UTILIZATION AND CONSERVATION OF NATURAL RESOURCES

Basic concepts

- **Reserves**

These are resources which are known to exist but not used today.

- **Bio-diversity**

This means the variety of genetically distinct populations and species of plants, animals and micro-organisms co-existing with man and the variety of eco-systems of which they are functioning parts.

- **Environment**

This is an aggregate of complex sub-systems within which natural resources respond to human activity. In general the environment is categorized as the natural environment and artificial environment. The components of the *(natural)* environment include: lithosphere (solids-soils and rocks), hydrosphere (liquids-water resources), biosphere (plants and animals) ,and the atmosphere(gases) .

NATURAL RESOURCES

A resource is anything that is beneficial or essentially beneficial to satisfy human needs. Resources expand and contract in response to human wants and actions. An object is originally neutral staff but when human value is attached to it, it becomes a resource.

Natural resources refer to anything provided by nature /gift of the nature capable of satisfying human needs. Examples include: vegetation, soils, rocks, air, water resources, animals, insects, human beings etc

CLASSIFICATION OF NATURAL RESOURCES

Renewable natural resources

These are resources capable of self-reproduction. They are resources that can be regenerated once deteriorated and put back to use. If used with care, these resources are inexhaustible. Examples include: soils, climate, water resources, scenic beauty, natural vegetation, animals.

Non-renewable resources

These are resources which lack the capacity to regenerate themselves after deterioration. They diminish and get exhausted when used. They form slowly and from the human perspective their supply tends to be fixed especially mineral resources.

NB: Renewable natural resources should always be organized and sustainably utilized in a way that humans can yield the greatest for the longest possible time. Non-renewable resources need to be sustainably utilized emphasizing conservation through optimal use.

SOILS

Soil constitutes the upper most layer of the earth's crust. It is composed of minerals, organic matter, water, and air. The soil supports plants with nutrients .soils degradation arises from the removal of natural vegetation by man and his animals, which produces non-productive soils (impoverished soils).

This is attributed to the activities of man like bush burning, deforestation, and pastoralism. Other activities leading to reduced soli productivity include use of fertilizers which, pollute the soil, cultivation along steep slopes carelessly, dumping of polythene papers which take years to decompose, monoculture etc

Possible remedies of soil degradation:

- Use of crop rotation
- Improving the use of organic matter
- Proper use of fertilizers
- Proper disposal of polythene material
- Sensitization o the masses
- Restricting settlement and agricultural practices in fragile zones such as along steep slopes.
- Use of soil erosion control measures such terracing, contour, strip bands of grass, control of livestock.
- Proper land use planning.

CLIMATE

Climate is a resource that growth of crops and rearing of livestock. It supports vegetation growth, wind to produce wind energy etc. Many activities have been responsible for the deterioration or changes in climatic conditions such as deforestation, swamp reclamation, pollution, and increased industrialization. Many areas are increasingly characterized by low and unreliable rainfall, and the dry season is long, yet the occurrence drought is frequent.

WATER RESOURCES

This combines the surface and ground water resources i.e., the lakes, rivers, streams, oceans, and swamps /wetlands. These sources are important for domestic and industrial use, irrigation, fisheries, H. E. P generation, transport etc. the water-related environmental problems include: water shortage, and deterioration of water quality through pollution and contamination. Whereas some areas receive enormous amounts of water, other areas receive hardly any or very little.

Regarding the quality, there is evident pollution of fresh water sources. Rivers and lakes have been polluted by agricultural chemicals, sewage and industrial waste disposals-which affects aquatic life makes the water unsafe for consumption. There is also overfishing and indiscriminate fishing leading to depletion of fish stocks, construction of many bore holes, which affects underground water sources. For oceans /seas, the international dumping of toxic chemicals and nuclear substances by industrialized countries is a problem of major concern.

Principles of management of water resources:

- Encouraging afforestation and reforestation
- Legislation of waste discharge
- Careful licensing of fishermen to minimize over fishing.
- Setting standard net sizes
- Restocking the overfished waters
- Encouraging fish farming
- Protection of catchment areas
- Emphasizing community participation such in conserving wetlands
- Treatment of industrial wastes before dumping water bodies
- Carrying out environmental impact assessment(EIA) for all projects

NATURAL VEGETATION

This includes forests, grasslands, scrub, thickets, and woodlands. For example the forests are useful for timber, rubber; protect water resources, wildlife conservation, recreation, soil erosion control etc. it is noted that much of tropical vegetation is being lost especially in west Africa, DRC, etc the savanna vegetation is continuously threatened by the ever growing population requiring land for settlement and farming . Other activities for vegetation are: lumbering, charcoal, political etc

Possible solutions to vegetation degradation:

- Encourage afforestation and reforestation
- Control of lumbering activities by government
- Encourage the use of alternative sources of energy

- Use of energy saving stoves
- Prohibiting bush burning
- Creation of forest reserves
- Education/sensitization of the masses about vegetation conservation
- Enforce the laws involving of agricultural encroachers.
- Train more environmental management manpower
- Emphasize population control measures

WILDLIFE

This comprises of a combination of undomesticated plants and animals (flora and fauna) found in their natural found in their natural habitat and forming part of natural resources. Wildlife is basically restricted to national parks, sanctuaries, wildlife research centres among others. Wild life is more crucial as a tourist attraction and hence generates foreign exchange.

Wildlife is threatened by increased population settlement, poaching, uncontrolled cropping, bushfires etc a number measures can be taken to conserve wild life such as controlling agricultural encroachment, massive education about the value of the environment among others.

SCENIC BEAUTY

This includes the general natural features of an area such as mountains, valleys, drainage features (e.g. waterfalls, rapids), vegetation etc. the scenic beauty is degraded /destroyed through mining and quarrying, construction, deforestation, garbage, and waste disposal etc.

Guiding Questions

1. (a)Differentiate between renewable and non-renewable resources.

(b) With specific examples from either a developed or a developing country, examine the measures being taken conserve renewable natural resources.

2. (a) Giving specific examples ,assess the extent which the renewable natural resources of Africa have been deteriorated .

(b) Discuss the steps being taken to ensure sustainable utilization of natural resources.

3. Account for the deteriorating of renewable resources in Africa and suggest ways how the concerned government can combat these problems.

ENVIRONMENTAL DEGRADATION

This refers to fall in the biological productivity of environmental resources. Or It is the decline productive value of the components of the environment.

Environmental degradation/deterioration is characterized by desertification, pollution and global warming, deforestation, soil erosion, landslides and mass wasting, leaching, and loss of biodiversity.

Causes of environmental degradation in Africa

Recent studies in Africa have all found progressive environmental deterioration over the last decades, and this can be explained by both natural and man-made causes.

1. **Rapid population growth** which has over strained the natural resources and environmental systems such as the hydrological cycle. It has created imbalance between people and natural resources due to exceeding the carrying capacity. This has increased the clearing of natural vegetation for settlement, land fragmentation and reduced soil productivity.
2. **Poor farming methods /unsound agricultural practices** which include overgrazing, bush burning, monoculture, over cropping, cultivation along steep slopes, and river banks among others.

a) Overgrazing resulting from over stocking mainly in the pastoral communities such as the Fulani in the Sahel region (northern Nigeria), the Maasai of Kenya and Tanzania among others. The soils are left bare and hence exposed to severe soil erosion. This in turn reduces soil productivity /crop yields and also contributes to increased drought.

b) Bush burning mainly done by shifting cultivators, other peasant farmers and nomadic pastoralists, for example when clearing farming land, preparing for fresh pastures at the beginning of the wet season among other reasons. This also exposes the soils to the agents of erosion, destroys the useful living organisms and humus that contribute to soil formation. It also leads to the development of resistant grasses-not good for livestock.

c) Monoculture due to growing of especially perennial crops year after year and this also leads to deterioration of soil productivity.

d) Over cropping—continuous cultivation of land without giving it ample time regenerate, also makes the land to lose fertility and consequently reduced yields.

3. **Poor lumbering methods and increased deforestation** without selective cutting and failure to replace the cut down trees. Much of the tropical forests are being lost especially in West Africa (such as southeast guinea, Cameroon, Ghana, southern Nigeria). In Southern Nigeria there has been rapid deforestation in the Yoruba and Ibo states. Deforestation leads to increased soil erosion, loss of soil fertility, reduced evapotranspiration /reduced rainfall, and unreliable water supply—hence general environmental degradation.

4. **Reclamation of swamps /wetlands** caused by land shortage and the desire to grow certain crops that require a lot of water (such as rice). Many swamps have been drained for crop farming coupled with industrialization and bricklaying. This leads to insufficient water for both livestock and man. It also affects the water table and the drained areas soon become arid and unproductive. More so the habitat of birds and animals is lost which negatively affects the tourism industry.
5. **Increased infrastructural development** which leads to destruction of vegetation such as clearing the forests to set up roads, railways, schools, health centres. There is destruction of the soil structure such as by leveling the ground to set up various infrastructures. This leads to soil erosion, mass wasting, and reduced evapo-transpiration.
6. **Over fishing** due to the growing demand for fish year after year and the increased use of modern fishing gargets leads to over fishing and depletion of fisheries resources such as the disappearance of certain fish species.
7. **Poaching** and this involves illegal hunting of wild animals especially in game parks and game reserves. Poaching leads to the reduction in the wild game, hence negatively affecting the tourism industry.
8. **Mining and quarrying activities** which leads to gradual depletion /exhaustion of deposits, leads to pollution of the environment (both air and water pollution),destroying of scenic beauty/ disfiguring of the landscape by leaving large quantities of waste rock and abandoned mining pits. There is also increased noise pollution through blasting of rocks. In fact many environmental problems in the Niger delta of Nigeria are associated with the oil mining industry such as oil spills due to leaking oil pipes ,and fires due to sabotage by certain groups. Oil spillage leads to contamination of underground water, affects aquatic life, and people in the surrounding areas.
9. **Increased industrialization in many parts of Africa** and this increases the exploitation of various resources such as minerals, forest resources, and water resources. Industrialization also leads to the destruction of grasslands, forests, wetlands, to provide room for industrial sites. It is still associated with pollution through the release of toxic substances and industrial fumes, which affect the ozone layer gradually leading to global warming. Industrial wastes are also disposed into water sources which affect urban water supplies and endanger aquatic life –hence increased environmental degradation.
10. **Rampant political instabilities in Africa** such as the West African countries (Liberia, Ivory Coast), DRC, Somalia, and Rwanda. These conflicts accelerate the cutting down of trees, burning of bushes and bombing of forests by rebel and government forces. This leads to reduced evapo-transpiration, increased soil erosion and resource degradation. The weapons used also increase the rate of environmental pollution.
11. **Insufficient technical knowledge about the environment/ Limited knowledge about the value of environmental resource**. Most people do not know much about ecosystems and

other life support systems. This explains the increased overstocking and over grazing, over fishing and indiscriminate fishing, charcoal burning, cultivation along riverbanks etc. The effects of human activities cannot be predicted with reasonable certainty. There is much gambling with survival than caring for life support systems or environmental resources.

12. **Increasing poverty and failure to understand the wealth of nature**. This leads to over using of natural resources such as fishing, forest cutting, illegal hunting of wildlife etc in attempt to look for survival/livelihood.
13. **Poor patterns of resource tenure and control** since in many cases the user rights are not specified which escalates degradation. For example the communal ownership of land among the pastoral communities (Maasai, kikuyu, Fulani) and shifting cultivators (such as Bemba of northern Zambia). This leads to over stocking, careless bush burning, and cutting down of trees—resulting into soil erosion, loss of soil fertility, reduced evapo-transpiration.
14. **Weak and conflicting government policies on environmental protection**. More effort is put on industrialization and agriculture at the expense of sustainable utilization of resources. For example there are policies targeting the conserving of wetlands yet at the same time other policies focus on modernizing of agriculture by draining wetlands such as rice schemes. Still many laws fail to focus on the causes of environmental mismanagement for example laws against poaching of wild animals.

Natural causes

1. **Climatic hazards**:
    - **Influence of prevailing dry winds and cold ocean currents** for example the North East trades from the Arabian Desert are causing arid conditions over areas of northern Kenya and northeastern Uganda. The dry Harmattan winds affect northern Mali and Senegal negatively leading to desertification. The cold Benguela current has affected the coastal areas of south west Africa by creating aridity due to pre –mature condensation. This also explains the desertification effect such as the Kalahari and Namib Desert.
    - **There is also flooding due to excessively heavy rainfall** in many parts of Africa such as Malawi, Mozambique, Ethiopia, and Sudan. Flooding leads to the destruction of agricultural land, loss of property, loss of life, contaminating drinking water.
    - **Leeward /rain shadow effect**. This leeward side of a mountain has dry descending winds and lies in a rain shadow characterized by limited rainfall, limited/stunted vegetation growth, and it is here that arid conditions start.
2. **Absence of large water bodies** which would otherwise be recharging sources for winds, but their absence makes the areas dry lands, with reduced rainfall.
3. **Presence of thin infertile soils/ sandy soils** not capable of sustaining plant growth. It is noted that desertification starts in such areas, leading to resource degradation. The

absence of moisture conservation techniques in such areas to manage dry soil agriculture forces people to degrade even other areas/resources such as woodland and forest lands.

4. **The occurrence of locusts and other pests**. Locusts have greatly affected the irrigated fields of dry lands such as in Senegal, northern Nigeria, and Mali. Locusts have also destroyed large areas of vegetation in West Africa, north and north eastern Africa. This affects evapo-transipiration, leading to reduced rainfall totals and vegetation destruction further accelerates soil erosion. Other plant pests include: aphids, caterpillars, also coupled with livestock pests.
5. **Other natural disasters/hazards** such as volcanic eruptions, earth quakes, and landslides. These also affect slope stability; soil structure and in turn affect vegetation growth. Earth quakes also increase the incidence of landslides especially in highland areas, which degrade the environment further.

Research question

a) Account for the occurrence of environmental deterioration in Nigeria
b) What steps are being taken to solve the above problem in Nigeria?

ENVIRONMENTAL CONSERVATION

This is involves management of human use of environmental resources so that they may yield the greatest sustainable benefit to the present generations while maintaining their potential to meet the needs and aspirations of future generations.

The environmental conservation strategies include the following:

1) **Adopting population control measures** such as family planning; since population pressure is both a cause and symptom of environmental crisis. This should be coupled with resettlement of excessive populations.
2) **Using forest resource management programmes** such as afforestation and reforestation programmes. It should also involve planting of fast growing trees as well as agro forestry.
3) **Emphasizing alternative energy sources** to reduce the careless cutting down of trees .there should be a wide range of choices such as natural gas, HEP, biogas, use of coffee husks, and use of energy saving stoves.
4) **Improving the farming systems** for example encouraging agro forestry, crop rotation, mixed farming, intensive farming, ranching etc
5) **Establishment of irrigation projects** in specific areas and the use of moisture conservation techniques.
6) **Enforcing strict laws on environmental resource management** such as wetland protection/protection of forest reserves. This also calls for laws reforms coupled with their assessed impact on the environment.

7) **Reforming resource ownership /tenure rights** to return responsibility for management of natural resources such as the local forest reserves, bush lands.
8) **Improving solid waste management** such as by burning, burying, land filling, recycling, and re-use of solid wastes to reduce environmental degradation.
9) **Soil management strategies** such as terracing, planting cover crops, use of ridges, contour ploughing. There is also need for land consolidation.
10) **Strengthening education and awareness campaigns** about environmental management. This includes use of the media, local community, NGOs, wildlife clubs among others.
11) **Encouraging community participation in environmental management** and this empowers the local people to mobilize their own capacities to be social actors rather than passive subjects. It also involves sharing of social and economic benefits with the local populations.
12) **Campaigns for political stability in various parts to reduce insecurity** such as through peace talks, enhancing political and economic democracy.
13) **Effective coordination of natural resources management agencies** such as game departments, wildlife authorities, ministry of natural resources to avoid conflicting interests. There should be good policy formulation and implementation.
14) **Avoiding wastage at the industrial level,** that is, ensure total use of resources. For example parts not suitable for pulp can give paper boards, fiber, and the remaining for fuel. In addition, the re-use of waste paper for news print among others.
15) **Environmental impact assessment (EIA**)—this is a systematic examination conducted to determine whether or not a project will have any adverse impacts on the environment.

Guiding questions:

1. Man is responsible for environmental degradation in Africa. Justify the statement.
2. 'Environmental degradation is not only man-made but also natural' explain using specific example from Africa.
3. To what extent is environmental degradation a consequence of man's misuse of the environment?
4. (a) What do you understand by the term environmental degradation?

(b) To what extent have human activities contributed to environmental degradation in the Sahel region of Africa?

Desertification

Qn. (a) Account for the extensive desertification in Africa

- define desertification

- Identify the characteristics/ indicators of desertification and identify areas experiencing desertification in Africa.
- Explain with specific examples the causes of extensive desertification in Africa

Desertification refers to the extension of the desert conditions to areas where it has not been experienced.

Desertification involves reduction of the biological productivity of land to low levels. The land becomes unproductive, and incapable of supporting livestock and crops.

The characteristics/ indicators of desertification include: desert-like conditions (such as low and unreliable rainfall, very hot temperatures, low humidity ,high evaporation rates); reduction in rainfall amounts and frequent occurrence of drought; reduced vegetation cover, reduced diversity of plants and animals; reduced resource productivity; increased areas of bare land; reduced water level in water bodies; reduced surface water(*lakes, rivers, streams, swamps)* reduced soil moisture , rising levels of salination in irrigated fields among others.

In Africa it is noted that the Sahara desert and Kalahari Desert are extending into the nearby marginal lands, thereby there destroying the productivity of the land. The Sahel region (margins of the Sahara desert) has been the most seriously affected area. Areas experiencing desertification therefore include the Sahel (northern Nigeria, Somalia, Sudan, Ethiopia, Chad, Mali, Senegal, etc); Botswana, southern Zimbabwe, northeastern Uganda, northern Kenya, central Tanzania among others.

The reasons for extensive desertification in Africa

1) ***Lack/absence of large water bodies***, which otherwise would be recharging sources for winds .this results into dry conditions and reduced rainfall totals. More so water bodies are reducing in size due to high rates of evaporation and this adversely affects the climate of the surrounding areas.
2) ***Poor sandy soils in the fragile zones*** which are not capable of sustaining plant growth since they do not retain moisture. This leads to poor vegetation growth and hence reduced evapo-transipiration.
3) ***The influence of dry winds*** such as the North East trade winds from the Arabian desert which causes continuous dryness in northern Kenya and Somalia, the dry Harmattan winds which contribute to the dry conditions of north west Africa.
4) ***Influence of cold ocean currents*** such as cold Benguela current and the cold Canary current which induce aridity over the nearby coastal areas. This is because their coldness induces pre-mature condensation in the on-shore winds near the cold currents, reducing the rainfall

totals such as the Kalahari desert extended into the interior partly explained by the cold Benguela current which blows along the western coast of southern Africa.

5) ***Lee ward/rain shadow effect***. Some areas are located on the leeward sides of mountains such as Northern Kenya and North Eastern Uganda situated on the leeward side of the Ethiopian highlands , the Maasai lands found on the leeward side of the Kilimanjaro mountain. Such areas are dry for most parts of the year due to dry descending winds.
1) ***Influence of pests such as Locusts*** which have particularly invaded the Sahel region destroying the green vegetation, resulting into reduced evapo-transpiration, and hence low rainfall totals.
6) ***Rampant deforestation*** by man, especially in Central Tanzania, West Africa, Namibia, Malawi. This has mainly affected the savanna woodlands and savanna grasslands due to increased demand for fuel wood, charcoal, building materials, and cultivation land. The removal of vegetation results into reduced rainfall and increased temperatures.
7) ***Poor farming methods*** such as nomadic pastoralism characterized by over grazing and destruction of pastures ; cultivation on steep slopes, monoculture, shifting cultivation, over cultivation, bush burning, and careless clearing for cultivation like in the Sahel (Mali , Somalia , northern Nigeria, northern Kenya) and Kalahari Desert margins, thus extension of dry conditions such as severe soil erosion, hard grasses and reduced rainfall totals.
   (Over stocking and overgrazing such as in northern Nigeria by the Fulani cattle keepers, northern Kenya by the Turkana, Maasai land of Kenya and Tanzania. This leads to increased soil erosion since the soils are left bare).
8) ***Reclamation of swamps / draining of wetlands*** for cultivation reduces the water table and supply of water vapour into the atmosphere hence desert conditions—increased temperatures and reduced rainfall totals. This is one of the major causes of desertification in Senegal.
9) ***Increased sinking/ drilling of bore holes and construction of valley dams***, which also lowers the water table and results into loss of soil moisture which could sustain vegetation growth—hence leading to natural drying of vegetation.
10) ***Rapid population growth/population pressure*** hence increased need for land for cultivation and settlement leading over use of the land, clearing of vegetation, swamp reclamation, land fragmentation and soils deterioration. This in turn lowers the water table leading to dry conditions since the carrying capacity of land is exceeded.
11) ***Increased industrialization and urbanization***, which explains the destruction of the ozone layer by emitting carbons, methane and other pollutants into the atmosphere resulting into global warming. The ozone layer is gradually losing its natural ability to absorb the ultraviolet B radiation from the sun. Hence, the amount of heat reaching the earth's surface is higher than the expected normal amount.
12) Inadequate environmental awareness among the population.

13) Weak government policy implementation, regarding environmental resources such as laws against deforestation and swamp reclamation.

(b) Explain the effects of desertification in Africa

1. Famine results due to reduced rainfall totals and increased temperatures plus prolonged drought. There is scarcity of food since the land becomes becomes too dry to support crop cultivation and livestock farming. There are changes in the planting seasons due to climatic changes.
2. Results into shortage of surface and underground water, which limits the survival of man and livestock. For example, Lake Chad has greatly reduced in the water level, almost drying out in the last three decades.
3. It accelerates the rate of soil erosion by both wind and running water. This reduces land productivity and also destroys the nature of the land by creating depressions and gullies.
4. Results into shortage of pastures and hence reduction in the livestock especially cattle. This is common in the Sahel region of Africa where the Fulani have lost large numbers of cattle. The same experience is in Somalia due to prolonged drought.
5. Results into further encroachment on marginal lands such as mountain slopes, wetlands for cultivation, hence further environmental degradation.
6. Worsens poverty and standard of living due to loss of wild life, loss of domestic livestock, reduced soil productivity, and reduced fisheries among others.
7. Results into loss of biodiversity—animal, bird and plant species which are not adopted to the arid conditions. It is only the drought resistant plant species that remain yet many animal species either die or migrate to other areas.
8. Results into shortage of fuel wood and other wood products since many forests and woodlands are destroyed.
9. Limits human settlement to only a few areas where surface water can be got, and this increases population pressure in such areas and thus further environmental degradation.

(c) Outline the steps being taken to control (combat) desertification in the Sahel region.

Examples should be cited from the Sahel region (such as northern Nigeria, Senegal, Algeria, Mali, Chad, southern Sudan etc).

1. ***Adopting population control measures*** since population pressure is both a cause and symptom of environmental crisis. This is coupled with resettlement of excessive populations.
2. ***Using forest resource management programmes*** such as afforestation and reforestation programmes.

3. ***Emphasizing alternative energy sources*** to reduce the careless cutting down of trees such as natural gas, Hydro electricity, biogas, use of coffee husks, and use of energy saving stoves.
4. ***Improving the farming systems*** for example encouraging agro forestry, crop rotation, mixed farming, intensive farming, ranching etc
5. ***Establishment of irrigation projects*** in specific areas and the use of moisture conservation techniques.
6. ***Enforcing strict laws on environmental resource management*** such as wetland protection/protection of forest reserves. There also law reforms coupled with their assessed impact on the environment.
7. ***Reforming resource ownership /tenure rights*** to promote responsibility for management of natural resources such as the local forest reserves, bush lands.
8. ***Improving solid waste management*** such as by burning, burying, land filling, recycling, and re-use of solid wastes to reduce environmental degradation.
9. ***Emphasis on Soil management strategies*** such as terracing, planting cover crops, use of ridges, contour ploughing.
10. ***Strengthening education and awareness campaigns*** about environmental management. This includes use of the media, local community, NGOs, wildlife clubs among others.
11. ***Encouraging community participation in environmental management***, which empowers the local people to mobilize their own capacities to be social actors rather than passive subjects. It also involves sharing of social and economic benefits with the local populations.
12. ***Campaigns for political stability in various parts to reduce insecurity*** and this also involves the use of peace talks, enhancing political and economic democracy.
13. ***Effective coordination of natural resources management agencies*** such as game departments, wildlife authorities, ministry of natural resources to avoid conflicting interests. There is improvement in policy formulation and implementation.
14. ***Avoiding wastage at the industrial level*****,** that is, ensure total use of resources. For example tree parts not suitable for pulp can give paper boards, fiber and the remaining for fuel. Also the re-use / recycling of waste material.
15. ***Environmental impact assessment (EIA).*** This is a systematic examination conducted to determine whether or not a project will have any adverse/ negative impacts on the environment.

Other guiding questions:

1(a) Examine the causes of desertification in east Africa.

(b) What steps are being taken to combat the spread of the desert?

2. Examine the causes and effects of desertification the Sahel region of Africa.

3. “The increasing desertification in Africa in mainly a consequence of man’s activities.” Discuss

Famine

Question (a) “The famine problem in Africa is primarily a result of human factors”. Discuss.

(b) Suggest possible solutions to the above problem.

Solution (a)

- Define famine
- Identify the countries in affected by famine in Africa /locate the areas.
- Explain using specific examples how human factors have caused famine in Africa
- Explain how other factors (natural factors) are also responsible for famine in Africa

Famine is the state of extreme food scarcity characterized by extreme hunger and starvation for a relatively long period of time. OR Famine is the acute food shortages leading hunger, starvation and death.

The counties in Africa greatly affected by famine include: Ethiopia, Somalia, Sudan, Eritrea, Zimbabwe, Malawi, Chad, Burkina Faso, Senegal, Mali, Mauritania, Niger, northern Kenya, north eastern Uganda, and Tanzania. Some areas suffer from periodic famine, yet other areas are experiencing persistent famine. Famine results into starvation, malnutrition, epidemics, fall in standard of living and even death.

Human factors to a bigger/greater extent:

1) ***Political instabilities and conflicts in many parts of Africa*** which disrupt settlement, cultivation and food distribution such as prolonged wars in southern Sudan, Somalia, Ethiopia, Chad, Rwanda, Angola, northern Uganda, and Liberia. Wars are associated with attacks on land, burning of farmlands and also preventing people from settling down to grow food crops and rearing of livestock-hence leading to famine.
2) ***Rural-urban migration (in search for white collar jobs)***. Many people move into the rapidly growing towns like Lagos, Kampala, Nairobi, Cairo, and Yaoundé, Dakar; which also leads to movement of energetic labour away from rural areas, leaving agriculture for the old folk, women, and children who are less/not very productive, leading to acute food shortage.
   Poor attitude towards agriculture as an occupation when compared to other occupations. Many people leave the rural areas to look for better paying employment in urban areas yet they continue depending on the farming community for food supplies.

3) ***Cultural ways of life (conservatism in many areas)*** such as nomadic pastoralists who do not practice food crop production like the Fulani of West Africa, Tuaregs of the Sahara desert, Maasai of Kenya and Tanzania. Other practices are extended funerals, traditional taboos and other cultural beliefs which limit food crop production as more time is spent on such activities instead of farming, causing famine. (*Some ethnic groups have long-honoured staple foods and consumption habits, hence reluctant to change to new foods).*
4) ***Poor land tenure system*** such absentee landlordism-denies many people access to land *(land is in the hands of few people who do not use the land for sufficient food production),* communal ownership of land-which denies exclusive rights over land and leads to irresponsible use of land and, limits the initiative to introduce modern methods of farming – all of which limit food crop production. Also the inheritance of land leads to land fragmentation since land is divided among sons and daughters-hence reducing yields due to over use of land.
5) ***Poor farming methods*** such as bush burning, over grazing, monoculture—which lead to soil exhaustion-loss of soil fertility and consequently reduced food production. Many farmers produce for subsistence /home consumption and thus producing less food—with no surplus for other people. Many farmers cultivate small pieces of land which cannot produce enough food to meet the requirements of the population.
6) ***Poor post-harvest management of foods /poor storage facilities*** which leads to loss of the produced food such as in Senegal, Nigeria, Mali, and Rwanda. During the peak harvests there is a lot of food wastage. There are storage pests which affect some cereals such as beans, maize; that could help during periods of disaster (*such as prolonged drought*) .Also the perishable foods are not properly handled/ preserved such as fruits, milk, and meat.
7) ***Extreme poverty in many African countries /limited capital*.** This also reinforces the production of cash crops and therefore inability to produce more food crops. It limits accessibility to modern technology and loans since they lack the required security. Limited capital has also forced farmers to cultivate small pieces of land and hence cannot produce enough food crops to meet the requirements of their families and other people.
8) ***Low level of technology*** used in many countries of Africa (such as Sudan, Eritrea, Sudan) involving poor like hand hoes, panga, sickles,shovels,; which lead to low food production. There is a little day's work per person and of course small harvests. More so, farming is highly dependent on nature and hence limited use of irrigation facilities.
9) ***Over reliance on food aid*** such as from World Food Program (WFP) and other countries. This has also promoted laziness among the people of Africa-with limited engagement in productive farming and thus causing famine. They always expect assistance from outside sources.
10) ***Emphasis on cash crop production*** for export in many countries and the crops include coffee, cotton, rubber, tea among others at the expense of food crops. This implies that

more land has been used for cash crops and thus less land available for production of food crops, leading to food shortages. Some countries even export large quantities of their staple food crops.

11) ***Poor transport systems ,with many remote areas inaccessible.*** Most production areas do not have good feeder roads linking them to markets/ consumption areas. The roads become impassable during the wet season which affects food distribution and thus surplus output cannot easily be marketed. This limits the transportation of food from areas of plenty to areas of food scarcity.
12) ***Unfavourable government policy /poor government planning for the agricultural sector***; which otherwise would ensure food security. The governments inject less money in farming, yet commercial farmland is offered for forestry, industry, or even putting more effort put on cash crops. The government in Zimbabwe has undertaken a controversial land re-distribution program.
13) ***Limited research and education of the farmers***, hence limited innovation in the agricultural sector leading to low yields and continued growth of traditional crops. Agriculture is dominated by traditional varieties which are slow growing, prone to pests and diseases and yielding low output. Farming is mainly carried out by peasant farmers who are used to traditional methods of farming; leading to low output and acute food shortages.
14) ***High/rapid population growth rates in Africa***, generally over 3% per annum. This exceeds food production leading to food shortages. There is also over use of land leading to the decline in crops yields. More so the population structure is characterized by very many young ones who are not agriculturally productive.

However look at other factors (physical factors) causing famine:

2) ***Adverse climatic conditions****:*

- ***Heavy rainfall, floods and hailstorms***. Heavy torrential rainfall leads to the destruction of food crops. Some areas often receive bad and destructive rains characterized by hailstones and floods. People living within the river valleys such as Niger, and Senegal have occasionally been disturbed by floods. Large areas of farmland have often been submerged—hence low food production, leading to food shortages.
- ***Unreliable rainfall***. Low and unreliable rainfall also greatly limits food crop production. There are many cases of late rains, rain failure or limited amounts of rainfall far below the normal. This is common in many areas of the Sahel.
- ***Prolonged drought***—there is abnormal shortage of rainfall below that required for food crop production. The countries greatly affected by drought include; Somalia, Sudan, Ethiopia, Kenya, Tanzania, Zimbabwe, Niger, Zambia, Chad, Mali, Mauritania, and Botswana. This discourages cultivation and also results into low crop yields.

3) ***Pests and diseases*** also limit food production. Locusts have particularly invaded the Sahel region destroying the green vegetation including the planted food crops. There are also other crop pests and diseases such as cassava mosaic, maize rust, groundnut rosette, banana wilt, bean anthracnose, halo blight (affecting tomatoes). This leads to low quality and quantity of output from farmlands leading to famine.
4) ***Poor soil conditions*** such as infertile, sandy or skeletal soils. This also limits food crop production, for example some parts have rocky, skeletal soils especially in the deserts of Sahara and Namibia, semi-desert areas.
5) ***Rugged relief of some areas***, where farming cannot easily taken place. This also influences the rain shadow effect in northern Kenya, Ethiopia—where low rainfall is received leading to low farm output. Rugged relief also limits mechanization and thus limiting food crop production.
6) ***Other natural calamities*** which include: volcanic eruptions displacing many people like in eastern DRC (Nyirangongo), earthquakes along the fault zones, landslides
7) ***Effect of natural vegetation*** for example the thick forests of the Congo basin (DRC), Gabon; swamp vegetation which cannot easily be cleared to allow crop farming.

(b) Possible solutions to the above problem

1. Ensure political stability in all parts of the country such as through regional cooperation and peace talks.
2. Adopt /emphasize population control measures
3. Emphasize / intensify research in agricultural sector such as control of pests and diseases, soil improvement.
4. Development of technology used in agriculture
5. Establishment of irrigation projects/schemes
6. Land reform policies such as land consolidation and removal of unfair land tenure systems.
7. Development of transport infrastructure
8. Education to the farmers be encouraged such as about soils, fertilizer use, new breeds, new varieties.
9. Provision of agricultural extension services
10. Encourage production of food crops rather than cash crops.
11. Encourage large-scale farming in food crops / increase land under food crop production.
12. Encourage cooperative farming and other farming groups.
13. Improving storage and preservation facilities
14. Set up a national food policy and effective regional agricultural planning.
15. Seeking aid from relief organizations as a temporary solution.