GEOGRAPHY FOR COMPETITIVE

III B.SC GEOGRAPHY

DATE : 03/09/2020

TIME : 9.30 TO 10.30

TOPIC : EROSIONAL & DEPOSITIONAL FEATURES OF A RIVER

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Introduction

- **Definition of river**
- **General definition:**
- According to Mary Marisawa: “A stream may be define as a channelized flow of water”.
- According to Jackie Smith: A river is a large stream of fresh water flowing downhill within a channel to enter another river or a lake or sea.
- **Source of the River :** Rainfall, Snowfall
- **River channel components**

1) Width
2) Wetted perimeter
3) Cross sectional area
4) Water depth
5) Stream gradient

Classification of River

According to supply of water:

Perennial river, Non perennial or Seasonal river

According to relation:

Main river, Tributary, Distributary

According to their origin:

Consequent, subsequent, Resequent, obsequent

According to relation with structure of base:

Antecedent, Superimposed

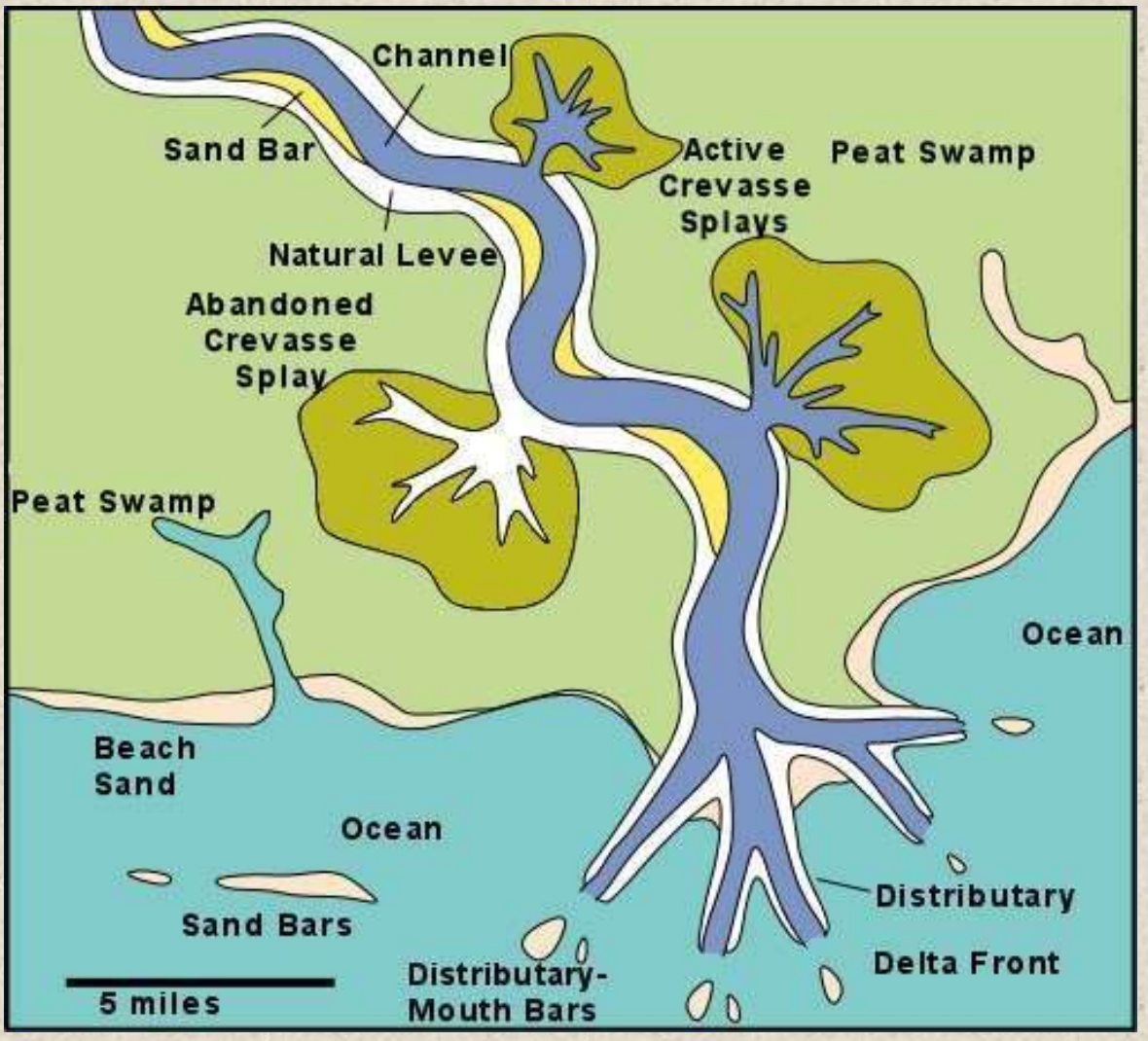
According to supply of water

Perennial River

Non perennial or Seasonal river

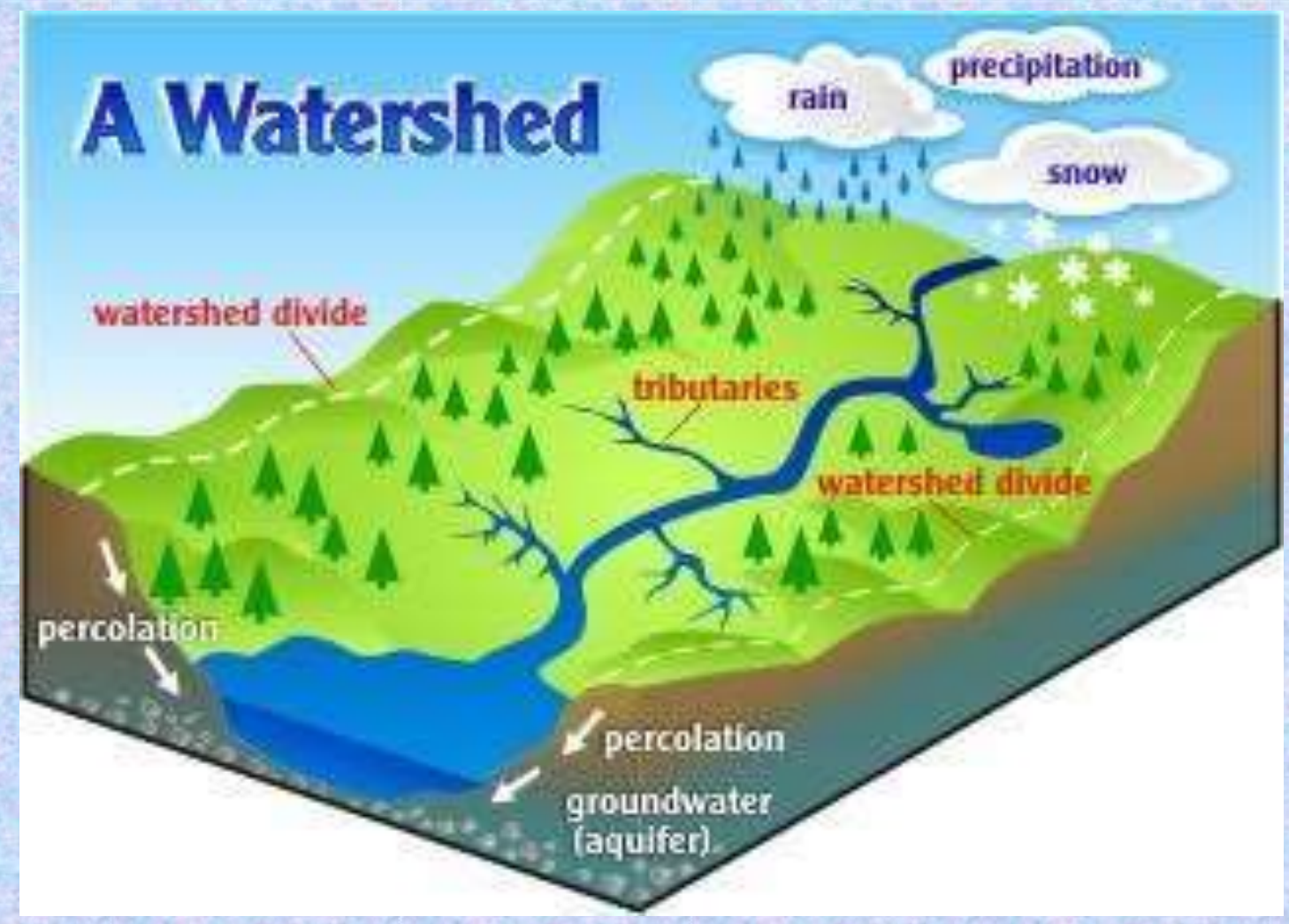
According to relation:

Main river, tributary and distributary



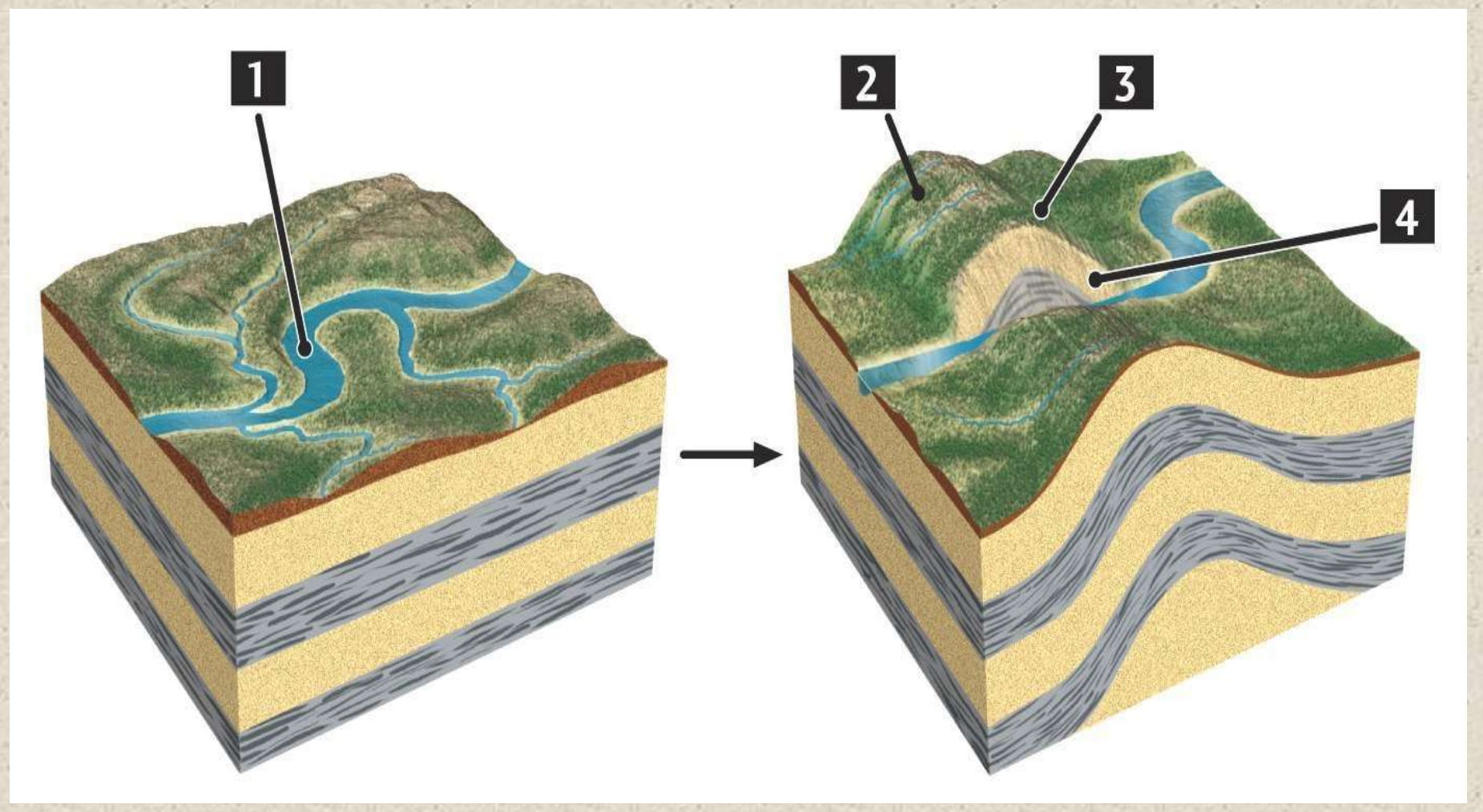
According to their origin:

Consequent, subsequent, Resequent, obsequent



According to relation with structure of base:

Antecedent



Superimposed River

Superimposed and Antecedent Streams

- Superimposed streams is one whose valley and direction of flow were developed much later than the underlying structure, and the river possessed sufficient stream power to cut through these underlying structures.
- An antecedent stream is one whose path of flow within a valley was established before the mountainous structure was uplifted

Works of River

- 3 type of works –

1. Erosion
2. Transportation
3. Deposition

Processes of erosion

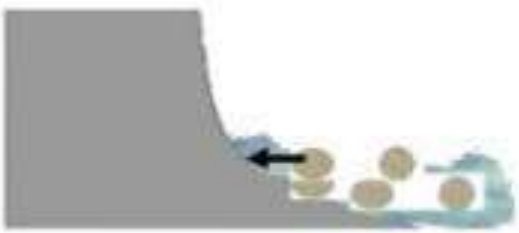
Hydraulic action

Corrosion

Processes of erosion

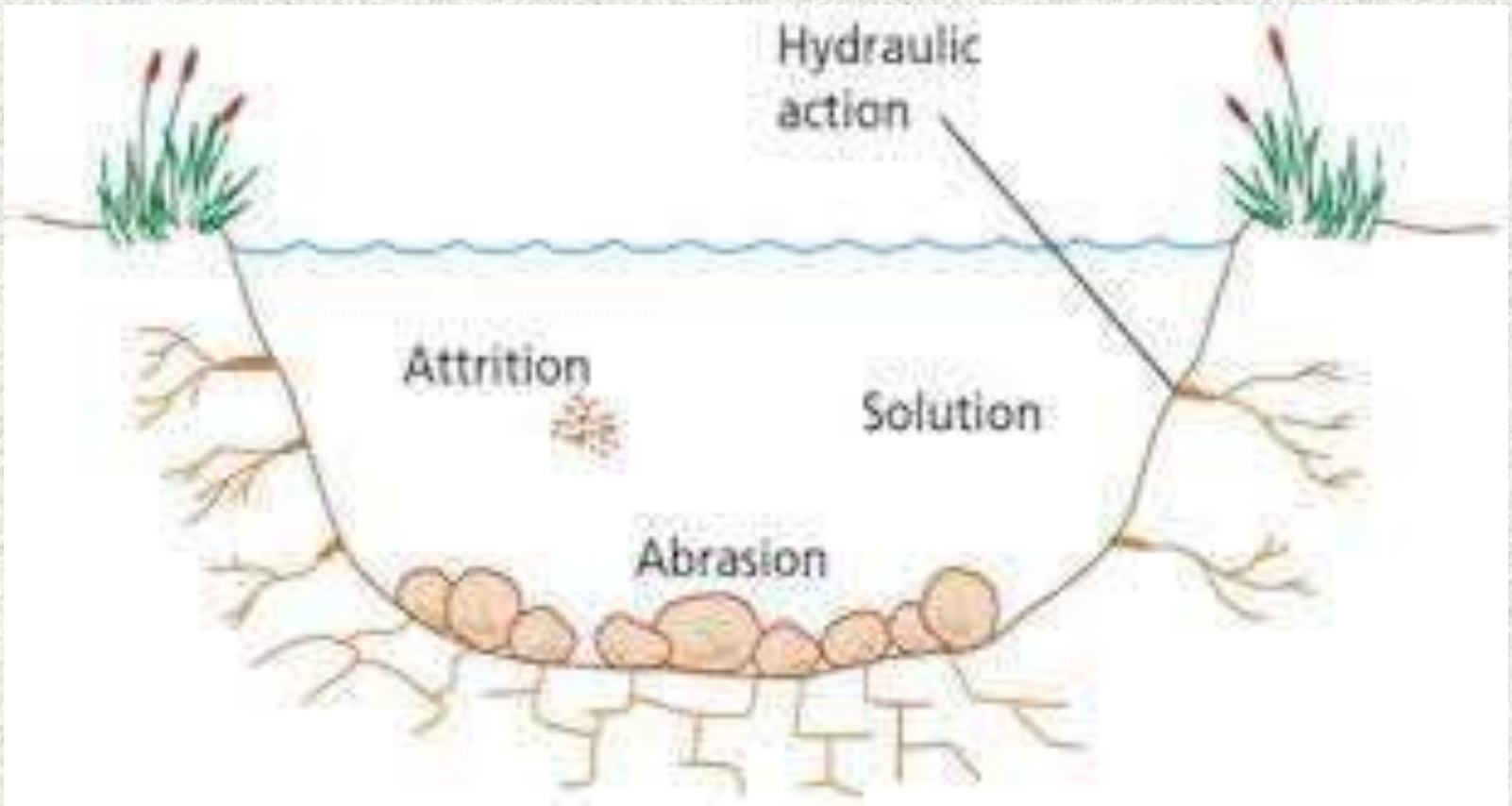
Attrition

Corrasion / Abrasion



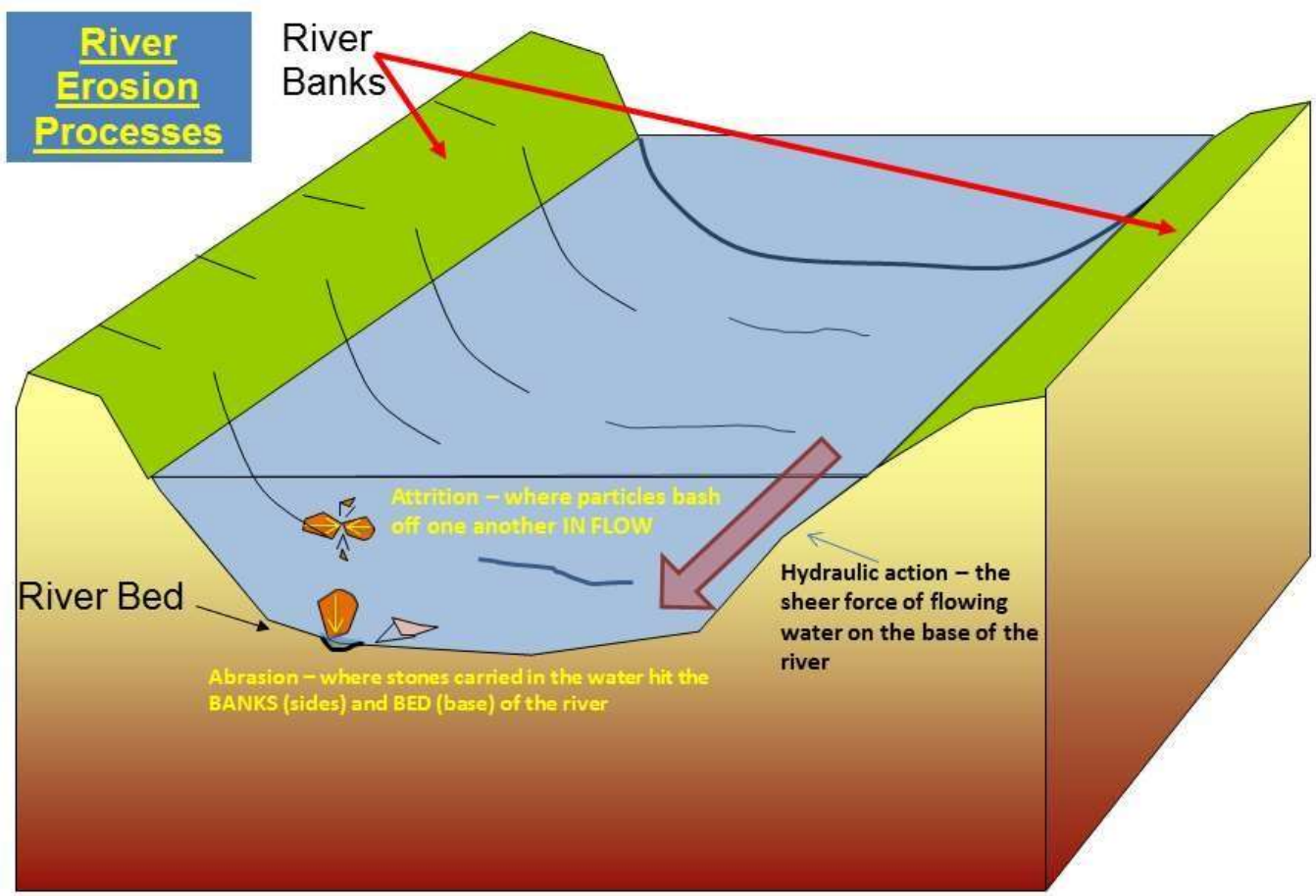
1. Erosion

- ✓ **Abrasion/ Corrosion**



Fluid/ Hydraulic Stress

Attrition



Collision

Cavitations

Corrosion

Plucking

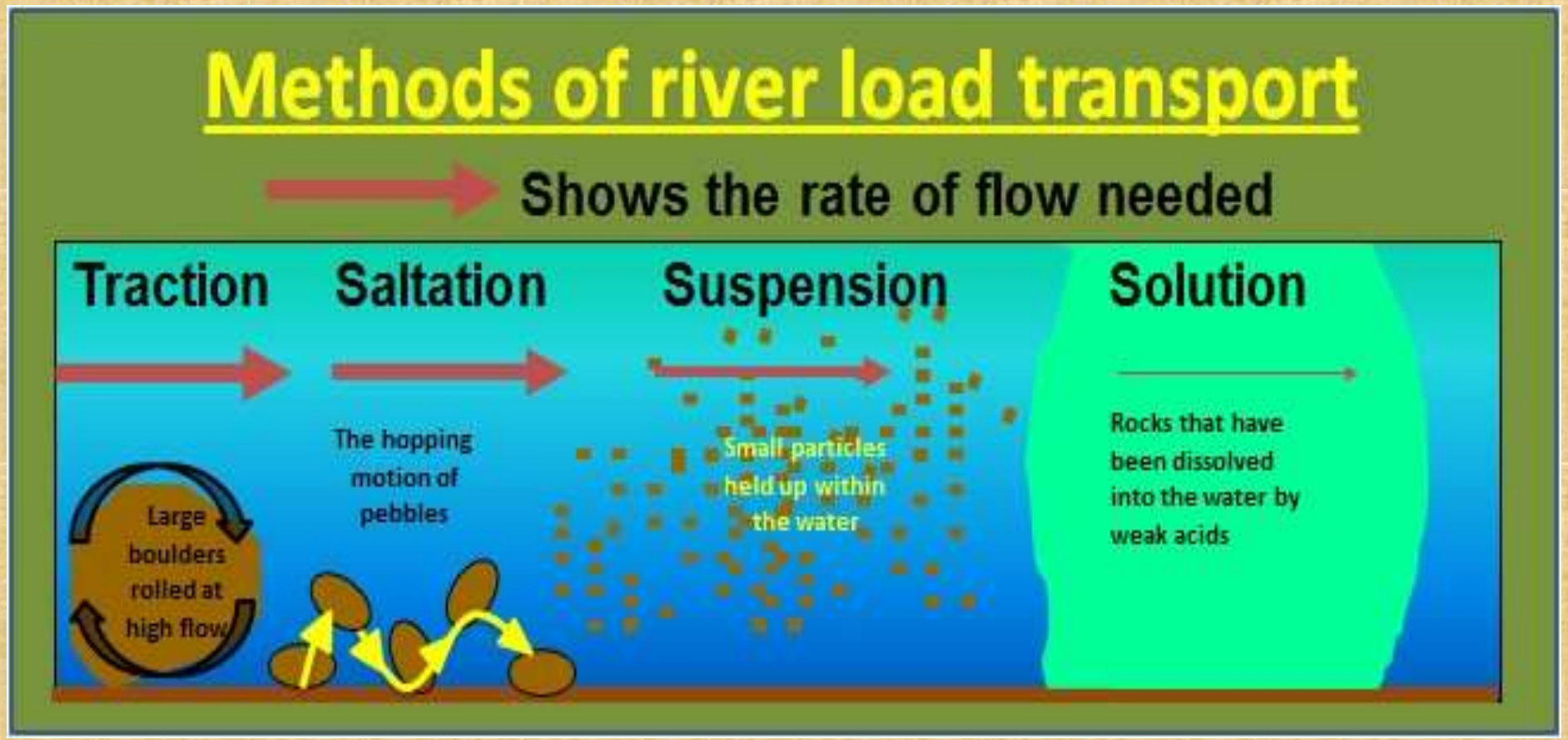
2. Transportation

- 4 affecting factor-

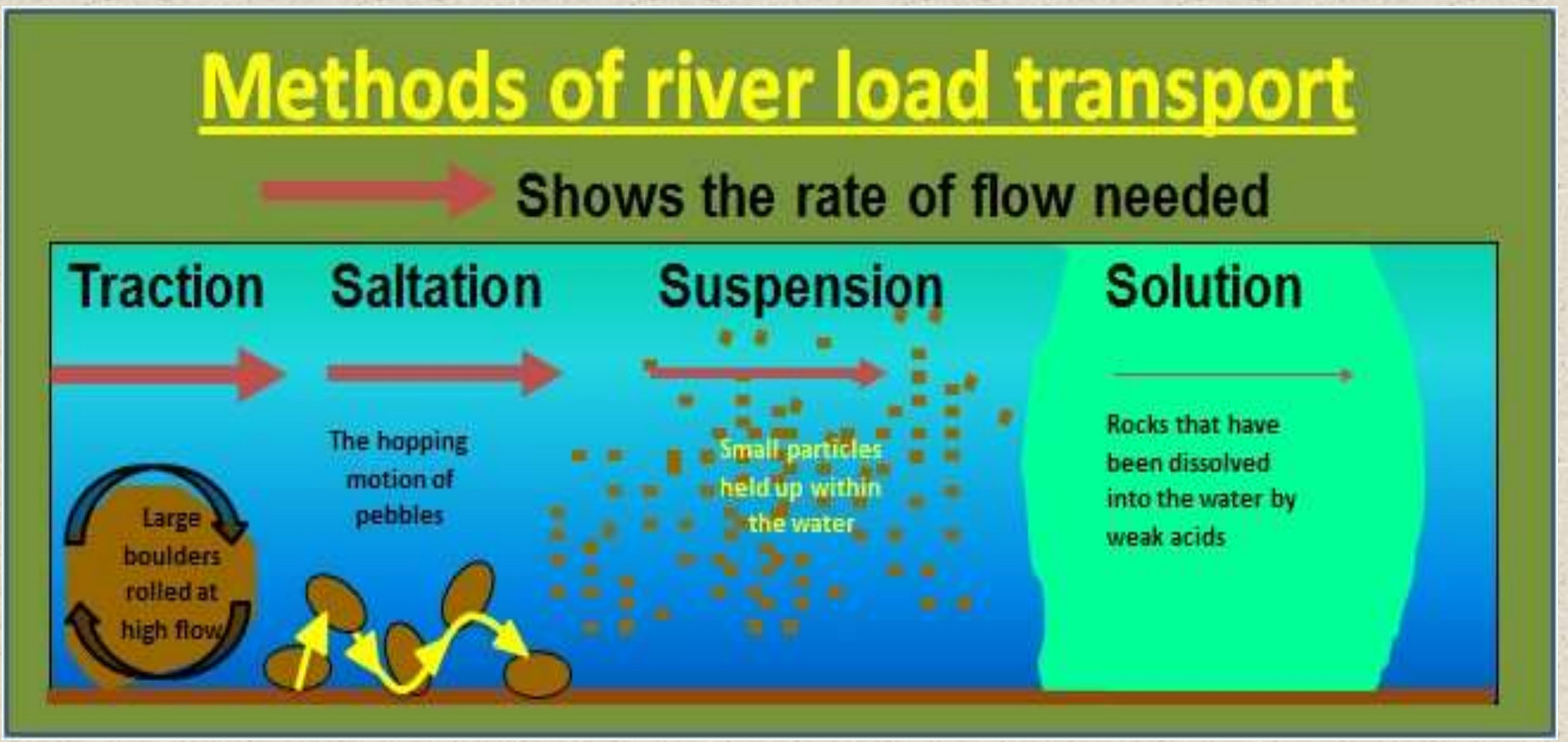
1. Slope of the River
2. Quantity of the water perimeter of River
3. Weight of the materials
4. Size and weight of the materials

Process of the transportation

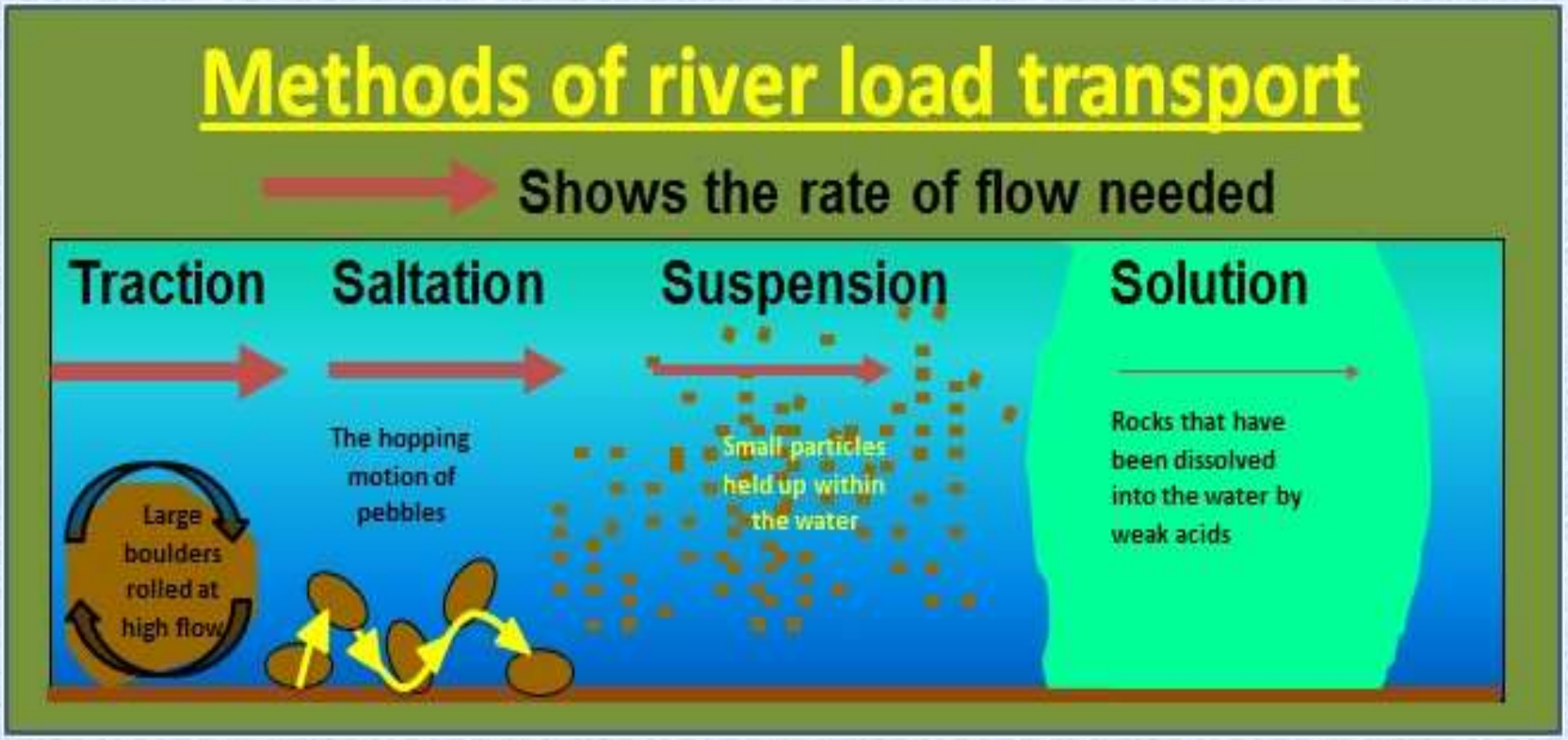
1. Traction



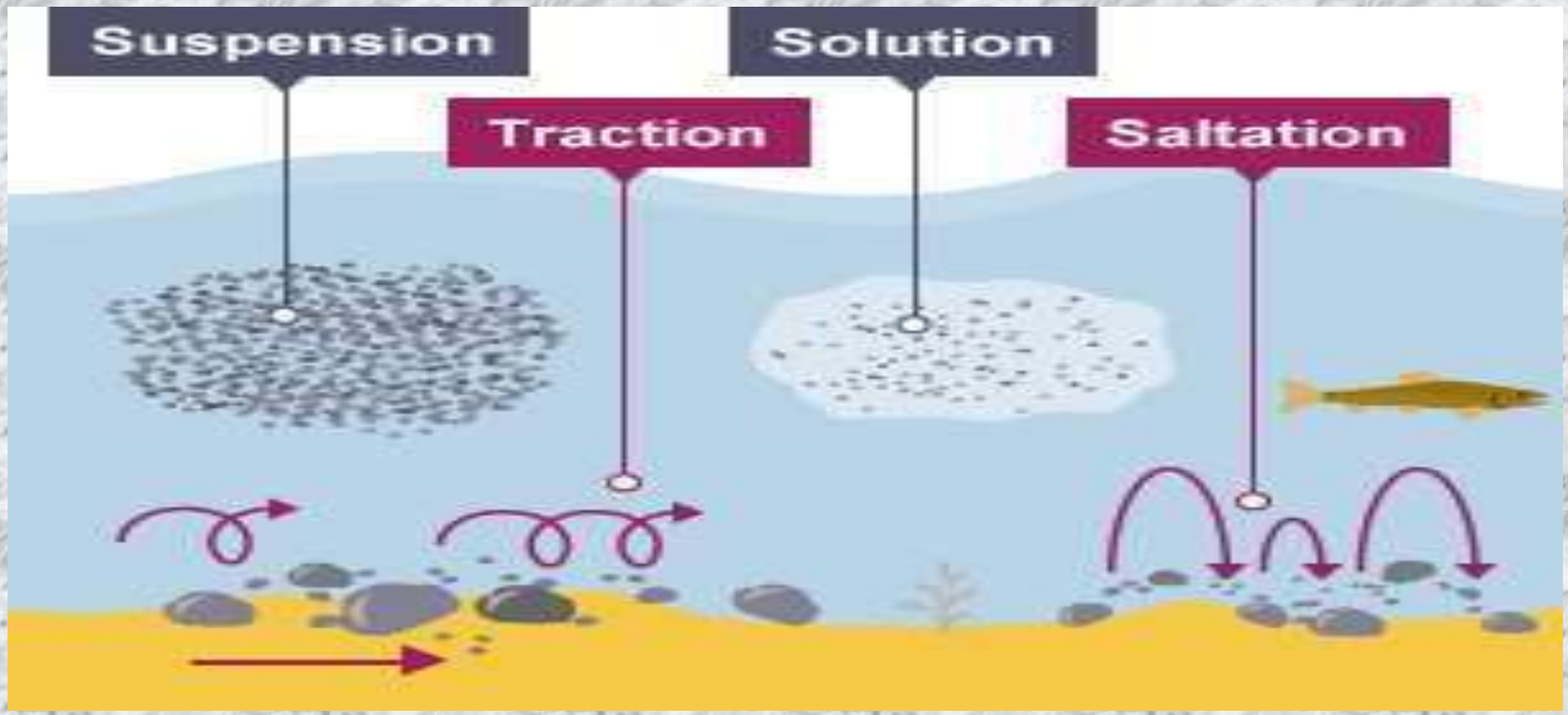
2. Saltation


Methods of river load transport
Shows the rate of flow needed
Traction
Saltation
Suspension
Solution
Large boulders rolled at high flow
The hopping motion of pebbles
Small particles held up within the water
Rocks that have been dissolved into the water by weak acids

3. Suspension



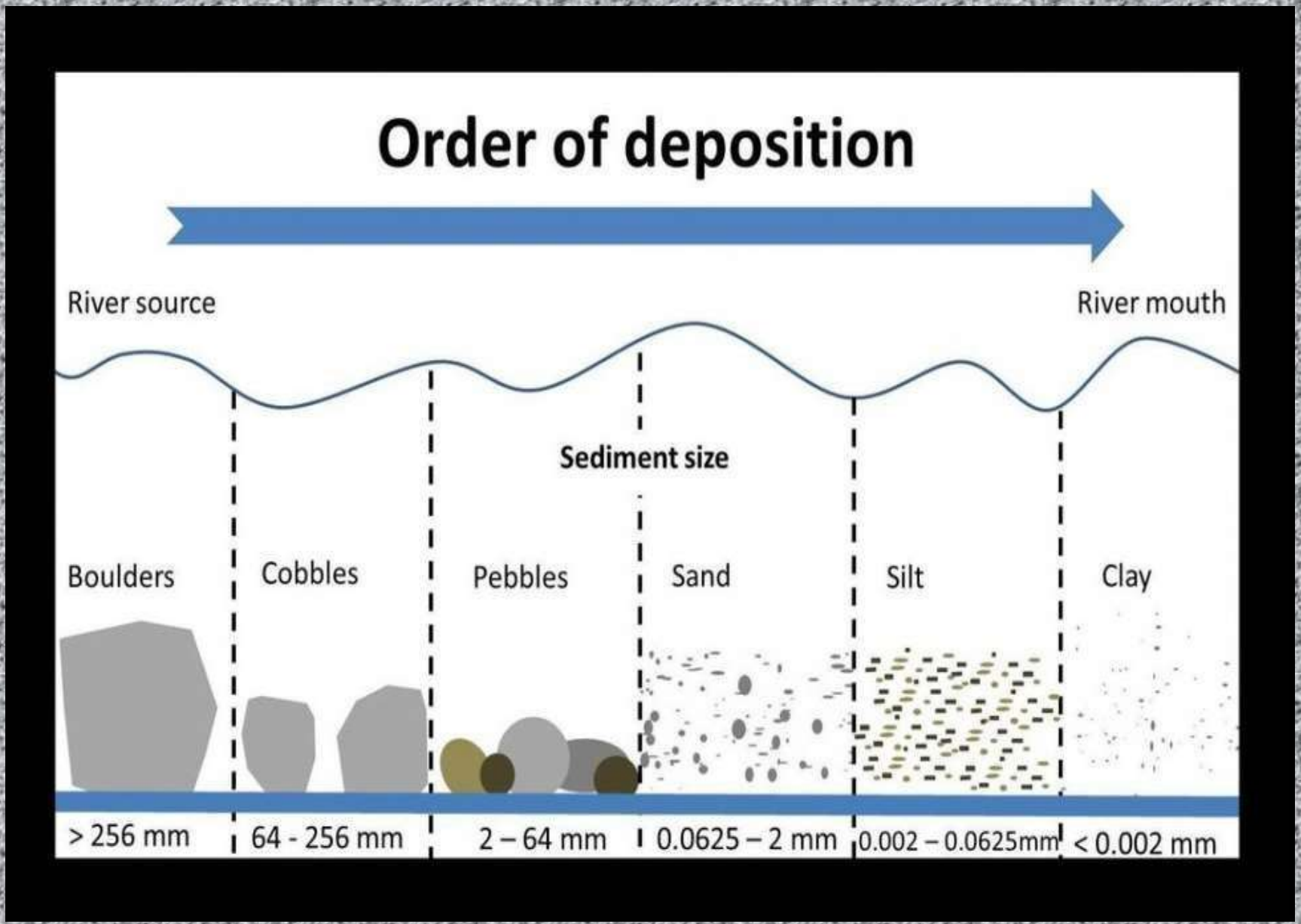
4. Solution

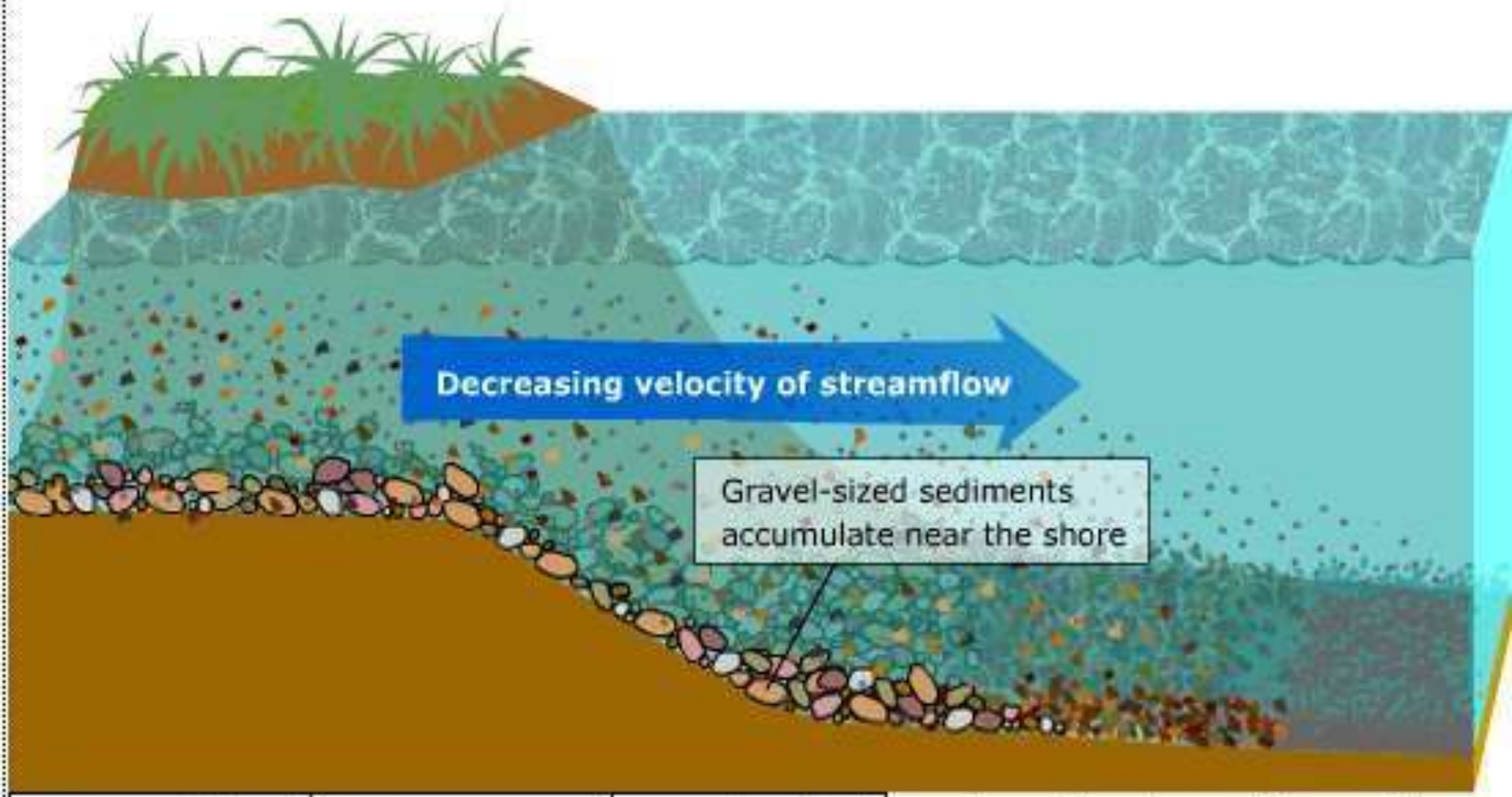


3. Deposition

Affecting factors:

- Decreasing the amount of water
- Slope of the river
- Dropping lake or ocean
- Losses water velocity


Order of deposition
River source
River mouth
Sediment size
Boulders
Cobbles
Pebbles
Sand
Silt
Clay
> 256 mm
64 - 256 mm
2 – 64 mm
0.0625 – 2 mm
0.002 – 0.0625mm
< 0.002 mm



= gravel-sized sediments	= sand grains	= clay-sized particles

Lenni Armstrong, informmotion

Affecting factor of a River works

- Climate
- Relief
- Nature of the rocks within the River
- Structure of the rocks
- Crack within the Riverine
- Nature of the Loaded material
- Nature of the wetted perimeter
- Types of river

River course

3 types of river course –

- **Upper course:**

Erosional : V-shaped valley, I shaped valley or Canyon, George, Hanging Valley

- **Middle course:**

Erosional: Rapids, Waterfalls, Potholes and Plunge pools

Depositional: Meander, Riffle and Pool, Flood plain, River Terrace, Alluvial Fan, Natural Leave, Point Bar

- **Lower course:**

Depositional: Delta

Erosional landform of a River (Upper Course)

1) V- Shaped valley

Erosional landform of a River (Upper Course)

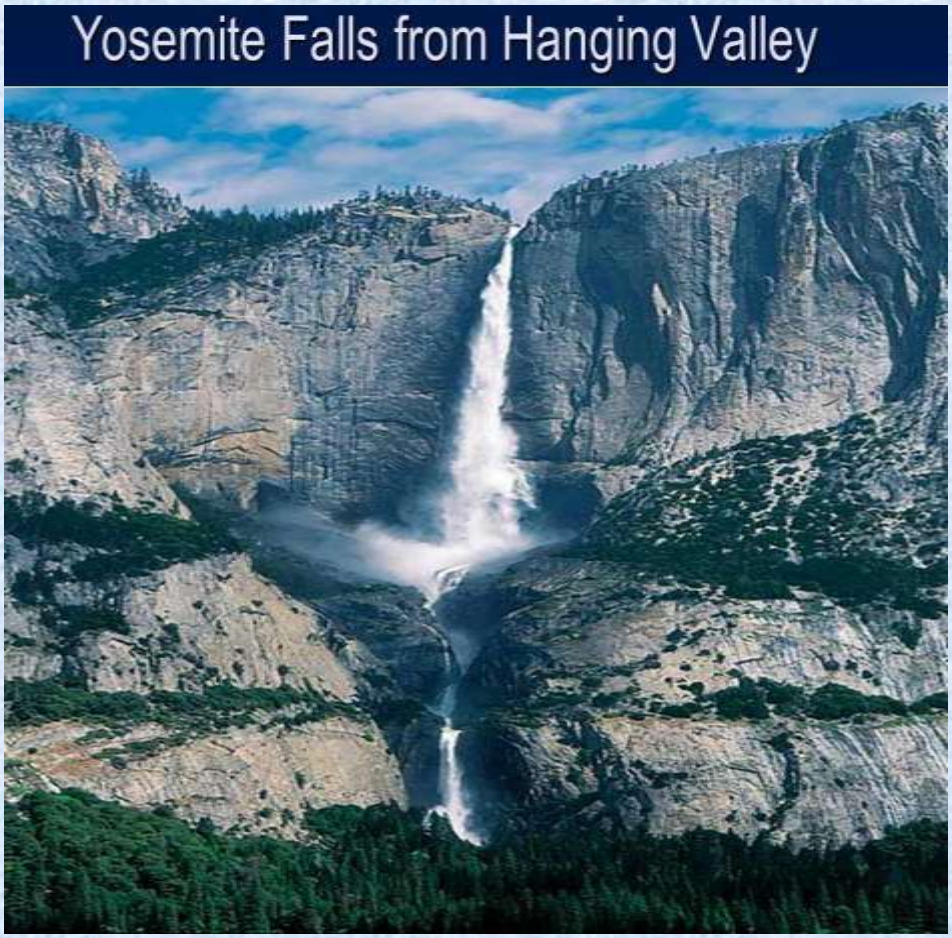
2) George

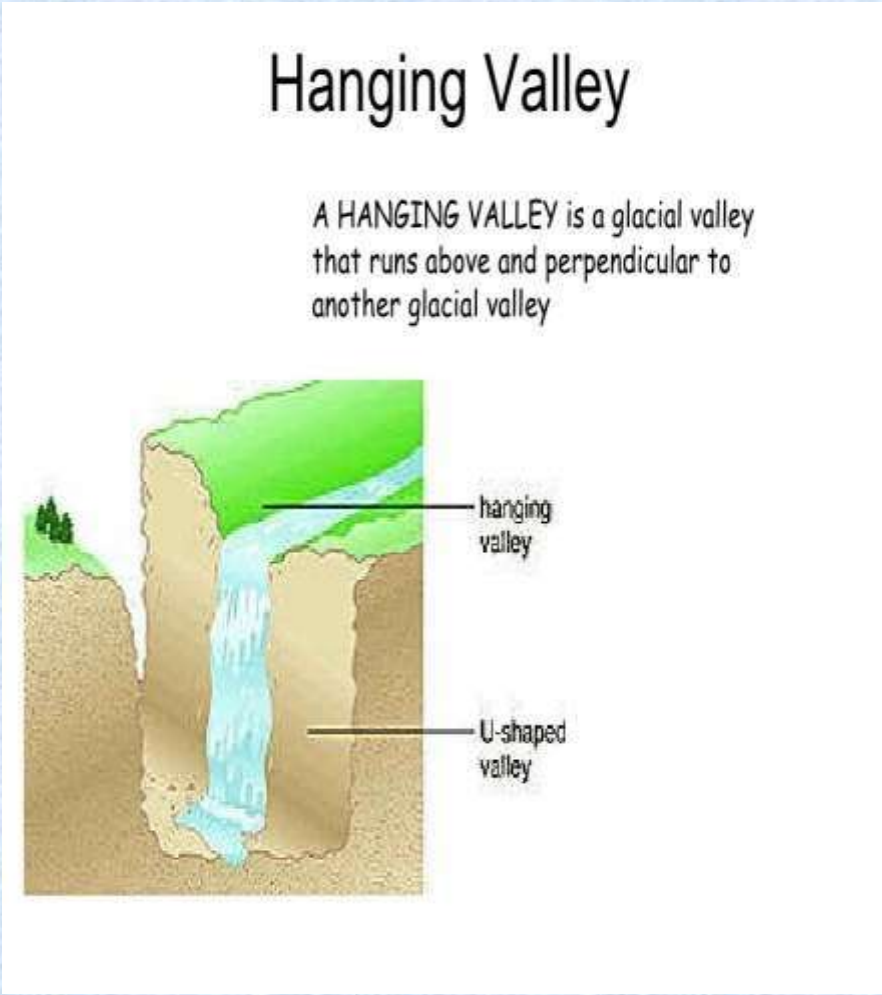
Erosional landform of a River (Upper Course)

3) Canyon

Erosional landform of a River (Upper Course)

4) Hanging Valley





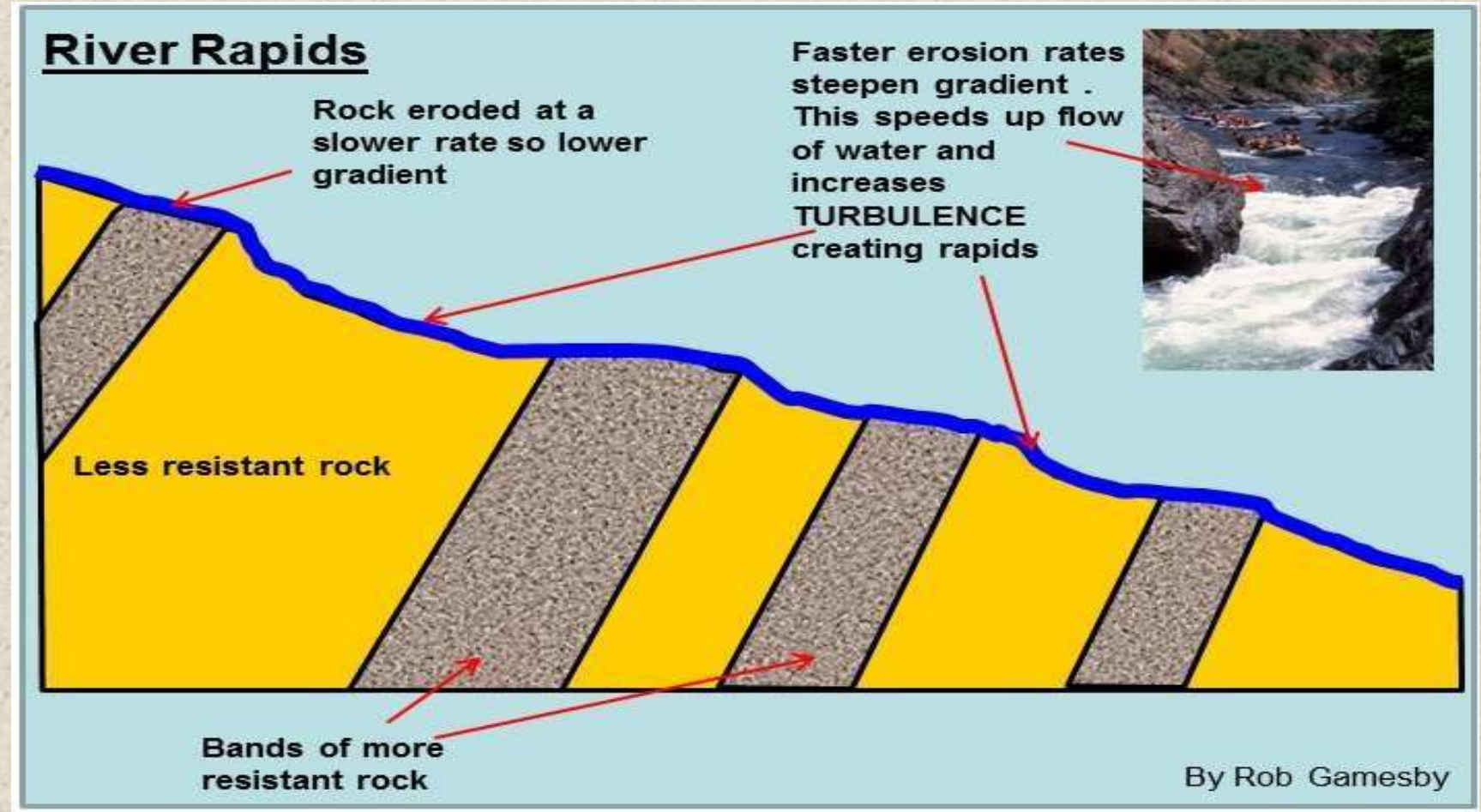
Upper Course of a River

Some characteristics:

- ✓ From the source to Mountain, Plateau areas course are fall under this course.
- ✓ Downward erosion is the main characteristics.
- ✓ As a result I, V shaped valley, Canyon are formed
- ✓ Steep slope
- ✓ Height above base level
- ✓ As a result Erosional power of the river are more

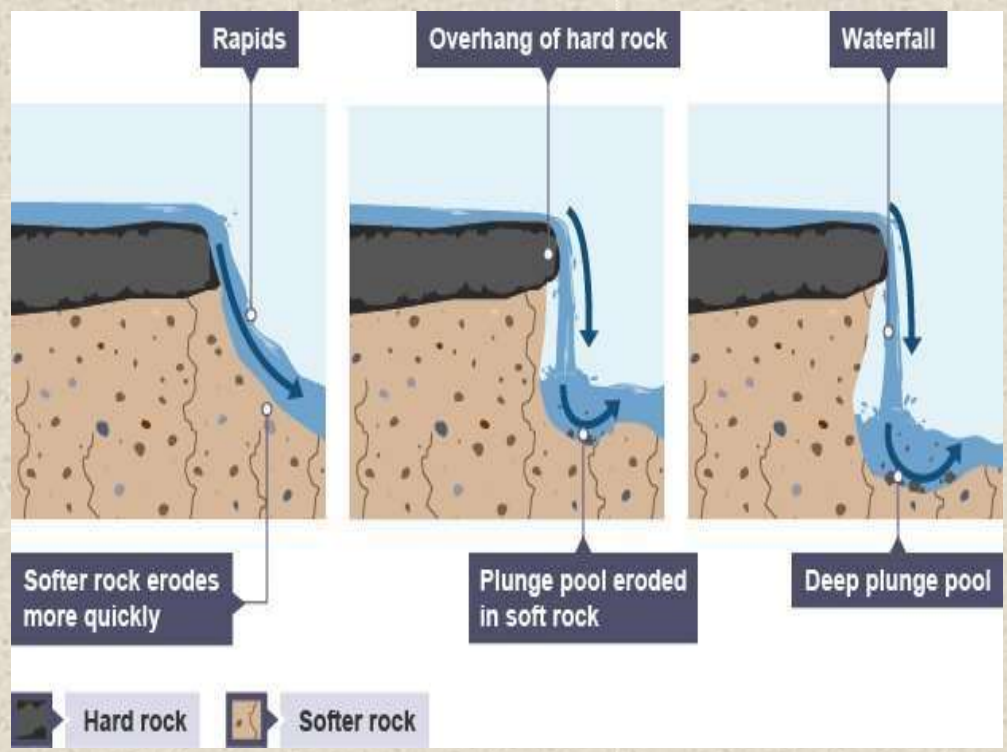
Erosional landform of a River (Middle Course)

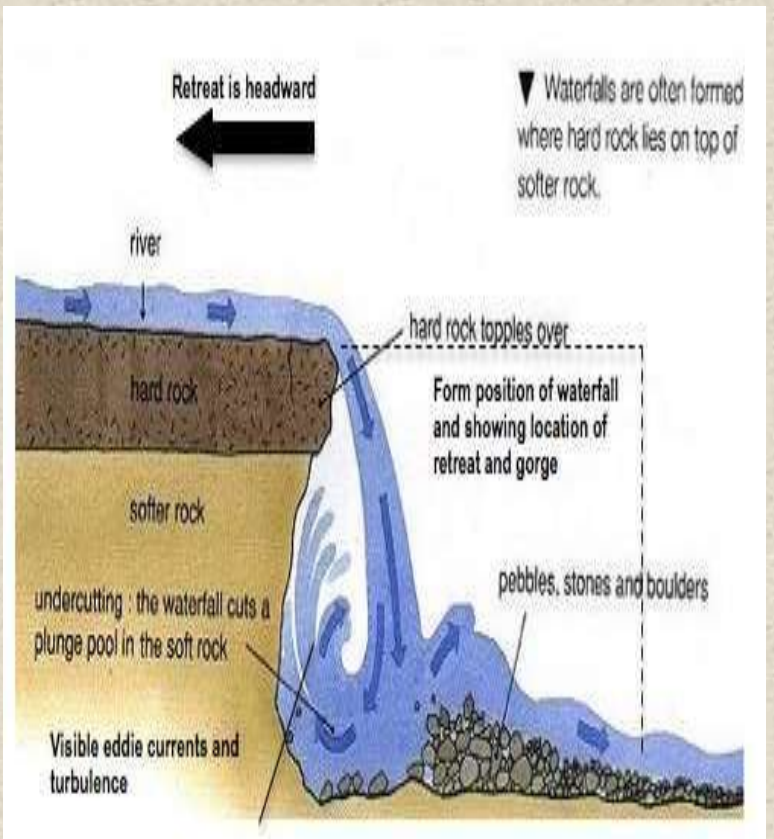
5) Rapids



Erosional landform of a River (Middle Course)

6) Waterfall





Erosional landform of a River (Middle Course)

6) Waterfall

Erosional landform of a River (Middle Course)

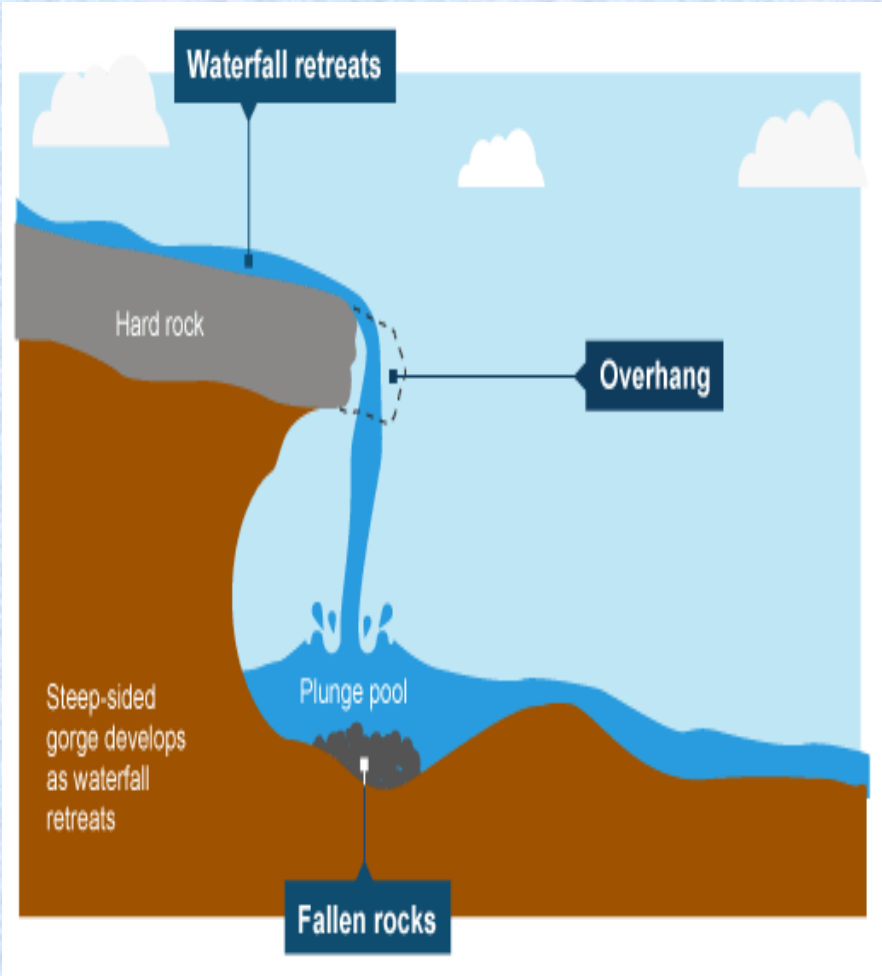
6) Waterfall :

Formation of a waterfall

- ✓ Glaciers
- ✓ Erosion of soft rock
- ✓ Fault Scarp
- ✓ Knick Point
- ✓ Volcanoes
- ✓ Earthquakes

Erosional landform of a River (Middle Course)

7) Potholes and Plunge Pools



Middle course of a River

Some characteristics:

- ✓ River valley are more wider
- ✓ Meandering of the river
- ✓ Lateral erosion
- ✓ Stratification of sediments
- ✓ Ox bow lake
- ✓ Decreasing water velocity

Depositional landform of a River (Middle Course)

1) Meanders

Depositional landform of a River (Middle Course)

1) Meanders :

Formation of Meander

- The term derives from the Meander River located in present-day Turkey and known to the Ancient Greeks.

1) Due to banks of sediment at the bottom of the river
2) This movement targets one bank of the section after the riffle, subsequently leading to erosion (carried out by hydraulic action and abrasion) – this becomes the outside bend of the meander.
3) This leads to the formation of a river cliff on the outside bend. The material eroded further upstream is deposited on the opposite bank (inside bend) on the slip off slope
4) Erosion and deposition continues which leads to the meanders becoming more curved

Depositional landform of a River (Middle Course)

1) Meanders :

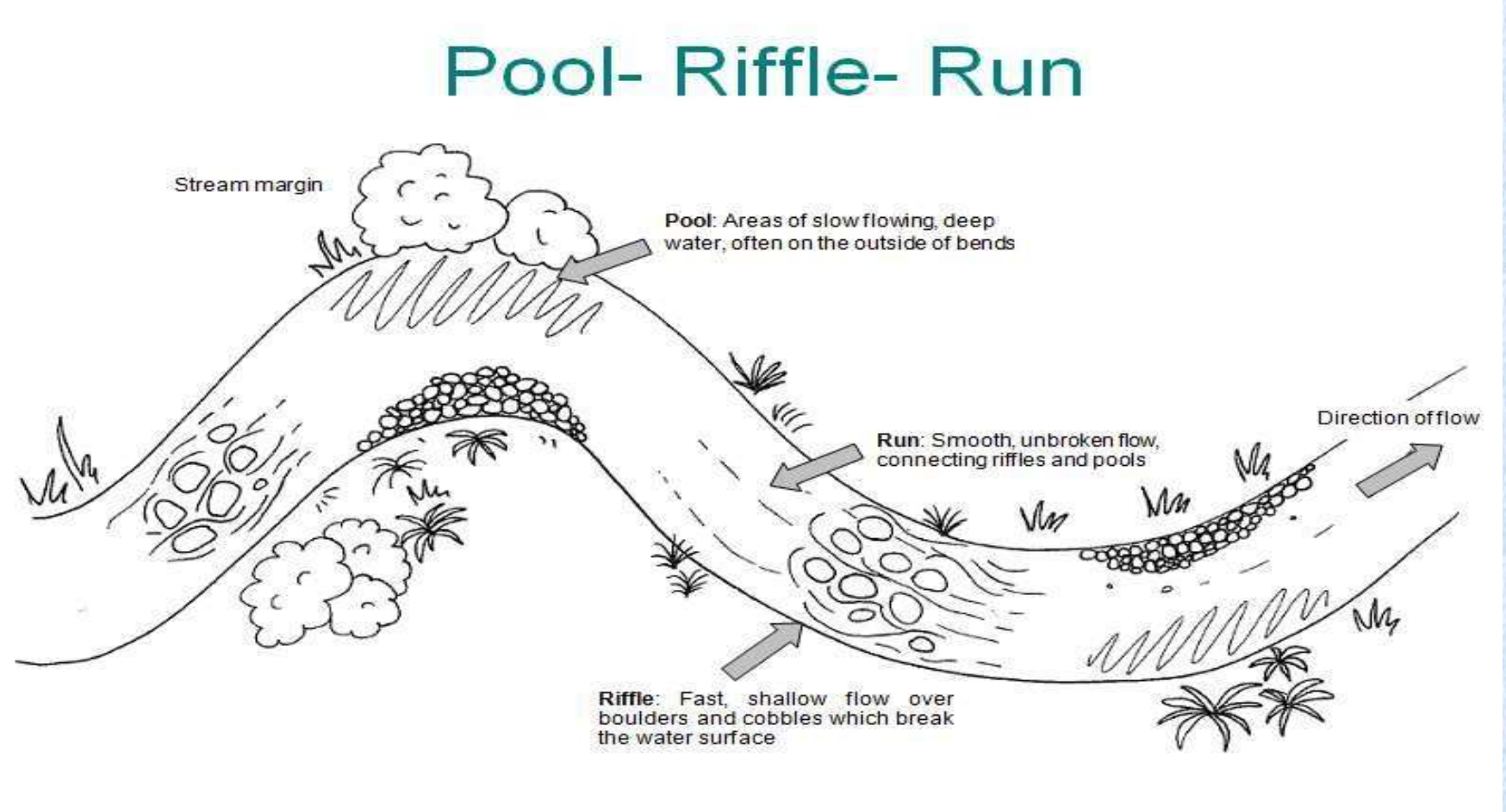
Sinosity Index

Sinuosity, sinuosity index, or sinuosity coefficient of a continuously differentiable curve having at least one inflection point is the ratio of the curvilinear length (along the curve) and the Euclidean distance (straight line) between the end points of the curve.

SI <1.05: almost straight
1.05 ≤ SI <1.25: winding
1.25 ≤ SI <1.50: twisty
1.50 ≤ SI: meandering

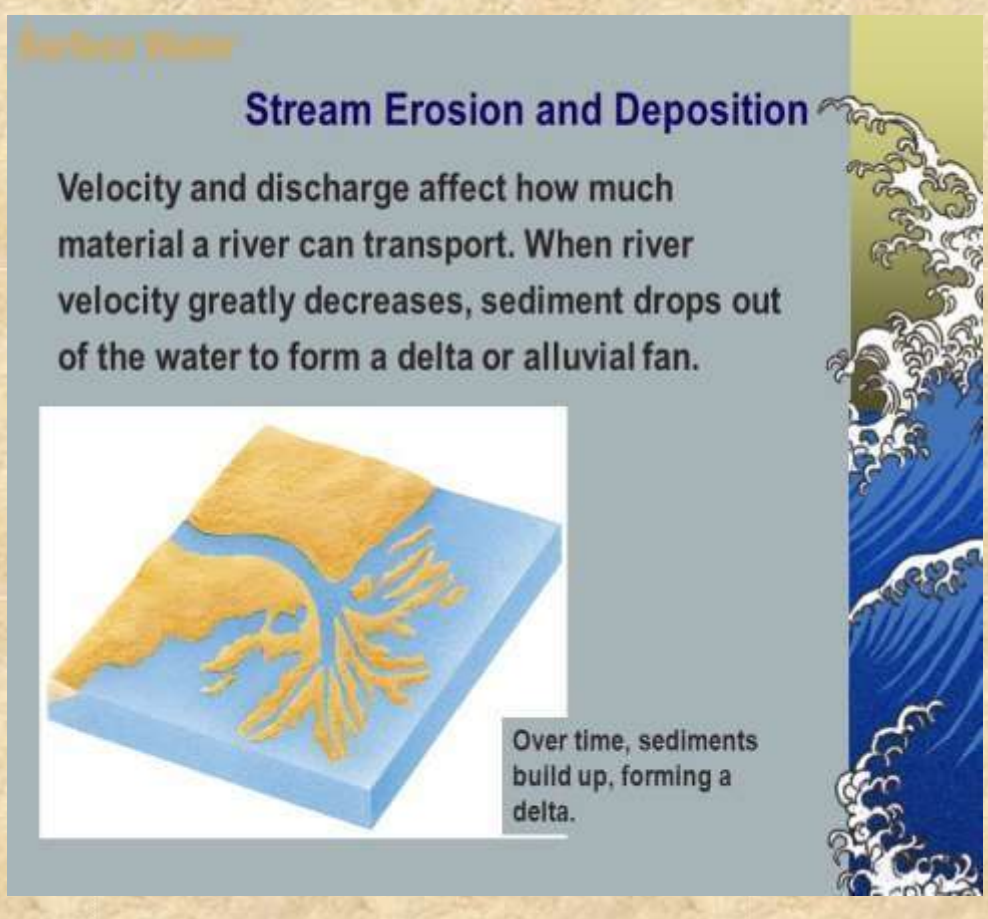
Depositional landform of a River (Middle Course)

2) Riffle and Pool



Depositional landform of a River (Middle Course)

3) Alluvial Fans



Depositional landform of a River (Middle Course)

3) Alluvial Fans : Formation

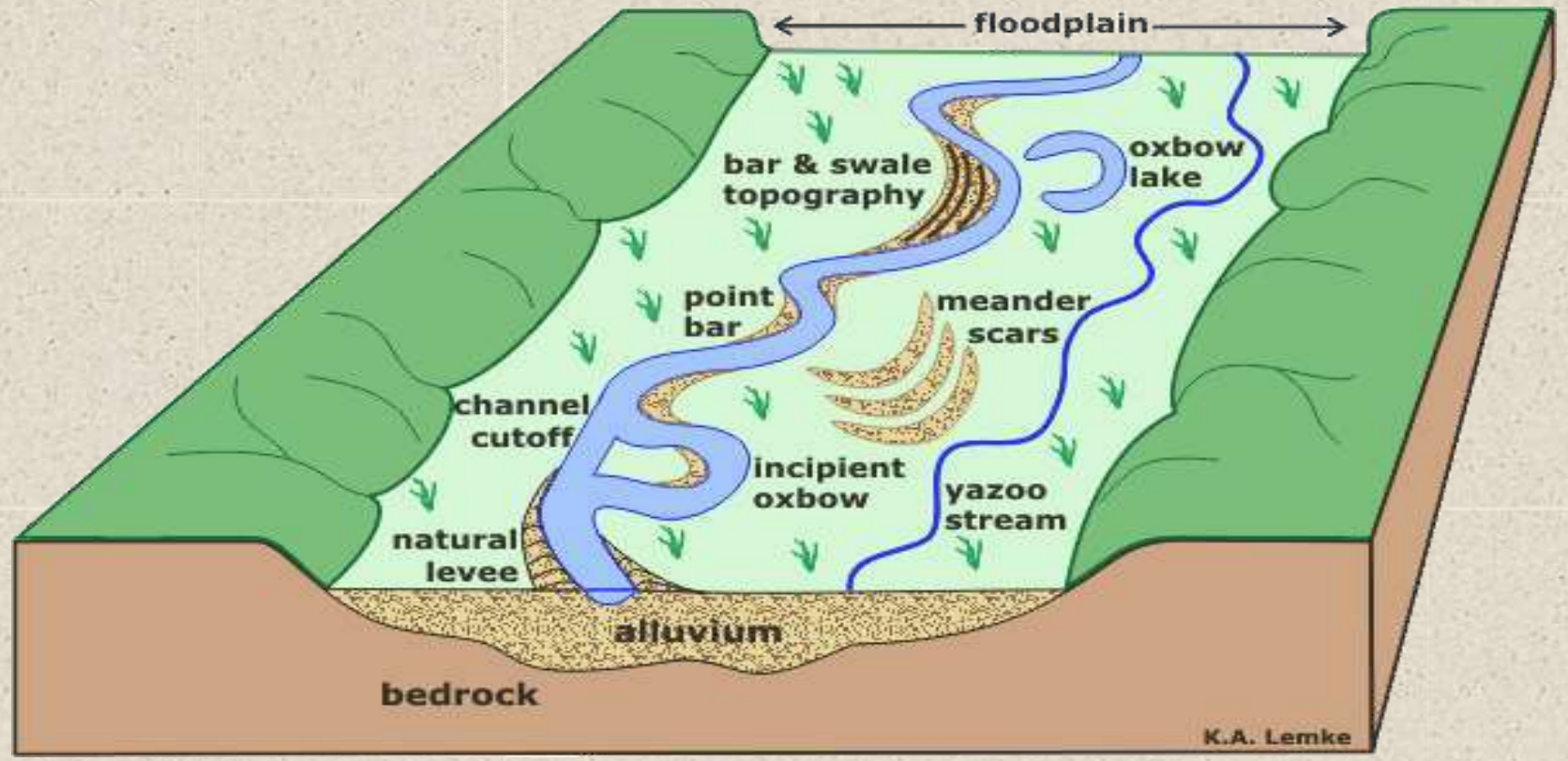
- Decrease of the slope
- Partiality blind valley
- Formation of braided structure of river
- Low transporting capacity due to braided structure of river
- Weather
- Parent material

Modes of Deposition of Alluvial Fans

- Flash flood
- Inert stream relation
- Stream flood

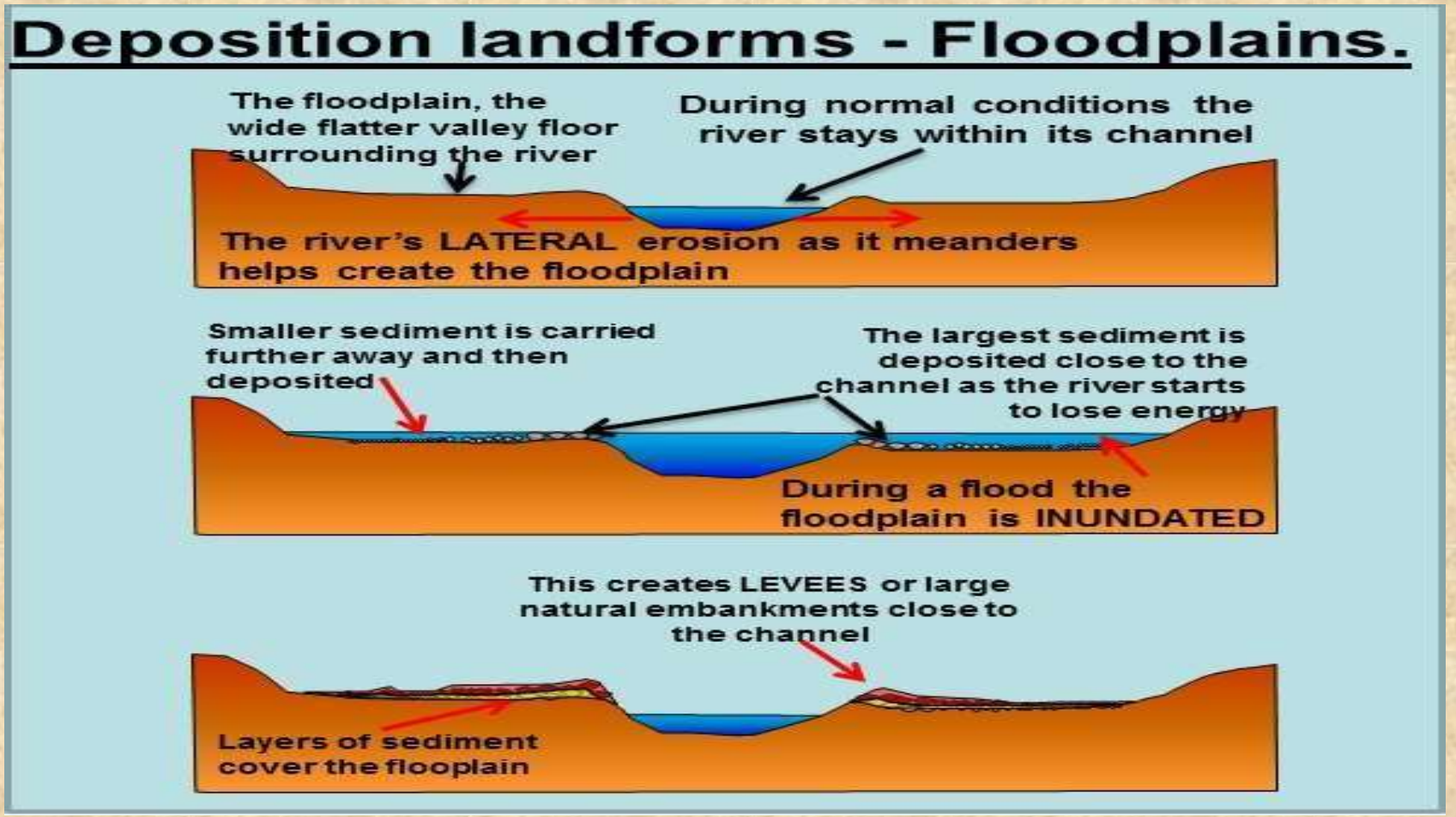
Depositional landform of a River (Middle Course)

4) Flood Plain



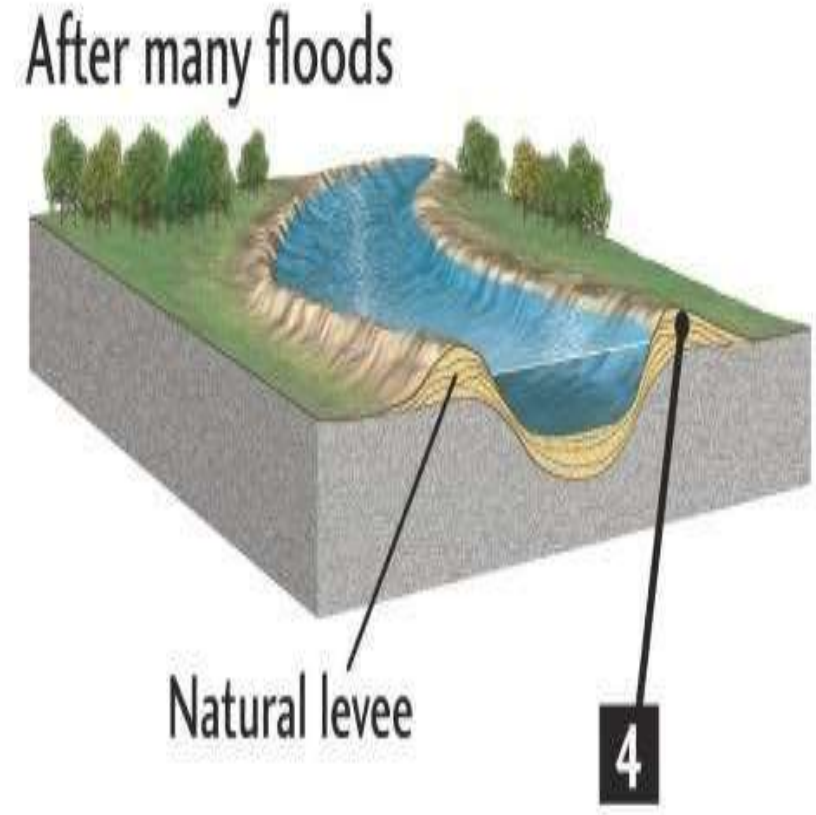
Depositional landform of a River (Middle Course)

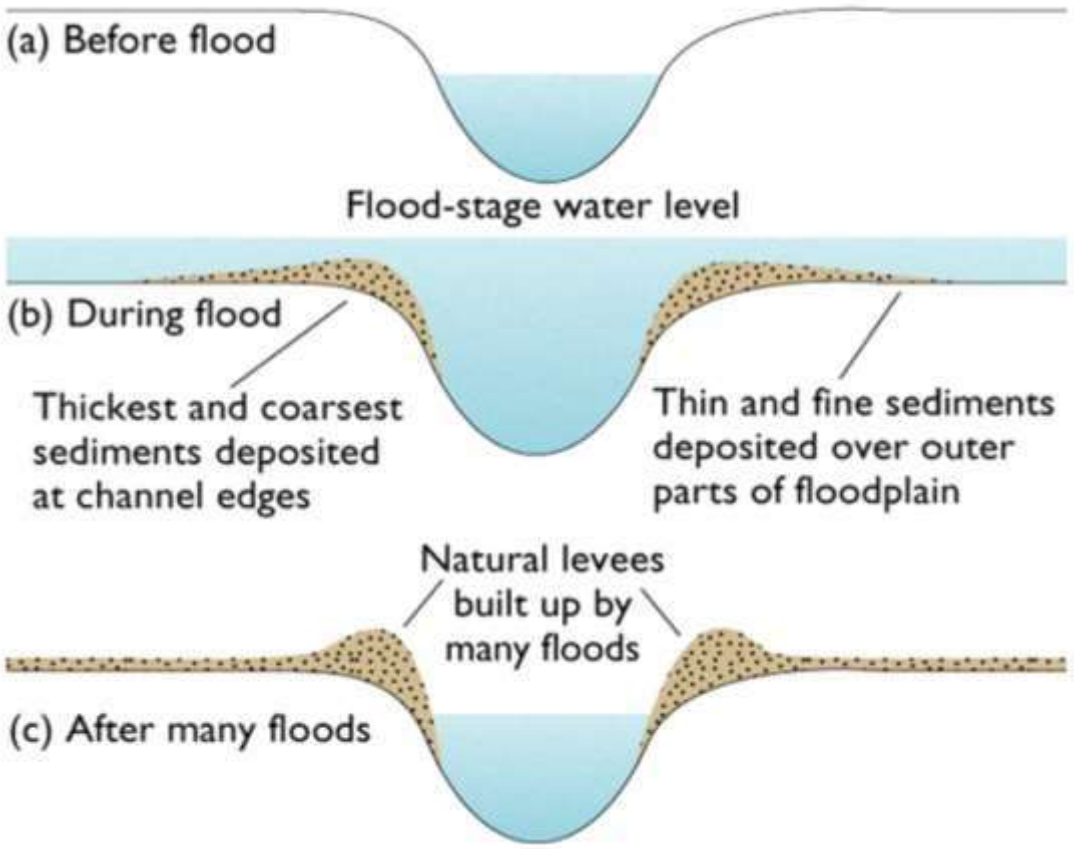
4) Flood Plain



Depositional landform of a River (Middle Course)

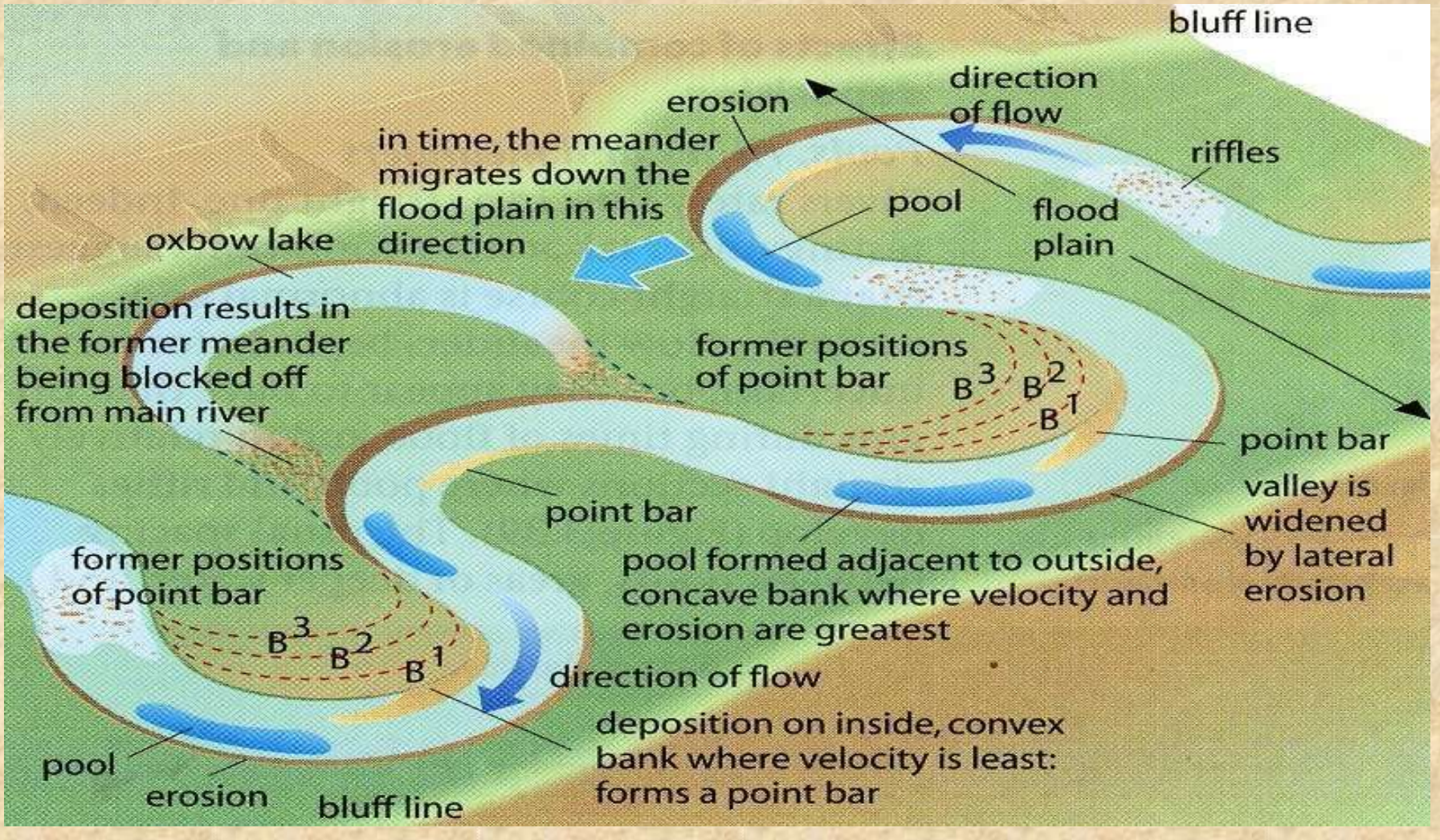
5) Natural Levees





Depositional landform of a River (Middle Course)

6) Point bars

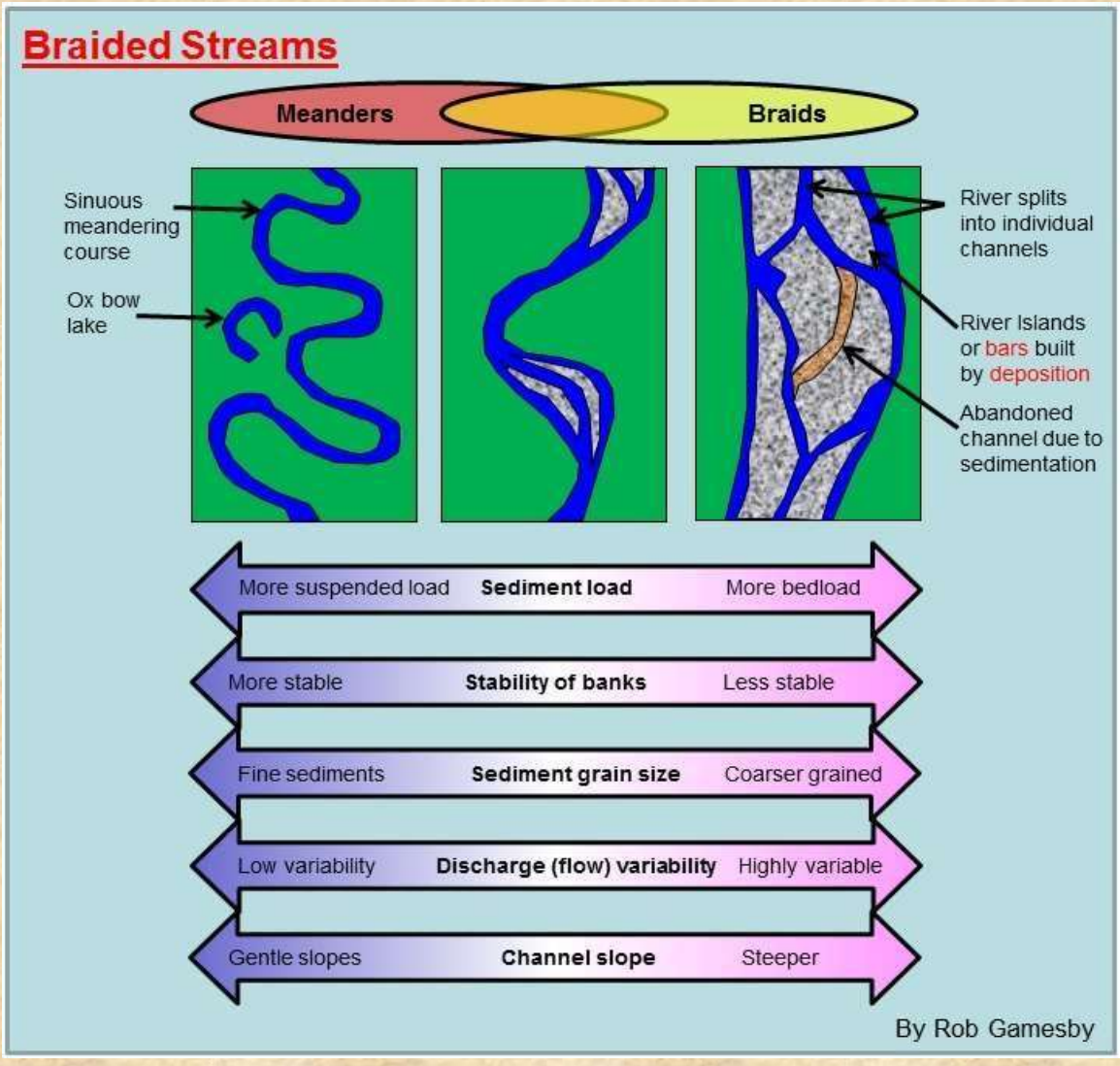


Depositional landform of a River (Middle Course)

7) River Terrace

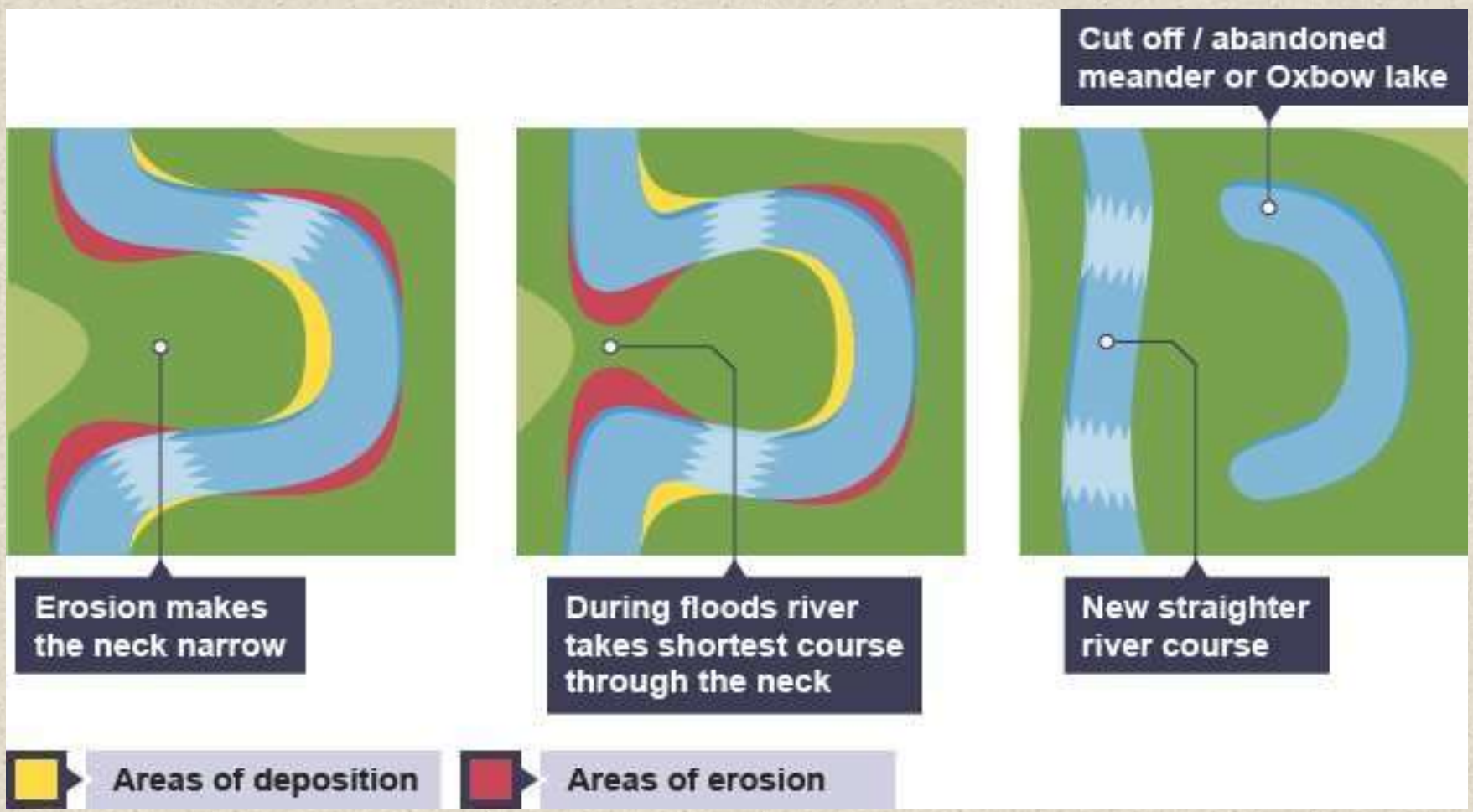
Depositional landform of a River

8) Braided Stream



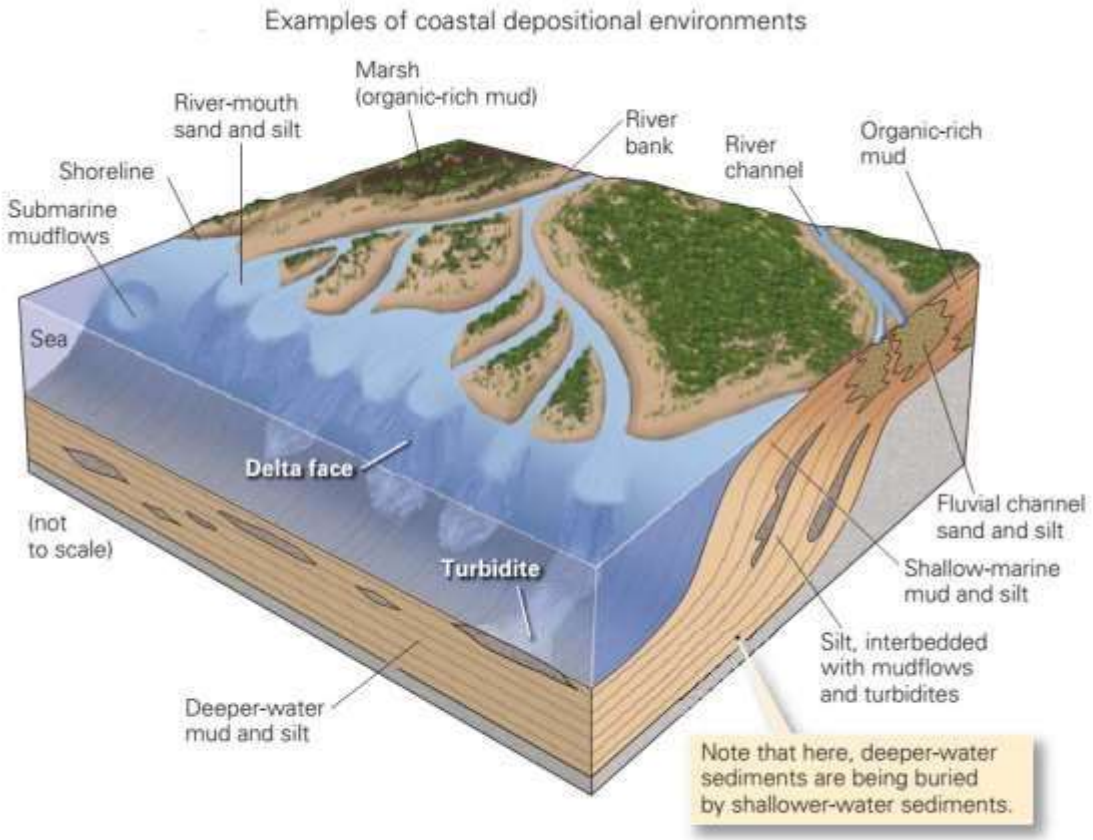
Depositional landform of a River (Middle Course)

9) Ox-Bow Lake



Depositional landform of a River (Lower Course)

10) Delta



(a) A major river delta along an ocean coast is a complex depositional environment. Sea-level changes affect locations of depositional settings.

(b) Waves on this California beach wash and sort the sand.

Depositional landform of a River (Lower Course)

10) Delta : Favorable factors for constructing Delta

✓ The river must have large load. This will be possible if there is active erosion in the upper and middle stages.

✓There should not be extensive deposition in the middle stage e.g. presence of lake in between or high evaporation rate (first).

✓The river's load must be deposited faster than it can be removed by the action of currents and tides.

✓ Presence of shallow adjoining sea or continental shelf.

✓The velocity of a river must be sufficiently low to allow most of its load to be deposited in the river's mouth.

✓Relative density of ocean water.

✓Agents of ocean water

✓Physiographic characteristics (gradient, depth etc.) of the coastal area.

Mechanism of Delta Formation

- **Homopycnal flow: (equal density of both river & ocean/ lake water)**
- **Hyperpycnal flow: (more densely water compare to ocean)**
- **Hypopycnal flow: (less densely water compare to ocean)**

Avulsion/ River shifting

Depositional landform of a River (Lower Course)

Classification of Deltas : (According to shape)

1) Bird's Foot Delta:

- Fine materials
- Less densely water of river
- Linear delta
- Distributary rivers
- Misisipi river delta
- Misisipi river delta increasing 75m/year

2) Arcuate Delta:

- Latin word archus = bow (dhanuk)
- Bow in sea
- Joint result of Ocean current & ocean wave
- Maximum spread in middle part
- Called Bajni delta or jihba/ toung delta
- Increasing towards sea called progradation
- Nile river delta, ganga river delta

Depositional landform of a River (Lower Course)

Classification of Deltas : (According to shape)

3) Estuarine Delta:

- Deposition of river load into Long elongated fiords
- Rine river delta in Germany
- Shain river delta in France

4) Cuspate Delta:

- Linear coast
- High velocity wave
- Flourish river load
- Limb of the delta is like arc to bend
- Bend increasing towards sea
- Taibar river delta in Italy

Classification of Deltas : (According to Structure)

a) High destructive delta

b) Wave influenced delta

c) Tide influenced delta

d) High constructive delta

Depositional landform of a River (Lower Course)

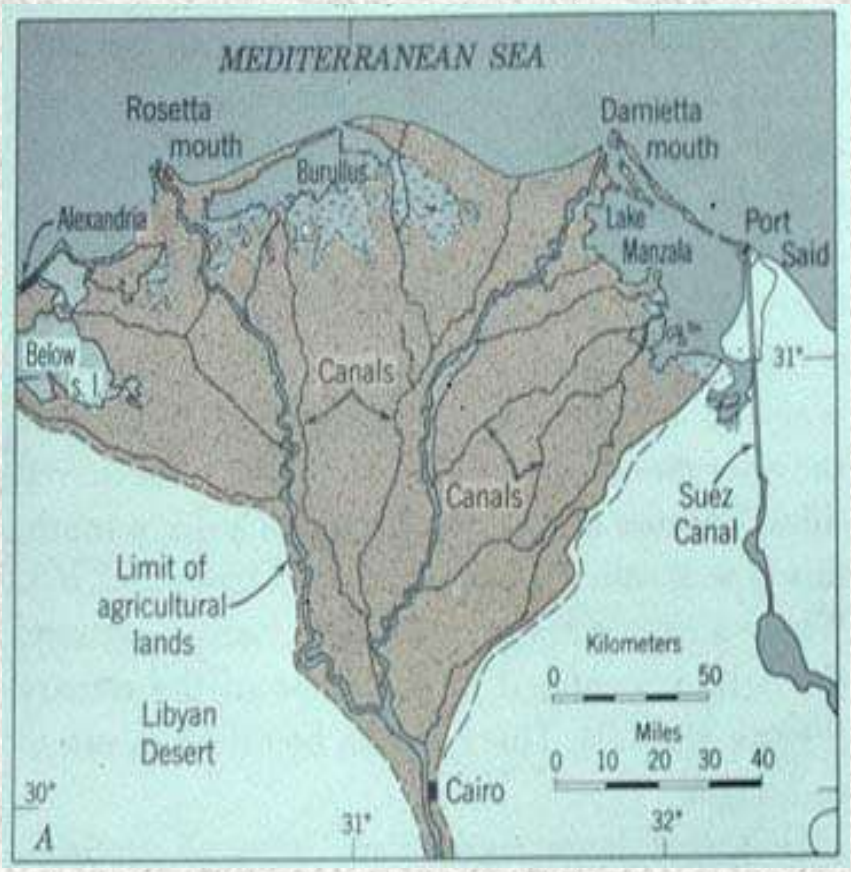
Classification of Deltas :

1) Bird’s Foot Delta

Depositional landform of a River (Lower Course)

Classification of Deltas :

2) Arcuate Delta



3) Estuarine Delta