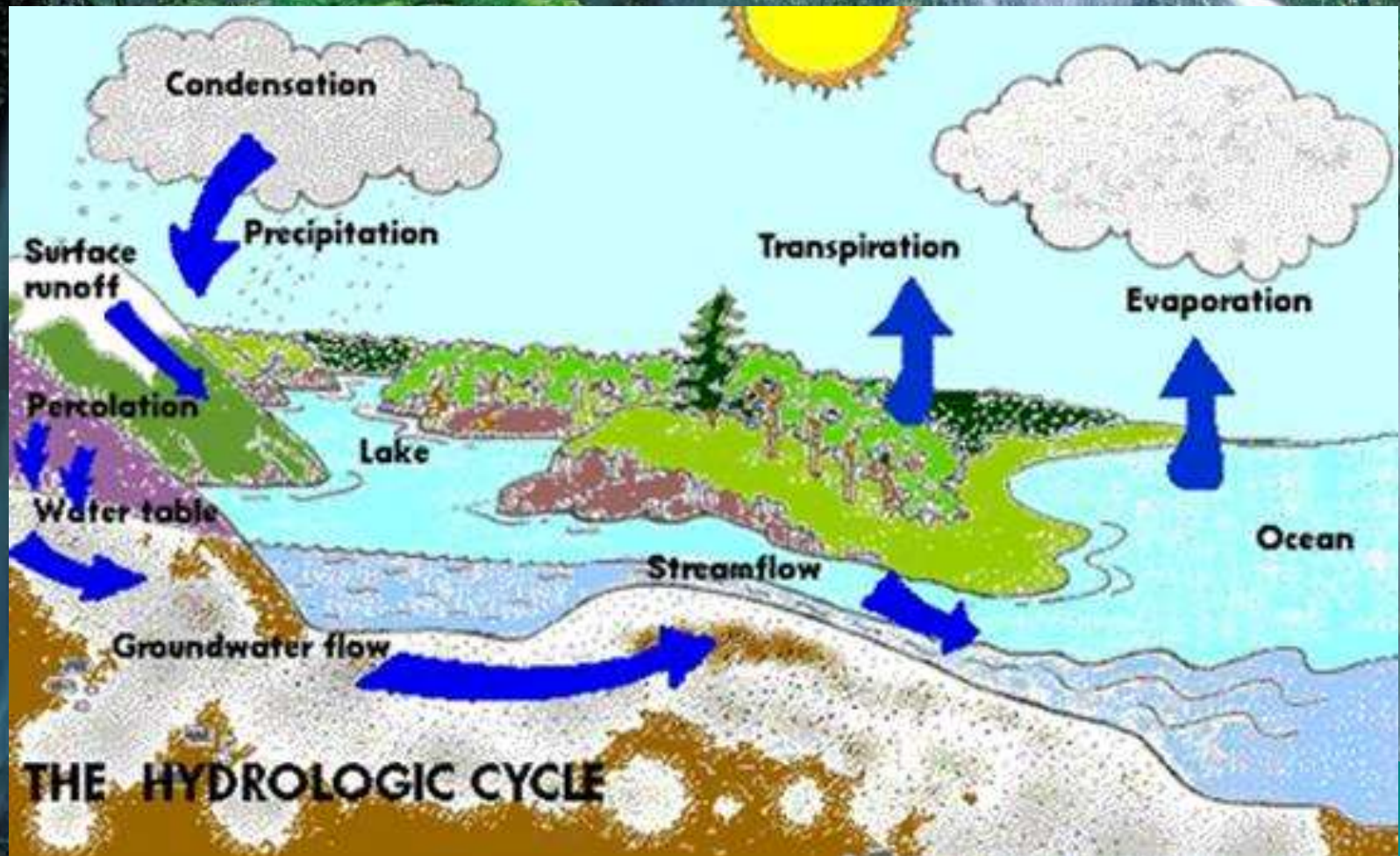# Earth & Space Science

Unit 4 Lecture 2:

Running Water and Groundwater (Ch. 5)

Distribution of Earth's Water

Earth's total water

Salt water (oceans) 97%

Fresh water 3%

Freshwater

Ground water 30.1%

Other 0.9%

Icecaps and glaciers 68.7%

Surface water 0.3%

Surface water

Swamps 11%

Rivers 2%

Lakes 87%

The Hydrologic Cycle
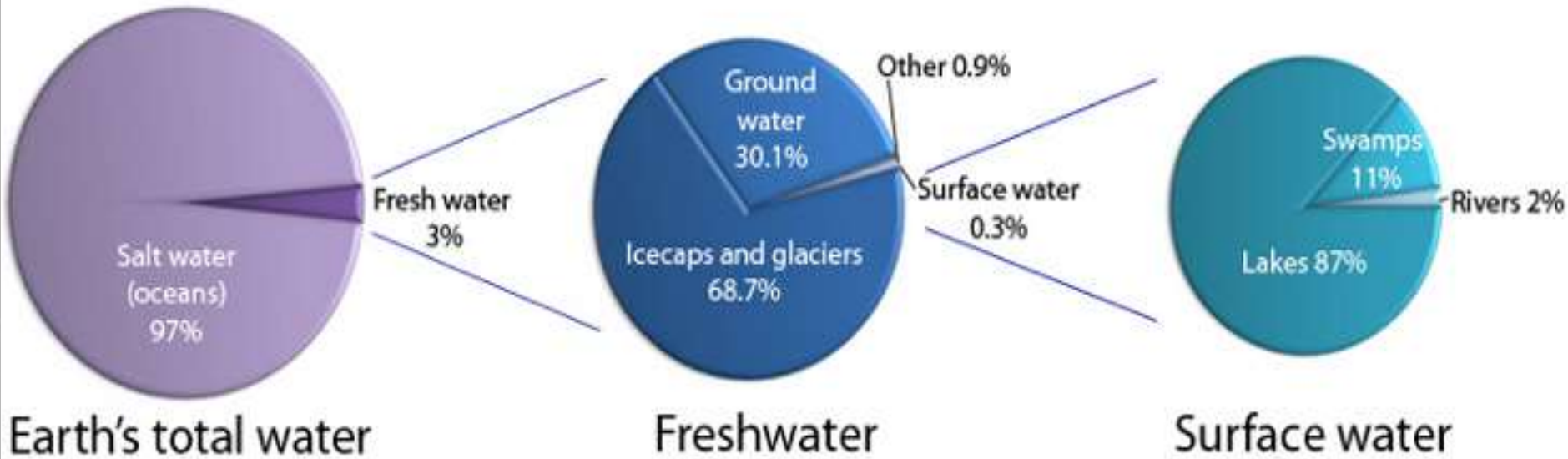
THE HYDROLOGIC CYCLE

Stream Flow

OUTSIDE OF CURVE   INSIDE OF CURVE

High Velocity

Medium Velocity

Low Velocity

High Velocity

Medium Velocity
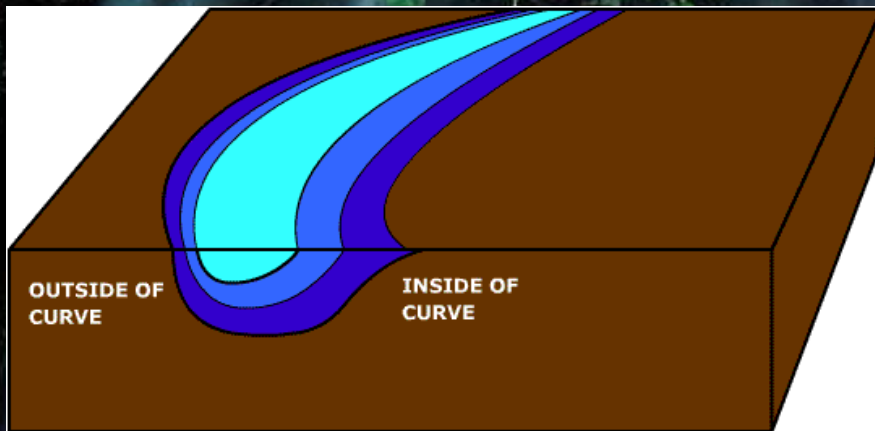
Low Velocity
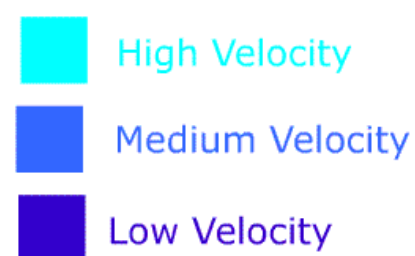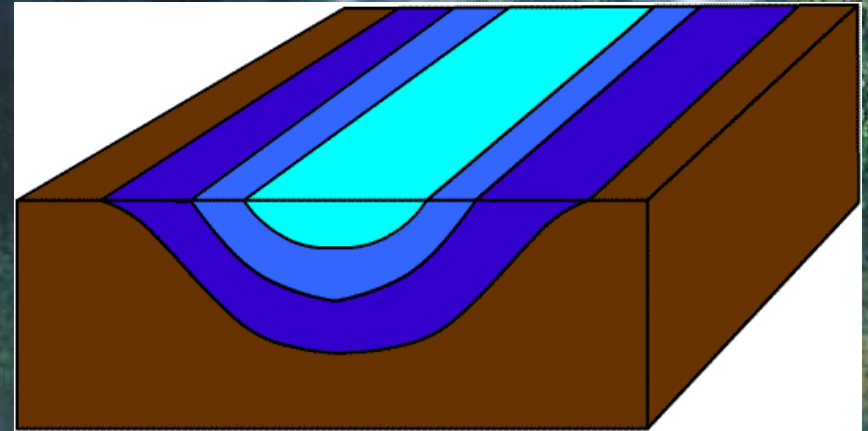
Stream Flow (cont.)

◆ Gradient
  – The slope of a stream from 'head' to 'mouth'
    ◆ 'head' or 'headwaters' is the beginning of the steam
    ◆ 'mouth' is the end of the stream
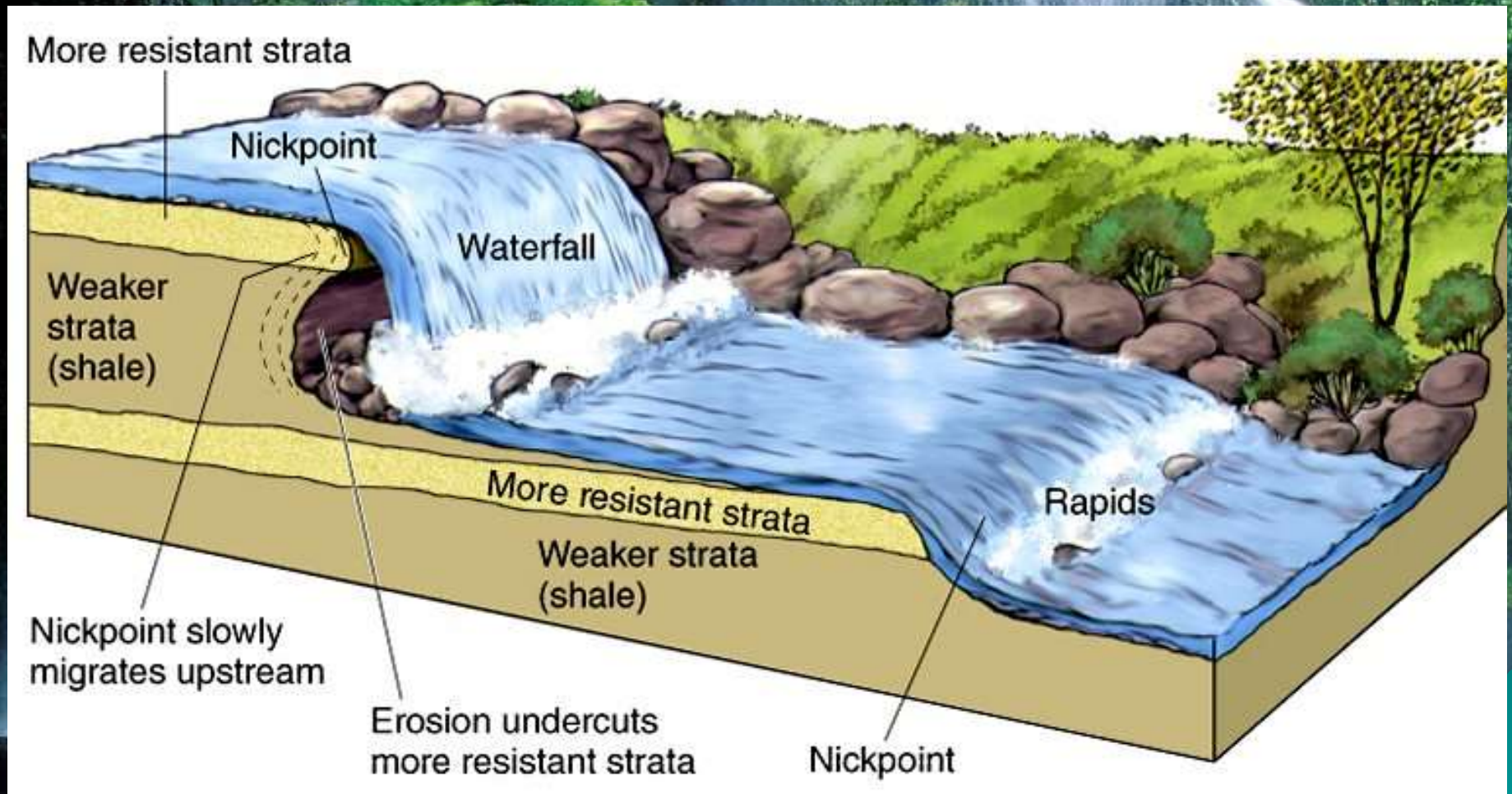
◆ Discharge
  – The volume of water that is flowing down a specific point of the steam at a given time

Base Level

◆ Sea level is considered the ultimate base level

◆ Temporary, or local, base levels are considered to be:

– Lakes

– Resistant layers of rock

– Main streams which act as base level for their tributaries

Base Levels (cont.)

More resistant strata

Nickpoint

Waterfall

Weaker strata (shale)

More resistant strata

Weaker strata (shale)

Rapids

Nickpoint slowly migrates upstream

Erosion undercuts more resistant strata

Nickpoint

Work of Streams

◆ Erosion

◆ Transportation: 3 ways
   1. In solution (dissolved load)
   2. In suspension (suspended load)
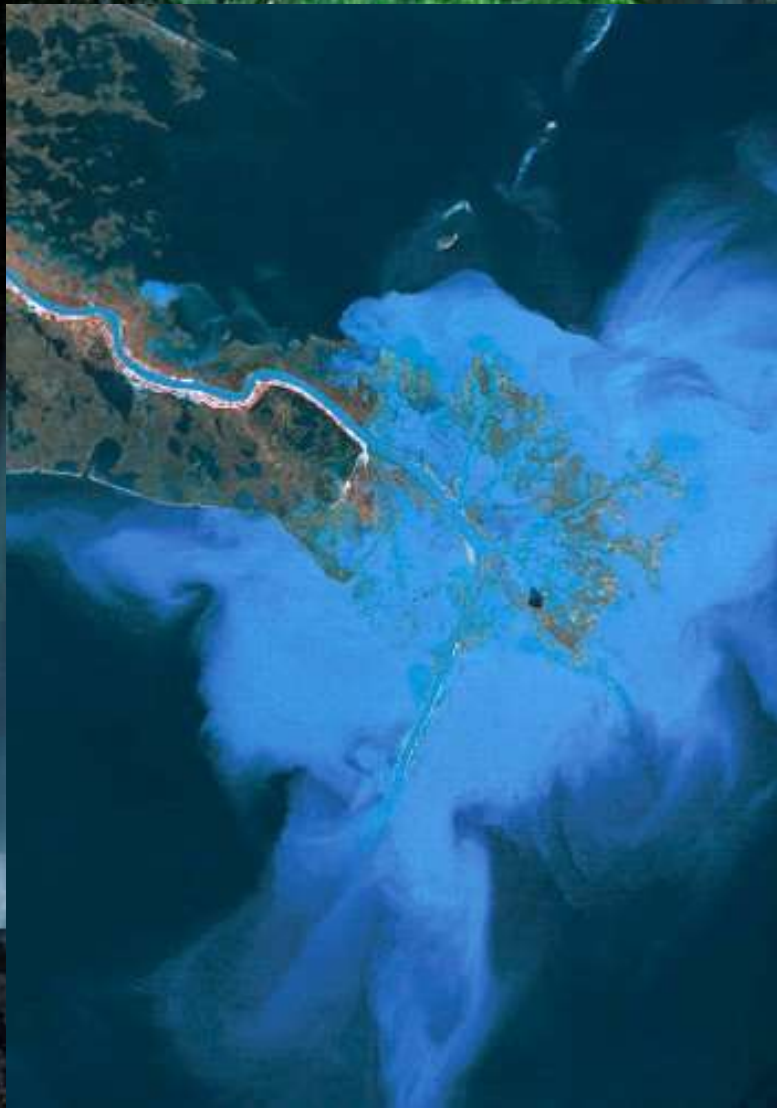   3. Scooting or rolling along the bottom (bed load)
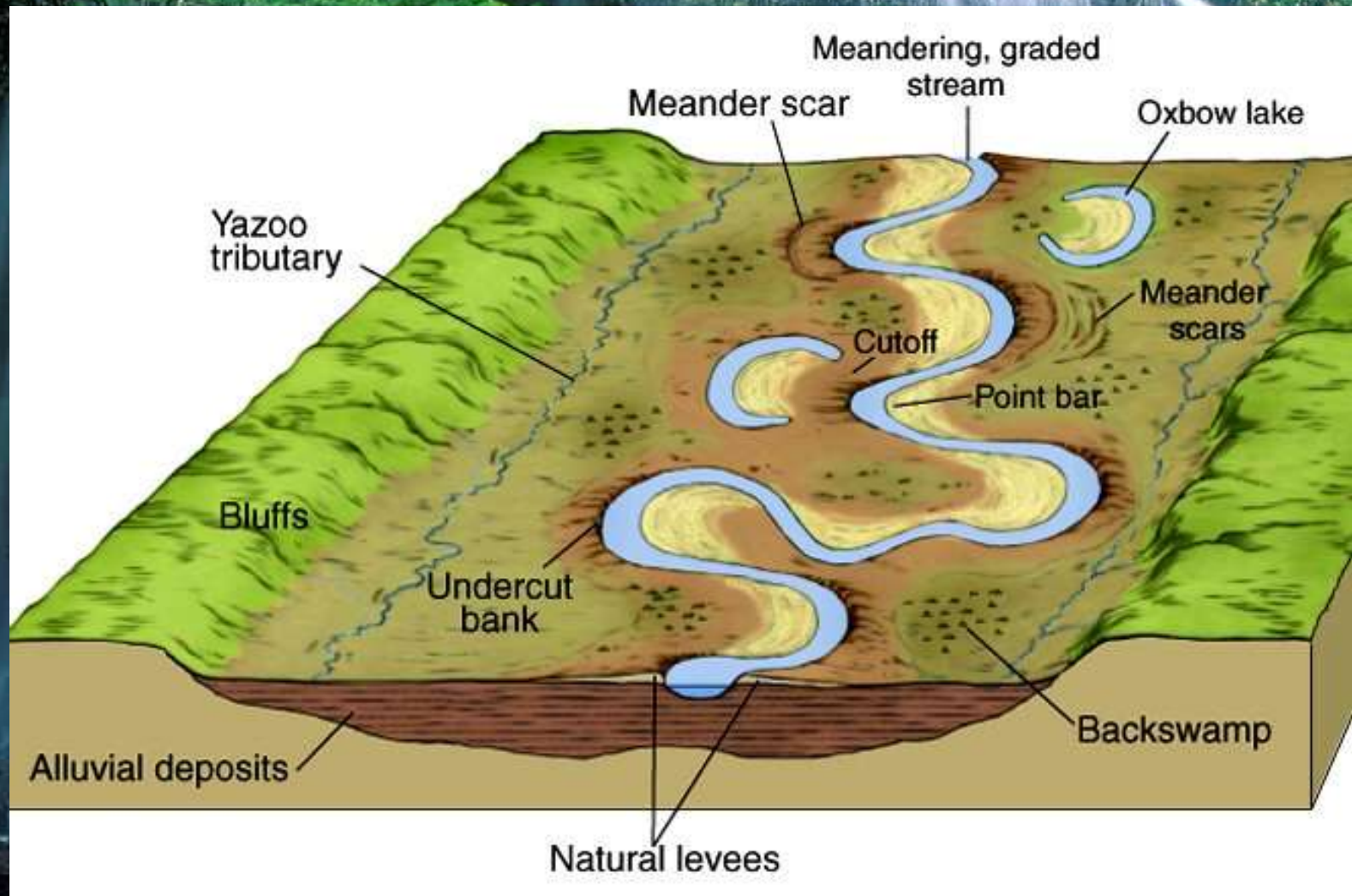
Work of Streams (cont.)
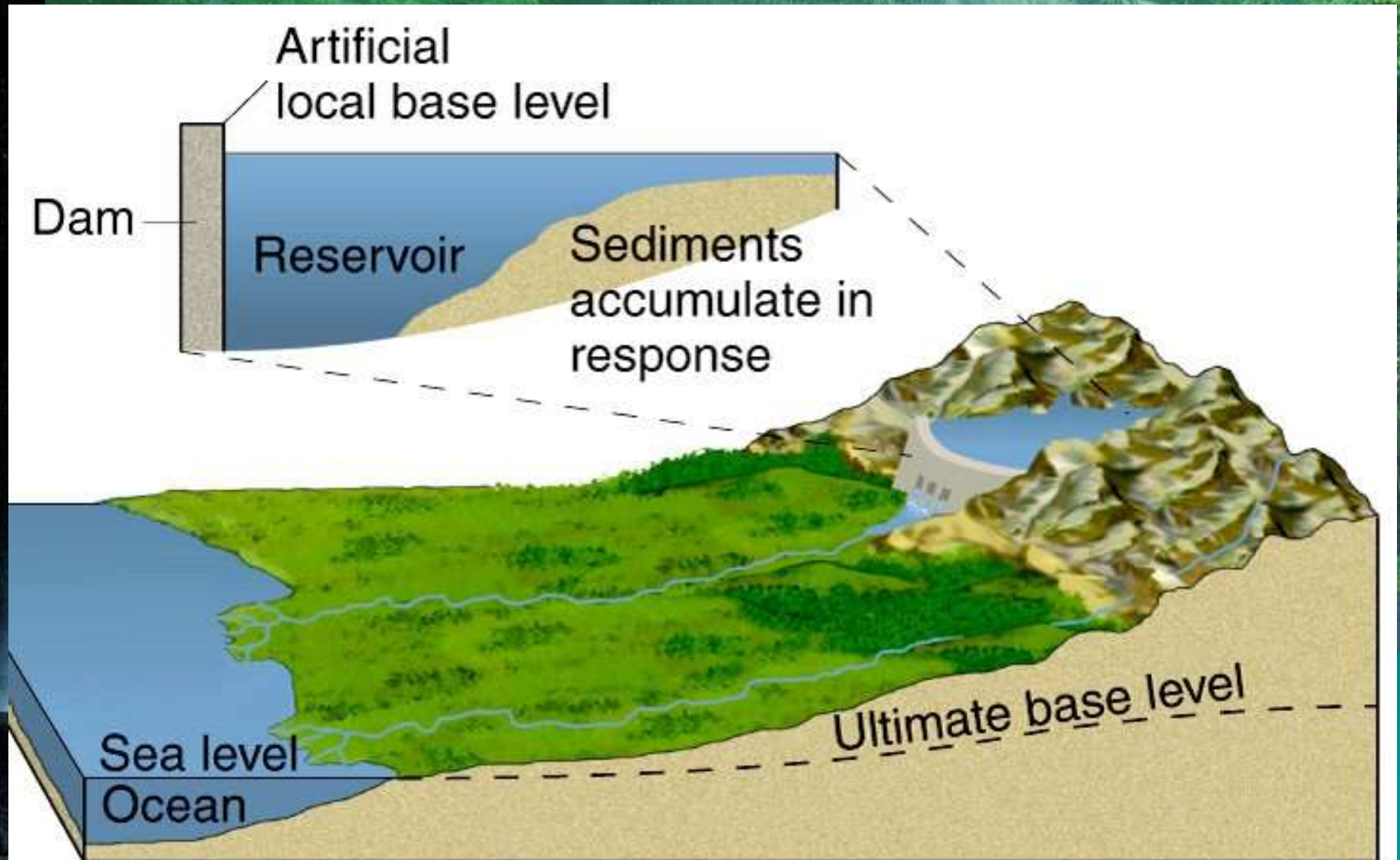
Work of Streams (cont.)

- The ability of a stream to carry a load is dependant upon 2 things:
  - ◆ Competence: maximum size of particles that a stream can carry
  - ◆ Capacity: the maximum load it can carry

◆ Deposition
  - The depositing of materials

Work of Streams (cont.)

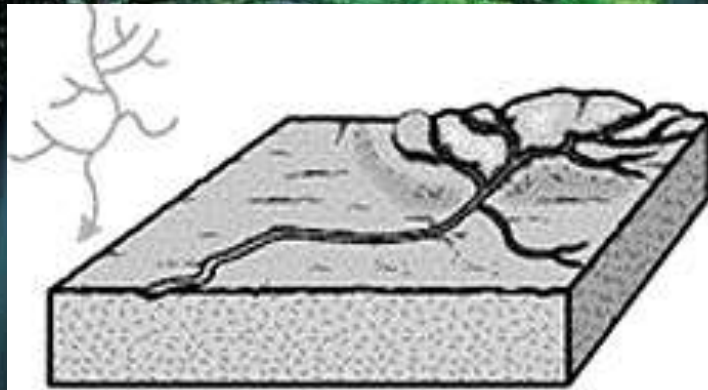# Work of Streams (cont.)

Work of Streams (cont.)

- Narrow Valley
  - Narrow "V" shaped valley
  - Stream has been down cutting towards base level
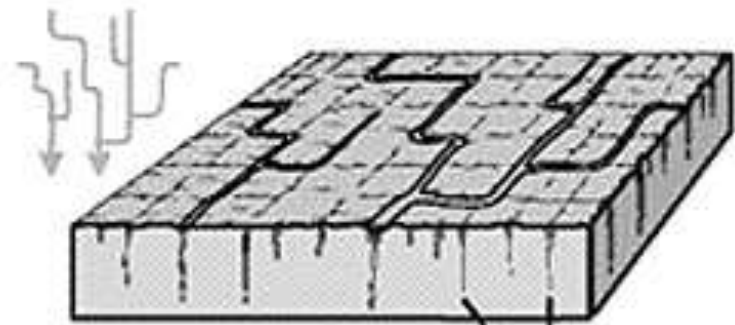 - Predominate Feature is rapids
- Wide Valleys
  - Energy is now side to side
  - Floodplains, meanders, cutoff, oxbow lakes, and artificial cuttoffs
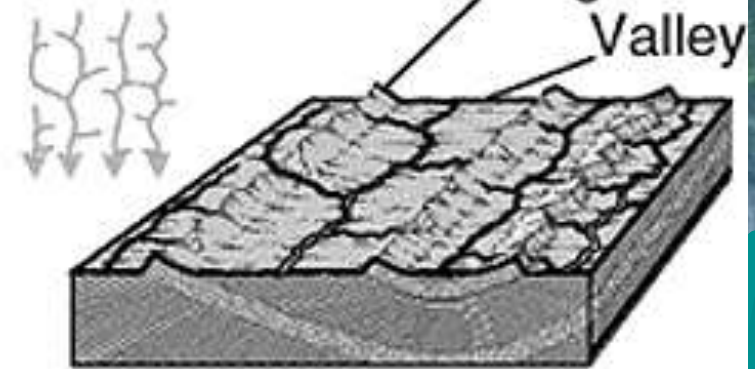
13

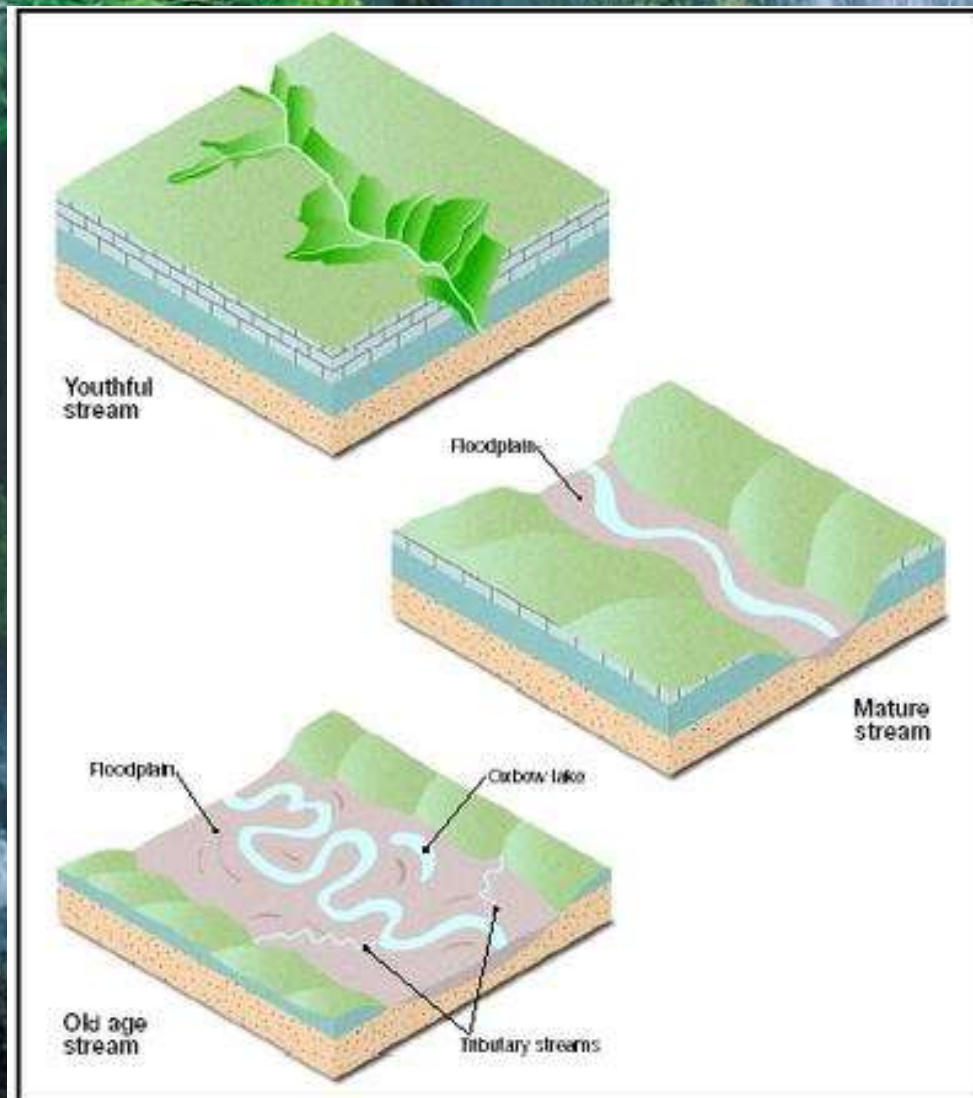# Drainage Patterns

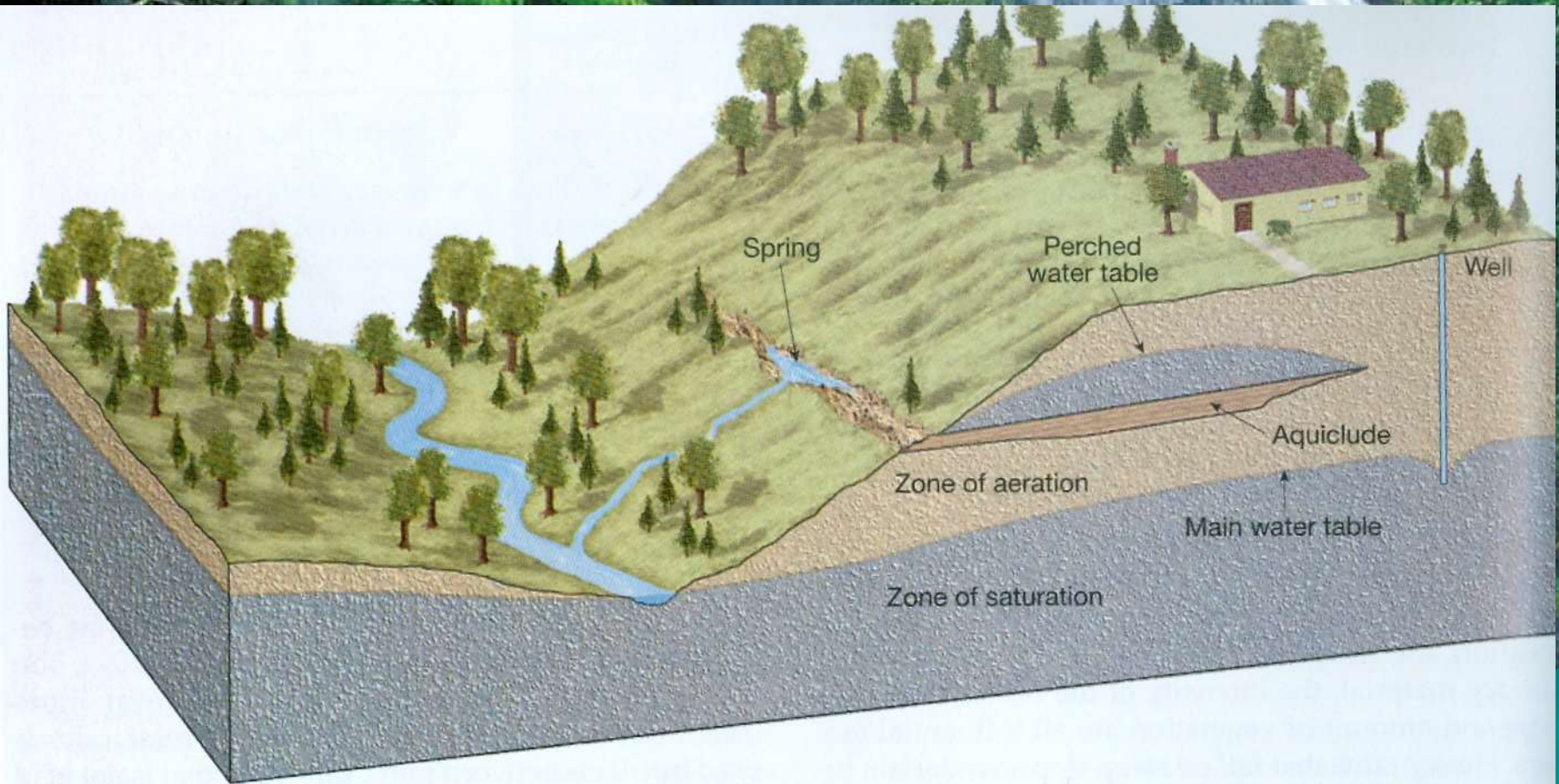Dendritic · Rectangular (Fractures) · Radial · Trellis (Ridge, Valley)
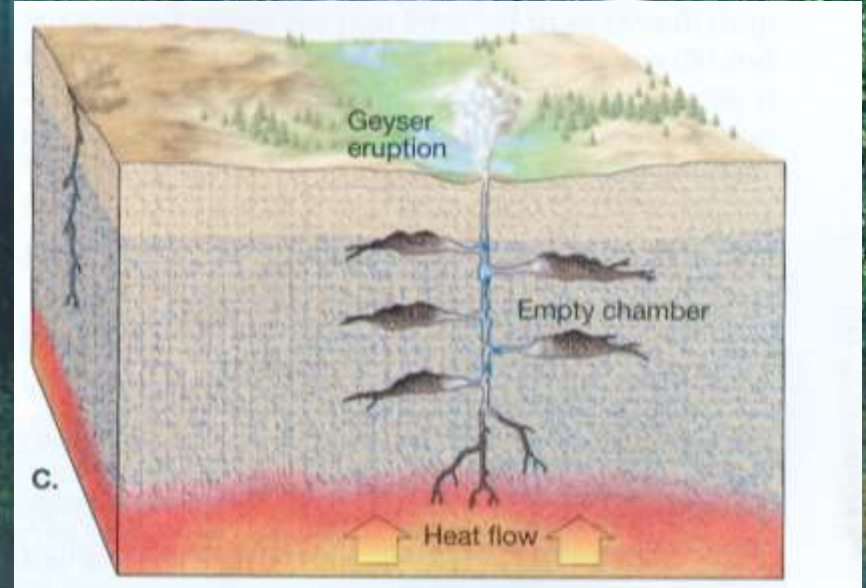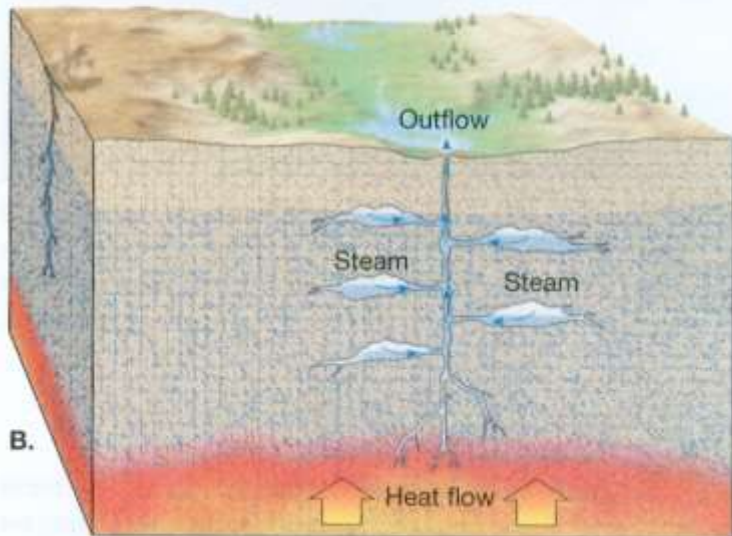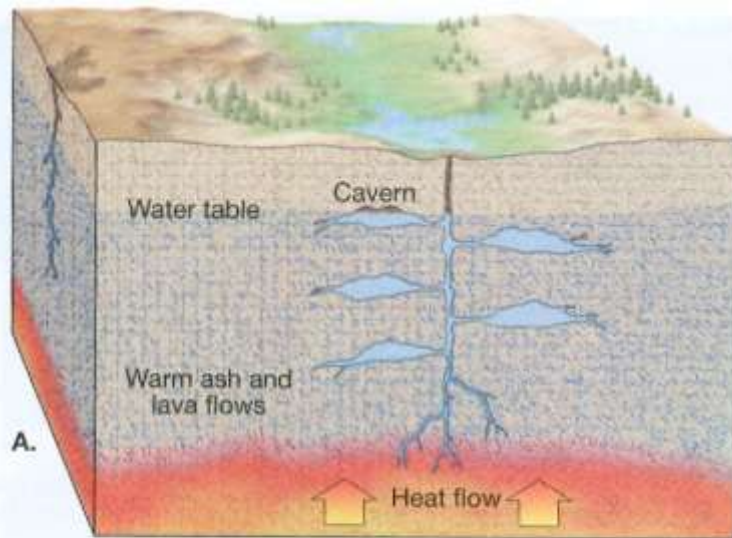
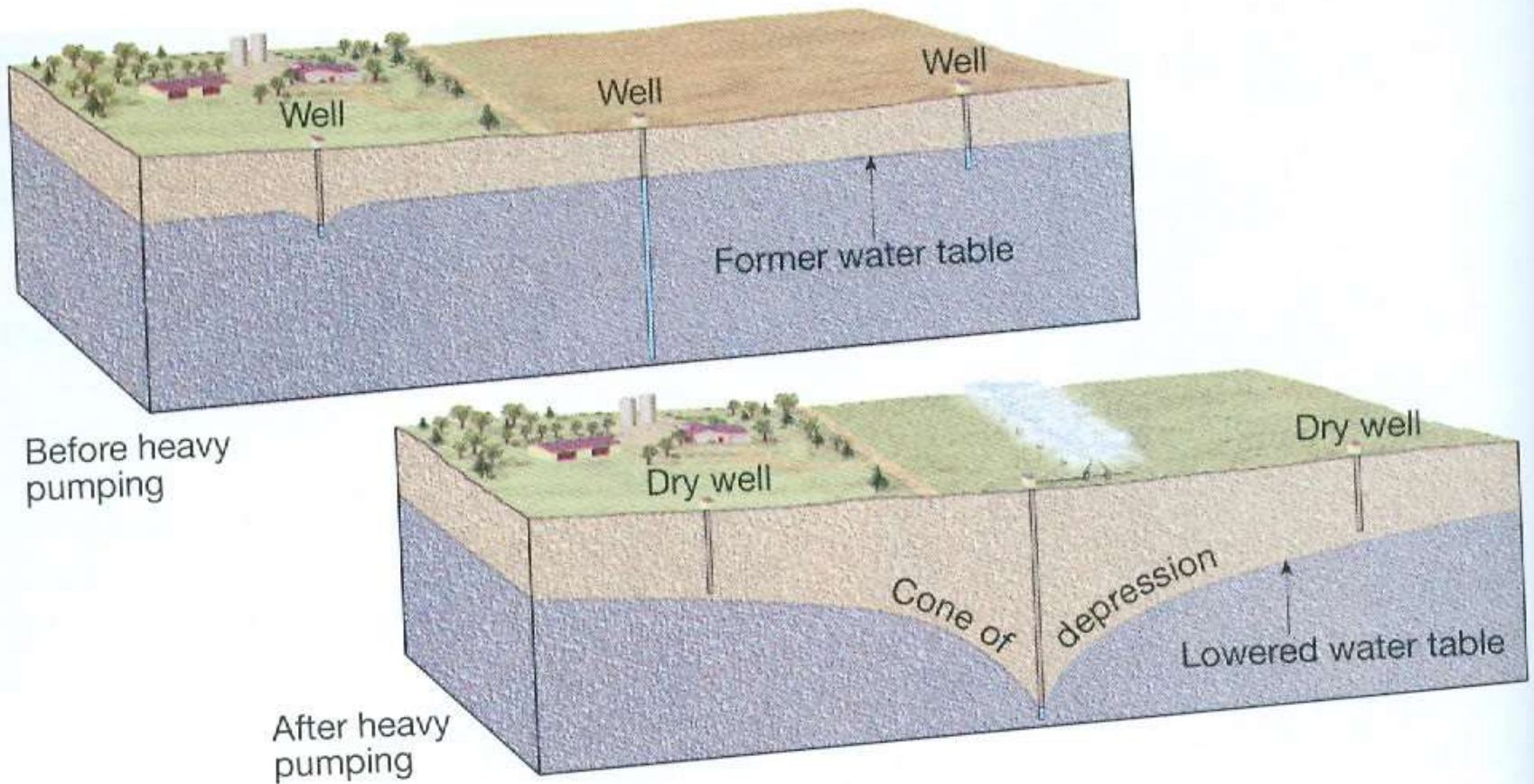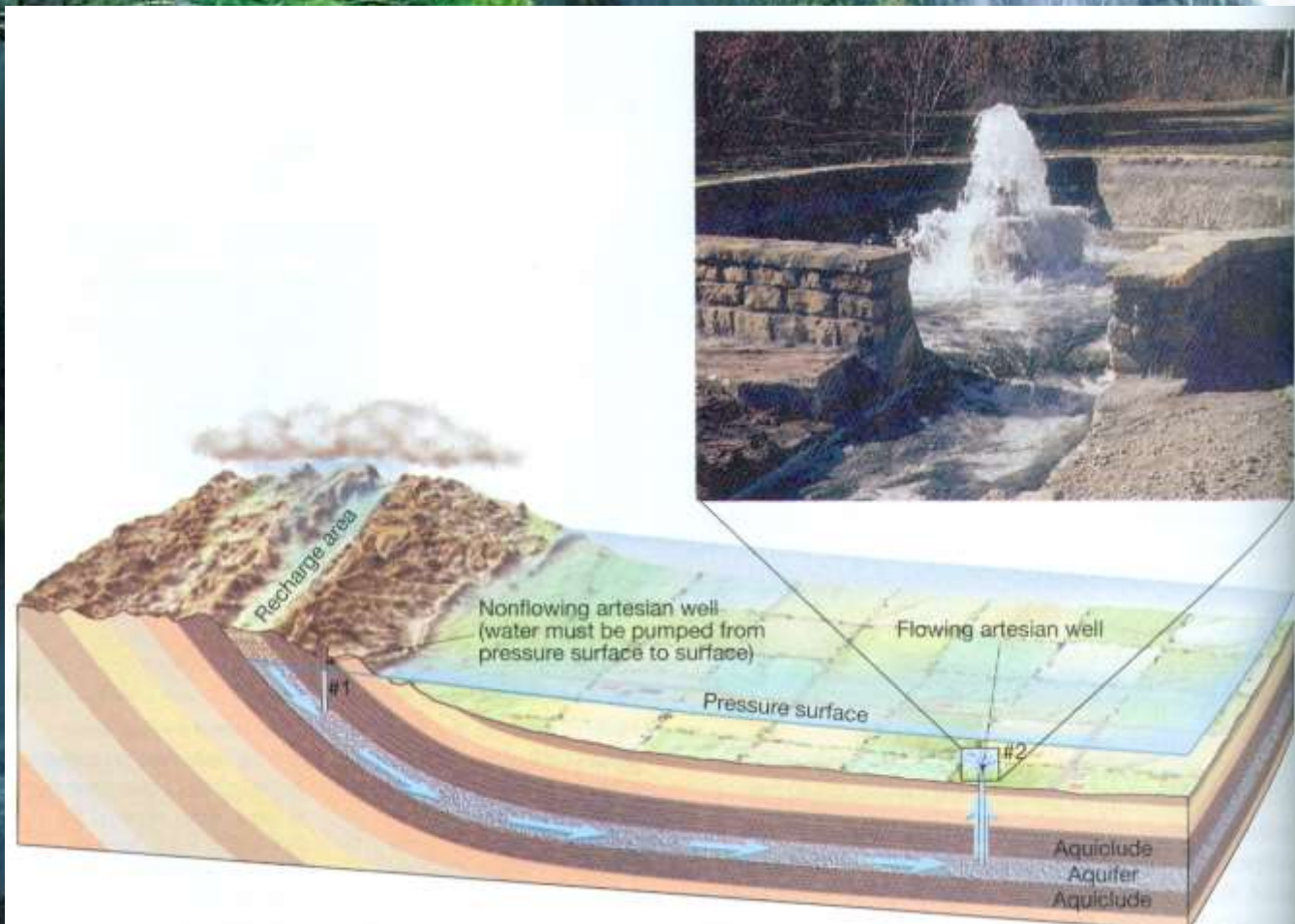# Mississippi River Drainage Basin
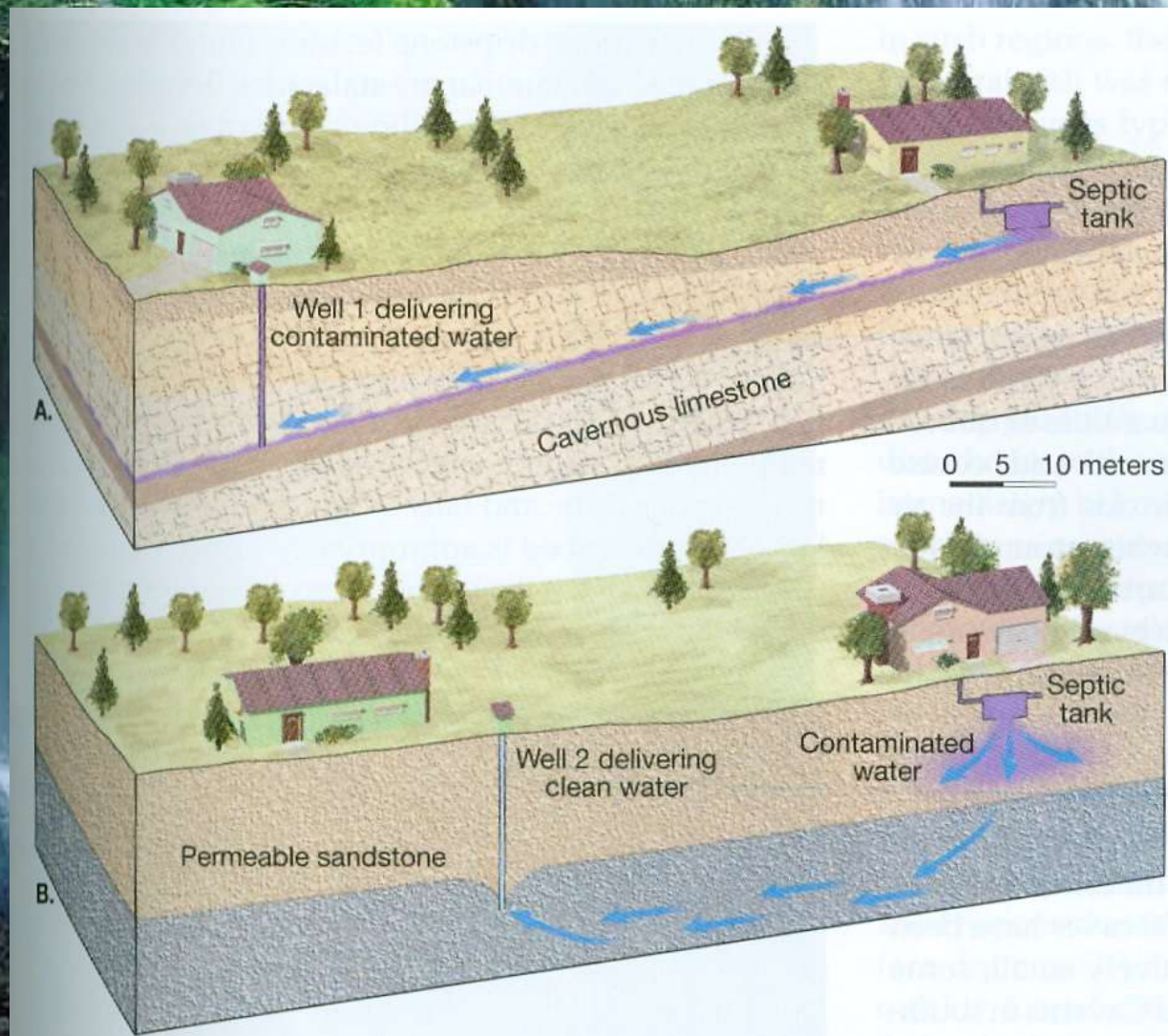
Stages of Stream Valley Development

Ground Water

Geysers

Cone of Depression

Artesian Well

Nonflowing artesian well (water must be pumped from pressure surface to surface)

Flowing artesian well

Recharge area

Pressure surface

Aquiclude
Aquifer
Aquiclude

#1

#2

Septic Tanks

Caverns and Caves