**SCHEME OF WORK - GEOGRAPHY**

**SSS 3 - ALPHA TERM**

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**WEEK ONE**

**Revision of last term’s work/Earthquakes**

**TOPIC: EARTHQUAKES**

An earthquake is a violent tremor in the earth crust which send out a series of vibrating waves in all directions.

These are sudden movement or vibrations of in the earth crust. They occur as a result of disturbances within and below the earth crust

**CAUSES OF EARTHQUAKES**

Most earthquakes one caused by sudden movement within the earth crust particularly where there are fractures of faults, stress is built up within the earth crust when a certain point of tension or intensity is reached, cracked or ships occurs within the earth crust. This produce the shock effect that sands but vibrations.

The point at which the shock originates is caved in a nut shell earthquakes are caused by the development of faults or cracks in the crust which results from the collision between the tectonic plains.

The movement of molten rock below or within crust or the sudden release or stress which are slowly built up along the plain. The point at which the shuck originates is called Origin or Focus and the point on the earth surface directly above the focus or where the shock waves first meet the surface with Intensity of earthquake is called seismograph. This instrument records the vibration produced by an earthquake. The effect produced by the earthquakes is referred to as Intensity. The magnitude of shock of the earthquake which refers to the total amount of energy released is measured according to Richter’s scale.

When earthquakes occur on the seafloor for example, it sets up huge waves called tsunamis. This waves at times more than 10m high invade adjacent costal lands drowning people and livestock and pull down structure. For example on December 27, 1939 an earthquake and accompanying waves killed 50,000 people and destroy 100,000 homes in Turkey.

**WEEK TWO**

**Regions of earthquake occurrence**

**POPULAR EXAMPLES OF DISASTROUS EARTHQUAKES**

Africa is generally free from earthquake except along the edge (Morocco, Algeria and Egypt) where some earthquake have been recorded.

In East Africa, some major earthquakes have occurred in the rift valley zone e.g. Tanzania, near the shore of Tanganyika in the December 1910 and in Kenya in January 1928. The Accra region of Ghana is the only part of West Africa that has not experienced tremors since the second half of the 18th century.

Major tremors occurs in 1867, 1906 and 1937. In the last few years, minor earth tremors have been recorded in the basement complex areas in Nigeria particularly in Oyo and Ogun state.

In 1964, earthquake measuring 8.5am struck Alaska, capital anchored was severally damaged even though the epicentre was 120km away.

**THE EARTHQUAKE PROCESS**

The point in the interior of the earth from where the vibration or earthquake waves originates is called the focus of the earthquake. The waves radiate upwards incomes of waves known as underground body waves. They arrive the surface in concentric circles where they are celled the surface waves. The vertically above the focus which is the same as the centre of the earthquakes. The epicentre is the point in the point on the earth surface directly above the focus or where the shock waves first hit the surface.

The instrument used in measuring the intensity of earthquake is caked seismography. The instrument records the vibration by an earthquake.

**TYPES OF SHOCK WAVES**

There are two type of waves which are: (i) Body waves (ii) Surface waves

1**. BODY WAVES**: this waves travel through the crust. There are two types of body wave.

a. **Primary Waves:** this causes the coastal rocks to move backwards and forward in the direction of the wave movement.

b**. Secondary waves**: this cause the coastal make to move from side to side i.e. at right angles to the direction of the wave movement.

2**. SURFACE WAVES:** this travel through the surface rocks. They are of two types

a. Love waves: this causes the surface to move from side to side at right angel to the direction of the wave movement

b. Rayleigh waves: this causes the surface rocks to have a vertical circular movement.

**EFFECTS OF EARTHQUAKES**

**WEEK THREE**

TOPIC: **VOLCANICITY**

Volcanicity is the ejection of solid, liquid or gaseous materials from some deep-seated reservoir of molten magma beneath the earth crust to the earth surface.

Volcanicity is defined as the rising of molten magma or other gaseous materials beneath to the surface of the earth or within the earth crust.

Volcalnicity can be referred to as all various processes associated with the ejection of magma and relates the material from the depth below onto the earth crust.

**PROCESS OF VOLCANICITY**

Volcanicity is formed when molten magma or mobile rock forces its way into the place of weakness or vent of the earth crust to escape quickly or explosively to the surface. Molten magma naturally escape through areas that have experienced mountain building process of compression and tension. The magma while moving through the vent to the earth surface may cool and solidify within the earth crust before getting to the surface of the earth as plutonic rock leading to intrusive land form.

On the other hand, when the magma reaches the surface of the earth, it cools and solidifies as volcanic rock and results in extensive land form. Rocks formed by either volcanic activities or plutonic activities are referred to as igneous rocks.

**INTRUSIVE VOLCANICITY/INTRUSIVE LAND FORMS**

The intrusive land form of volcanicity include:

1. Dyke
2. Sill
3. Batholith
4. Phacolith
5. Lopolith
6. Laccolith
7. Volcanic rock and dyke neck

DYKE

This is a discordant volcanic intrusion which is formed when magma solidifies within vertical faults. Dyke results when an intension of magma is made vertical within the sedimentary layers. Example of dyke include, dyke in England, deviant in scotland.

CHARACTERISTICS OF DYKE

1. A dyke is a rock form lying vertical or inclined across the bedding planes (discordant)

2. It is a narrow wall – like features that is rarely prominent in the landscape.

3. at times when exposed, a dyke forms shallow trenches

4. A dyke is a resistance rock

5. It may be circular in shape e.g. ring dyke in Jos and very extrusive in length

6. Sometimes, adyke gives rise to water polls or rapids and constitutes oil tap or water tap e.g. clave land dyke of Yorkohire, ring dyke in Jos.

SILL

Sill unlike dyke as a sheet of solidified magma which lies cordantly to the bedding of sedimentary rocks, sill, it react when an intrusion of magma is horizontally along the bedding place of sedimentary rock.

Examples are: Nerthumberland in England and little and great Farrons in South Africa.

BATHOLITHS

It is a huge mass igneous rock usually granite which after removal of the overlaying rock forms a massive and resistant upland region, such as Wick low mountain of Ireland. The upland of Britain, France and the main ranges of Malaysia.

Formation of Batholiths have been attributed to the shrinking and the resistant melting and the incorporation of large block of surrounding areas rocks into the molten magma which may later solidify.

LACCOLITH

Laccolith is a large baster or igneous mould with a dome-shaped upper surface and a level base fed by a pipe-like conduct from below (this is by local accumulation of molten magma). If arches up overlying strata of sedimentary rocks e.g. the laccolith of the Henry mountains in vtah USA.

LOPOLITH

Lopolith is another variety of igneous intrusion with a saucer shape. Example are the Bashreld lopolith of Tranovaal, South Africa examples area also found in England and Scotland and Sierra Leone peninsula.

PHACOLITH

Phacolith is a lens-shaped mass of igneous rocks occupying the crest of an anticline or the bottom of a syncline and being Jed by a conduct from beneath. An example of phacolith is London Hill in Shropshire England.

VOLCANIC NECKS

They result from solidification of larva invents of volcanoes. They resist erosion better than volcanic cones themselves e.g. Dumberyan Rocks, Scotland Devils, Tower in Wyoming USA.

DYKE RIDGES

They are steep-sided sharp ridges of volcanic origin. They are usually larger than volcanic rocks e.g. (i) crazy mountains of Montana (ii) the great Dyke of Rhodesia.

EXTRUSIVE LANDFORMS

Extrusive landforms are determined by the nature and composition of the larva and other ejected materials that reach the surface of the earth. When molten magma immerge at the surface of the earth, it is called larva. The magma could get to the surface of the earth through a vent (hole) or fissures (cracks). If the larva immerged through a vent, it usually build up a volcano and if through a fissure, it may build up a larva plane or larva plateau. Some major extrusive landform of volcanicity include:

1. Composite cone
2. Larva dome/shield volcanoes
3. Ash and cinder cone
4. Caldera

REATURES OF EXTRUSIVE LANDFORMS OF VOLCANICITY

1. COMPOSITE CONES: They are also called strato – volcanoes. These hence, formed some of the grand-outer mountains of the earth. They are built of alternating layers of lava flows, volcanic ashes and cinders through several vents on parasitic cone. Volcanoes begin earth emption with a great explosion and extremely viscous acid larva, domes or plugs. The magma volumes of dissolved gases such as water vapour, carbon monoxide, carbon dioxide, hydrogen sulphate.

CALDERAS

These are huge craters of volcanoes often surrounded by the shattered remain of cone. Caldera often result from violent eruption of volcanic cone the extent that the huge crater often several kilometres across. When water accumulates in a Caldera, a lake is formed. Examples of this include Lake Toba in Somalia, Paryen Lake in Pankshro near Jos.

HOT SPRING

Hot springs are thermal springs which emit hot water quietly without any violent eruption. Water rises up from the rock to the surface without any explosion. Some springs contain dissolved minerals which may have medicinal value.

Hot springs provide tourist attractions e.g. Ikogosi Hot spring in Ekiti state, Nigeria and those in Japan and Hawall.

Such springs are common in Iceland some of them have been harnessed to heat courses, swimming pools and for other domestic purposes.

BASIC LAVA CONE (LAVA DOME)

This is made up of very hot lava with temperature of about 1000C and therefore is in liquid form. They flow for relatively long distance as soon as they poured out of the volcano. They flow out as thin mobile sheets of lava for great distances before solidifying. Examples of this cone is Manna in the pacific.

ASHES AND CINDER CONE

These are volcanic cone which are made up of mainly ash and cinder e.g (i) Valance defanged in Guantemeta (2) Ikere one in Ekiti, Nigeria.

Ash and cinder cones are typically small volcanoes occurring in groups, and rarely exceeding 300m in height other examples include Mt. Nuume in Italy and Mt. Pricilla in Morocco.

GEYSERS

Geysers are not only more violent than springs but emits superheated steams which may spout up to a height of 46m from the earth beneath the phemo memorare aerated with thermal of volcanic region in which the water below is heated beyond the boiling point (1000c). The jet of water usually emitted with an explosion trigger off by gases seeping out of the heated rocks.

The major geyser are found in (i) Iceland (ii) Northern Ireland of Zealand (iii) Yellow stone of National park of USA.

**WEEK FOUR**

**LIMESTONE (KARST) REGION**

**Meaning: Limestone or Karst region (Fig. 38.10) refers to a large stretch of land occupied by limestone which possesses a unique type of topography. Limestone is a sedimentary rock of organic materials made up of calcium carbonate.**

**Characteristics of limestone region**

1. **Solubility**: Limestone is insoluble but is made soluble by the action of rain water which dissolves carbon dioxide to form a weak acid which in turn acts upon it (limestone) to make it soluble.
2. **Presence of depressions:** Limestone region contains depression of varying sizes and depths.
3. **Absence of luxuriant vegetation cover in limestone region:** There is a complete absence of thick vegetation cover in limestone region.
4. **Absence of surface drainage:** Most surface water flows for a short distance and disappears underground due to easy permeability of the region.
5. **Presence of jointed and rugged topography:** Limestone regions are well jointed, stony with a broken landscape.
6. **Presence of dry surface valleys**: Due to easy penetration of water in limestone region, all the valleys are usually dry. Water, on the meeting hard rock underground may re-emerge below the limestone below the limestone as spring orresurgence.

**SURFACE FEATURES OF A KARST OR LIMESTONE REGIONS**

1. **Grikes:** Grike is a surface features in a limestone region. It is formed as a result progressive widening of cracks or joints by solution to form limestone pavement.
2. **Clint’s**: Clint’s are surface features of isolated and rectangular blocks which exist between the joints or grikes.
3. **Shallow holes or sink holes:** These are also surface features. They are small depression carved out by solution where rain water sinks into the limestone at a point of weakness.
4. **Dolina:** This is formed when a number of several swallow holes join together to form large depression.
5. **Uvala:** This result when several dolines join together to form a larger depression.
6. **Poljes:** These are formed from larger depressions partly due to faulting.

**UNDERGROUND LIMESTONE OR KARST FEATURES**

1. **RESURGENCE OR SPRING:** When water percolates the base of limestone, it re-emerges as resurgence. This is when the water reaches an impermeable surface before flowing horizontally. The stream in the landscape disappears through the swallow holes.
2. **CAVES OR CAVENS:** These are underground features of karst regions. Some of these features may contain water or ponds.This feature is often linked by swallow holes and may contain stalagmites and stalactites. The caves are large underground spaces formed as a result of sinking and flowing of waters into the limestone through joints and bedding planes.
3. **STALACTITES:** These are underground features of limestone region found in caves growing from up downwards and may join stalagmites to form pillars. Stalactites are sharp, slender and downward-growing pinnacles that hang from the roof of the caves formed when the water drips downwards.
4. **STALAGMITES:** These features are also of underground limestone found in caves, growing from the grounds upwards and may stalactites to form pillars. These features are shorter, fatter and more rounded. They are formed when water drips down stalactite to the floor.
5. **LIMESTONE GORGES:** These features are created when the vertical sides of an underground cave collapse or when a river cuts across and down into a limestone region.
6. **PILLAR:** Natural pillar is formed by joining of the stalactite hanging from the roof to the stalagmite growing to roof of the cave.

**IMPORTANCE OF LIMESTONE REGION TO MAN**

1. Limestone region provides limestone which is an essential raw material for cement making.
2. Limestone is also used in smelting of tin and iron.
3. The limestone region is also a beautiful area of tourism.
4. It is also a source of underground water.
5. It also ensures or provides grazing land for animals.

**WEEK FIVE**

**DENUDATIONAL PROCESSES**

Denudation is the process of lowering or sculpturing the earth surface by the activities of certain agents called denudation. The word denude is an original Greek word for reduction, that is, lowering or cutting. Therefore, denudation process are processes that contribute to lowering or reshaping the earth.

**Types of Denudational Processes**

Denudation involves four major processes and a fifth, which strictly speaking is not considered as properly belonging to this group. They include;

1. Weathering
2. Erosion
3. Transportation
4. Mass Movement
5. Deposition
6. **Weathering**

Weathering has been defined as the decay or decomposition of rock materials in situ. The process of weathering may be physical, chemical or biological.

1. **Erosion**

Erosion is the removal of weathered materials. It involves the detachment of debris or classic materials (broken material).

1. **Transportation**

This involves the conveyance of the eroded materials away from the original point’s erosion by transporting agents such as running water, wind, ice, waves and gravity.

1. **Deposition**

Deposition in its strict sense is not a Denudational process. Rather, it belongs to a process of a gradation instead of degradation.

**Major concepts of Weathering**

The following major concepts are briefly explained below:

1. In situ
2. Disintegration
3. Expansion and contraction
4. Oxidation, carbonation, solution, hydrolysis
5. Debri
6. Definition of weather materials based on sources.

In situ: This means on the spot disintegration of materials. This implies that no movement of any kind is involved.

Disintegration: is the detachment of the materials from the parent body. It means splitting away of the debris or clastic materials.

**Expansion and contraction**

This is a physical weathering process which is caused by the action of heating during the day and cooling at night. Daytime heating will produce expansion while night time cooling will imitate contraction. This phenomenon of expansion and contraction is most common in hot desert landscapes where excessive heating during the day would cause expansion while night time radiation will result extreme cooling and contraction of rock surfaces.

**Oxidation**: This relates to the effects of atmosphere oxygen on rocks that contain iron materials, the oxidation process acts to reduce the iron material from its ferrous (Fe2) to its ferric ionized state (Fe3). Oxidation or ionization results in the production of reddish surface on materials undergoing the process. Oxidation is commonly screen in the rusting of metals particularly iron.

**Carbonation**: Solution and hydrolysis are different process of chemical reaction, which is facilitated by, water action. They shall be treated in detail below.

**Debris:** These are weathered materials which come in different shapes. They may be called regolith, or elastic materials.

**Definition of weather materials by source**

1. Aeolian deposits – wind derived materials.
2. Marine deposits – from sources in the ocean
3. Lacustrine materials – from lake source
4. Fluvial materials –from source in rivers
5. Fluvial glacial – derived from valley glaciers
6. Glacial deposits – from sources of glaciations
7. Volcanic deposits – from volcanic sources.

WEEK SIX

TOPIC: WEATHERING

Weathering is the disintegration and decay of rocks which is caused by forces of weather such as frost, rain and temperature changes. It can also be defined as the process by which rocks are broken down into smaller fragments by weather forces/atmospheric forces.

It is a process of rocks breaking and decaying which are caused by climate factors (frost action, rain water and temperature) the nature of rock, relief and living organisms.

TYPES OF WEATHERING

There are three types of weathering: physical, chemical and biological weathering.

1. PHYSICAL/MECHANICAL WEATHERING

This is the process by which rocks are broken down by the forces of weather without any change in chemical composition of the rocks.

It takes place in three major ways:

i. Alternate heating and cooling: this process is more prominent in regions such as desert which experience daily extremes of temperature. During the day, the rocks are heated intensely by the scorching sun.

The outer parts which are more intensely heated also expand more and tend to pull away from the inner part. At night when temperature stops rapidly and contrast more rapidly than the inner. When rocks are subjected to this kind of daily stress for a long time, three things may happen.

1. The outer parts begin to peel off like onion a process known as Exfoliation which leads to the formation of rounded features known as Exfoliation domes.
2. Well-joints or bedding-planes. The rocks are then broken into large regular blocks, a process known as block disintegration.
3. Rocks made up of different minerals e.g. granite made up of quartz, mica and feldspar are broken up into small pieces in form of large grains, a process known as granular disintegration.

ii. Alternate wetting and drying: this takes place in tropical regions where heavy rains saturate the rocks and then the hot sun quickly dries them again. Repeated wetting and drying may also affect coastal rocks which are subjected to tides and wares. When the rocks are wet, the absorb water especially the outer layer or part which then expands. When the rocks dry, they contract. If this process is repeated over a very long time, stresses build uo which makes the surface layers to peel off.

iii. Alternative freezing and thawing: in temperature regime, what is at times called frost action is more effective in breaking down rocks. When temperature drops sufficiently at night or during winter, the water in cracks will freeze. As it freezes, it expand by about 10% of its normal volume, thereby exerting more pressure on the walls of cracks and trying to force the rocks apart. When the temperature increases sufficiently, the water thaws. Repeated freezing and thawing is capable of widening and deepen cracks and crevices and leading to the breaking of rocks.

CHEMICAL WEATHERING

This is the decomposition or decay of rocks involving chemical processes or reactions which leads to the changes in chemical composition and coherence of the affected rocks.

The following are the major chemical weathering processes: (i) Solution (ii) Oxidation (iii) Hydrolysis (iv) Hydrate (v) Carbonation

Carbonation: rain water passing through the atmosphere absorbs carbondioxide which produces carbonic acid. This weak acid is capable of dissolving rocks composed of calcium carbonate such as limestone. The limestone dissolved is removed in solutions by running water or percolating water passing through joints or dripping through underground caves.

Hydration: certain rocks are capable of absorbing water into their structure. This takes them to swell, they are therefore weakened and can easily breakdown. The rocks may fracture as internal stresses are set up within them.

Oxidation: this is the reaction that occurs when additional oxygen is taken up by a mineral compound. Oxidation occurs when rocks are exposed to oxygen in air or water. The simplest and most easily recognisable process of oxidation is when iron in a ferrous state is changed by addition oxygen into a ferric state. The rock or soil which might have been blue or grey in colour is dissolved into reddish brown. A process better known as rusting (this occur when oxygen combines with minerals).

Solution: this is a simple chemical process some minerals e.g. rock salt are soluble in water and simply dissolve when it is applied. The rate of solution or dissolution increases with the degree of acidity of water. It is the process by which rain water attacks and dissolves rock salts, calcium carbonate of limestone. Thereby, widening cracks.

Hydrolysis: this process involved by hydrogen combining with certain metals irons that is the water and the mineral then give rise to the formation of different compound.

BIOLOGICAL WEATHERING

This is the weathering process involving the activities of living organisms (plants, animals or even man himself).

Plants and animals also help in the weather process of rocks breaking. Roots of trees sometimes grow in cracks and the roots penetrate through. As they grow, they are as wedge and cause piece of rocks to breakdown from main mass.

Burrowing by animals like earthworm also helps to loosen the soil. The activities of man in read construction, mining and farming also contribute to biological weathering.

Factors that influence weathering of rocks

The five major factors influencing weathering rocks are:

1. Nature of rocks
2. Climate
3. Relief
4. Vegetation
5. Man’s activity

**WEEK SEVEN**

**MASS MOVEMENT**

Mass movement can be defined as the movement of weathered materials (regolith) on slope under the force of gravity. It can also be referred to as the movement of rock materials from one place to another under influence of gravity.

**FACTORS THAT AFFECT MASS MOVEMENT**

These are factors that affect mass movement

1. Gradient of the slope.
2. Human activities.
3. Nature and weight of materials.
4. Pressure of the lubricating moisture.
5. Presence of vegetation.

**Gradient of the slope**

The gradient of the slope is one of the most important factor that affect mass movement. For example, rock material move faster in steep slopes or hilly areas than in gentle slopes.

**Human Activities**

The activities of man like construction, farming, grazing, running on the slope of mountains or highlands to promote or reduce the movement of rock materials.

**Nature and Weight of materials**

It is noted that the loose rock materials tend to move faster than tightly held in material i.e. the heavier the weight of the material the slower the movement.

**Pressure of lubricating moisture**

The pressure of lubricating moisture like rain, water, ice tends to produce, promote or increase the movement of rock materials down the slope.

**Presence of vegetation**

The pressure of vegetation can either increase or decrease/reduce the movement of rock materials.

**TYPES OF MASS MOVEMENT**

There are two main types of mass movement

1. Slow movement
2. Fast movement

**Slow movement**

They are more effective in area of deep chemical weathering. There are three most important types which are

1. Soil creep
2. Talus creep
3. Soil flow

**SOIL CREEP**

It is a slope almost unnoticeable but continuous movement of weathered material down a slope under the influence of gravity. It operates on a gentle slope and speed of the movement will be as slow as 1cm per year. This movement is aided by water which act as a lubricant which enables rock materials to creek over each other. Alternating, melting and drying, heating and cooling of soil e. t. c. are other factor that influences soil creep.

Soil creep can be noticed when fence and trees bend towards the direction of movement of the soil in a gentle slope, electric and telegraph pole are tilted, vertical rocks layers are covered down slow leaning of tree trunks down the slope, bulging of walls and fences, soil accumulated behind walls which may collapse as a result of the soil erosion.

**TALUS CREEP**

This is less pervasive than soil creep. Talus creep is the movement of angular rocks down moderately through steep slopes. Large talus sheets move in mass especially in mountains region, where frequency thawing action is frequent.

**SOIL FLOW**

This is a slightly faster movement usually average of five cm and one meter a year on moderate slopes. It occurs on temperate and Polar Regions. During the winter the surface layer whole ground is frozen. In the summer the surface layer thaws while the ground is still frozen. The saturated top soil may now begin to move on active layer over the frozen sub-soil

**FAST MOVEMENT TYPES**

**Land slide**

Landslide is the most significant for of the fast movement types. This takes place when large quantities of loosened surface rocks and soil suddenly slide down a steep slope such as cliff, a valley slide or an embarkment.

Landslide are caused by the lubricating action of water at fall of gravity. The actions that help to produce a land are the under cutting of the base of a steep slope a river or sea and human action.

**Rock slide**

This is the most likely to occur where rocks have bedding planes which slip towards valley. The bedding plane provide the ship surface on which the saturated overlying rock layer easily slight over the under laying stable crust. Rock slides occur in over steepened slopes e.g. scarps, wall cutting.

**Rock fall**

This is the most rapid of all mass movement and occurs on very steep slopes which may even be vertical the movement is spontaneous once the rock is detached. It falls vertically down slope to form talus or screen at the put of the slope. This detachment is caused by weathering agents such as freeze the action of wave pounding on sick leaves, earthquake or pressure release.

**Earth flow and mud flow**

This two are also considered as rapid movement when the regolith on slopes of five degree to fifteen degree become saturated with water, it begins to flow down- hill.

Mud flow occurs in firmly steep slopes. The material is made up of semi-liquid mud at times with gravel and boulder. Large volumes of unconsolidated materials, super saturated becomes fluid begins to flow down- hill. It is common in arid and semi-arid regions.

**Effects of Mass Movement**

1. It can lead to loss of farmlands.
2. It can also result to displacement of settlement.
3. It can cause disruption of transportation network.
4. It can lead to loss of soil fertility.

**Differences between Erosion and Mass Movement**

1. Erosion is the gradual movement of top soil while mass movement is the movement of loose rock material down slope.
2. Agents of erosion are running water, wind, waves and glaciers while that of mass movement entails the force of gravity.
3. Erosion involves scratching, polishing and pushing and plucking of loosed rock surfaces while mass movement involved creeping, sloping, sliding and falling.

**WEEK EIGHT**

**CLIMATIC CHANGE**

**Climate Change**

Meaning and Nature of Climate Change

Climatic change refers to large scale alteration in the normal cycle of weather over pronounced time or duration. This change or alteration is expressed in the irregularities (anomalies) of the cycle or regimes of major elements such as rainfall, solar radiation, temperature, pressure patterns and all-other elements otherwise called climate controls.

**Causes of Climate Change**

Climate change may be caused by natural phenomena, as well as human activities.

**Natural Causes**

1. **Volcanic Eruption**: Natural incidents of climate change may be derived from volcanic eruption such as the 1972 eruption which took place in Kenya (East Africa). The volcanic materials and dust particles which were hauled (carried) over long distances led to significant impact in the weather of such areas. It was reported that a pronounced dry spell occurred in the religions which were covered by the effects of these volcanic materials.
2. **Change in Earth’s Orbital Plane**: It has been said that the path along which the earth revolves round the sun is elliptical (irregular) equally, the angle of inclination of the earth axis to the plane of elliptic also tilts or wobbles leading to a shift in the Equinoctial angle (equatorial plane) in relation to the sun. Such a tilt may result in pronounced aphelion or perihelion for the earth environment.

**Man-Made Causes of Climatic Change**

Human activities have been responsible for the incidence of large scale climate change phenomena. Important causes of climate change include the following, among others:

* Deforestation
* Atmospheric pollution
* Ozone layer depletion
* Increased green house effect
* Increased urbanization

1. **Deforestation**

Different activities engaged in by man leads to reduction in the forest areas. The climatic impact of deforestation is first seen in the overall disruption of the global and regional ecological balance. This means that the energy cycles in the flow of moisture (water) carbon, nitrogen and other element will be adversely affected.

1. **Atmospheric pollution**

Atmospheric pollution is derived from many anthropogenic source in addition to some natural sources (already explained). Industrial pollution of different kinds contribute to large quantities of emission of carbon dioxide and other green house gases to the atmosphere.

1. **Ozone Layer Depletion**

Ozone layer is a layer of tri-molecular oxygen (O3) in the stratosphere called stratospheric ozone layer. It functions as a screen (interceptor) of excess short wave ultra-violet rays to the lower layers.

Under normal conditions, the amount of insolation is effectively regulated by this layer. The ozone layer has been discovered to be perforated (destroyed) in some parts, and so is producing what is called ozone hole. Climatically, it is called atmospheric window. The incidence f atmospheric window produces opportunity for increased insolation.

1. **Increased Green house Effect**

This phenomenon has been discussed previously in connection with atmospheric pollution effect on climate. Increased house effect is derived from increased production of carbon dioxide from sources deforestation, industries and agricultural activities. The more the concentration of the principal greenhouse gases (CO2, SO2, NO2, CH4, etc.) The higher the temperature of the lower troposphere.

1. **Increased Urbanization**

Effect of urbanization on climate change has been recognized. Urban development produces large-scale changes in the character of the land. Vegetation clearance and the introduction of new landscape features in the form of `tarmacked surface (tarred roads) concrete surfaces, open air surfaces have been carried out to investigate the existence of urban micro climate and the findings are that the temperature, rainfall, humidity and pressure system in the inner city are different from the surrounding rural areas.

**Consequences of Climate Change**

Climate change has far reaching consequence on the ecosystem as well as human welfare.

Examples of these consequences include:

* Sea level rise and flooding of continental water.
* Melting glacier
* Biodiversity loss
* Wide spread incidence of diseases
* Proliferation of disease vectors
* Poor productivity in agriculture
* Others: (Displacement of Isotherms)

1. **Sea-level Rise**

Climate change or the global warming type will cause the melting of glaciers and continental ice sheets. The glacial melted water from the glacier will add to the existing level of the oceans thereby causing a rise in the level of the sea.

1. **Melting Glaciers**

This point has been discussed in connection with sea-rise above. There are several implications of the incidence of melting glaciers and the sheets.

First, this will result in the transformation of the ecosystems in such location. Life forms like polar bears and other creatures will be threatened.

Melting ice may spell doom for mankind in the long run because it will cause excessive rainfall and flooding which may drown continental upland regions in different parts of the world. This means large scale danger to human settlements both in the hinterland and as well as coastal and island locations. The flood incidence envisaged by this incidence of glacial melt will be akin (close) to the biblical “Noah’s flood”

1. **Disease Vectors**

Global warming caused by rising temperature levels will provide Favourable conditions for proliferation of disease vectors.

1. **Agricultural Productivity**

Agricultural productivity will be adversely affected in some regions while in others it may be favoured. For example, increased rainfall caused by temperature rise will work in favour of arid and high latitude areas while for the equatorial and tropical areas, it will generally be disfavored. Poor productivity in agriculture in some regions will lead to emergence of food crisis.

1. **Shift in Isotherms**

It has been predicted that climatic changes will likely result in the pole ward shift of the isotherms. This implies equatorial belts will shift northwards by about ten degrees (10o) and correspondingly, other belts will undergo pole ward advance such that temperate belts will move pole wards in a pole ward shift. This could lead to widespread dislocation of ecosystem across regions.

**Solutions to Climate Changes**

Incidence of environmental or climate change can be mitigated or addressed using a variety of measures which include reforestation, reduction in carbon emission levels through improved energy efficiency, introduction of clean development mechanisms, innovation in agriculture, population control, improved forest management, sustainable use of resources to ensure availability in the present generation and legislation and measurement of climate impact on society.

**Improving Energy Efficiency**

This requires changes in the techniques/technologies of production. Energy-efficient technologies may result in reduction of the amount of carbon dioxide emitted to the atmosphere which will in turn reduce green house effect and global warming.

**Clean Development Mechanisms (CDM)**

Clean development mechanisms involves the use of energy sources that are pollution free. For example, the use of solar energy power, hydro-power, wind power and other energy sources that will contribute zero emission to the atmosphere. The alternative energy sources will cause the reduction in CO2 and green house emissions.

**Agricultural Innovation**

Innovation in agriculture requires a wide range of approaches to be adopted to achieve environmentally friendly practices. This may involve adoption of methods like intensive cultivation involving better methods of soil management, employing the method of mixed farming, reducing over grazing and adopting the method of livestock ranching among others.

Such innovations will reduce deforestation as well as curb overgrazing of areas.

**Population Control Measures**

Measures of population control are diverse but they all aim at reducing exponential (spiraling) growth of population. It has been recognized that the greatest enemy of the environment is increased population.

**Improved Forestry Management**

Improved forestry Management will involve adoption of different strategies aimed at curbing excessive exploitation of forest resources.

For instances, introduction of other sources of domestic fuel supply may cut down aggressive exploitation of wood for fuel from the forests. The use of kerosene, gas and other energy sources will divert attention from dependence on fuel wood.

**Legislative Measures**

This involves enacting laws to protect the environment from unwanted destruction. Legislation may come in the form of principles, guidelines, protocols, treaties and declarations all aimed at regulating and controlling the use of environmental resources in a more sustainable way.

**WEEK NINE**

**ECONOMIC CO-OPERATION OF WEST AFRICA**

**International Economic Co-operation of West African state (ECOWAS)**

The economic community of West African states (ECOWAS) is a sub-regional organization formed by West African countries mainly to promote co-operation and development in all economic fields and to contribute to the progress and development of the African continent.

**ORIGIN OF ECOWAS**

The treaty called Lagos treaty formally establishing ECOWAS was signed on May 28th 1975 in Lagos, when the head of states and governments of fifteen independent states of West Africa converged in Lagos, where they signed the treaty. Guinea Bissau later joined to make up sixteen countries. The idea of establishing ECOWAS was conceived by the heads of states of Nigeria and Togo in 1973.

**MEMBERSHIP OF ECOWAS**

There are sixteen member-states (countries) that make up ECOWAS. These are Nigeria, Togo, Benin Republic, Cote d’Ivoire, Liberia, Sierra Leone, Guinea, Senegal, Burkina Faso, Guinea Bissau, Gambia, Mauritania, Mali, Niger and Cape Verde.

**SECRETERIAT**

The administrative or secretariat is located in Abuja, Nigeria while the financial headquarters is in Lomen, Togo. The headquarters was formally in Lagos before taking to Abuja

**THE ORGAN OF ECOWAS**

1. The authority of the head of states and governments is composed of all the fifteen heads of states of the member states. It is highest decision making body.
2. The council of ministers is made up of two members of two member states. The council monitors the functioning and development of the community and make recommendation to the authority.
3. The executive secretariat performs the administrative functions of the community.

The seat of the secretariat is Abuja,Nigeria.

1. The tribunal of the community is charged with the functions of interpreting the treaty and ensusing the observance of law and justice.
2. The technical and specialized commissions include:

i. The trade, customs , immigration , monetary and payment commission .

ii. The transport , communication and energy commission

iii. The Industry , Agriculture and Natural Resources commission

iv. The Social and Cultural Affairs commission

v. The Defence commission

ACHIEVEMENTS OR BENEFITS OF ECOWAS

1. Development of common market
2. Free movement of people
3. Trade liberalization
4. Cultural integration
5. Educational integration
6. Educational interaction
7. Scientific / technical cooperation
8. Military cooperation
9. Promotion of unity
10. Right to settle anywhere
11. Development of international communication
12. Promotion of sports

PROBLEMS OF ECOWAS

The following problems have limited the achievements of ECOWAS

1. Similarity of products
2. Fears of domination
3. Difference in political ideology
4. Non- payment of due
5. Non-implementation of programmes
6. Language barriers
7. Differences in currency
8. Allegiance to former colonial master
9. Political instability
10. Problem of transportation
11. Problem of debt burden

SOLUTIONS TO THE PROLEMS

1. Diversification of production
2. Payment of dues
3. Resolution and programmes
4. Common currency
5. Trade liberalization
6. Teaching of modern language
7. Free movement
8. Political stability
9. Detach from colonial masters
10. Commitment

**WEEK TEN**

**WORLD TRADE**

Trade is the buying and selling of goods and services between one region and another, within the same country or between one country and another. The former is known as internal trade while the latter is called international trade.

**Types of Trade**

International Trade

This trade is divided into two groups. They are:

1. Import Trade: This trade involves the buying of goods and services from another country into one’s own country.
2. Export Trade: This is the selling of goods and services produced in one’s own country to another country.

**Reasons for Trade**

Countries of the world are involved in trade for the following reasons.

1. **Differences in Natural Resources**: The presence of natural resources in some regions and the absence of the resources in other regions have created opportunities for trade among nations.
2. **Differences in Climate**: Different climatic conditions favour the growth of different crops for exports. The mediterrean climate, for instance, favours the growth of fruits including grapes, oranges, apples etc. While the tropical climate favours the mineral deposits.
3. **Differences in Technology**: The higher the differences in the level of technology, the greater the volume of trade between two countries. The low level of technology difference between African countries and the industrialized western countries explains the existing high volume of trade between the two continents.
4. **Differences in Agricultural Products**: A wide difference in the production of agricultural goods among regions promotes large volume trade.
5. **Differences in the import Duties**: Higher import duties imposed on imported goods may discourage trade between two countries.
6. **Differences in the prices of Goods**: The higher the differences between the prices of goods, the greater the volume of trade between two countries.
7. **Colonial Ties**: Franco-phone countries trend to have Favourable trade with other Franco-phone countries while Anglo-phone countries also have higher volume of trade among themselves because of the existing colonial ties, as for example, trade between Nigeria and Britain.
8. **Political Consideration**: The trade between one country and another may be based on bilateral relations or political considerations. For instance, the imposition if political and economic sanctions on a country may affect the volume of trade between one country and another.
9. **Earning of Foreign Exchange**: The need to earn foreign exchange help promote trade between nations.

**Reasons for High volume of Trade between Nigeria and Developed Countries**

The reasons for high volume of trade between Nigeria and developed countries like Japan, Britain, U.S.A and China are as follows:

1. Dissimilarity of Products
2. High level of technology
3. High levels of Savings
4. Preference for imported goods
5. Absence of Trade Barrier
6. Differences in import duties

**Factors which limit international Trade**

1. Strained international Relations: Economic sanctions as a result of strained diplomatic relations can lead to non-importation or exportation of goods.
2. Low demand for Products: The low demand for products may limit the volume of trade between two countries. The aim of trade is to maximize profit. Low demand for products implies inadequate market for the products
3. Political Instability: Political instability or civil strife and other social vices, including hostage taking, hijacking, etc, can limit the volume of trade between two countries.
4. Inadequate foreign Exchange: Inadequate foreign exchange can seriously affect the volume of trade between two countries.
5. Language Barrier: Differences in language between countries hinder the operation of international trade.
6. Differences in Currency: Differences in Currency among countries make the availability of foreign exchange very problematic. The foreign exchange rate differs from one country to another. The existence of parallel foreign exchange market in some countries has further compounded the currency situation.

**WORLD’S MAJOR SHIPPING ROUTES**

The world’s major ocean shipping routes are;

1. **The North Atlantic route:** This trade route links two most populous and heavily industrialized parts of the world; that is, Western Europe and Easter parts of North America. It is the busiest shipping route in the world.
2. **The Panama Canal route:** This is a domestic route between the east and west coasts of the U.S.A. the Panama Canal route was opened in 1913 between the Atlantic and the Pacific oceans. It serves the Caribbean countries. Some of these countries are Cuba, Jamaica, Venezuela, Columbia, Ecuador, Chile and Peru.
3. **Trans-Pacific routes**: it is the longest route in the world, connecting the western side of North America and East Asia. The route serves the following countries Japan, China, Korea, Australia and New Zealand. The major seaports are Sydney, Auckland, Manila, Yohohama, Vancouver and San Francisco.
4. **The Cape route**: This sea route was discovered by Vasco Da Gama in 1498 during his voyage to India. It was a very famous route that linked Europe, America with the Middle East through South Africa. The popularity of the route was greatly reduced when the Suez Canal was constructed and opened in 1869. The main sea port along this sea route is Cape Town in South Africa.
5. **The South Atlantic route**: the route links South America, Europe, West Africa and Western Europe. The major seaports along this sea route are London and Rotterdam in Europe, Buenos Aires in Argentina, Rio de Janeiro in Brazil, Dakar and Lagos in Nigeria. The main items of trade in the route include manufactured goods from Europe and agricultural produce such as coffee, wheat, meat, and dairy products from Brazil and Argentina, Groundnuts, Crude oil, Palm produces from West Africa.

WEEK ELEVEN

Revision

WEEK TWELVE

Examination