshore?

2014 Wisconsin Lakes Partnership Convention
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Talking Points

Erosion Concepts

What is Erosion?

Shoreland Zones

Erosion Factors – Active / Passive

Planning Concepts

Site Evaluation

Incorporating Landowner Preferences

Assistance

What is Erosion?

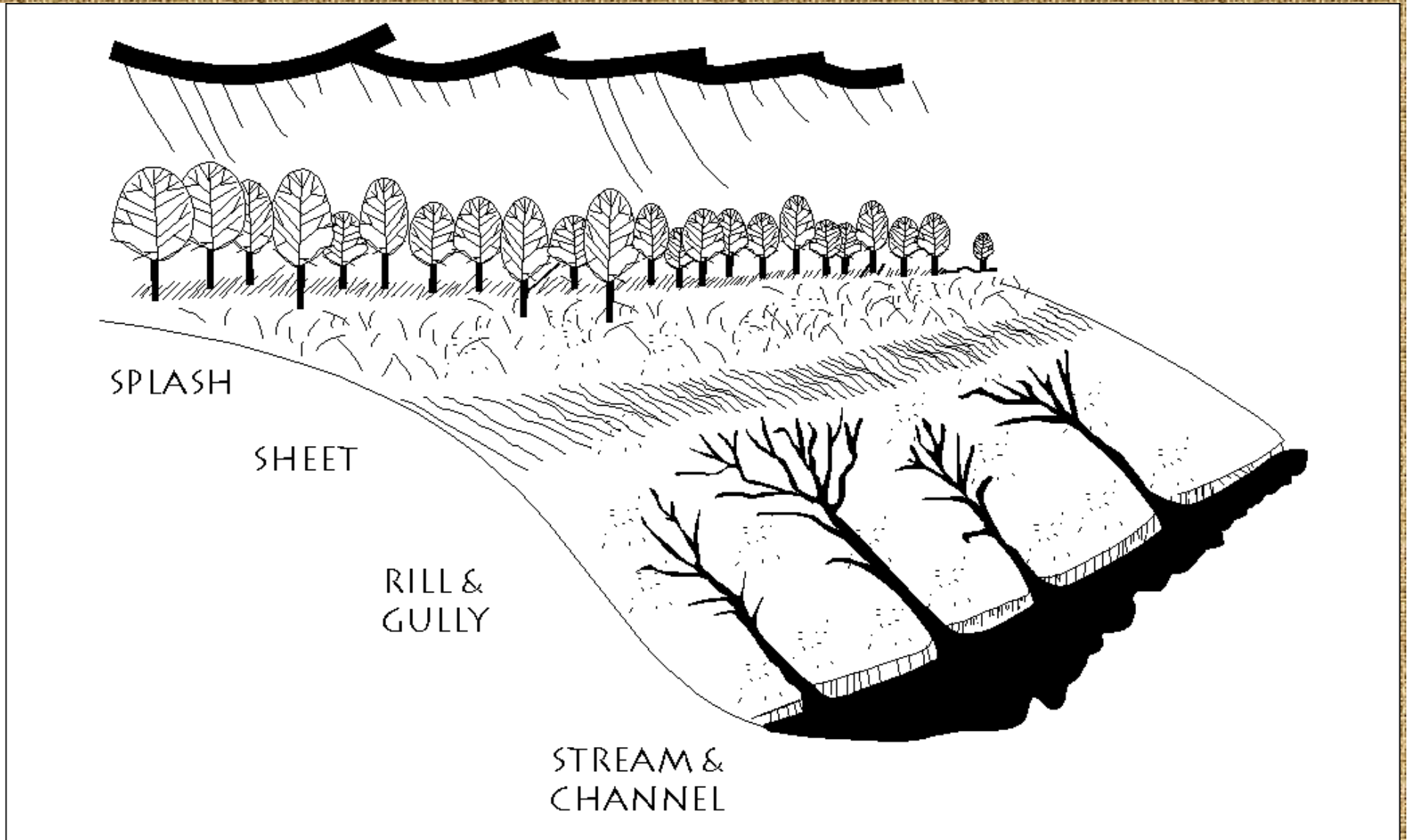
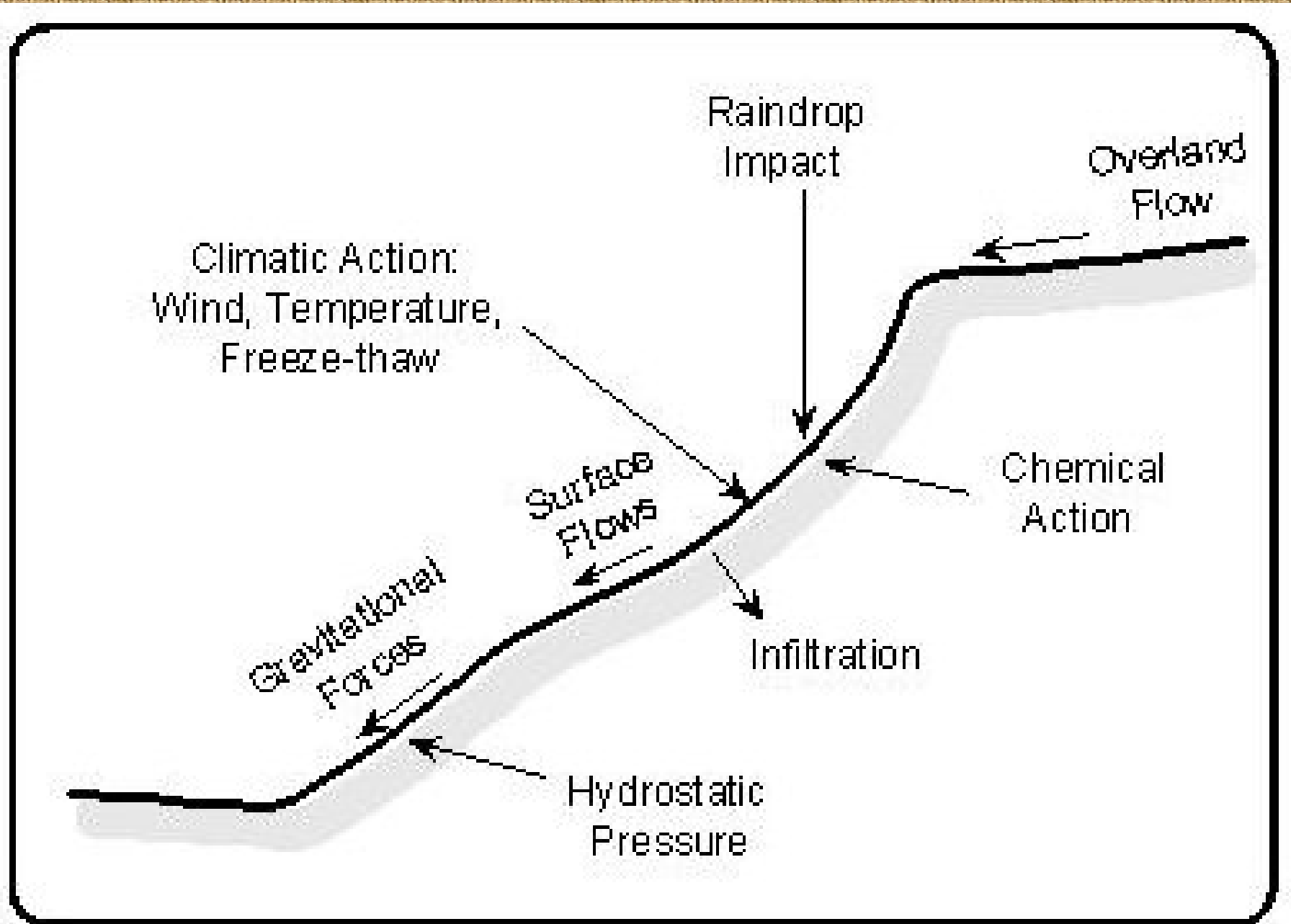
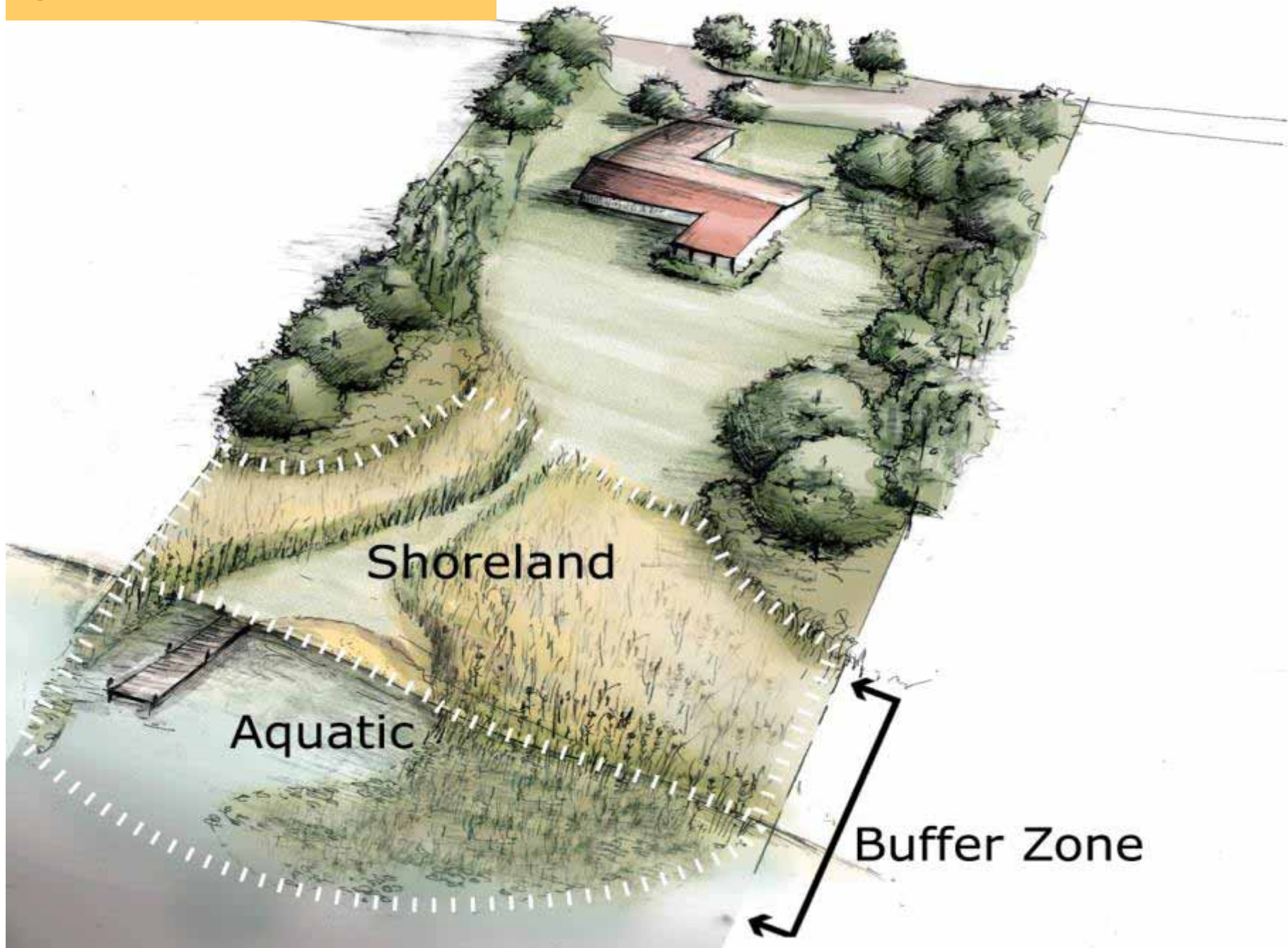


Figure 1. Four types of soil erosion on an exposed slope. (Source: Ref. 33)

What causes the soil particles to come loose?



Shoreland Zones

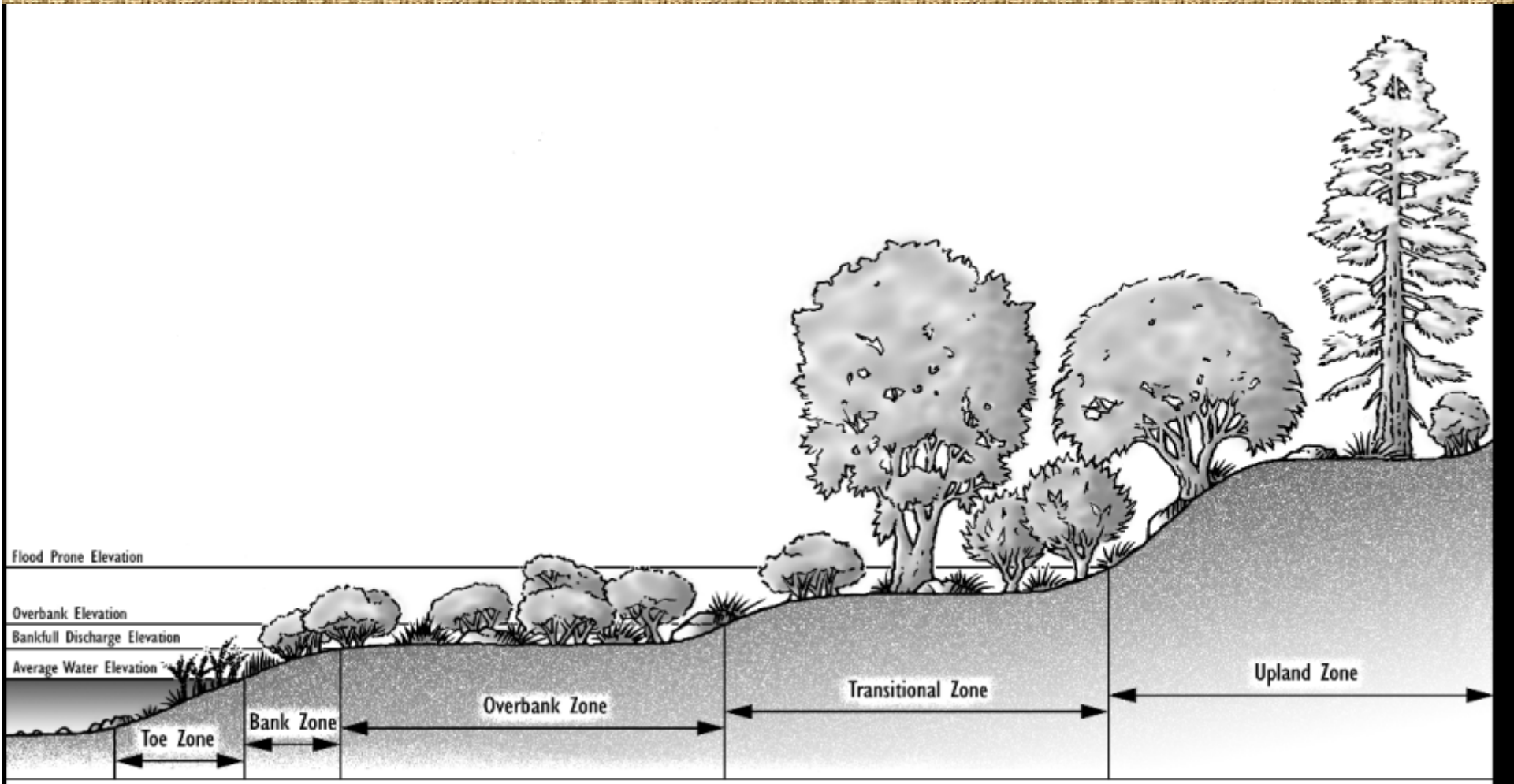


90% of all lake life is born, raised, sheltered, and fed or grows in the area where land and water meet:

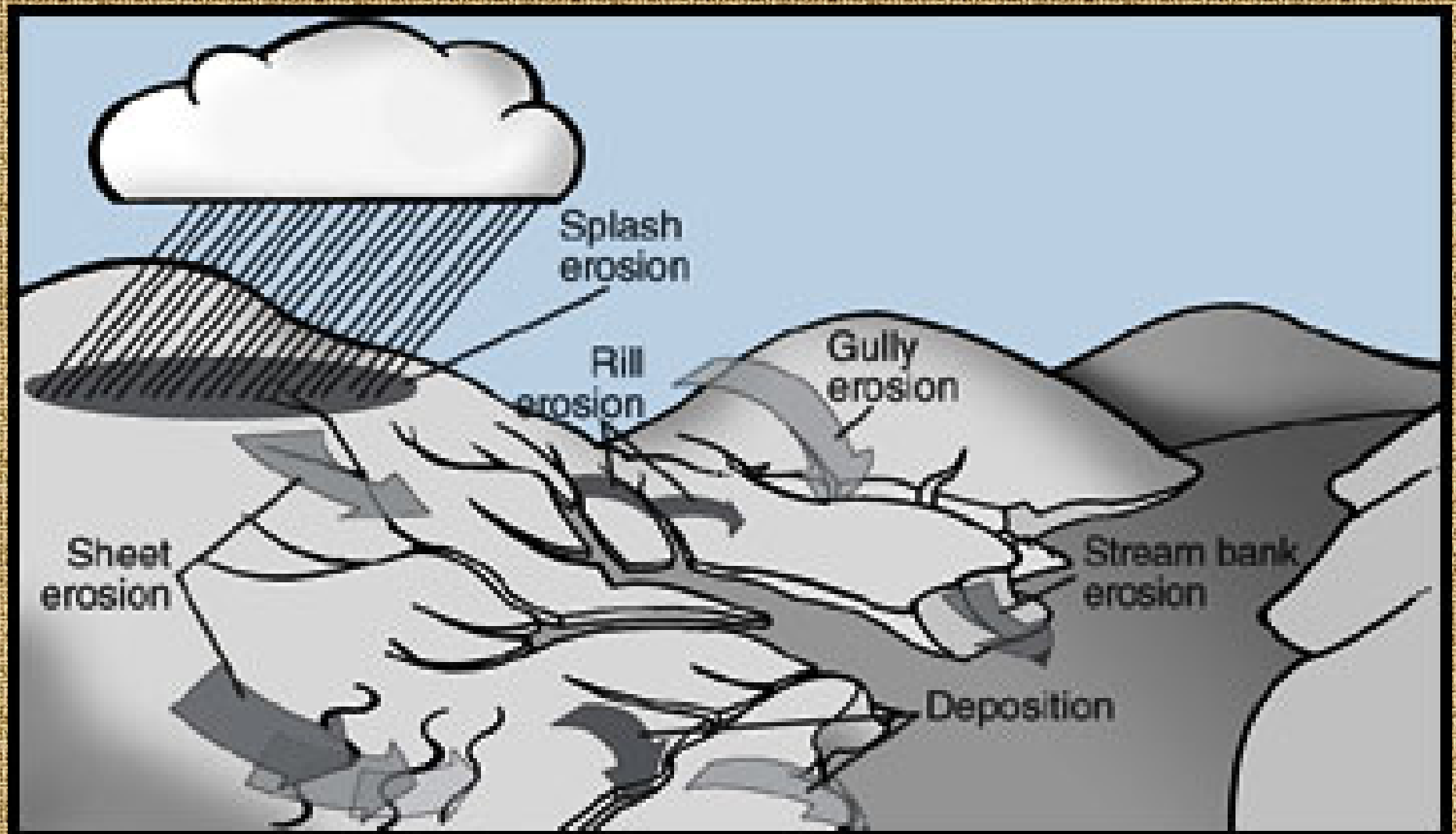
The Shoreland Buffer Zone



Shoreland Zones



Erosion on Shorlines



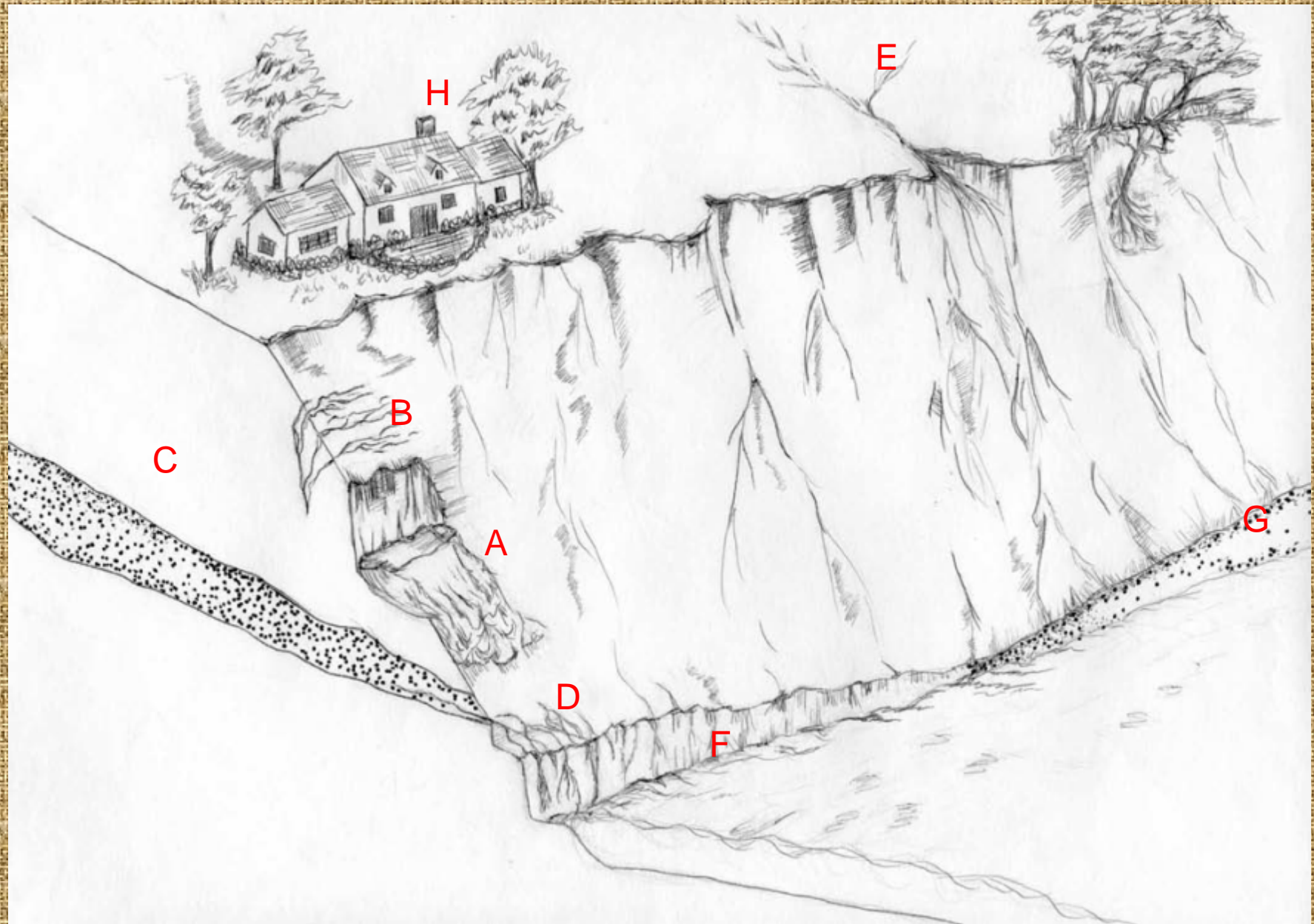
Erosion on an ancient river bank



Erosion due to Natural Processes



Types of erosion on a shoreline bluff

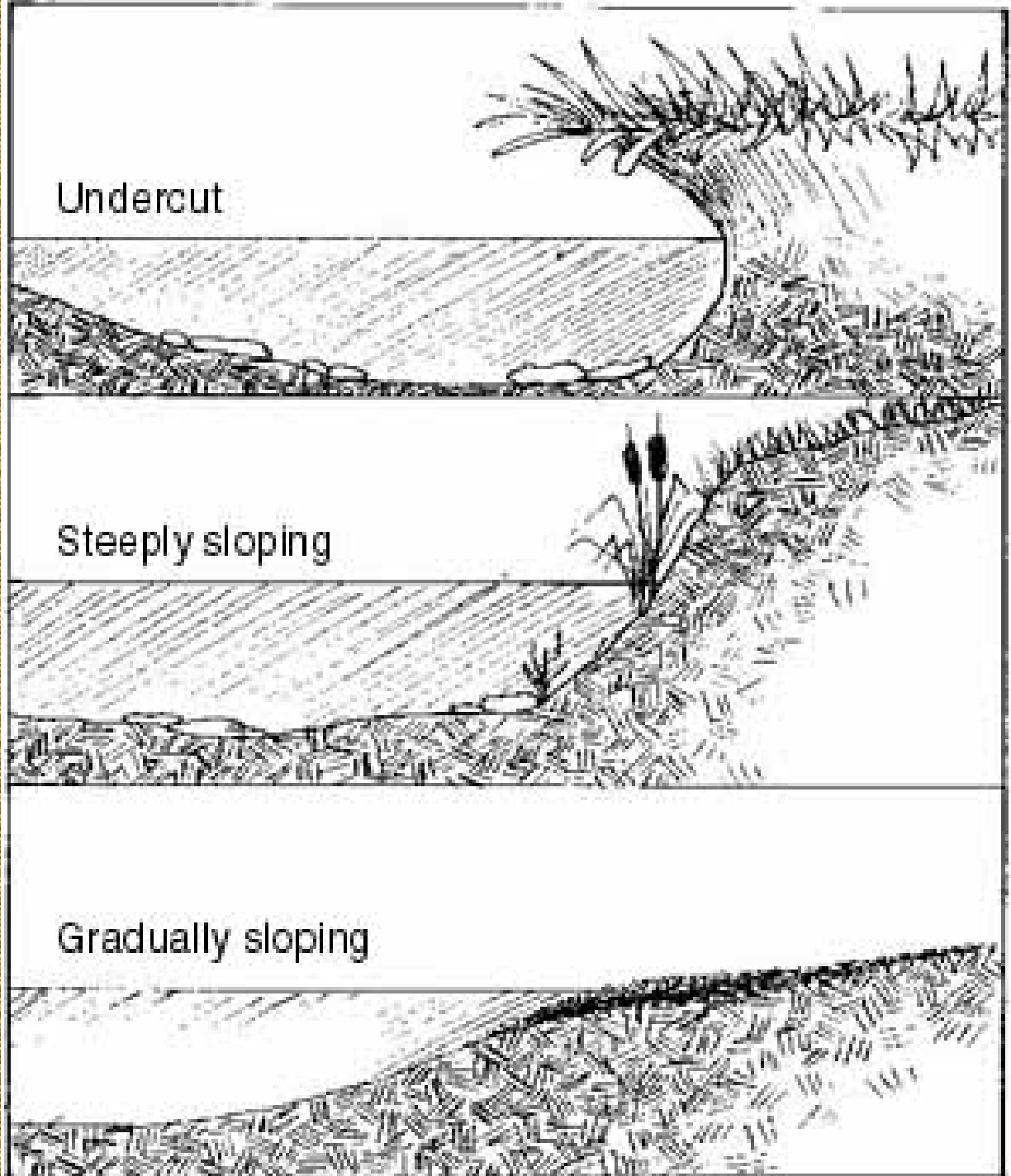


Causes of Erosion - Passive

Passive = physical features

- Bank or Shoreline Characteristics
 - soil types & properties
 - geology
 - geometry
 - natural vegetative cover
- Currents
- Wind (fetch)
- Wave action

Shoreline and lakebed shape, soils, and vegetation



Fetch is the distance across water over which wind has blown

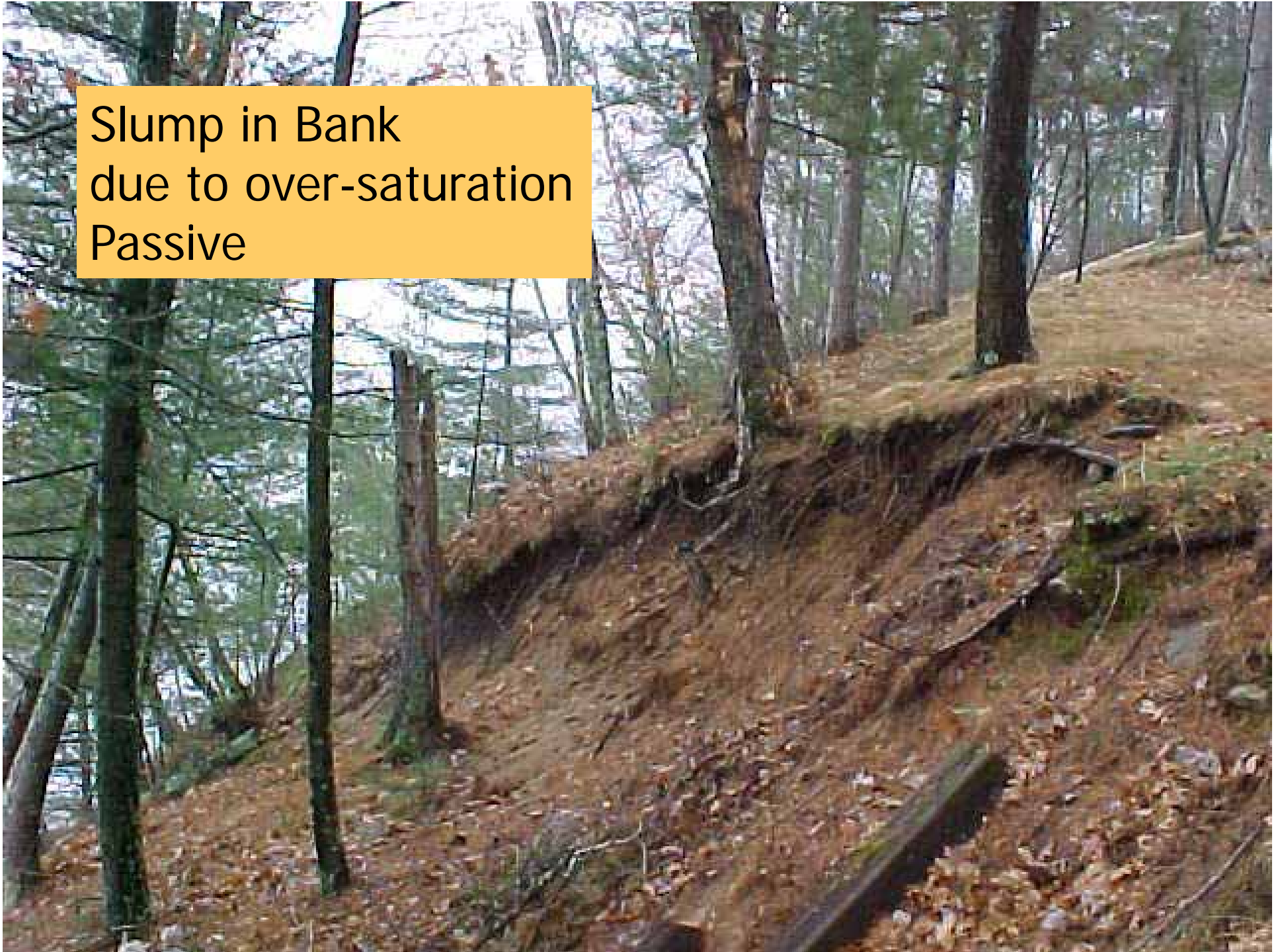


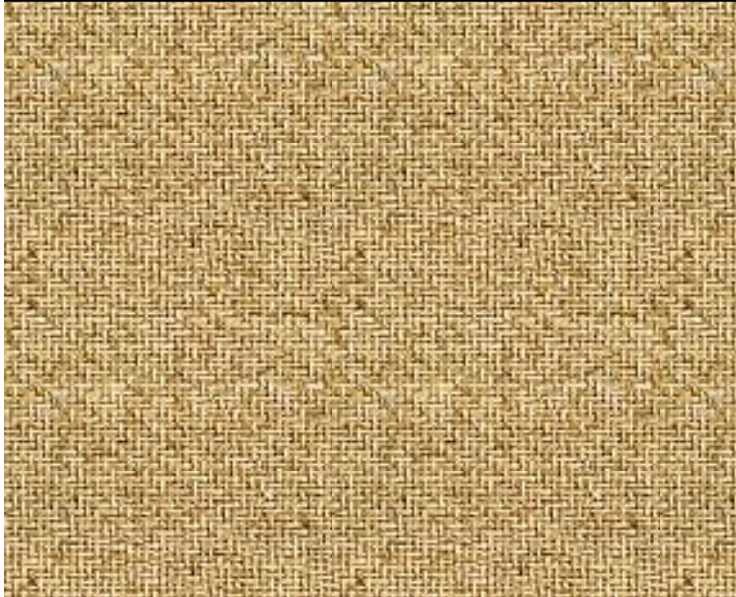
Causes of Erosion - Passive

Passive = physical features

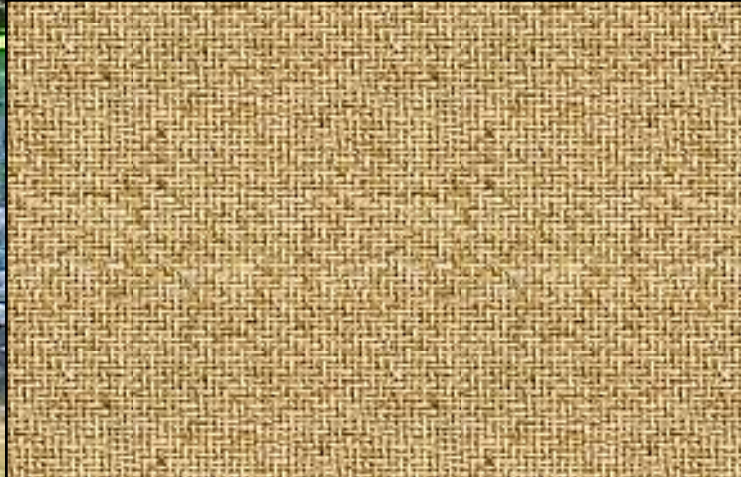
- Groundwater (seeps)
- Frost/thaw
- Ice heave
- Adjacent Features/Character
 - watershed patterns
 - long shore currents
 - tributary areas / flowing water

Slump in Bank
due to over-saturation
Passive





Ice
Heave
Action



Natural Wave Action



Causes of Erosion – Active

Active – due to human factors

- Waves – caused by boat wakes
- Exposed soil or lawns (ie removal/change of vegetation)
- Impervious surfaces
- Inappropriate engineering
- Ineffective Drainage
- Land use/development beyond the immediate shoreline
 - Road placement
- Animal disturbance (trampling of bank or over browsing of vegetation)



Removal of Vegetation



Removal of Vegetation





Ineffective Drainage & Loss of Vegetation

Removal of vegetation due to equipment storage





**Impervious surface,
ineffective drainage,
and exposed soils**

Inappropriate design/engineering





Removal of Vegetation and Ineffective Drainage

10/6/00



Upland Runoff Issues;
Channelized Flow

Water Level Fluctuations;
Seawall Overtopping; &
Splash Impacts



Livestock trampling
of stream bank



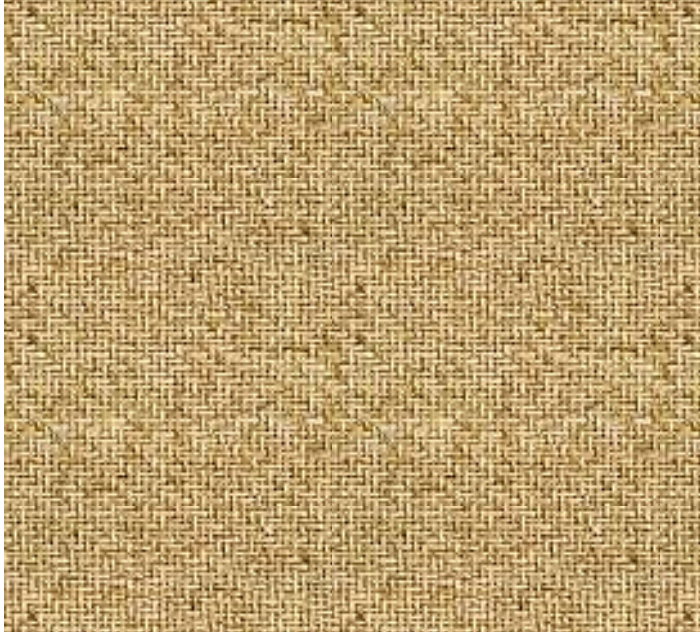


New Shorelines



New Shoreline

Unstable Soils
on a steep bank



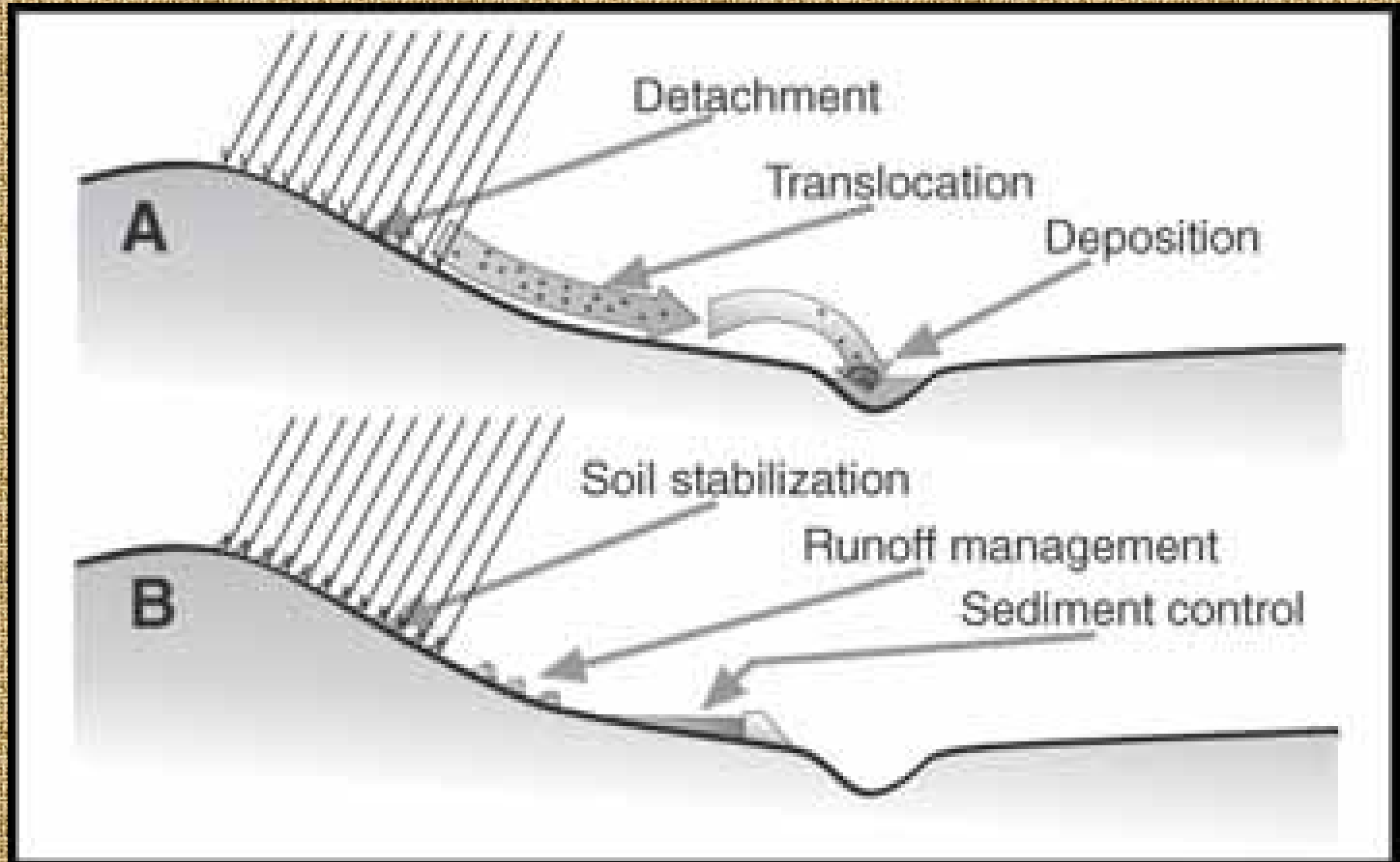
Erosion Control – Objective

Slow the water down

Stop the soil movement

Soak the water in

Slow - Stop - Soak



Erosion Control Planning– Site Evaluation

Define the cause(s) of erosion:

- Upland runoff? Impervious areas? Velocities?
- Wave energies? Boat or wind generated?
- Ice action? Prevailing wind direction?
- Water level fluctuations? Floods or Droughts?
- Groundwater seeps?
- Slope gradient (steepness) and bank height?
- Stability of native soils? Fill soils?

Planning Concepts - Incorporating Landowner Preferences

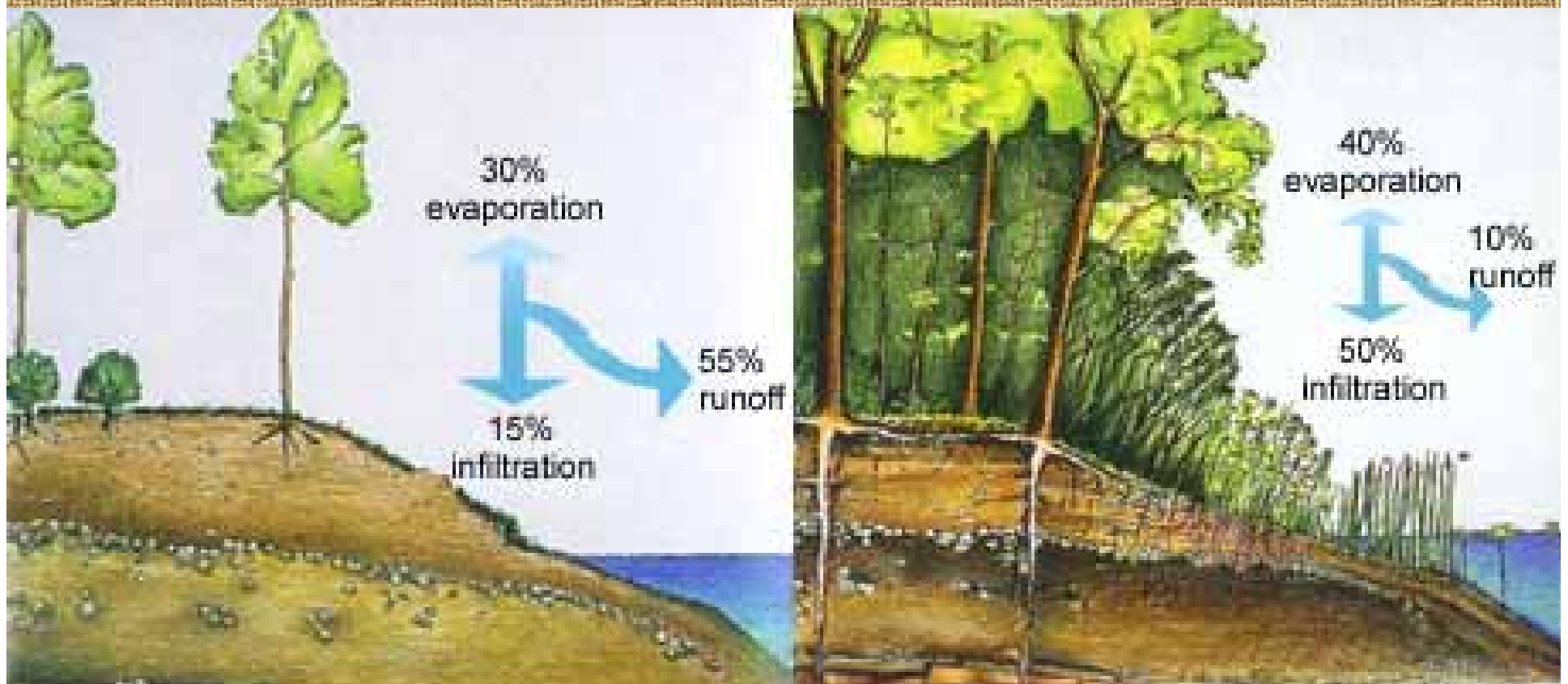
- Existing Structures to be Removed or Remain?
- Walking Paths or Travel Areas?
- Equipment Storage and/or Fire Pit Areas?
- Existing and Proposed Vegetation?
- Current Level of Maintenance/Mowing?
- Access to Lake and Docks/Piers?
- Well and Septic Area Locations?

Planning Concepts – Site Evaluation

Vegetative Treatment Only:

- Minimal fetch distance (<0.5 - 1 mile)
- Protected cove or bay (not point or island)
- Shoreline does not face prevailing winds (i.e. faces east and rarely gets a westerly wind)
- When boat traffic waves are not common or constant (i.e. no motorized traffic allowed, no public landing, SLOW NO WAKE zone = increase the wave intensity)
- When water level fluctuations do not harm vegetation survival rates and/or success (dam management)

Vegetative Treatment



Water quickly runs off a shoreline cleared of natural vegetation, washing nutrients and pesticides into the water. A natural shoreline holds rainfall, which soaks into the soil; less water, soil and chemicals run into the lake or river. Shoreline and aquatic plants anchor shoreline areas, helping to protect them from erosion due to runoff and waves.

Planning Concepts – Site Evaluation

Other Considerations:

- Soil type - conducive to slope stability at given angle without toe protection?
- Parcel development is limiting a stable slope (i.e. home too close to slope break or existing vertical walls, driveway placement and angle of slope)
- Impervious surfaces (i.e. roofs, patios, garage roofs)
- Managed runoff (i.e. rain gutters, runoff directed away from the lake or infiltrated)

Planning Concepts – Site Evaluation

Other Considerations:

- Lake channel (narrow areas) or controlled wake areas create constant waves so vegetation can not establish
- Extreme ice action continuously removes or stresses soil/plants
- Erosion intensities are too high for existing vegetation

Technical Planning Assistance

County Land & Water Conservation Departments

USDA Natural Resource Conservation Service

Wisconsin Department of Natural Resources

WI Dept. of Agriculture, Trade, & Consumer Protection

Private Consultants & Businesses