GEOGRAPHY NOTES

An Updated Well-Organized Detailed Revision Notes for the Current Form 3 Syllabus.

SERIES 1

THIS IS A FREE SAMPLE OF THE ORIGINAL NOTES

EXTERNAL LAND FORMING PROCESSES

Processes operating on the exterior of the earth resulting in the formation of natural physical features.

These are:

- weathering
- mass wasting
- erosion
- transportation
- deposition

Weathering

Mechanical breakdown or chemical decay of rocks "in situ" (without movement) **Agents of weathering** -Things that work to cause it:

1. Weather elements:

- rainfall

- temperature
- frost
- gases e.g. CO2,O2

2. Plants

3. Animals

4. People

Factors That Influence Weathering

Climate

Different areas with different climatic elements experience different types of weathering e.g. block disintegration are experienced in arid areas while frost action is experienced in temperate regions and mountainous regions of tropics.

Topography

Weathering is faster on steep slopes than on gentle slopes because weathered material is washed away quickly exposing the rock once again to agents while on gentle slopes materials remain in one position shielding the rock from weathering agents.

Nature of rocks

Dark coloured rocks absorb more heat than light coloured ones hence break faster due to excessive expansion and contraction.

A rock with different minerals may disintegrate faster due to differential expansion and contraction of minerals.

A well jointed rock will break faster because physical and chemical agents can penetrate faster e.g. by freezing and thawing.

Fine textured rocks have a large surface area on which chemical processes can act e.g. Limestone.

Biological organisms

Bacteria facilitate rotting of organic matter producing organic acids which reacts with some minerals causing the rock to break up.

Plant roots and burrowing animals penetrate rocks resulting in cracks providing passage for agents such as water to act on rocks.

People accelerate the rate of weathering by exposing rocks buried deep below by digging, blasting and drilling.

Types of Weathering

1. Mechanical Weathering

Physical break up of rocks without change in their chemical composition.

Processes

a) Block Disintegration/Separation

Breaking of rocks into blocks along the joints.

It's effective in arid areas because of great diurnal temperature range.

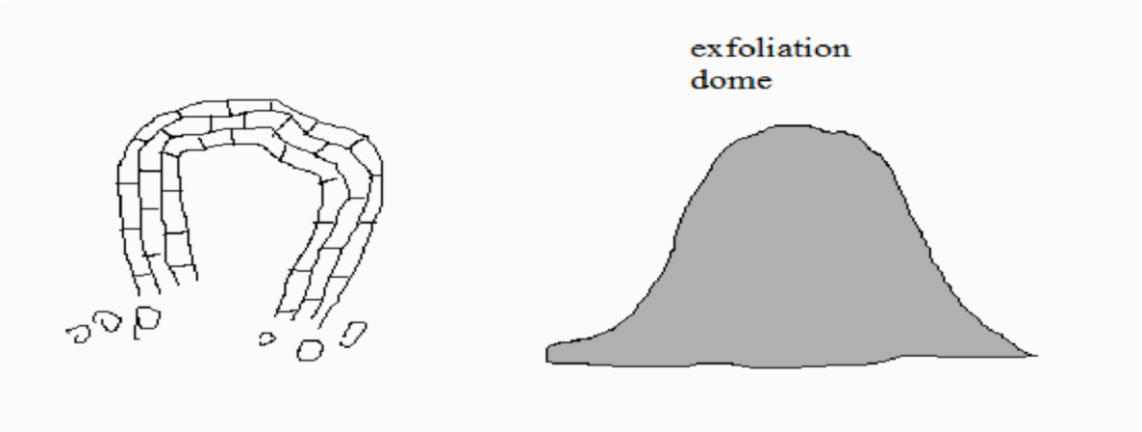
Day, well jointed rocks are subjected to intense heating causing minerals in it to expand.

In the night the rock is cooled causing it to contract.

The rock joints enlarge due to the alternating cooling and contraction.

The process is repeated over a long time causing the rock to disintegrate into blocks along the joints e.g. Mundanda rock in Tsavo East.

b) Exfoliation



Peeling off of layers of rocks.

Also common in arid areas.

Day, rock surface is heated more than inner layers because rocks are poor conductors of heat.

The surface expands more than inner layers causing strain between the two layers.

With time outer layer develops cracks and later peels off and pieces of rocks fall down under gravity
e.g. along Mombassa-Nairobi road between Mtito Andei and Voi.

c) Granular Disintegration Disintegration of rocks into grains.

Occurs in rocks with different minerals.

When the rock is heated, different minerals expand differently.

Internal stress results and with time the rock disintegrates into grains.

d) Pressure Release/Sheeting/Unloading

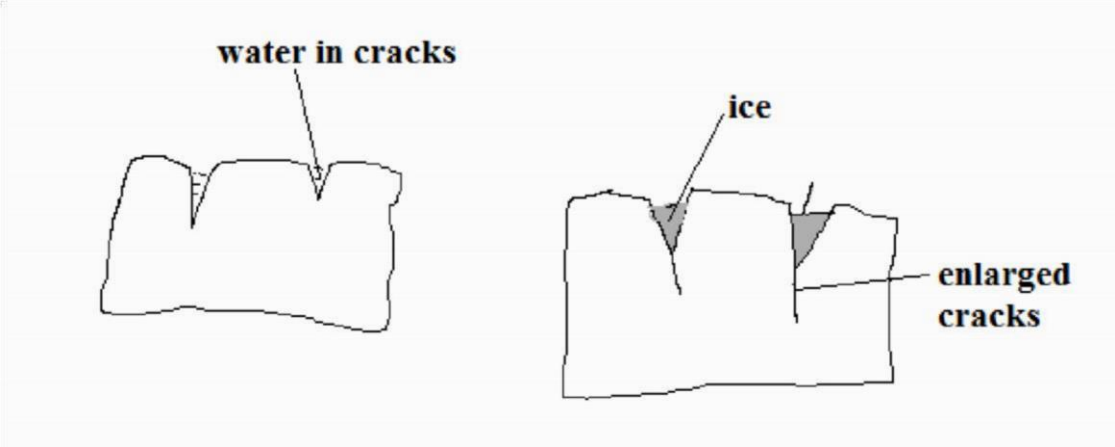
Disintegration of rocks due to expansion when weight is removed from over it.

Soil and other materials lying on top of a rock are removed by erosion and mass wasting (denudation).

The exposed rock expands when the weight that was pressing it is removed. The outer layer curves and eventually shells are pulled out from the rock.

The result is formation of a high rocky hills called granitic tors e.g. Maragoli and parts of Machakos.

e) Frost Action



Breaking of rocks into angular blocks due to repeated freezing and thawing.

Common in temperate regions or mountainous regions of tropics where temperature fall below zero.

Water from melting ice collects into small cracks of rocks.

It freezes and expands and exerts pressure on cracks widening them.

Repeated freezing and thawing causes the rocks to break into angular blocks e.g. on Mt. Kenya, Kilimanjaro and Ruwenzori.

f) Crystal Growth

Break up of rocks due to crystal growth.

It occurs in arid areas.

High rate of evaporation draws out moisture and dissolved minerals from the rock interior through capillary action.

The moisture evaporates when it gets to the surface of the rock leaving behind crystals in the cracks and pores of rocks.

The crystals continue to grow exerting pressure on the cracks or pores widening them and eventually causing the rock to break down e.g. at Hells Gate near Naivasha.

g) Slaking/Rain Water Action

Breaking up of sedimentary rocks due to alternate wetting and drying.

When it rains, the rock absorbs water and swells.

When dry season comes, the rock loses water and the outer surface shrinks.

The process is repeated and the minerals become loosely attached to another e.g. in Kenyan Coast at Tudor and Miritini areas.

2. Chemical Weathering

Weathering involving changes in the chemical composition of minerals making up rocks

Processes

a) Solution

Break up of rocks as a result of dissolving of minerals in water without chemical change in them.

Rain water falls on rocks with soluble minerals.

The minerals are dissolved and carried down in solution.

The rock gets weakened and crumbles.

b) Carbonation

Weathering caused by reaction of calcium carbonate in rocks with rain water containing a weak carbonic acid.

Common in temperate regions.

Rain water absorbs small quantities of carbon dioxide forming a weak carbonic acid.

$H_2O + CO_2 \rightarrow H_2CO_3$

The weak carbonic acid falls on limestone rocks reacting with calcite forming calcium bicarbonate.

$CACO_3 + H_2CO_3 \rightarrow CA(HCO_3)$

Calcium bicarbonate is removed from the rock in solution.

c) Hydrolysis

Weathering caused by reaction of hydrogen ions of water and ions of rock minerals.

Igneous rocks are greatly affected.

d) Oxidation

Weathering in which minerals in rocks combine with oxygen in the presence of moisture to form new minerals.

Rocks containing iron are affected.

Ferric oxide is formed on the rock surface which appears as a soft brown or red earth which can be scooped by hands.

e) Hydration

Weathering in which hygroscopic minerals in rocks take up water causing them to swell and expand causing disintegration of rock due to internal stress.

3. Biological Weathering

-Weathering of rocks due to action of living organisms on them.

a) Action of plants Mechanical

The roots grow bigger into the cracks and joints of rocks widening them. With time the rock separate into blocks (wedging mechanism).

The widened joints and cracks also provide passages for moisture and air to penetrate deeper into cracks facilitating hydrolysis and solution to act at deeper levels.

Burrowing animals dig and break up small bits of rock from the main rock mass and bring them to the surface.

By digging they also provide passages for other elements like gases and moisture to reach rocks that are deep.

Large herds of animals such as cattle, zebra etc. pound the rocks with their hooves as they move resulting in resulting in mechanical breakdown of rocks.

People break up rocks by using explosives in mining by exploding bombs on the ground and during building of houses and construction of roads.

Chemical

Plants rot on rock in the presence of moisture and produce organic acid It reacts with some minerals within the rock causing decay.

Animals excrete on rocks and release chemical substances which react with some minerals in rocks causing them to break up.

Chemical substances released from the industries to rivers cause the water to act on rocks over which it flows.

Gases such as CO2 emitted from motor vehicles and industries are

Absorbed by rain and acids such as carbonic or sulphurous which react with minerals causing rock to decay.

Significance of Weathering

Positive

Leads to soil formation which is important for agriculture.

Produces other natural resources such as clay used in pottery, brick making, etc.

Weathered rocks form beautiful scenery for tourist attraction e.g. Hells Gate and crying stones of Kakamega.

Weakens rocks easing their exploitation by quarrying and mining **Negative**

May weaken the earth's crust resulting in unstable foundations of buildings and roads and eventually lead to their collapse. **MASS WASTING**

Movement of weathered material down slope under the influence of gravity

Factors Influencing Mass Wasting

a) Degree of slope

Movement of weathered material is faster on steep slopes than on gentle slopes due to the influence of gravity.

b) Climate

Weathered material in areas receiving heavy rainfall move faster since wet materials have less cohesion.

c) Nature of the material

Material saturated with water is more likely to move down slope as its heavy.

Mass wasting is more likely to occur in areas where the weathered material is deep.

Weathering is more likely where massive rocks lie on weak rocks such as clays, shale than where fine materials lie over weak rocks.

Vegetation

Surfaces with vegetation experience less mass wasting because it binds weathered material together.

Tectonic movements

Earth movements such as earthquakes, volcanic eruptions or faulting cause large and widespread mass wasting.

Human activities

Explosives used in mining and quarrying shake the ground initiating downward movement of materials.

Mining and quarrying also interferes with the stability of the surface by loosening it making it easy for the loosened materials to move down slope.

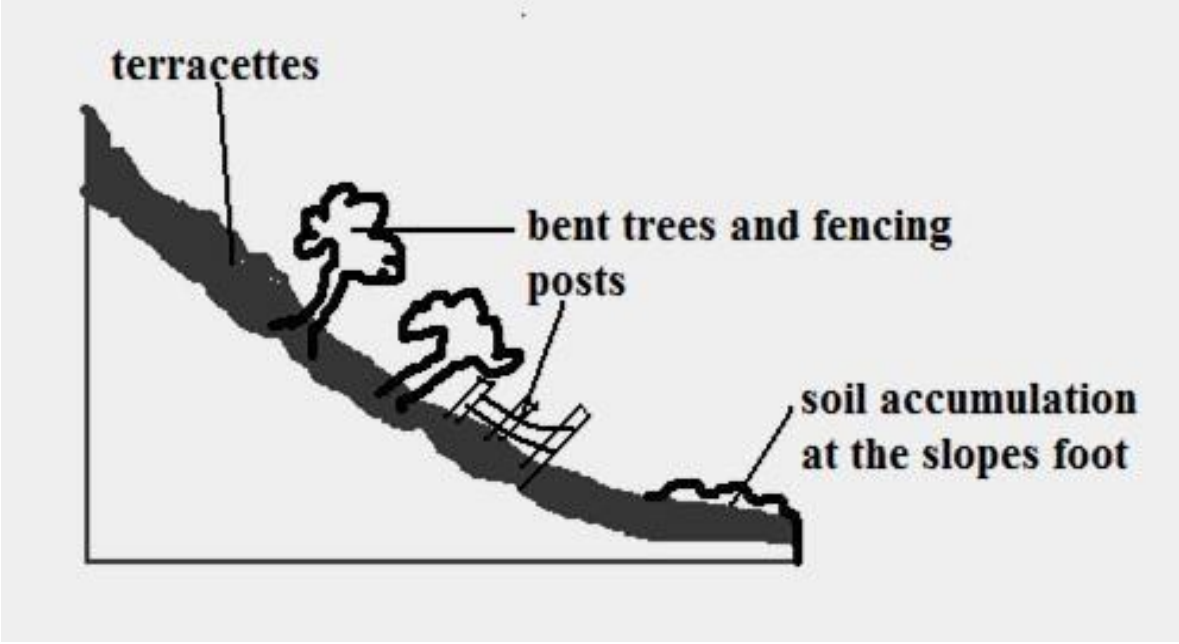
Types of Mass Wasting

1. Slow Mass Wasting

Slow but steady movement of soil or loose rock debris down slope.

Processes

a) Soil Creep



Slow and steady movement of soil and other fine materials along a very gentle slope.

Causes

Alternate heating and cooling causing expansion and contraction of particles causing them to change their positions.

Alternate wetting and drying of soil whereby when it's wet its compact and when dry the particles are loosened and tend to move away from each other.

Trampling and burrowing of animals.

External forces e.g. shaking by earthquakes, explosives, heavy vehicles, etc.

Sloughing down hill

Freezing of soil water causing it to expand which lifts particles at right angles to the slope in a process called heaving.

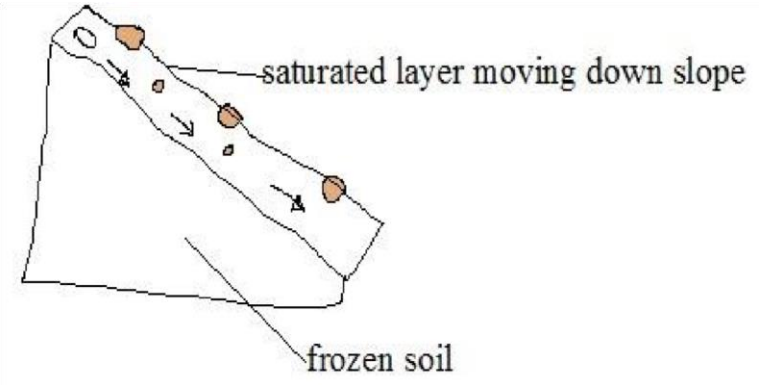
b) Solifluction

Movement of saturated soil, gravel and weathered rock down a moderate slope.

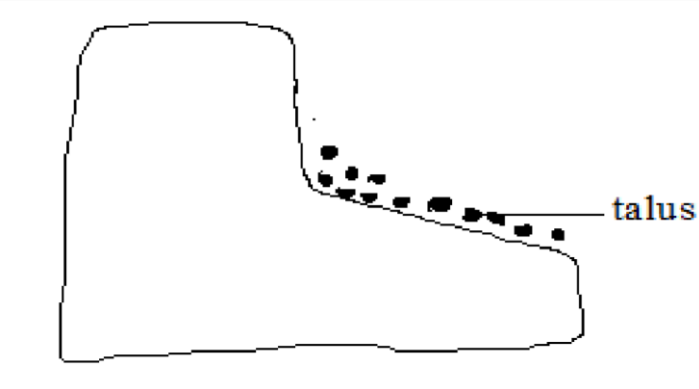
Common in mountainous and very cold climates

Thawing occurs during spring causing top soil to become saturated.

Saturated soil begins to creep over the subsoil which still remains frozen(permafrost).

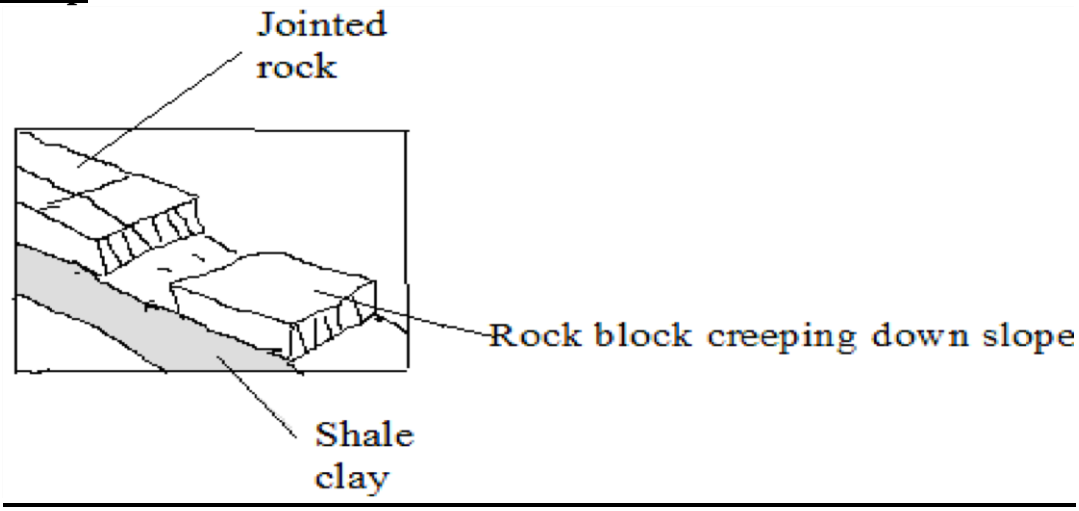


c) Talus Creep



Slow and gentle movement of the mass of broken rock particles which accumulate at the base of cliffs (scree) downhill.

d) Rock Creep



Slow movement of individual rocks which lie on clay at a very low speed down slope in the presence of moisture.

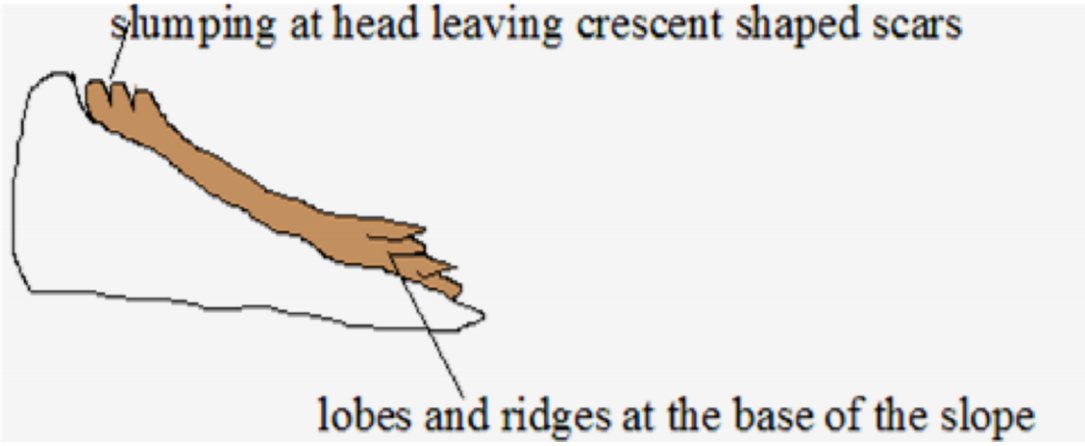
2. Rapid Mass Wasting

Type of mass wasting involving large amounts of weathered material moving suddenly and fast down slope.

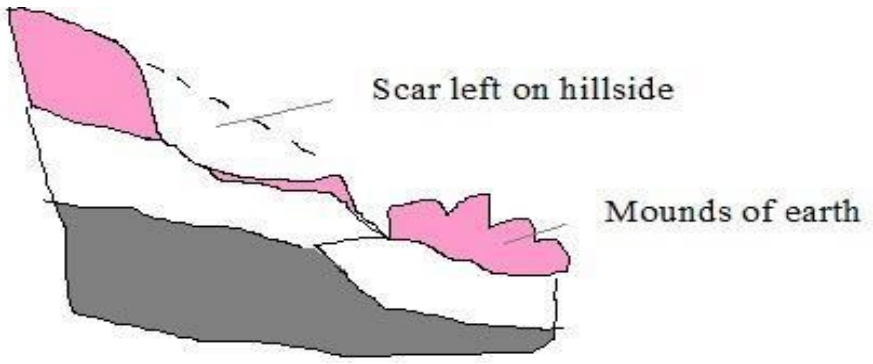
a) Mud Flow

Movement of oversaturated weathered material inform of liquid down slope.

It occurs mainly in dry areas after heavy rains.



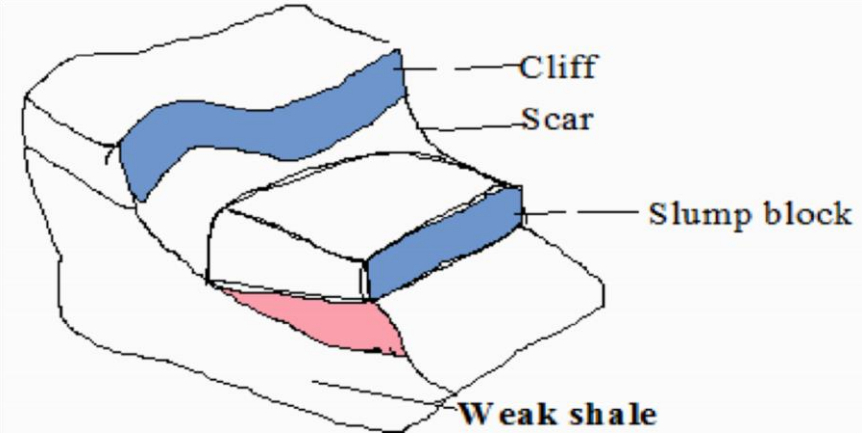
b) Earth Flow



Movement of saturated earth material on hill sides down slope. ***c)***

Land Slide

Sudden slipping of large quantities of loosened surface rock or soil down a slope. ***d) Slump***

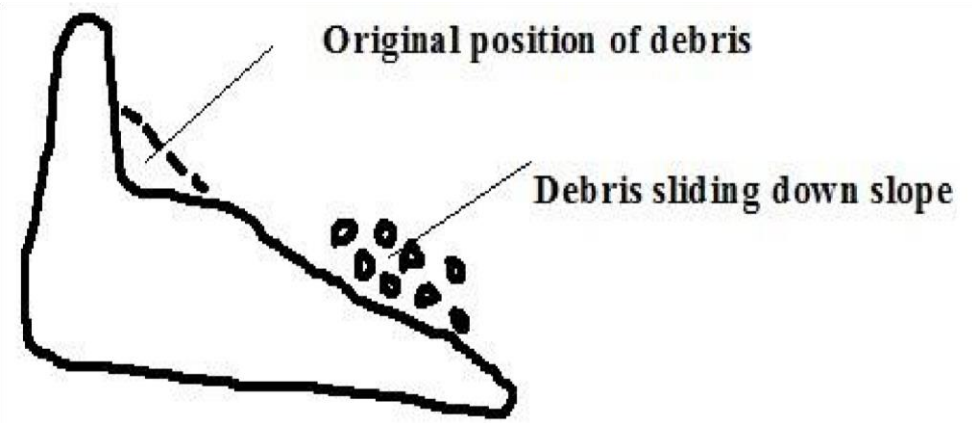


Erosion occurs on the weak rocks at the base of a cliff undercutting the weak rock.

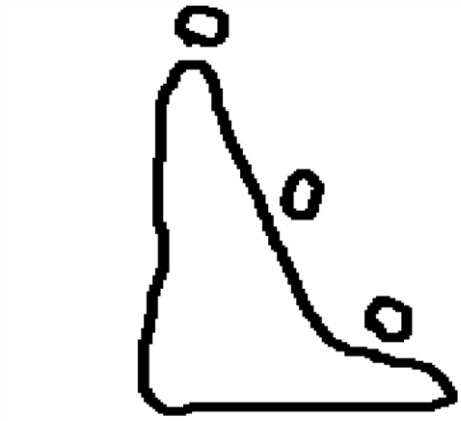
The overlying rocks break off causing the overlying rocks to slide down hill rotating around a curved plane.

e) Debris Slide

Sudden downhill movement of accumulated rock debris and other loose material downhill as a whole



f) **Debris fall**



Sudden free fall of debris from a vertical or hanging cliff to the base of the slope. **g)**

Rock Slide

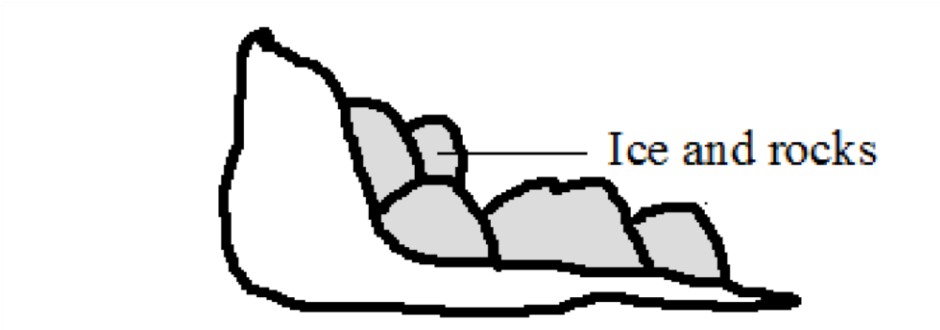
Sliding down of masses of rock a steep slope along a bending plane, joint of fault. **h)**

Rock fall

Falling or rolling of individual rocks or boulders down a steep slope or a cliff. Most rapid of all mass wasting.

h) Avalanche

Sudden slipping and falling of a large mass of snow, ice and loose rock materials down a mountain side.



i) Rain Wash

Type of mass wasting involving removal of weathered materials by rain water.

When rains come, the first drops scatter soil particles that have been loosened by drying.

The increasing downpour then washes large quantities of loosened soil downhill.

TYPES

a) Sheet wash

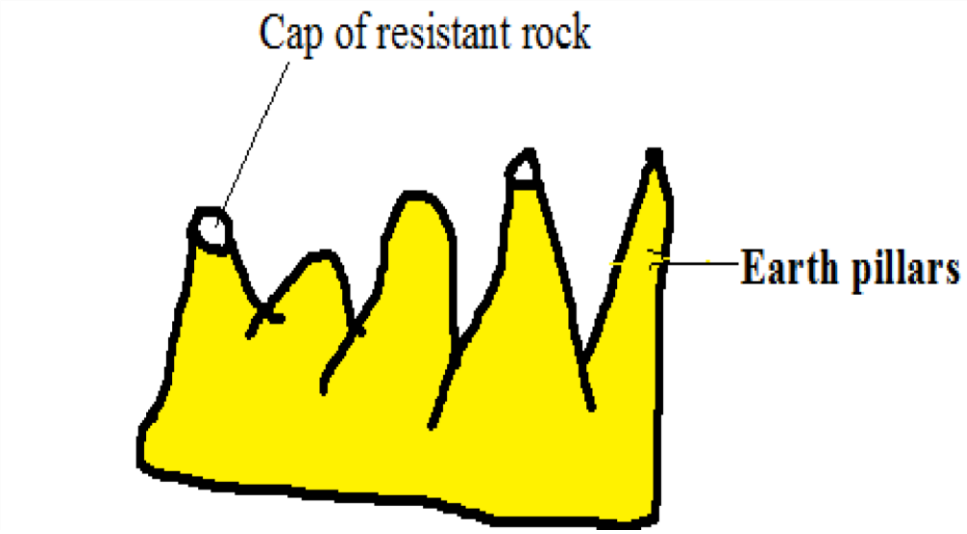
Uniform removal of soil from a large area.

Rainfall with uniform drops fall on loosened soil on a land with uniform slope.

The water from the rainfall then flows down slope.

As it does so, it uniformly sweeps all the loose soil from the surface. Its common around L. Baringo and Marigat.

b) Gulleying



Removal of soil through wide and deep channels called gullies.
Rain falls on an even slope
The water irregularly runs down slope along specific channels called rills.
The channels are widened and deepened by the water to form gullies.
Neighbouring gullies are widened and the ridges between them are reduced to form earth pillars.

C. Splash erosion

Removal of soil by rain drops scattering loose particles and carrying them down slope by runoff.

Effects of Mass Wasting On Physical and Human Environment

Positive

Make the soil to become fertile where soil from fertile areas is deposited.
Leads to formation of new land forms such as scars, depressions, lakes, rock pillars, etc. ***Negative***

Soil creep may destroy walls built across the slope when creeping soil exerts pressure on them.

Decrease soil fertility where fertile soil moves down slope.

Makes the ground prone to soil erosion especially where scars have formed.

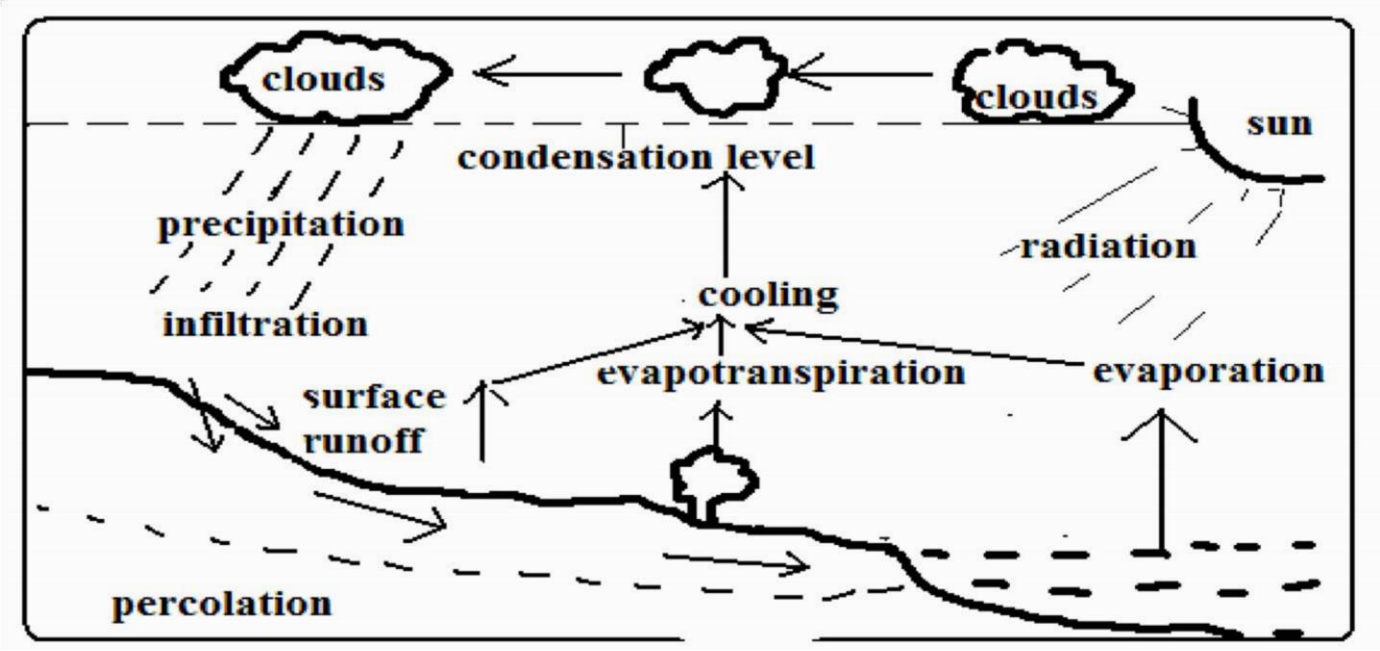
Hinders transport and communication by blocking railway lines making maintenance to be costly.

Hinders mechanisation of agriculture e.g. gulleying does not allow movement of vehicles and machinery on farms.

Leads to destruction of property and loss of live by burying people in their houses and stones falling on escarpments along roads causing accidents.

May Cause Rivers to change their courses e.g. mud flow.

HYDROLOGICAL/WATER CYCLE



Endless interchange of water between the sea, atmosphere and land.

Processes in Which Circulation Is Carried Out **Evaporation**

Changing of water into water into water vapour when it's heated by solar radiation.

Evapotranspiration: **C**ombined loss of water from the soil through direct evaporation and transpiration by plants. **Cooling**

Reduction of water vapour temperature as it rises into the atmosphere when it expands due to reduced temperature and pressure.

Condensation

Turning of water vapour into tiny water droplets which form clouds when cooling continues below dew point.

Precipitation

-The process in which the earth receives moisture from the atmosphere.

It occurs when droplets formed by condensation combine forming heavier drops which fall on the ground as rain or may become frozen to form snow, hail, sleet, etc.

Surface runoff

Some of the water from precipitation that flows on the surface into valleys, ponds, lakes, etc

Infiltration

Entry of water into the ground through pores, joints and cracks in rocks.

Percolation

Downwards and sideways movement of water that has entered into the ground.

Overland flow

Surface runoff makes the overland flow.

River water flows back to the oceans where evaporation takes place again and water cycle is repeated.

Significance of Hydrolological Cycle

Positive

Provides water to man from precipitation and underground water.

Provides rain to man who is useful in agriculture.

Atmospheric water is important in regulating heat loss from the earth by absorbing terrestrial radiation and reflecting it back to the earth keeping the lower atmosphere warm.

Negative

May lead to shortage of water when evaporation rate exceeds precipitation.

May lead to decreased agricultural production as a result of excessive evaporation causing weathering of crops.

May lead to flooding when excessive evaporation cause increased rainfall.

May lead to shortage of rainfall if there is less evaporation due to low temperature.

ACTION OF RIVERS

A river is a mass of water flowing over the land in a definite channel.

Work of a River

Drain excess water from the land.

Sculpturing land through erosion, transportation and transportation.

River Erosion

Removal by river water of materials from the sides and bed of the river channel.

Factors Influencing River Erosion

River volume

A river with a large volume has a greater kinetic energy to erode than one with a small volume.

Slope of land

A river flowing on a steep channel has greater velocity and therefore more energy to erode its channel than one flowing over gentle or flat land.

Rivers load

A river with large, rough and heavy load e.g. tree trunks and boulders erodes more than one with light, fine and smooth materials e.g. sand.

A river carrying more load erodes more than one with less load as it has more abrasive tools.

Nature of bed rock

Erosion is faster where a river flows over soft bed rock and less where it flows over hard rock.

Processes/Ways of river erosion

1. ***Solution/Corrosion***

River water dissolving soluble minerals and carrying them away.

2. ***Hydraulic Action***

Erosion by the force of river water when it thrusts itself into cracks and joints of rocks on the sides of the channel dislodging lumps.

Also by pushing air into the cracks, compressing it increasing pressure which widens the cracks eventually dislodging lumps.

3. ***Abrasion/Corrosion***

Abrasion is scratching of the bed and banks by materials are carried away by the river.

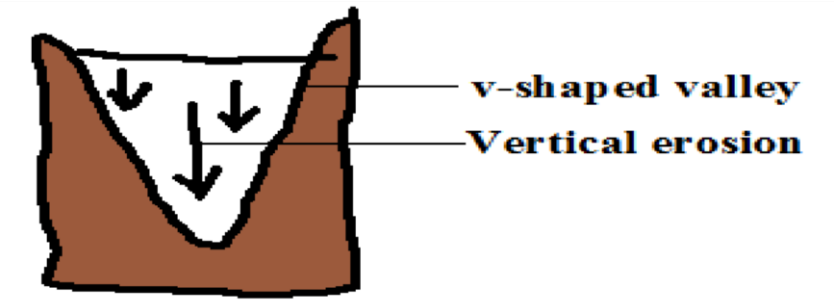
Corrosion is hurling of rock fragments carried by the river against rocks which weaken and eventually break them.

4. ***Attrition***

Hitting against one another of rock fragments carried by river water breaking one another into smaller pieces.

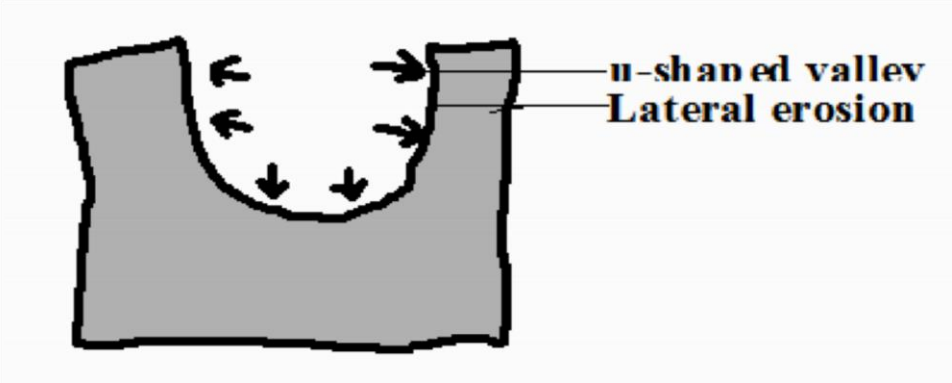
Types of River Erosion

1. Vertical Erosion



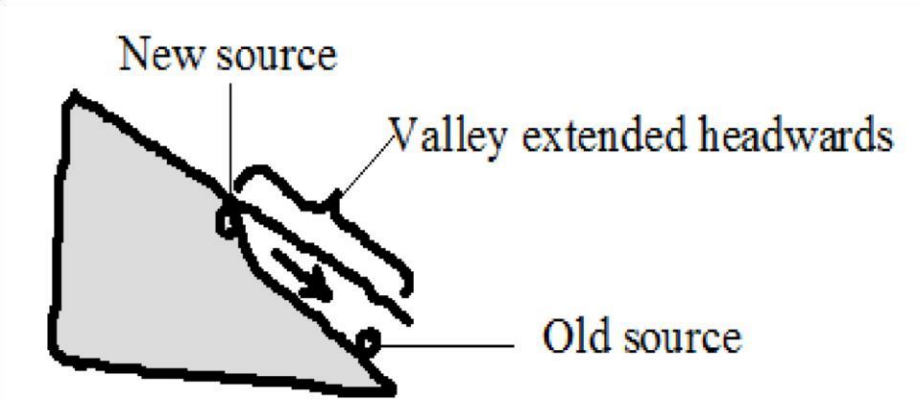
Erosion in which the river cuts downwards into its channel.

2. Lateral Erosion



Erosion in which the river erodes the sides of the channel.

3. Headward Erosion

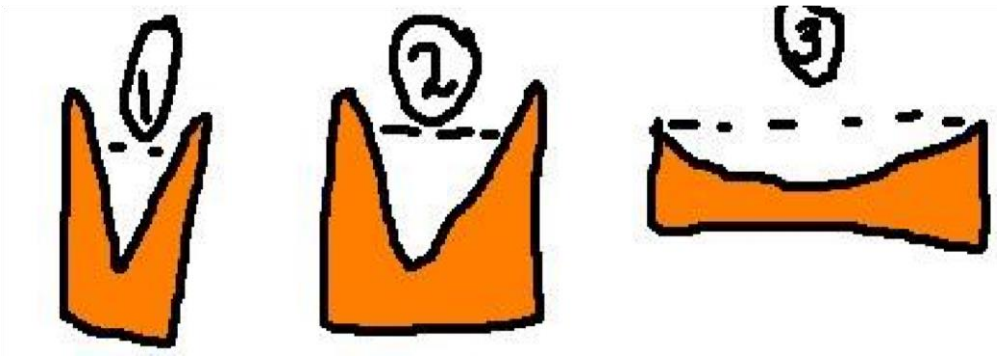


Erosion in which a river cuts back at its source.
Where there is a water fall.
The river undercuts at the base of a waterfall.
The rock above the undercut cliff collapses.
The position of waterfall shifts upstream.
Where gulleying or soil creep occurs where there is a spring causing its position to shift upstream (spring sapping).

Resultant Features of River Erosion

1. Stream Cut Valleys

Valleys with V, open V or U shaped cross sections along the river channel.



In the source region a river cuts itself a channel which starts as a gulley.

The channel is deepened by vertical erosion resulting into a v-shaped valley.

In the middle stage lateral erosion widens and deepens the valley resulting in a more open v-cross section.

In the old stage lateral erosion creates a very wide channel with a U-shaped cross section.

2. Gorges

Narrow, deep, steep-sided valley.

Ways/modes of formation

Where a river flows along a fault or a section of soft rocks eroding the channel vertically through the soft rocks or fault.

By headward erosion at a water fall when the river's erosive activity is increased due to increased gradient causing the river to undercut at the base of the water fall, then the rock above the undercut base collapses causing the waterfall to shift upstream resulting in a gorge below the water fall.

Where a river flows across a plateau with alternating horizontal layers of hard and soft rocks eroding them resulting in a gorge with stepped sides called a canyon e.g. Grand canyon on R. Colorado in USA.

Due to river rejuvenation when the river's erosive activity is renewed causing the river to vigorously erode deep into its channel.

Where a river maintains its course across land which is being uplifted gradually. **Rapids**

A section of the rivers course where the bed is suddenly steepened causing the water to suddenly flow swiftly.

How they are formed

Where a less hard rock lies below a soft rock and the soft rock is eroded more resulting in a steep

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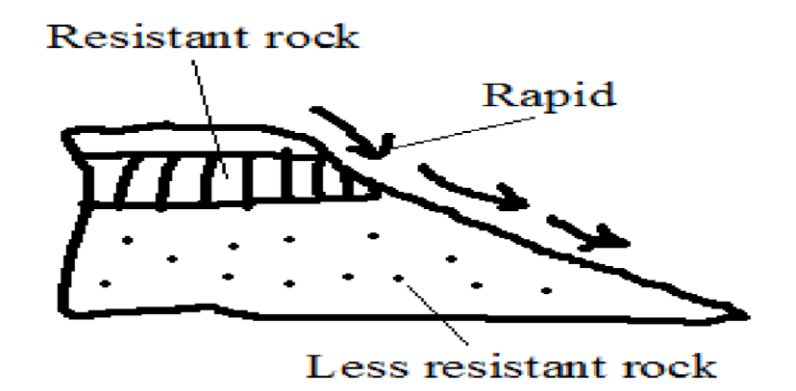
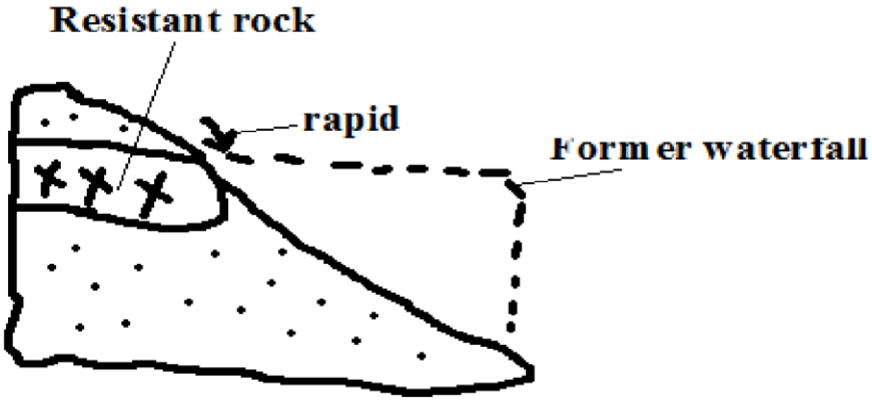
slope.

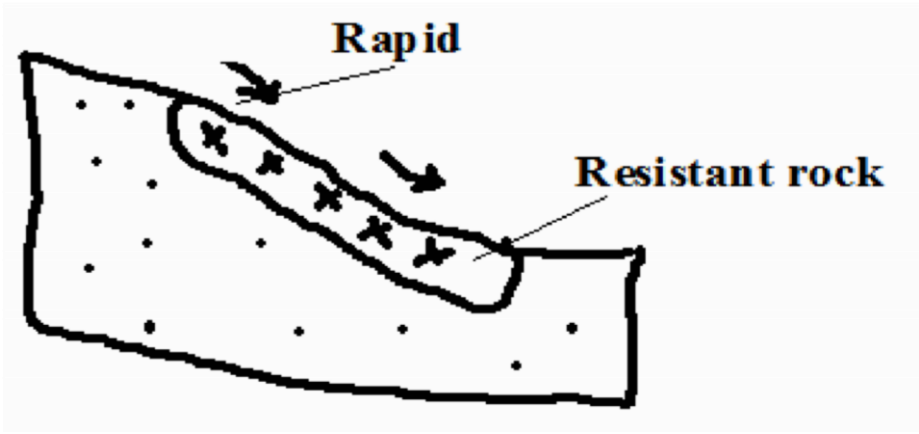


Where a water fall has been eroded by headward erosion reducing its height.



c)

Where resistant rock dips downstream and is unevenly eroded.



Water Falls

A place on a rivers course where a river bed is vertical or nearly vertical. **Formation**

Where a river descends over a sharp edge of a plateau encountering a sharp drop.

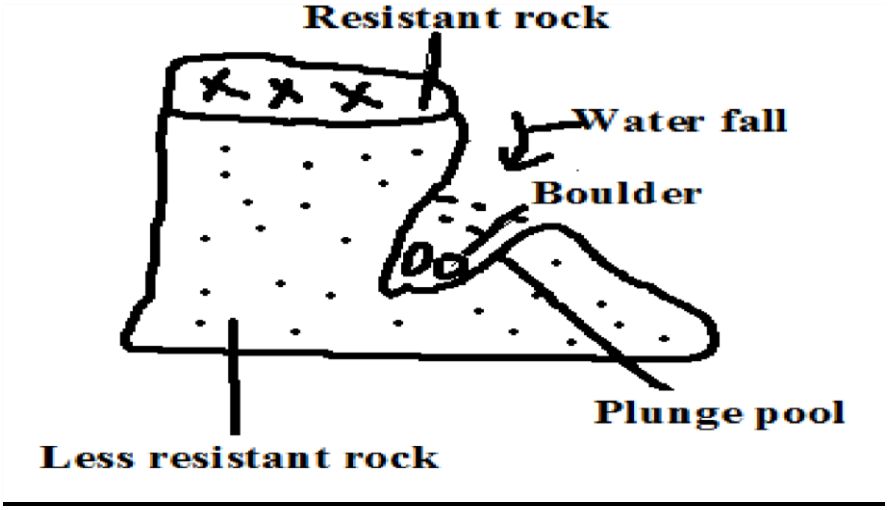
Where a river descends a cliff into the sea.

Where a river descends a fault scarp.

Where a river descends a sharp edge of a plateau.

Where a river is blocked by lava flow causing water to accumulate on the upstream side and a water fall forms at the point of overflow.

Where a resistant rock lies across a river with a less resistant one on the downstream side and the less resistant one is eroded faster causing a rapid to be first formed, then a waterfall.

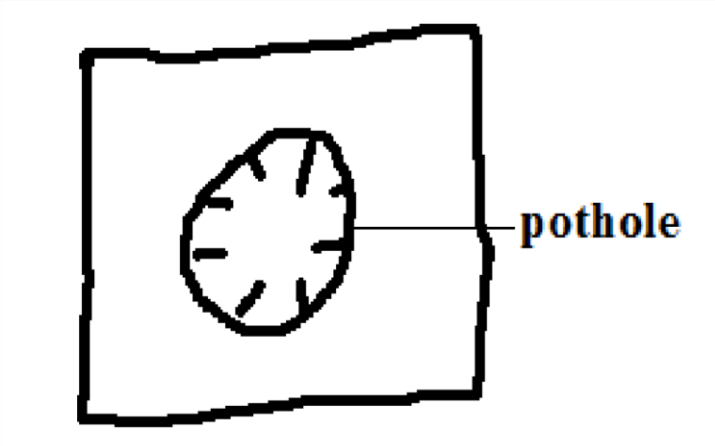


Pot Holes

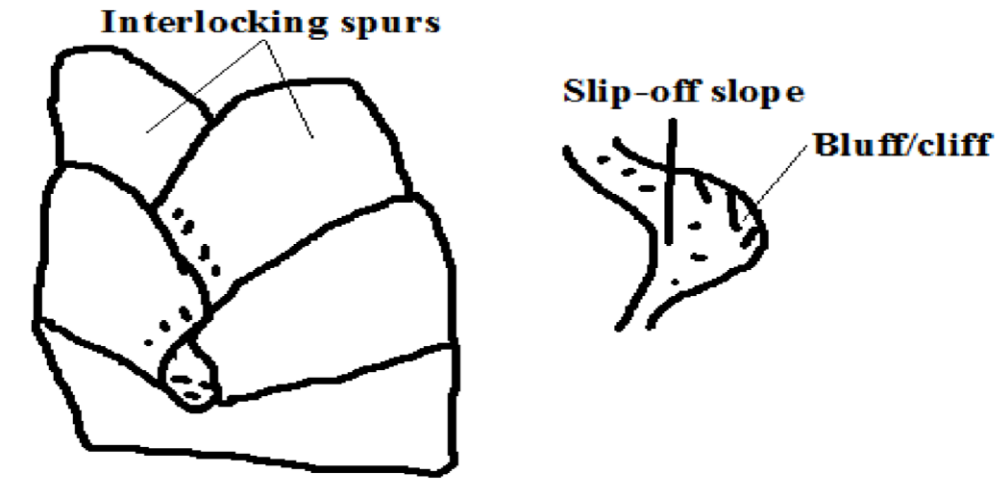
Circular depressions on a river bed.

Form where a river flows over shallow depression and develops strong circulating currents which cause the load to scratch the bed in circular motion.

HARDWORK



Interlocking Spurs



Highland projections which appear as they fit together.

Formation

HARDWORK

Where In the youthful stage, a river flows around spurs undercutting the outer bank more than the inner bank causing the bends to be more pronounced making the spurs to appear as if to fit together. The outer bank becomes river cliff/bluff and the inner bank slip off slope. **River Transportation**
River carrying away materials that its water has eroded from the channel.

Factors Influencing River Transportation

a) Rivers Volume

A river with large volume of water has more energy and therefore greater carrying ability than one with a small volume.

b) Gradient

A river flowing on a steep channel has greater ability to transport than one on a gentle slope because it flows fast due to gravity.

c) Rivers Load

Small and light particles are transported over long distances while heavy materials are transported for a short distance.

Dissolved load is carried all the way to the rivers mouth.

Small amount of load is transported for a long distance while large amounts of load collide reducing the speed and therefore rivers ability to transport causing some of the load to be dropped along the way.

Processes/ways of River Transportation *a)*

Suspension

River transportation of light and insoluble materials in form of a mixture. ***b)***
Saltation/Hydraulic Lift

River transportation of large particles through a series of jumps and hops.

Materials are lifted by force of moving water and pushed for a short distance and land back on the river bed by gravity.

The process is repeated causing the load to be transported downstream. ***c) Traction***

River transportation of heavy materials like boulders by rolling them by the force of water. ***d) Solution***

River transportation of load in solution form.

Load transported by suspension, Saltation and traction is called clastic load while that by solution is called dissolved load.

Deposition

Laying down of some of the load carried by the river when energy decreases.

Factors Influencing Deposition *a)*

Gradient

When gradient reduces the river's speed decreases and hence its energy is reduced causing it to drop some of the heavy load.

b) Rivers Volume

When rivers volume decreases its energy also decreases causing it to deposit heaviest load then lighter ones.

c) Obstacles

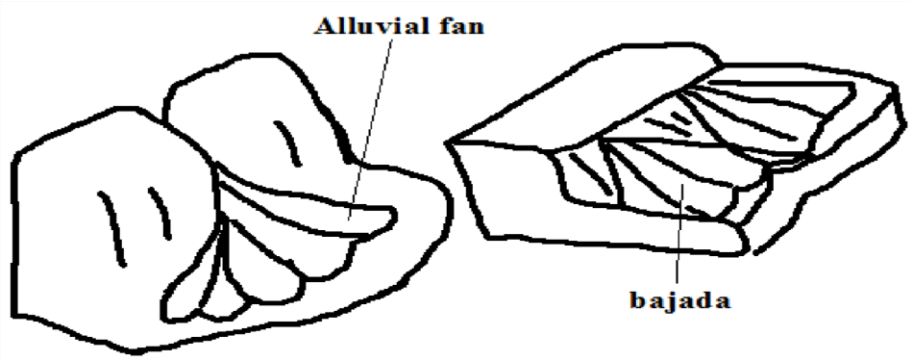
Obstacles such as swamp vegetation and rock outcrop reduce the river's speed and also trap some of the load thereby facilitating deposition.

d) River Bed Width and Depth

Where a rivers channel becomes wide and shallow there is less water per unit area and hence the river has lower capacity to transport so deposition of excess load begins.

Resultant Features of River Deposition

a) Alluvial Fans and Bajadas



Fan shaped deposits of alluvium.

Formation

The river flowing through a narrow channel enters a plain from a higher ground and suddenly spreads out.

There is a sudden loss of velocity causing the river to scatter alluvium all around to form an alluvial fan.

Alluvial fans merge to form a continuous feature called bajada or piedmont fan.

b) Meanders and Oxbow Lakes

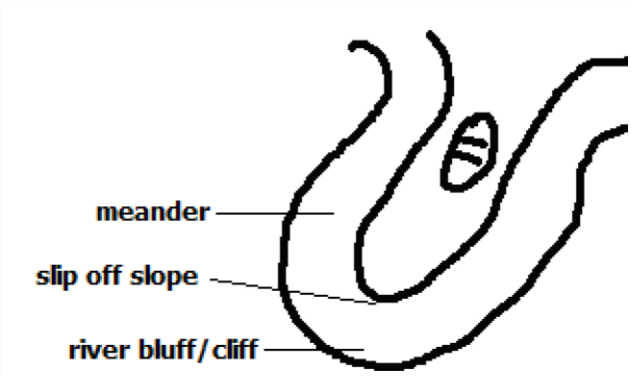
Meanders are loop-like bends in a rivers course.

Oxbow lake is a horse shoe shaped section of a former river.

Formation

In mature stage river flows sluggishly due to reduced gradient. It meets an obstacle and flows around it.

Erosion is greater on the outer bank and deposition on the inner bank causing the river to form loop like bends.



Erosion continues on the outer bank (bluff) narrowing the land between the two outer banks forming a pronounced meander e.g. on rivers Yala, Nzoia and Tana.

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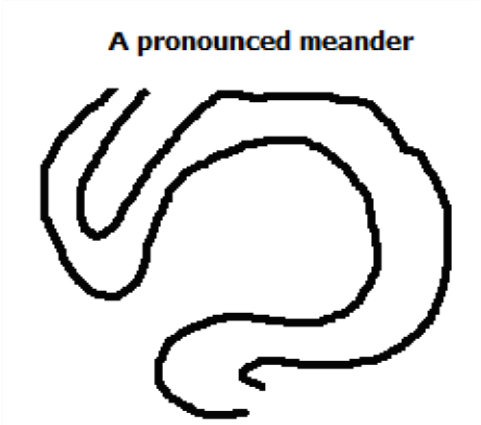
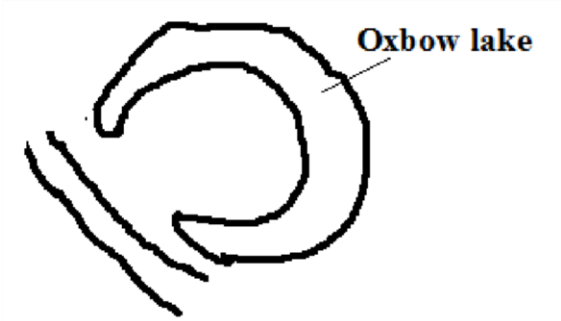
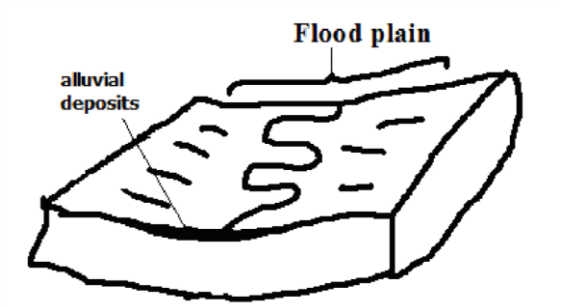


During the floods when the river has more energy it cuts across the narrow land.

The former bends are cut off by deposition to form an oxbow lake e.g. Kanyaboli on R.Yala and Shakababo on R.Tana.



Flood Plains



Wide gently sloping plain of alluvium on the floor of a river valley.

Formation

A river meanders.

There is erosion on outer bank and deposition on the inner bank.

The process continues and layers of alluvium deposited on inner bank join to form a plain e.g. Nzoia and Yala flood plains. ***River Braids***

Net work of diverging and converging channels along a rivers course.

Factors favouring formation of braids

River must be carrying large load.

Reduced gradient on the section.

Reduced amount of water such as in dry season or arid conditions.

Presence of obstacles such as rock out crops.

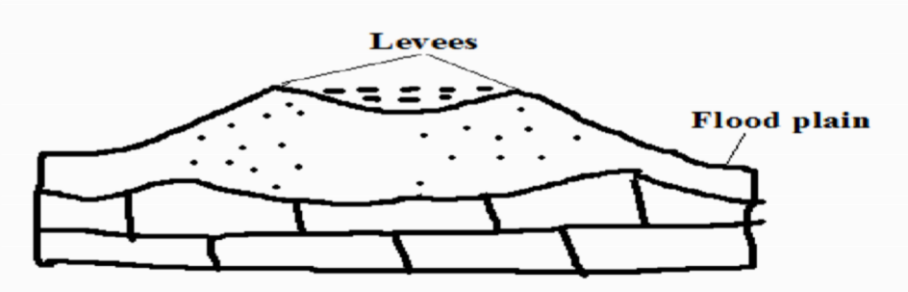
Formation

River flows sluggishly due to low gradient.

Deposits of alluvium are laid on river bed.

The deposits raise the river bed causing the channel to be subdivided into channels or distributaries.

Natural Levees



Raised river banks which are made of alluvial materials.

Formation

River floods and spills over its banks.

Deposition of coarse materials near the banks and fine materials are carried further on the flood plain.

Coarse materials accumulate raising the banks above the general level of the flood plain.

Effects of Levee Formation

Creation of differed tributaries and confluences.

Differed tributary: Tributary blocked from joining the main river by levees.

Differed confluence: New point where the differed tributary joins the main river downstream.

Destructive flooding.

Due to the river bursting its banks during the flood season due to the bed being raised above the general level of the flood plain.

Due to differed tributaries flowing into the flood plains.

Because the river channel has become narrower and shallower due to deposited alluvium. **Estuaries**

Broad channel at the mouth of a river where the river enters the ocean as a whole.

Some are deep and narrow because sediments are carried away by ocean currents while others are wide and shallow due to sediments covered by water e.g. on R. Congo and Gabon. **Deltas** Low lying tract of alluvial deposits formed at the rivers mouth.

Ideal Conditions for Formation of A Delta At A Rivers Mouth

Large load such as from a large catchment area where erosion is taking place actively.

The rivers course to be free from obstacles such as swamps so as not to filter sediments before they reach the mouth.

Low speed at the point where the river is entering a sea or lake for deposition to take place.

The rate of deposition should be higher than the rate of erosion by sea or lake currents.

How a Delta Forms

The speed of the river is checked by sea or lake.

Heavy load is first deposited.

Lighter load is carried further into the sea causing that part of the sea to become shallower.

The part is colonized by plants making it swampy but firmer.

Plants trap more alluvium making the delta to grow in height.

The river builds levees making it narrower.

The river burst its banks and small channels branch off the main river and carries water into the sea or lake (distributaries).

Types of Deltas

Marine: Type formed at sea.

Lacustrine: at a lake.

Inland Delta: Deltas which form along a rivers course before it reaches the lake or sea.

Formation

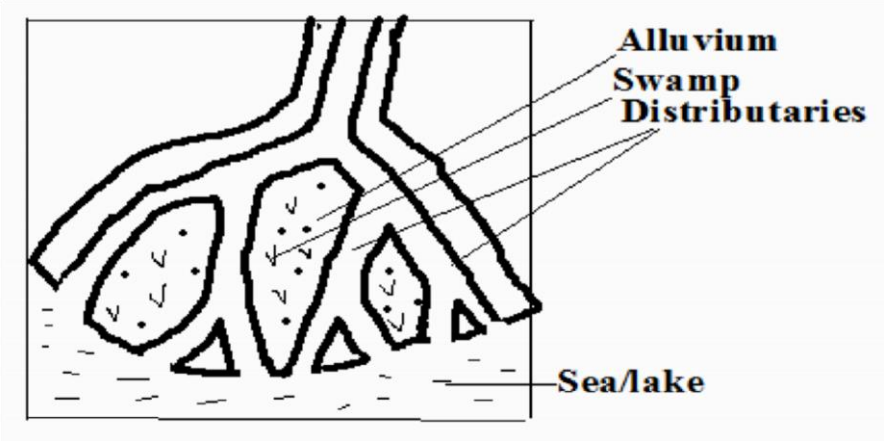
The velocity of the river is checked on entering a relatively flat swampy land.

The river builds up levees.

The river bursts banks forming distributaries.

Alluvial deposits are spread over vast areas when river floods e.g. Niger and Okavango deltas.

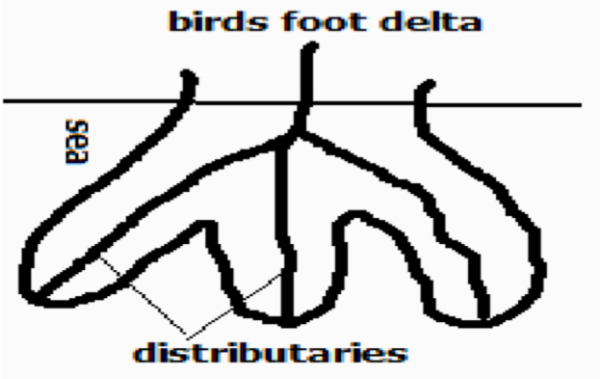
Arcuate Delta



A delta with a convex shoreline on the seaward end due to strong currents spreading materials over a wide area on seaward side.

Has many distributaries e.g. Tana and Rufiji deltas.

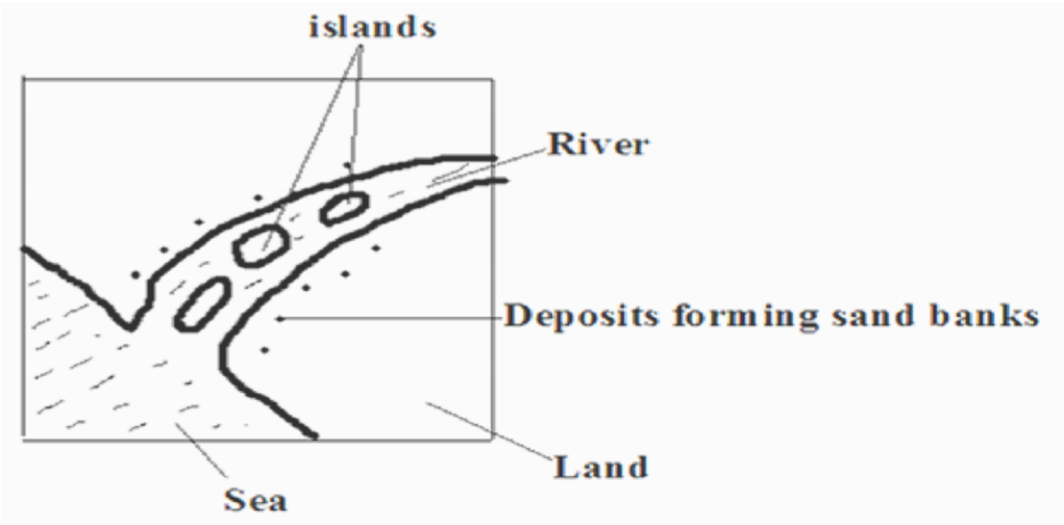
Birds Foot Delta



Type of a delta with a pattern resembling the foot of a bird.

Has few distributaries.

Formed on a river carrying large quantities of fine alluvium into water where there is low wave energy e.g. Omo and Mississippi deltas. Estuarine Delta



Delta which has formed on an estuary. **Formation**

The rivers load is deposited on the estuary when the speed is checked by sea.

The river cuts across in a single channel that may be bordered by levees e.g. on R.Volta in Ghana and on R. Zambezi.

Development of a River Profile

Longitudinal section of a river from source to mouth.

1. Youthful/ Torrent Stage

Characteristics Steep gradient.

The river flows very fast.

Vertical erosion is dominant Headward erosion is evident.

Features

V- shaped valleys

Waterfalls

Rapids

Potholes

Gorges

Interlocking spurs.

2. Mature/ Valley Stage

Characteristics

Low and almost regular gradient.

The flow is less swift.

The river is wider due to being joined by tributaries.
Lateral and vertical erosion but lateral is more active.
Deposition starts at some sections. ***Features***
Wider open v-shaped valley
Meanders
River bluffs/cliffs Slip off
slopes

3. Old/ Plain Stage

Characteristics

Very gentle/almost level gradient.

Very slow flow of river.
The main work of the river is deposition.
Some lateral erosion occurs.
Seasonal floods are common.

Features

Shallow broad flat bottomed u-shaped valley.
Meanders
Oxbow lakes
Natural levees
Differed tributaries
Differed confluences
Braided channels

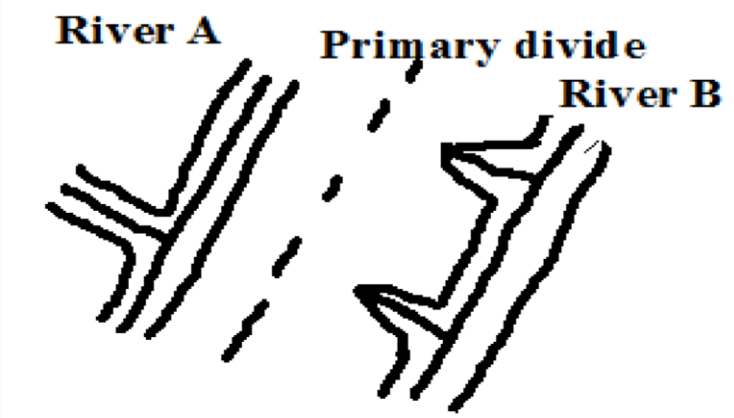
Flood plains
Deltas
Distributaries

River Capture/Beheading/Piracy/Abstraction

Diversion of head waters of one river into the system of an adjacent powerful river due to erosion.
The river that captures is called ***pirate.***
The captured one is called ***victim***.

How it occurs

At first there are a powerful river and a weaker river flowing adjacent to each other.

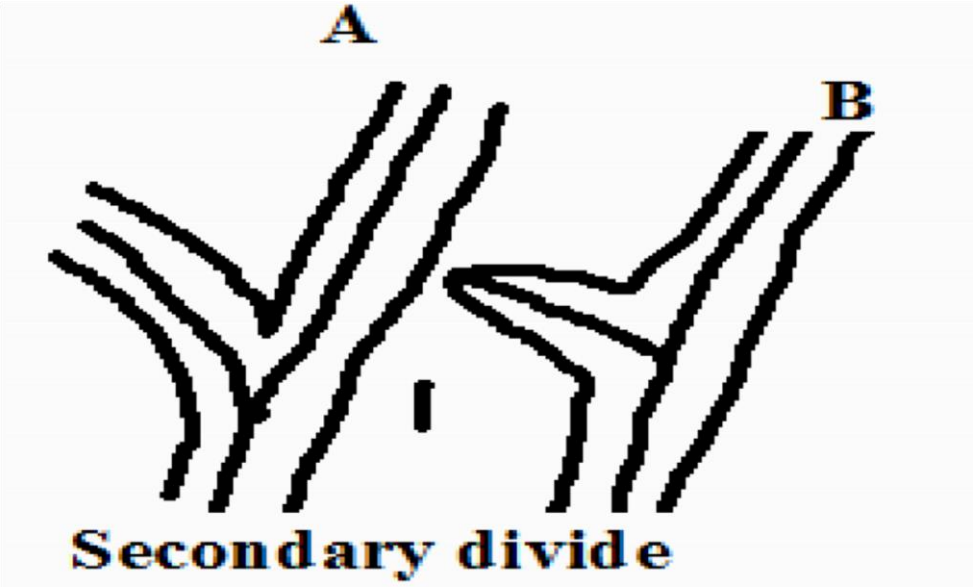


The powerful river erodes vertically and laterally than the weak river making it to flow at a lower level.
At the same time, it extends its valley backwards by headward erosion.
The stronger river eventually joins the valley of the weak river.

The headwaters of the weaker river start flowing into the valley of the stronger river e.g. R. Tano in Ghana was captured by the Black Volta River and R. Eyong was captured by Imo in S. Nigeria.

The remaining section of the beheaded river is called a ***misfit/beheaded river***.

The dry valley between the elbow of capture and the new course of the misfit stream is called a ***wind gap***.



River Rejuvenation

Renewal of erosive activity of a river. Happens in the old stage.

Causes

A. Change in the Base Level

Base level is the lowest level to which a river can erode its bed. Rejuvenation resulting is called dynamic rejuvenation

Drop in sea level

The river mouth moves further seawards.

A steep gradient occurs between the old and the new mouths causing the river to starts to move swiftly.

Vertical erosion resumes extending back to the flood plain.

Uplift of a section of land along the rivers course.

Faulting or folding may occur.

A section of land along a rivers course is uplifted.

The gradient is increased causing the river to flow swiftly and undercut through the uplifted section. An antecedent gorge is formed.

Unequal sinking of land along a rivers course.

The downstream side sinks more than the upstream one. An increase ingredient occurs causing the river to flow swiftly

The river starts to undercut more vigorously than before.

B. Increase in Rivers Discharge

Rejuvenation resulting is called static rejuvenation

The rivers discharge increases due to high precipitation or capture.

The rate of erosion becomes higher due to increased discharge. The river starts to undercut more vigorously.

C. Change in Rock Structure

A river passes a resistant rock and starts flowing over a less resistant rock.

The river starts eroding more vigorously into the softer rocks.

Features of River Rejuvenation

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