

## **S6 GEOGRAPHY**

### **RENEWABLE AND NON-RENEWABLE NATURAL RESOURCES**

A **natural resource** is anything provided by nature which man can utilize to satisfy his needs. Natural resources are categorized into renewable and non-renewable natural resources.

**Non-renewable** natural resources are resources which can't be regenerated when threatened by exhaustion. Such resources are minerals.

**Renewable natural** resources on the other hand are resources which can be regenerated when threatened by exhaustion. It can also be defined as a resource whose productivity can be made to regenerate after it has been exhausted. Such resources include natural vegetation (forests), climate, soils, water (the hydrosphere), scenic beauty and animal resources.

### **SOILS OR LAND (LITHOSPHERE)**

Soil constitutes the uppermost layer of the earth's crust composed of minerals, organic matter, water, air and bacteria. Soils support the growth of a variety of plant life.

**Soils have over time been degraded through the following ways;**

1. The use of poor methods of farming such as shifting cultivation which involves bush burning, destroying organic matter and bacteria in the soil as well as nomadic pastoralism characterised by over stocking encouraging over grazing leading to soil erosion and loss of soil fertility reducing soil productivity.
2. The use of agricultural inputs such as fertilizers, pesticides and insecticides, pollute the soil raising the acidic levels in the soil making them less productive.
3. The practice of monoculture where perennial crops are grown such as coffee, tea, cocoa, rubber, sisal which take up soil nutrients year after year lead to soil deterioration.
4. Over population puts pressure on land for settlement, farming, industrialization leading to land fragmentation and use of poor farming methods hence degrading the soils.
5. Land pollution through dumping of industrial wastes that destroy the soils rendering them barren and polythene papers reduce the productivity of the soil since these cannot decompose and hamper plant growth.

6. Deforestation especially of tropical rainforests due to demand for wood products, charcoal burning, agricultural land and settlement exposes the soils to agents of erosion especially wind and water, making the soils quickly lose fertility once put under cultivation.
7. Mining activities have also led to soil deterioration through mine pits left behind which accelerate soil erosion while mineral wastes also pollute the soils making them barren.
8. Construction works such as roads, railways, settlements, industries have led to land degradation exposing the soils to erosion and leaching reducing their productivity.
9. Excessive rainfall experienced especially in equatorial areas and coastal areas lead to loss of soil nutrients through leaching to the bed rock reducing soil productivity.
10. Cultivation of steep slopes increases surface run-off of water which leads to soil erosion washing away productive top soil and landslides affecting the productivity of soil.
11. Floods also affect soil productivity through washing away the fertile top soils leaving behind infertile soils which cannot be put to agriculture.

**The soils can however be conserved through;**

1. Applying fertilizers and manures to restore soil fertility especially where monoculture is practiced on the large plantation farms. In Nigeria, “under operation to feed the nation”, large amounts of fertilizers are used to improve the production of the soil.
2. Carry out afforestation and re-afforestation especially on the very steep slopes to protect the soils against soil erosion since the trees reduce the force of falling rain while tree roots bind the soil particles together.
3. Use of improved farming methods such as crop rotation, rotational bush fallowing, mixed cropping, intercropping to allow the soils regain their fertility naturally. In Chad, Lake Chad basin organization (L.C.B.O) has built agricultural development centres which are aimed at improving agricultural production within the region through teaching farmers better methods of farming. In Sudan, crop legumes are being emphasized.
4. Control the number of animals in the pastoralist areas to avoid overgrazing which leads to soil erosion. The carrying capacity of the land should be adhered to, to allow regeneration of grazing lands and soil. In Sudan, there has been establishment of grazing co-operative societies and range management schemes.

5. Productivity of soils can also be improved through adopting irrigation farming especially in arid and semi-arid areas such as Sudan on the Gezira, Kenana, Managil, Senegal on the Richard's Toll Scheme, Nigeria in the Sokoto State.
6. Carry out mass sensitization programmes about the dangers of poor methods of farming, over cultivation, shifting cultivation and bush burning in order for the farmers to acquire and adopt better methods of farming.
7. Control population pressure through encouraging the use of family planning methods so that pressure on land is reduced for the various land use types especially farming and settlement.
8. Encourage the treatment of industrial wastes before dumping them on the land to avoid contamination of the soils.
9. Encourage the use of soil conservation measures such as terracing, contour ploughing and mulching to avoid soil erosion and landslides. These are commonly practiced in highland areas such as Kigezi highlands, Burundi and Rwanda.

### **CLIMATE (ATMOSPHERE)**

Climate is a resource in that it supports the growth of crops, rearing of livestock, supports the growth of natural vegetation and is a source of energy through wind mills and solar.

**Activities that should have led to the deterioration of climate are as follows;**

1. Deforestation is rapidly depleting forests and woodlands to provide fuel, timber, agricultural land, settlement, infrastructural construction and industries. This interferes with evapotranspiration leading to reduced rainfall amounts affecting agricultural production.
2. The extensive drainage of wetlands has led to reduced precipitation since swamps are sources of moisture through evapotranspiration. This has led to insufficient water supply rendering the areas unproductive.
3. Atmospheric pollution by industries and fumes from car exhaust result into global warming, formation of acidic rain and de-glaciation. This affects other economic activities especially farming.
4. Poor methods of farming such as bush burning by pastoralists and shifting cultivators have also affected the climate of their environments, they led to de-vegetation affecting sources of moisture for rainfall formation hence reduced rainfall amounts.

**Climate can however be improved through;**

1. Afforestation and re-afforestation programmes to ensure the growth of forest cover which through a process of evapotranspiration leads to rainfall formation. In Nigeria, fast growing neem trees have been planted at Kano and Katsina to check on the advancing southward movement of the Sahara.
2. Enforce laws against illegal cutting down of forests and issue exploitation licenses to forest users in order to check on the rate of forest exploitation.
3. Limit swamp reclamation through planned and controlled use of wetlands to avoid extensive reclamation which has negative effects on climate.
4. Encourage treatment of industrial waste and clearing of air before emission in the atmosphere to avoid the formation of acidic rain that is harmful to plants and aquatic life.
5. Develop alternative sources of energy such as solar, bio gas, Hydro Electric Power to reduce the clearing of forests for fuel, wood and charcoal.
6. Control burning of fluro-carbons which emit toxic gases that have effects on the skin, respiratory and nervous systems.

### **WATER (HYDROSPERE)**

This refers to both surface and ground water sources, they include lakes, rivers, oceans and swamps. These water surfaces can be used as means of transport for use in domestic and industrial purposes, fishing, sources of water for irrigation and Hydro Electric Power generation.

#### **Water resources have been deteriorated through;**

1. Dumping of industrial and domestic wastes in lakes and rivers contaminating the water. This leads to scarcity of safe water for domestic purposes as well as leads to massive death of fish.
2. Construction of boreholes leads to the lowering of the water table which affects the usage of underground water resources especially by the agriculture sector.
3. Over fishing and use of indiscriminate fishing methods such as trawling, purse seining leads to the depletion of stock affecting the continual exploitation of water resources.
4. Drilling of oil in the river valleys and coastal areas may result in oil sipages and spills in the water bodies polluting them, affecting aquatic life and interfering with shipping vessels affecting navigation.
5. Swamp reclamation reduces water levels affecting aquatic life. It also leads to reduced amounts of rainfall received since they are sources of moisture for rainfall.

6. Cultivation along river banks and lake shores leads to soil erosion and silting of the water bodies. This makes them shallow for use as navigation routes. The silt also pollutes the water making it unsafe for human consumption.
7. Commercial farming requires large amounts of water for irrigation purposes. This may lead to overuse of the resources, drying up the water points affecting aquatic life and their usefulness as navigation routes.
8. Car washing at river and lake banks pollutes water making it unsafe for use as well as leading to death of fish.
9. Drought conditions have also led to the deterioration of water resources through inducing high evaporation rates leading to reduced water levels affecting aquatic life and water usage for irrigation and other purposes.
10. Natural factors such as volcanicity, landslides, and earthquakes have affected water resources through damming off rivers causing river reversal, pollution and silting reducing the river or lake levels, drying up some water bodies, affecting aquatic life and their use for transport.

**The water resource can however be renewed through the following ways;**

1. Carrying out afforestation to help protect water catchment areas and control surface run-off improving water supply. In Chad, under L.C.B.O Government is aiming at conserving Lake Chad because of its high rate of shrinking.
2. Discourage indiscriminate fishing by setting standard net sizes so that young fish are protected which enables natural production to take place increasing fish stock.
3. Encourage fish farming through the establishment of fish ponds to release pressure on the large water bodies offering alternative sources of fish, minimizing the dangers of fish depletion.
4. Re-stocking of over-fished waters by introducing hatcheries where highly demanded fish species are bred and later introduced in the water bodies increasing fish stock.
5. Encourage treatment of industrial wastes before dumping in the water bodies to avoid pollution, protecting the aquatic life and quality of water for domestic and industrial use.
6. Control fishing by patrolling fishing grounds and issuing licences to fishermen to avoid overfishing hence ensuring the continued use of water bodies for fishing.
7. Control the problem of over fishing through adapting to better fishing methods and use of recommended fishing gears. In Chad, four training centres were established under the supervision of L.C.B.O where training of fishermen in modern methods of fishing is done.

8. In some cities, manmade water bodies have been constructed to supplement on the available water sources. In Sudan, digging of pumped wells and surface reservoirs called hafirs is common while in Libya, artificial rivers were created.
9. Discourage swamp reclamation since they help in controlling the hydrological cycle improving rainfall formation ensuring more sources of water. Besides, they act as filters providing safe clean water for usage.

## **NATURAL VEGETATION**

This ranges from forests, woodlands, grasslands to shrubs and thickets. Forests are mainly used for the extraction of timber, pulp and paper, rubber, protection of water resources, wildlife conservation, and recreation and protection against soil erosion. Grasslands are used for grazing and game conservation.

### **Natural vegetation has deteriorated through;**

1. Rapid population growth that creates high demand for land for settlement and farming encouraging deforestation.
2. Forests are a major source of wood and wood products such as timber and poles for the construction and furniture making industries, charcoal and firewood. These therefore create the need for de-vegetation.
3. Forests have also been depleted by bush fires started by lighting or deliberately by nomadic pastoralists for pasture regrowth, hunters and shifting cultivators when clearing land for farming.
4. Vegetation has also been degraded through over stocking leading to overgrazing which leads to soil erosion and further loss of vegetation. This is particularly so in the semi-arid and arid zones where pastoralists operate.
5. High rates of deforestation have also been due to over cultivation, firewood collection, charcoal burning and burning of the vegetation during the dry season. This affects their sustainable use.
6. Political instabilities have also led to the deterioration of vegetation. They act as hiding places for anti-government agents necessitating their clearance.
7. Changes in climatic regimes have also contributed to de-vegetation. This is through increased temperatures and reduced rainfall which interfere with plant growth. In Africa, the Sahelian Region on the Sahara margins have experienced a high rate of vegetation disappearance.

8. Construction works have also led to vegetation deterioration. This is in form of road, rail, industrial and settlement projects. These call for forest destruction out of need for more land for construction purposes.
9. Mining activities have also led to the loss of vegetation. This is because the land is cleared to give way for mining activities to take place such as construction of mining tunnels, transport routes and in some cases construction of smelting industries.
10. Pests and diseases have affected vegetation in a way that they lead to stunted growth lowering their usefulness and value of the trees. Such pests include; wood peckers while diseases include; leaf curl and swollen shoot disease.
11. Wild game with reference to herbivorous animals especially elephants and giraffes debark trees and feed on their leaves. This affects the rate of tree growth and exposes them to attacks from pests and diseases. The quality of such trees is lowered as well as their value.
12. Natural calamities such as earth quakes, landslides and volcanicity affects vegetation in that in places where these are experienced, they lead to mass destruction of forests interfering with their continued existence.

**Natural vegetation can therefore be renewed in the following ways;**

1. Encourage afforestation and re-afforestation in the deforested areas. In Chad, the Lake Chad Basin Organization (L.C.B.O) established forestry centres with an aim of improving on the vegetation cover within the region while in Somalia, tree species such as the acacia, casuarine pine, cactus and the date palm were planted. In Nigeria, the fast growing Neem trees were planted in Kano and Katsuna.
2. Develop alternative sources of fuel to reduce pressure on the forests for fuel wood and charcoal. Such energy sources include solar, Hydro Electric Power, bio-gas, nuclear and thermo power.
3. Develop other building materials to substitute the use of timber and poles in construction such as bricks, tiles and metal.
4. Control lumbering through issuing licenses to forest users to ensure sustainable use of the forest resources.
5. Control population growth through the use of family planning to control population encroachment on forest reserves. This reduces the number of people and their demands for more land for farming and settlement.
6. Discourage burning of vegetation by pastoralists and shifting cultivators who use the “slash and burn” method in land preparation by encouraging them to adopt better methods of farming and having settled ways of life.

7. Carry out mass education about the dangers of de-vegetation and benefits of environmental conservation through the use newspapers, radios, television stations, magazines, workshops and seminars. This creates environmental awareness and the sustainable use of the natural resources.
8. Natural vegetation can also be conserved through government policies like establishment of forest reserves, game parks and reserves to control the wild game. This controls forest encroachment by people searching for different wood and wood products.
9. In the pastoralist areas, controlled grazing can be done through limiting the number of animals in grazing areas to control over grazing and erosion, protecting the sustainable use of grasslands.
10. Apply pesticides and insecticides to control pests and diseases. This improves the rate of vegetation growth leading to better quality vegetation and value.
11. Encouraging peaceful resolution of political conflicts to avoid wars. This protects the forests for clearance ensuring their continued survival.

### **ANIMAL RESOURCES (fauna)**

Animals are both domesticated (cows, goats, sheep, rabbits) and undomesticated (elephants, lions, hyenas) found in their natural habitats and form part of the natural resources. Their distribution is partly due to climate and partly due to their restrictions to national parks and game reserves. The most important benefit derived from game conservation is attraction of tourists and earning especially countries foreign exchange.

Some mammals are sources of food for man while others are valued as cultural heritage by some countries, tribes and clans.

#### **The wild game is faced with the following problems;**

1. Poaching and uncontrolled animal cropping (harvesting of wild game through shooting) has led to some animal species becoming extinct while many are endangered for their skins such as leopards, cheetahs, crocodiles, elephants for their tusks and rhinos for their horns. This is done in national parks and game reserves.
2. Increased population increasing the need for land for farming and human settlement. This pushes people into encroaching on the existing gazetted areas for wildlife game, endangering the animals and competing with them for land for survival.



3. In some areas, there is an imbalance in the eco system. It has been found that the ratio of predators to prey is too big in some parks which results in the decline of other species of animals.
4. Wild fires have also endangered the wild game. These fires may be started either naturally or by man through bush burning common among the pastoralists or shifting cultivation. These devastate parks and game reserves leading to death of wild life or their migration to safe places.
5. Construction works especially building of roads and railways passing through forests necessitates excessive clearing of the vegetation and this is the natural habitats for various animals. This act therefore leads to migration of the wild game.
6. Pollution of the natural habitats for the animals has also interfered with their survival. Some animal species die or others are forced to migrate to other areas free from pollution.
7. Wild game has also been endangered with illegal exports of animals. This has led to extinction of some animal species making it hard to restock them.
8. The presence of diseases which attack animals has affected their survival. As such some animals die reducing the number of wild game.

**Wild animals can however be conserved through the following ways;**

1. Poaching and animal cropping can be reduced through institution of regular patrols in the game parks and reserves.
2. Wild animals can also be conserved through the establishment of national parks, game reserves and sanctuaries where animals faced with extinction are preserved.
3. Carry out mass education about the importance of wild game conservation in that the people can protect the animals instead of hunting them down.
4. Control animal hunting through issuing of licenses to game hunters. This would also control on the illegal animal exporters conserving the wild game.
5. Enacting international laws as trade in elephant trunks, rhino horns and skins of animals in order to protect the animals from poachers.
6. Reduce the human population pressure within the surrounding of parks and game reserves through resettling them in other areas. This prevents agricultural encroachment into land belonging to parks and game reserves.
7. Discourage burning and clearing of vegetation to preserve and protect the natural habitats of the animals.
8. Establish zoos to protect and preserve those animal species that are seriously endangered. These can be let to breed and later taken to game parks such as the white rhinos in Uganda.

### **REVISION QUESTIONS**

- 1a)** Distinguish between renewable and non-renewable natural resources.
- b)** Examine the measures being taken to conserve the renewable natural resources.
  
- 2)** Giving specific examples, assess the extent to which the renewable natural resources of Africa have deteriorated.
  
- 3)** Describe the steps being taken to ensure sustainable utilisation of natural resources in tropical Africa.
  
- 4)** With reference to any one country outside East Africa, discuss the steps being taken to conserve renewable natural resources.

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