RESOURCE PERCEPTION AND MANAGEMENT

UNIT 1: THE MEANING AND NATURE OF RESOURCES
SESSION 1: MEANING AND NATURE OF RESOURCES

- What is a Resource?
  - Etymologically, the word “resource” is related to source.
  - The prefix “re” means again
  - The two put together suggests something that is relied upon for the satisfaction of human want.
  - Sources of human satisfaction, health or strength, labour, entrepreneur skills, investment funds, fixed capital assets, technology and cultural and physical attributes may all be referred to as resources.
Cont’d

- Brian Goodall (1987), defined resource as
- “something material or abstract that can be used to satisfy some human want or deficiency
- What makes something a resource depends on its value to humans and not its intrinsic value
- In his book, The Dictionary of Human Geography, Johnston (1994) defines the word resource as “a concept employed to denote sources of human satisfaction, wealth or strength”
Cont’d

- This include: labour, entrepreneurial skills, investment funds, fixed capital assets etc.

- Shelley and Clarke (1994) defined resources as “substances that can transform into artefacts”

- Tivy and O’Hare (1981) have defined resources as a “stock of some material of use or value to humans” – To them these materials may be organic or inorganic.
Cont’d

- **Zimmermann (1972)** dealt extensively on what a dictionary offers as definitions for resources:
  - That upon which one relies for aid, support, or supply
  - Means to attain given ends
  - The capacity to take advantage of opportunities or to extricate oneself from difficulties
“Resource Management context”

- Reserved for substances, organisms and properties of the physical environment (Natural Resources)
- Human beings evaluate or appraise natural systems, regarding as resources only those elements, which they have knowledge, and technology to utilise and which provide desired goods and services.
- Natural attributes failing to meet these criteria remain unvalued, NEUTRAL STUFF (Zimmermann, 1972)
Cont’d

- **Some misconceptions about Resources**
  - Resources are identified with substances or tangible things as for instance, coal iron, petroleum, copper etc, while the intangible things such as health, social harmony is ignored.
  - Our focus with the so-called natural resources at the expense of human and cultural resources excludes a clear understanding of the true nature of resources.
Cont’d

- The tendency to think of resources in terms of a single asset, e.g., iron, coal, oil rather than in terms of the whole complex of the substance.

- Resources are living phenomena, expanding and contracting in response to human effort and behaviour.

- There are resistances to all resources; resources are not for free, but one needs to overcome some impediments before getting them.
Cont’d

- The nature of resources
- Although resources are the products of the physical system, they are defined by human ability and need, not by nature.
- Human beings evaluate the natural environment and classify those substances that provide value to them.
- Resources are therefore dynamic cultural conceptions.
Cont’d

- Because what may be referred to as resource by one community or society may differ and vary among other communities and will also vary with time and the need for them. E.g. bauxite only acquired a resource status in 1886 when the commercial extraction of aluminum became feasible.

- Uranium had a negligible value until they military and economic importance of nuclear power became evident
Cont’d

- What is perception?
- It is the process by which an individual acquires information as a result of visual, tactile, verbal, olfactory and auditory contacts with his or her environment, and then organizes and interprets the data available in the light of his or her experiences and attitudes.
Resource perception:

is therefore referred to as the individual’s subjective assessment or conception of substances in the environment for the satisfaction of his or her need.

Such assessment are viewed as being formed by:

- The awareness due to the use of reference points in the person’s everyday life;
Cont’d

- That immediate reaction to distinctive or unusual features; and,
- That awareness drawn from past experiences and parallel situations.

- In effect, what is a resource to one person may not necessarily be a resource to another.
SESSION 2: THE NEW RESOURCE CONSCIOUSNESS

- Environment and resource use:
- The state of the environment and how our natural resources are used have become political issues at both local, national and international levels... (Read pg10 of Module about English Clergyman Thomas Malthus’ arguments in his text “Essay on the Principle of Population (1798)”)

- Two schools of thought have been identified:
  - “Prophets of Doom” of resource use”
  - “Prophets of Complacent Unconcern”
“Prophets of Doom” of resource use”

This school of thought maintained that if increases in population, industrialization and resource depletion continued unabated, limits to growth would be reached early in the 21st century, causing drastic declines in energy use as well as food and industrial production.

Some Prophets of Doom

Anne H. Ehrlich (Stanford Biologist)
Cont’d

- Some “Prophets of Doom”
  - Anne H. Ehrlich (Stanford Biologist)
  - Charles Westoff (Princeton University sociologist and demographer)
  - Meadows and others (Massachusetts Institute of Technology) – their book was “Limits of Growth”
Cont’d

“Prophets of Complacent Unconcern”

They argue that although human consumption of global resources has increased, the supply of resources is not in decline and remains abundant.

These experts note that due to technological advances, more supplies of global resources are being discovered or conserved.
Some “Prophets of Complacent Unconcern”

- Julian L. Simon (Economist)
- Stephen Moore (Cato Institute economist)
- Ronald Bailey (*author of co-Scam*) and researchers Michael Sanera and Jane S. Shaw
Cont’d

- A merger of the two schools of thought
- A debate over the effects of population growth on the availability of global resource continues to occur at the local, national and international circles.

- Questions:
  - Are Global Resources being depleted?
  - What agricultural policies should be pursued?
  - How can global Resources be depleted?
SESSION 3: THE FUNCTIONAL OR OPERATIONAL THEORY OF RESOURCES

- In order to understand the relationship that exist between man and resources, it is important to view human beings as existing on two levels:
  - The first level which is referred to as the animal level “man”
  - And the second level, “MAN” is used to refer to the super-animal level or human level
Cont’d

- The Creature “man”
  - Man in the animal level constitutes part of nature as pure biological being.
  - Man at this level existed without the benefit of culture
  - He was capable of drawing support from his environment(nature) and was exposed to the harmful forces and conditions in the environment.
As indicated earlier, those aspects of nature that harm or hinder “man” may be called natural resistances.

The extent of want satisfaction is however a function of resources and resistance and not resources alone.
Cont’d

- The Cultural “MAN”
- “man” after mastering his environment using various tools to overcome it, became “MAN”
- Man has gained control over many of the living creatures
- Those aspects of nature which “man” can utilize in the satisfaction of his creature wants without contribution made by “MAN” may be called natural resources.
Cont’d

- **Knowledge-the mother of all Resources**
- In resource literature, knowledge therefore is the incomparably greatest among human resources.
- It is an intangible resource lodged within individuals and is used to appraise all other resources.
- According to Zimmermann (1972) the original inhabitants of what is now U.S. lived in poverty-sticken environments.
SESSION 4: SOME BASIC CONCEPTS OF RESOURCES

- Reserves:
  - It refers to that proportion of resource, especially minerals, which can be exploited under certain existing conditions and with available technology.
  - Reserves are developed from resources through the application of technology, capital and expertise in response to cost and price changes.
Distinction between recoverable reserves and speculative reserves

- **Recoverable reserves** cover the amount of the mineral likely to be extracted for commercial use within a certain time frame and level of technology.

- **Speculative reserves** are deposits that may exist in geological basins or terrain where no exploration has yet taken place.
Cont’d

- **Reserves-Production Ratio (R/P):**
  - It is the ratio between the production rate of mineral and the proven or measured reserves remaining in the ground.
  - It therefore indicates the number of years of production remaining at the current annual rate of production, assuming no other deposits are discovered.
Cont’d

- **Resource Base**: It is the sum total of all components of the environment that would become resources if they could be extracted from the environment. The resource base is usually very large compared to the actual resource reserve.

- Resource base flow or renewable resources could also be conceptualized in terms of reception of solar energy, which is not only the ultimate determinant of biological processes in agriculture and forestry, but is also the driving force for resources such as wind and water power.
Resource process: This refers to the total flow of a resource from its natural state, through the production process and period of human use to its disposal.

Carrying capacity: This refers to the maximum intensity of use, at a given level of management, which a natural or people-made resource can sustain without an unacceptable degree of deterioration of the character and the quality of the resource or the product.
Cont’d

- **Sub-economic resources:**
- Those resources that can be extracted and used profitably are called reserves.
- Therefore those that do not qualify as reserves are referred to as sub-economic resources.
SESSION 5: RESOURCE VALUES

- **Resource Evaluation**

- It is a broad term for assessments which attempt to determine either the value of a resource or the consequences and adequacy of resource management strategies.

- Resource evaluation has been applied to five areas of work:
Cont’d

- **Determination of quantity of resource supplies**
- For non-renewable resources, it is never easy to forecast the quantity that will be available for human use.
- Proven reserves are those already discovered and known to be economically extractible under current demand, price and technological conditions.
However, new discoveries, changed technologies and altered socio-economic and political circumstances will alter resources availabilities over time.
Cont’d

- Determination of the capacity of the global or individual ecosystems to support human life and economic development over time.

- For land, soils, and recreational resources, the notion of carrying capacity is employed while the ability of the environmental medium to absorb waste products can be assessed by considering their absorptive or assimilative capacity.
Cont’d

- The value of the resource in social welfare terms:
- There is no absolute measure of value and a host of alternative assessment basis have been employed, for example, market prices, opportunity cost, labour value, social indicators, energy accounting, public preferences and ecological values.
Where resources of goods and services are incorporated into the market exchange system, market prices are usually taken as a measure of value, but the identity between price and value will only hold if:

- The consumer is sovereign
- Market is free and perfectly competitive
- The “ability to pay” problem is ignored
- The price incorporates all cost involved in supplying, using and discarding the product
Assessment of the likely consequences of resource programmers, projects, policies and administrative changes:

These are obtained from measures such as cost-benefit analysis and environmental impact assessment. Cost benefit analysis is an analytical procedure for the comprehensive, often pro-construction, economic evaluation of major public investment projects.
The evaluation criteria chosen are crucial to the results of any assessment.

Some assessment concentrate on the extent to which stated policy objectives are met.
Multiple Resource Values:

For any type of resources that provide more than one use of value for humans, their evaluation is based on the attribute which is considered most important or has the greatest demand at a particular time.

B – Biological Values
E – Economic Values
E – Ecological Values
S – Scientific Value
C – Cultural Value
Cont’d

- **Biological Values:**
- The biological value of an organic matter is dependent on the quantity of primary and/or secondary biological production expressed in yields of all or some of the plant matter per unit area, or in stocking rates.
Economic Values:

Organic resources of any kind, however are normally valued or assigned cost in traditional economic terms.

Unless the known quantitative and qualitative biological value is sufficient to make exploitation profitable, the material will have little or no economic or commercial value.
Cont’d

- **Ecological Values:**
  - It is often difficult to put a price tag on resources with ecological values.
  - These are values not susceptible to quantitative, cost-benefit analysis.
  - The ecological value for odum for instance is dependent upon its contribution to or its effect on the particular ecosystem of which it is a component.
Cont’d

- **Scientific Value:**
- This value depends on such factors as rarity of particular species and/or communities, or its value for scientific experiments whose value may be far more reaching than for the resource itself.
Cultural Value:

- Cultural and aesthetic values are closely interrelated.
- That is it sometimes impossible to understand the latter without the former.
- For example, some animals are used to portray the powers of some clans in Ghana.
SESSION 6: RESOURCES, RESISTANCE AND HAZARDS

- Resources are not for free, otherwise everyone could have access to the freely.
- Exploitation of these resources could also lead to hazard.
- Resistance may be explained as the impediments to obtaining these resources for human consumption.
Resistance to resources could be grouped into two:

- Primary or original natural resistance
- Secondary or derived natural resistance

**Primary resistance**: their probability in terms of the expected frequency of occurrence is known but their timing is usually unpredictable.

E.g. are hurricanes, earthquake, volcanic eruptions etc.
Secondary resistance:
They occur as a result of human interference with or impact on nature
Cont’d

- **Environmental hazards:**
  - These are discrete environmental events that are damaging to property or life.
  - They include events such as hurricanes, earthquake, volcanic eruptions etc.
  - In some cases, their probability in terms of the expected frequency of occurrence is known but their timing is usually unpredictable.
Cont’d

- The incidence of some hazards can be reduced by human action. E.g flood controlling measures such as avoiding putting up structures on waterways.

- Another approach is to adopt “defensive” strategies such as special buildings in earthquake prone areas.

- A third approach is to avoid prone areas of environmental hazards.
The End Unit 1
Hope to see you again for
Unit 2: Classification of Natural Resources
Thank you for your co-operation
Please feel free to leave a message in my inbox in case you have any information for me.

**RESOURCE PERCEPTION AND MANAGEMENT - Unit 1**

Answer All questions by clicking on the appropriate option or filling in the space where necessary. Finally, click on submit to view your scores.

1. Which one of the following explains natural resources?

   - Any material or property that can satisfy human want
   - Something material or abstract that can be used to satisfy some human want
   - Substances that can be transformed into artefacts
   - Any material or property of the environment that can satisfy human want

2. Resources are defined by nature, not human ability and need. True/ False

   - True
3. Human civilizations determine the utilization of natural resource. True/ False

○ True
○ False

4. Those parts of the environment which people find useful are called "neutral stuff". True/ False

○ True
○ False

5. Which of the following authorities defined resource as a "stock of some material of use or value to humans"?

○ Zimmerman(1972)
○ Brian Goodall(1987)
○ Tivy and O'Hare(1981)
○ Shelley and Clarke(1994)

6. Why do you think "opportunities" are considered as resources? Opportunities are...

○ neutral stuff
○ part of nature which satisfy human wants
○ chances
○ not part of nature which satisfy human wants

7. Which of the following authorities defined resource as a "means to attain given ends"?

○ Zimmerman(1972)
○ Brian Goodall(1987)
8. Why are resources regarded as dynamic? Because, they are cultural conceptions and since culture is dynamic,
- it cannot be translated into what a resource should be at any given time
- resources may also be dynamic
- it translates into what a resource should be at any given time
- resources are intangible

9. All the answers below are reasons why people would associate resources with tangible things such as coal except that...
- tangible things are obvious
- tangible things are expensive
- tangible things are easily recognized
- tangible things are considered important

10. How many schools of thought do we have under the new resource consciousness
- 1
- 2
- 3
- 4

11. The individuals’ subjective assessment or conception of substances (or opportunity) in the environment for human satisfaction is known as...
- resource management
12. The state of the environment at a particular time depends on the exploitation and usage of resources. True/False

- True
- False

13. One of the following is a "Prophet of Doom" of Resource use

- Julian L. Simon
- Stephen Moore
- Charles Westoff
- Michael Sanera

14. Identify the questions on resource scarcity that continue to agitate the minds of humans.
   I. Are global resources being depleted?
   II. What agricultural policies should be perused?
   III. What energies sources should be perused?
   IV. How can global resources be protected?

- I, II and III
- I, II and IV
- II, III and IV
- I, II, III and IV

15. "Man" exited like any other creature but "MAN" existed at the social or cultural level. True/False

- True
- False
16. "Man" at the animal level had only natural wants and natural capacities. True/False

○ True

○ False

17. All materials or properties of the environment that have not yet been ascribed values by humans are called...

○ natural resources

○ natural stuff

○ resources

○ neutral stuff

18. All materials or properties of the environment that hinder man in the acquisition of resources are called...

○ technology

○ neutral stuff

○ expertise

○ resistances

19. Limitations of "passive" adaptation and natural selection" still hold all creatures and "Man in bondage". True/False.

○ True

○ False

20. The existent of mans want satisfaction is a function of resources and resistance and not of resource alone. True/False.

○ True

○ False
21. The three key attributes of man which helped him to elevate "man" to "MAN" are his
   I. physical strength
   II. vocal apparatus
   III. cultural environment
   IV. natural brain power

- I, II, and III
- I, II, and IV
- I, III, and IV
- II, III and IV

22. Sub-economic resources are part of reserves. True/False.
- True
- False

23. Sub-economic resources are only kept for a "rainy day". True/False.
- True
- False

24. The proportion of a resource, especially minerals, which can be exploited under certain existing
   conditions and with available technology.

25. A _______ is the sum total of all components of the environment that would become
    resources if they could be extracted from the environment.

26. The resource _______ involves the appraisal, exploitation, production process and
period of human use to the disposal of natural resources.

27. ________ resources are intentionally kept but ________ resources are not kept intentionally.

28. The maximum number of users that can be sustained by a given set of land resources can be termed as a ________.

29. Reserves-Production Ratio (R/P Ratio) is the ________ between ________ production rate of a mineral and a proven or measured reserves remaining in the ground.

30. A reserve may be categorised into either ________ or ________ reserves.

Your score is 0 / 0

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UNIT 2

CLASSIFICATION OF NATURAL RESOURCES
1.1 Resource Classification:

- Resources are broadly categorized into:
- **Natural resources**: those part of the environment that people find useful; including materials and energy resources, climate, soils, natural vegetation, animal life and landscape etc.
- **Human Resources**: refers to the number and abilities (physical and mental) of people
- **Capital Resources**: those that aids in production and to living
Resource Classification

Resources

Natural Resources

- Non-Renewable
  - Non-Recyclable
    - Eg. Fossil fuels
  - Recyclable
    - Eg. Metallic ore

Human Resources
- (eg. population)

Capital/Cultural Resources
- (eg. Building)

Renewable

- Flow/Stockable
  - Short-term
    - Eg. Crops
  - Medium-Term
    - Eg. Water

- Continuous
  - Eg. Wind Power

- Long-Term
  - Eg. Timber
Natural resources are further classified into:

- **Non-Renewable:** (sometimes called flow resources) have taken millions of years to form and are fixed in supply. Examples include minerals and land.

- **Renewable:** (also called stock resources) naturally regenerate to provide new supply units within a human time span.
1.2 The Resource Continuum:

- It is difficult to identify a clear cut difference between renewable and non-renewable resources.

- However, it is more appropriate to use a continuum to bring out the differences based on their renewability.

- The two basic classes are further subdivided on the basis of the degree of susceptibility to modification by humans and the extent to which recycling is possible.
The Resource Continuum

At the extreme right, potential supplies are naturally determined. At the other, utilization massively exceeds regeneration and use is consumptive, producing unusable forms of matter and energy. Between these extremes, renewability is dependent on human decisions, future supply availabilities being determined by usage rates and investment in artificial regeneration.
**Cont’d**

- **Non-renewable resources** (also called non-replenishable, fund, stock, inventory or organic resources) evolved over geological period time span and cannot be used without depleting the stock.

- This raises the question of ultimate exhaustibility since their rate of formation is so slow as to be meaningless in terms of the human lifespan.
There is no theoretical limit on the rate of use of non-renewable resource—it depends on society’s capacity to exploit it.

They also undergo physical and chemical changes during the resource formation process, which change their form, allowing for further subdivision on the basis of recyclability.
Renewable resources have a natural rate of availability and yield a continual flow of services.

A distinction must be made between flow (stockable) resources, which can be depleted, sustained or increased by human activity.

And continuous (non-stockable) resources which are always available and independent of human activity (e.g. solar and tidal energy).
Again, all natural resources are renewable, in the sense that they are part of a natural cycle (geological and biological cycles).

However, they are usually subdivided according to their ability to renew or reproduce themselves at a rate meaningful to people.
2.1 Types of non-renewable resources:

- Resources that are consumed by use (e.g. petroleum, oil, gas and coal)
- Resources that are theoretically recoverable (elemental minerals and land in the natural condition)
- Those that are recyclable like metallic minerals (e.g. copper, iron, zinc, etc.)
Fossils fuels:
- Fossils are remains or impressions of organisms of past geological ages
- Fossil fuel were formed from past organic matter (plants and animals) which were buried millions of years ago.
Cont’d

- Land in the natural condition:
- In the cultural life of any nation, certain areas under natural and undisturbed conditions may be said to be indispensable for the purposes of study and for inspirational values.
SESSION 3: RENEWABLE RESOURCES

- Also known as flow resources, **renewable resources** are defined as those that are naturally renewed within a sufficiently time span to be of relevance to human beings.

- Flow resources include air, water in places, land in its spatial sense or land for human activities, forest, grassland, animals, soil
However, we can further distinguish between those flows that do not appear to be dependent on human activity;

And those that are only indefinitely renewable, if usage or consumption remains at or below their capacity to regenerate or reproduce.

On this basis, therefore; we have “critical zone” and “non critical zone” flow resources.
3.2 “Critical zone” Flow Resources

- These are resources that are renewable but can be exploited to exhaustion.
- If the rate of consumption exceeds the rate of natural replenishment, such resources can be lost completely.
- At some point, if the depletion process far advance the rate of replenishment, that natural recovery of supply flows fail to take place even when all exploitation activities cease.
Cont’d

- Resources that fall under this category are those that depend on biological reproduction for their renewal.
- It is well known that over-fishing, over hunting, over pollution and destruction of habitat have already damaged the regenerative capacity of many fauna species.
Cont’d

• In addition, it is possible that some soil may also have critical zone.
• This occurs when the soil is overused and becomes degraded by soil erosion, salinization (to treat or contaminate something with salt) and desertification.
Cont’d

- **Wild life resources:**
  - They are important in bringing stability in their respective eco-systems
  - Presently; however, wild life resources are attracting great importance and vitality for their aesthetic values.
  - Nevertheless, as a critical zone resource, improper management and care will surely lead to depletion and extinction
Cont’d

- Wildlife resources are exhaustible, but if proper care and management is adopted (e.g. regulation which allows for periodic hunting of animals), it is possible to replenish them.
Water in place:

Examples include, lakes, lagoons and aquifers (water bearing rock).

These resources could be exhausted if improper care is taken.

For aquifers for example, the only thing is that, the flow of water into the underground storage should not be impeded or restricted by improper land use.
In the same way, land use should not waste and pollute these water bodies.
Soils:

- Soils are replaceable or renewable but very slowly in nature.
- On the other hand, they can be exhausted through improper land use and excessive depletion of its nutrients.
- For this reason soil is classified as a critical zone resource.
- To some extent, soil can be rebuilt and maintained in quality and quantity by human effort.
Cont’d

- Land in its spatial sense:
- Land in space or room is maintainable in the sense that it may be kept in shape to ensure intensive human use or prevented from being littered or personated.
Forest:

- Forests are critical zone resources which are renewable and replaceable (though at a high cost and great effort),
- But on the other hand it could be exhaustible and reduced to stock resources if extraction level exert enormous pressure beyond which the regenerative or renewal capacities are exceeded.
Cont’d

- Misuse of forest also leads to other environmental problems such as climate change, landslides, erosion, extinction of plant and animal species and general socio-economic decline.
Cont’d

- Grassland and other foliage resources:
  - They are form of critical zone flow resource which could be renewed but also exhaustible if not properly managed.
  - Grassland resources could be permanently be lost through desertification induced by overgrazing and soil erosion.
3.3 “Non Critical Zone Flow Resources”

- They remain renewable irrespective of human use or activity.
- These include the atmosphere, water in cycle, solar energy, tidal energy (and waves).
- They are largely inexhaustible although some can be depleted temporary by over use such as sewage discharge into water bodies, emissions of harmful substances.
Cont’d

- In all such cases, quality and flow levels are naturally and speedily restored once depletive activities are controlled within the regenerative capacity.
The atmosphere:

- The atmosphere is a non-critical zone resource and includes the plenty of air around us, which is in-exhaustible and indispensable to human lives.
- Though the atmosphere is a natural resource that maintains its quality and quantity, we can manage the atmosphere or create a microclimate conditions; however this is not possible on a regional scale because air is continuous in motion.
Water and its cycle:

- This is another type of a non-critical zone resource which is in exhaustible.
- Water in its cycle involves rainfall, run-off, circulating ground water, ocean, seas, lakes, rivers etc.
- Together, they constitute an inexhaustible supply of water.
Though water covers about three-quarters of the earth’s surface, we do, occasionally experience shortages.

Rough terrain, insufficient road network and harsh climate make water more precious than gold.

In addition, most of the equipment needed to tap portable water is too costly and too difficult to operate and maintain.
Tidal energy:

Tidal energy is a means of generating electricity achieved by capturing the energy contained in moving water mass due to tides.

Two types of tidal energy can be extracted: kinetic energy of current and potential energy from the difference in height between high and low tides.
Cont’d

- Tidal power is considered as renewable source of energy, because tides are caused by the orbital mechanics of the solar system.
- It is also considered to be inexhaustible because tides always rise and fall due to gravity.
Human power:

It is obvious that human powers such as strength, dexterity and the physical skill which may be grouped as “powers of the body” are crucially important.

These powers are capable of being renewed and maintained and may be considered as the greatest of all natural resources.
3.4 When are renewable resources not renewable?

Below are some of these resources:

- **Fresh water:**
  - When fresh water gets used up, and no rain falls for a very long time, its supplies will be limited.
Trees:
when a forest of trees are cleared, it can change the soil and the climate of the ecosystem, so that new trees cannot grow, plants die and animals lose their habitat.
Cont’d

- **Oxygen/clean air:**
  - when forests and plants are destroyed or die from acid rain pollution, they can no longer absorb carbon dioxide from the air, nor release oxygen into the atmosphere.
Land/soil:
- when land is over grazed, or the nutrients in the soil is used up from improper farming methods, the soil cannot renew itself and plants and crops cannot grow.
Cont’d

- **Fish:**
  - when land is cleared of vegetation in watershed areas that drain into rivers, lakes, streams, estuaries etc. soil erodes into the water and the silt smothers the fish and plant life.
  - When pollutant drain into this waters, the toxic kill aquatic life and the pollutants can be carried through the water to far distance.
Biospheres of living things:

- when pollution destroys an area, like the devastating Exxon Valdez oil spillage that occurred in March 24, 1989, the whole biosphere is affected and all living things are damaged.

- It must be noted that nuclear contamination can last for longer than lifetimes.
SESSION 4: Other Types of Environmental Resources

- Environmental resources can be classified in various ways:
  - Whether they are scarce or abundant;
  - Whether they are widespread or localised in occurrence;
  - Whether they are exhaustible or renewable;
- The simplest and the most common division is into renewable and non-renewable resources, alternatively we have flow and fund(stock) resources.
Between these classification: renewable and non-renewable lie other categories of resources that are hard to classify.

For example how should **metal ores** (metal ores are the minerals from which metals are extracted) be classified.

At first they seem to be clear examples of non-renewable resource because the parent ores from which the metals are extracted exists as stocks and can be mined only once.
Cont’d

- But, the refined metals can thereafter be recycled as scrap.
- In effect, the resource products are renewable, even though the parent ores are not.
Land is also difficult to accommodate in the simple framework of renewable or non-renewability.

Land can be useful or valuable in many different ways.

It may offer sites for building houses and factories—in this sense it would seem to be a stock (non-renewable) resource.

The land, however, is not permanently consumed.
The space provided by the land cannot be destroyed—in this sense, land seemed to be a renewable.

It also give rise to stream of products such as food and wood, and in this function, it seems to be a flow resource.
4.2 Land, the Basic Resource:

- Land as a renewable resource is only on a condition that it is managed well.
- So also is the sea, as a fisheries resource. Over fishing can threaten the renewability of the resource and the result may be that in practice, it resembles a fund resource.
4.3 Some tangible and intangible resource:

- Aesthetic and recreational resources are especially difficult to accommodate in the general resource classification.
- It may be possible in some cases to restore damaged landscape or the quality of air or water and hence such resources may be potentially renewable.
5.1 Where are resources found?

In the past, people could only look to local environment for resources, but today world-wide systems of supply exist for many resource products.

Once, we were “ecosystem” people, drawing resources from the local ecosystem.

Now, resources could be drawn from around the world.
5.2 A spatial Taxonomy of Resources:

- Some natural resources are strongly localized, while others are widespread or even ubiquitous (existing everywhere).
- The atmosphere and its oxygen are literally ubiquitous, while the ocean is widespread.
- Ubiquitous occur everywhere while commonalties occur in many and widespread areas e.g. arable lands and forests.
This classification however tends to oversimplify.

One complicating factor is that the earth’s surface is almost continuously variable.

Some mineral deposits for example may be rarities, but the metallic elements they contain may be quite common and widely distributed.
Cont’d

- What is rare, therefore is not dependent on the presence of the material, but the degree of concentration of the metallic element in the deposit, and hence its ease of working.
- In the same way, a commonality such as arable land or forest may not be homogenous throughout its extensive occurrence.
- Some areas are likely to be fertile and productive than others.
Arable land is broadly defined by limits of temperature, rainfall, soil and terrain. But within these broad limits there is a “highly productive” optimal or core areas surrounded by marginal zone of less productive land. In the optimal areas, cost of production is relatively low as compared to the less productive zones.
5.3 Location and Resources:

Commonalty and rarity are therefore not necessarily constant, unchanging characteristics of resources.

A further complication arises in that place or location is of primary significance in determining whether part of the natural environment is a resource.
Location constraint may exist as well as environmental constrains.

Suppose two identical potentially cultivable land exist in different part of a town. One is located in a populated area, well served by transport links.

The other is in remote and inaccessible part of the town.

Obviously the former is more likely to be considered a resource than the other.
Cont’d

- If a potential product is sufficiently valuable or attractive, then the resource may be utilized even if formidable barriers of remoteness and inaccessibility have to be overcome.
- For example, the discovery of a mineral deposit in a thick forest.
- This may involve the costly construction of new roads or railways into previously inaccessible hinterland.
5.4 Mobile Resource and Mobile Humans:

- A particular group of environmental resource is characterized by mobility or migration.
- Certain fish species, such as the Atlantic salmon, undertake long distance migration and spend different part of their life cycles in different environment.
- Certain bird species also migrate over long distance.
These mobile resources pose the problem of management.

Private ownership and management cannot be easily applied.

Similarly, management of rivers that cross international boundaries is especially difficult.

Some resource users are nomadic (i.e. moving from place to place in search of food, water and pasture for their livestock)
Others are temporary visitors. A more modern form of mobile resource users is represented by climbers; those seeking wilderness experience and also by tourists. In the past humans were restricted to local areas in search of natural resources for consumption,
Cont’d

- But today, because of advancement in technology and improvement in transport system, we can move freely to every part of the world in search of natural resources.
- In effect, the spatial restriction on natural resources have been minimized.
SESSION 6: RESOURCE CREATION AND DESTRUCTION

6.1 Resource Creation:

- At some point in time, a component of the environment that was not previously viewed as useful or valuable may eventually become a resource.

- This change may follow from broad cultural or societal trends.

- It may also arise from a more sudden changes in technology, allowing previously invaluable resource becoming useful.
Some resources are suddenly and abruptly perceived as such.

More generally, the recognition of resource is slower and more gradual process:

- Initially, its usefulness is realized, but the technical feasibility and utilization may be costly.
- Then with technological improvement, its cost of production starts falling.
- The benefit of the resource being useful to mankind or society.
6.2 Destruction of Resource:

- If resources can be created by changing perceptions, they can also be destroyed or have their value being reduced in the same way.
- They can also be destroyed by changing technology.
- When they are used up and cease to exist thus becoming exhaustible.
Cont’d

- Other forms of resource destruction is degradation e.g. poor farming practices that exposes a piece of land to erosion.
- Similarly, material may be taken from a resource at a rate faster than it can be replenished by natural biological means, for example through hunting and fishing.
6.3 Resource “Expansion” and “Shrinking” Phenomenon:

- In our previous discussions, we have learnt that resources expand with every advancement in human knowledge, changing perceptions and improvements in technology.
- Likewise, they also shrink when they fall into disuse.
End of Unit 2
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RESOURCE PERCEPTION AND MANAGEMENT - UNIT 2
Answer All questions by clicking on the appropriate option or filling in the space where necessary. Finally, click on submit to view your scores.

1. Which one of the following is not part of the broad categories of resources?
   ○ Natural Resources
   ○ Capital Resources
   ○ Artificial Resources
   ○ Human Resources

2. Substances, organisms and properties of the physical environment which people find useful are called natural resources
   ○ True
3. From the view of human beings, renewable resources are fixed.
   - True
   - False

4. The resource continuum posits that the various categories of resources overlap.
   - True
   - False

5. Which one of the following is correct about capital resources? Capital resources ...
   - are those materials, properties, etc. without the contribution of man
   - are examples of human resources
     - have two sub-categories namely non-renewable and renewable resources
     - are made by man

6. Why do you think all natural resources renewable in the very long-run? They...
   - can be restocked
   - are part of natural cycles
   - are natural
   - part of the environment which satisfy human wants

7. In your view, do you think that stockable resources are resources that can be restocked/renewed?
   - Yes
   - No
8. Resources that cannot be retrieved after use can be termed as.......resources. - renewable + non-renewable - natural - capital

   {In the long term, non-renewable resources can also be renewable

   ○ True

   ○ False

9. How many schools of thought do we have under the new resource consciousness

   ○ 1

   ○ 2

   ○ 3

   ○ 4

10. Identify any three types of non-renewable resources. *Please your answer should begin with a capital letter.*

   i. 

   ii. 

   iii. 

11. Identify any two examples of non-renewable resources. *Please your answer should begin with a capital letter.*

   i. 

   ii. 
12. One fundamental feature of non-renewable resources with regard to their formation is that they take millions of years to form.

○ True
○ False

13. Identify the other names for non-renewable resources.
   I. Stock resources
   II. Fund
   III. Non-replenishable resources
   IV. Inventory resources

○ I, II and III
○ I, II and IV
○ II, III and IV
○ I, II, III and IV

14. What other name can you call renewable resources? _______________ resources. Please your answer should begin with a capital letter.

15. Can "Critical zone" flow resource be renewed irrespective of human use?

○ Yes
○ No

16. Any resource that is capable of renewing itself irrespective of human use can be termed as......resources. Please your answer should begin with a capital letter.

○ "Critical" zone flow resources
○ "Non-critical" zone flow resources

17.
State any two examples of "non-critical" zone flow resource. Please your answer should begin with a capital letter.

i. 

ii. 

18. Resources that depend on the biological reproduction for their renewal may be described under the category of "critical zone" flow resource.

○ True

○ False

19. 

Identify any two examples of non-renewable "renewable" resources. Please your answer should begin with a capital letter.

i. 

ii. 

20. Some renewable resources can be termed as non-renewable because ...

○ such resources cannot be "mined-out"

○ such resources could be "mined-out"

○ such resources can always remain in its natural state

○ such resources are easy to get from the environment

Submit

Your score is 0 / 0
UNIT 3

RESOURCE APPRAISAL - HUMAN WANTS AND SOCIAL OBJECTIVES
Dynamics of Culture:

- Nature sets the limit within which human can develop arts to satisfy wants.
- Within these limits, human is free to select from the numerous possibilities that provides want satisfaction in return for human efforts.
- Human culture is adaptive reflecting any change in humans environment
The size of our population is often perceived to be affected by cultural developments.

Culture involves two processes of development:

- It comprises the sum total of the cultural modification of the non-man environment, both physical and non-physical, artifacts as well as arts.

- Cultural challenges affecting human attitudes and relations within groups as well as between groups.
Paucity of natural resources:

It has been said that nature provides the opportunity for human to display their skills and apply their knowledge.

However, we need to recognize that nature offers “freely” only a small fraction of her treasure.

Nature does not only withhold the rest, but also place some resistance in the way of resource creation.
Cont’d

- The bulk of human’s resources are as a result of human’s ingenuity.
Dynamic interrelationship b/n human and their environment

- HUMAN has
  - Native physical and brain power (a+)
  - Basic wants (a-)

- Natural Env. has
  - Resources (b+)
  - Resistance (b-)
The diagram presents the concept of culture as a forefront which drives deeper into the realm of nature, converting more neutral stuff into resources and into resistance as well.

- In (a), human has basic wants (a-) and natural physical and brain power (a+)
- In (b), the natural environment possess resources and offers resistance to the acquisition of resources by human
Cont’d

- On one hand, human uses their native physical and brain power to overcome resistance in order to acquire resources that provides satisfaction for basic wants.

- On the other hand, human uses their strength and brain power to exploit resources to satisfy their basic wants.
THE NATURE OF WANTS

- Human wants may be divided into:
  - Basic(nature) wants
  - Culture wants
- These wants vary according to age, sex (gender), mode of life, habitat and individual constitution and perhaps according to racial characteristics
Basic(nature)wants

- Basic wants can be divided into **positive** and **negative** wants.
- As humans, we need food, air and water for metabolic activities.
- These are positive wants.
- To ward off diseases and unfavourably temperatures such as cold and protection against attack, humans need shelter, clothing etc. these are negative wants.
Cont’d

- The basic wants are the starting point of the economic process and consequently of resource appraisal
Culture wants

- Often human desire goes beyond the satisfaction of basic wants
- For example, human beings tend to eat and drink more than is absolutely necessary for mere existence.
- Thus more sophisticated desires are added to our basic wants.
- These are cultural wants.
Cont’d

- Cultural wants are however not subject to “maxima” or “minima” set by nature, nor are they constants or recurring.

- Conspicuous consumption plays its part as in the case of automobiles and homes.

- Social prestige may establish consumption “minima” or “maxima” through established habit and social sanction.
Cont’d

- Individual wants tend to crystallize into groups standard of living.
- Once such standard have become established, any force which threatens to lower them is fiercely resisted.
- Difference in living standards reflects in the appraisal of a given environment.
## Differences between nature and cultural wants

<table>
<thead>
<tr>
<th>Nature wants</th>
<th>Culture wants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must be satisfied for life to go on</td>
<td>Life can go on without them</td>
</tr>
<tr>
<td>They are subject to absolute natural limitations</td>
<td>They are not subject to absolute natural limitations</td>
</tr>
<tr>
<td>May vary according to age, sex, mode of life, habitat, body constitution and race</td>
<td>Craves variety and adds touches of refinement to the from and content of basic want satisfaction</td>
</tr>
<tr>
<td>They normally occur</td>
<td>They are not constant and do not recur</td>
</tr>
<tr>
<td>can be positive or negative</td>
<td>May vary according to age, sex, mode of life, habitat, body constitution and race</td>
</tr>
</tbody>
</table>
Want and want doctrine

- Apart from standard of living, there exists doctrines about wants.
- These doctrines may be divided into:
  - Negative or want discouragement doctrines such as ascetism and
  - Positive or want encouragement doctrine
Negative want doctrines

- The natural tendency for wants to expand and of standard of living to push upwards must be checked.
- Sometimes individuals make efforts to deny themselves of the satisfaction of some wants.
- Under such conditions, an attitude of resignations tend to develop.
- The ascetic (abstinent) seek happiness in self denial, in the curtailment of wants.
Positive want doctrine

- This doctrine rests on the belief that material progress leads to happiness and that progress in turn depends on want expansion and want multiplication.
- These wants often develop in the course of social evolution.
- These are wants that are created and imposed upon the individual.
Cont’d

- Such imposition does not consider the changes in taste and desires but in response to technical developments of factory production.
- This conscious expansion of wants may be influenced by advertisement and other properties such as colour and shape.
INDIVIDUAL WANTS AND SOCIAL OBJECTIVES

- **Individual wants:**
  - The wants of the individuals are the foundation for all resource appraisal.
  - However, since, humans are social animal, the resource appraisal of the environment, must be enlarged to take these social wants into account.
The environment must only produce that which satisfy human wants, but also serve as a reliable basis for continual group life.

Social life forms part of human nature, so the attainment of these social objectives is assumed to result in fuller satisfaction of individual wants.
Cont’d

- Resource appraisal must be studied from two different perspectives:
  - The standpoint of individuals
  - That of social objectives

- It must be noted that, group or social interest do not replace individual wants, rather they supplement the individual wants.

- In a society limited by inadequate natural opportunities, social wants may encroach on individual wants.
However, where the natural foundation of civilization is wide and firm, the satisfaction of social wants and the safeguarding of group interests are apt to result in full individual satisfaction.

Group cooperation may stimulate and accelerate the creative effort that satisfies both individual and group interests.
As noted earlier, the attainment of social wants is assumed to result in fuller satisfaction of individual wants.

In reality, however, the social and private interests clash due to various reasons.
Conflict between private and social needs

- Humans discovered that, security could best be assured by coming together as one (group cooperation).
- However, as groups grow in size, both the individual and the group become more complex.
- The pursuit of personal goals takes precedence over what the group could achieve together.
Cont’d

- The state is the most important social group.
- The state is entrusted with the provision of basic facilities for its citizens.
- Within this group, we have other numerous social relationships such as the family, church.
- In the church for example, one must subordinate his personal interests to that of the church.
Cont’d

- As such it may sometimes interfere with individual liberty and as a result, conflict may occur.
- To resolve this, the state is required to promote good citizenship.
Cont’d

- **Division of labour:**
  - During the barter system, (i.e. Prior to division of labour) man appraised the environment by its capacity to furnish him directly with what he wants.
  - But after division of labour, there was a functional division among individuals in the same community.
Cont’d

- Modern transportation, communication and trading and financing techniques render fusible inter-reprisal exchange on a world unit scale.
Cont’d

- **Introduction of Money:**
- The introduction of money facilitated the exchange process by promoting division of labour.
- Money has had such a revolutionary effect on resource appraisals because, in the minds of many, it has discarded its abundance and put scarcity on the throne instead.
Money turns subsistence economy into profit economy, use economy into exchange economy
Inventions as an adaptive effects:

- The rate of progress of inventions and arts varies considerably during different periods of history.
- Moreover, this development follows different directions in different parts of the earth.
- These inventions are conceived as devices used by various groups to adapt themselves better to their specific environment.
Cont’d

- Or to adapt their environment to their specific need.
- In every period, apparently, people live under a kind of “social tension” that must be relieved.
- The relief may come through expressive artist, philosopher, military leader or scientist depending on the crucial social need of the moment.
It must be pointed out that, first invention is infinitely more difficult than those that are built upon previous inventions.

As a result progress is usually slow and that is natural.

For example, initial inventions of simple machines like lever, axe, wheel and axle, may proved difficult, but later developments were much more easier.
Recent Technical Achievement:

- The application of science to resource utilization is a contribution of modern times.
- The effect of science on human productiveness is cumulative, one invention leads to the other.
- A new discovery increases the value of an old one.
From the foregoing, one may be tempted to think that, the study of resources belongs to the field of social sciences, but the synthesizing/harmonizing work they do must necessary rest on the findings of both natural and applied scientist.

Thus the study of resources becomes the study of merger of knowledge.
## RESOURCES AND THE SCIENCES

<table>
<thead>
<tr>
<th>NO.</th>
<th>ISSUE OF RESOURCE CONCERN</th>
<th>TYPE OF SCIENCE</th>
<th>SUBJECT DISCIPLINE</th>
<th>QUESTION SEEKING TO ANSWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Materials, energies, living organism condition etc. found in nature</td>
<td>PHYSICAL/NATURAL RESOURCE</td>
<td>Anatomy, physiology, psychology, biology etc</td>
<td>What is? Where is it? How is it and why? How does it behave and why</td>
</tr>
<tr>
<td>2</td>
<td>Man on the animal as well as on the supra-animal level viewed both individually and in civil society</td>
<td>APPLIED SCIENCES</td>
<td>The engineer, geologist, human/economic geographer, industrial chemist, the surgeon, physician, etc</td>
<td>What can we do with it? (technical feasibility)</td>
</tr>
<tr>
<td>3</td>
<td>Human culture in all aspect including technology, social and political institutions history</td>
<td>ENTREPRENEURIAL AND BUSINESS SCIENCES</td>
<td>Banking, actuarial financial economist, stock brokers, investment analysts</td>
<td>How should it be used to obtain the highest return on private enterprise</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>4.</td>
<td>Inter-relations between these fields</td>
<td>ECONOMIC SCIENCE</td>
<td>Economic operational research system analysts i.e what is best for society in the long run</td>
<td>How should it be used to reap the highest return to society</td>
</tr>
</tbody>
</table>
RESOURCES IN NATURAL AND HUMAN CONTEXT

- **Natural Resource-Management Context:**
- In the context of resource mgt, the term resource is reserved for substances, organisms and properties of the physical environment.
- We have noted that, human beings evaluate the natural system, regarding as resources those that they have the knowledge and technology to utilize and which provide desired goods and services.
Cont’d

- Resources are therefore subjective, functional and dynamic.
- In case of environmental resource, consensus over the resource definition is much less common.
- For instance, cultural significance of landscapes, flora and fauna; and natural ecosystems vary between countries, social groups and individuals.
Cont’d

- The Time Factor:
- The conflict between social and private interests develops from a fundamental difference in interests of the groups and of the individual.
- The group represents succession of generation, and therefore its life must be longer than that of the individual.
What has this difference in lifespan to do with resource appraisal?

To the average individual, an oil resource of the year 2090 may be of little concern because his imagination cannot follow his children and his children’s children far enough into the future.

Thus the strong individualist is not likely to be interested in conservation of fund or stock resource.
On the other hand, the statesman, the leader and the thoughtful citizen who regards the interests of future generation may feel very different.

As a result of such conflicting attitudes, social and private interests cannot agree on the “tempo” of resource development.
NATURAL RESOURCE AND CONFLICT

- Conflict Among Nations:
  - After the second world war, it is estimated that there have been more than 150 wars.
  - Few of these have been large scale conflicts between nations; about 80% have been civil wars and most of these have occurred in developing countries.
  - Policy makers and scholars have studied these wars in an attempt to understand why they occur.
Cont’d

- They agree that, the roots of conflicts are complex and perplexing, and that many has been as a result of political, social and economic factors.
Cont’d

- Critical Natural Resources and Conflicts:
  - One critical natural resource that seems to generate conflict is WATER.
  - For example, hostilities fled across the India-Bangladesh border in the 1960s and 1970s, when India, unilaterally diverted a large portion of Gangs River, which is used for irrigating crops in both countries.
In several African countries, lucrative mineral resource – oil, diamond and other minerals have generated a long standing conflict till date.

Predatory politicians try to enrich themselves and to outfit armies used to maintain their command.

Examples of these countries include: Congo, Nigeria, Sierra Leon and Angola, the latter involving control over diamonds.
Cont’d

- **Other Conflicts:**
  - The process of appraisal is largely dominated by the conflict between group and individual interests.
  - Ever larger and more complex social structures have resulted in a maze of conflicting interests that call for a constant balancing or pros and cons, for constant compromise.
Cont’d

- Villages and towns economies have merged into national economies and these, in turn, have become subject to world economic influence.

- Thus the aerial basis of resource appraisal has continuously expanded
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Kafuiaheto/RPMUnit3

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RESOURCE PERCEPTION AND MANAGEMENT - UNIT 3
Answer All questions by clicking on the appropriate option or filling in the space where necessary. Finally, click on submit to view your scores.

1. In the resource process, appraisal the central or core issue

☐ True

☐ False

2. A material continues to remain a "neutral stuff" forever once it is declared as such

☐ True

☐ False

3. In exploiting and utilising resources to satisfy human wants, man relies solely on his physical strength.
4. Opportunities may refer to intangible resources.
   - True
   - False

5. Nature gives "freely" only an infinitesimal fraction of her treasure and withholds the rest from resource-seeking and resource-creating man.
   - True
   - False

6. Man can create resistances for some resources.
   - True
   - False

7. Limits are sets in the satisfaction of culture wants.
   - True
   - False

8. Shelter and clothing are part of human "positive basic wants".
   - True
   - False

9. Culture wants are relatively constant and also recur.
   - True
   - False
10. Human wants can be divided into _______ wants and _______ want.

11. Positive want doctrine leads to want expansion and multiplication and these have implications for resource management.

  ○ True

  ○ False

12. State any two examples of human basic positive wants

   i. _______

   ii. _______

13. What other name is given to the negative want doctrine?

   i. _______

   ii. _______

14. Division of labour is enhanced by money as a medium of exchange.

  ○ True

  ○ False

15. Division of labour allows for the direct appraisal of the environment by individuals of all their wants.

  ○ True
16. What is the foundation of all resources appraisal?
   ☐ False

17. The most spectacular achievement of man's direct appraisal of resources was the introduction of money.
   ☐ True
   ☐ False

18. The modern breakthrough in the appraisal of resources is attributed to
   ☐ False

19. The relationship between individual wants and social objectives are that ...
   ☐ individual wants are aggregates of social objectives
   ☐ social objectives are aggregates of individual wants
   ☐ individual wants are more important than social objectives
   ☐ social objectives always similar to individual wants

20. Why was man's appraisal of resources very slow in the earliest times? Because ...
   ☐ of his capital base
   ☐ of his high technology
   ☐ of his low technology
   ☐ of his low interest in the resources available
UNIT 4

OWNERSHIP, CONTROL AND ORGANISATION OF NATURAL RESOURCES
Critical issues about land in Africa

- **What is land?**
  - Land is one of the major factors of production including all natural resources used in the production process.
  - Land includes forests, water resources, mineral deposits, oil reserves and even resources of the sea.
  - It also includes such natural phenomena as access to sunlight, rain, wind and changing temperatures and location with respect to markets and other areas.
  - Land is regarded as a gift of nature and its value tends, in the long run to depend on the intensiveness of its usage.
Cont’d

- **Land Degradation in Africa:**
  - The presence of gullies and sand dunes, of degraded forests and grazing lands are clear indications.
  - The wealth of Africa depends on her ability to conserve and manage her resource.
  - Apart from decreased food production, soil degradation can also result in droughts, ecological imbalance and consequent degradation of the quality of life.
In Africa, the most obvious symptom of land degradation on food production is the increased poverty levels and declining yields.

Another symptom of land degradation is the unpredictability of rains, regardless of the climatic zones.

The continent can be divided into four climatic zones:
- The humid zone
- The sub-humid zone
- The semi-arid zone
- The arid and desert zone
Africa’s soil:
- Africa also suffers from geologically induced and inherently low soil fertility.
- Our bedrocks consists mostly granites and gneiss (a kind of metamorphic rock).
- African rocks are among the oldest in the world.
- The relationship between the parent soils and the soil forming factors are very complex because the land surface has undergone series of vegetation and climate
Nearly one-third of central plateau of Africa is of pre-cambrian age (over 600 years old).

The rest of the surface is covered with sand and alluvial deposits of Pleistocene age (less than 2 million years old)

For this reason most of our soil are characterized by a low proportion of clay making it easier to work with but also easy to lose
Besides the harsh weather conditions Africa battles with, large part of the continent has been occupied by human beings much more than in other continent.

Human activities in obtaining food, cloth and shelter has significantly altered the soil.

Therefore, land degradation in Africa is mostly caused by humans, hence its pace is increased by the speed at which the population size increases.

Though land degradation is mostly man-made, irregular natural events such as droughts, worsens the situation.
Most African countries have already lost significant quantity of their soil to various forms of degradation.

Serious erosion areas in the continent can be found in Sierra Leone, Guinea, Ghana, Nigeria, Liberia, Ethiopia, Senegal etc.

Nomadic herders, grazing animals on arid and semi arid lands are particularly vulnerable to drought, since it depletes their livestock.
Cont’d

- Desertification and deforestation in Africa:
  - It has been estimated that 319 million hectares of Africa are vulnerable to desertification hazards due to sand movement.
  - An FAO/UNEP assessment of land degradation in Africa suggest that large areas of countries in the north of the equator suffer from serious desertification problems.
  - Example the desert is said to be moving at an annual rate of 5 km in the semi-arid areas of west Africa.
Cont’d

- Archaeological records indicate that Africa's arid areas have been getting drier progressively over 5000 years.
- What is new is the incidence of drought with increasing pressure put on fragile arid and semi-arid by mounting numbers of people and livestock.
- In the wetter areas however, there is a better chance that degradation can be halted and the land restored.
Soil degradation caused by deforestation is also a serious threat in Africa. It exposes the soil to high temperatures which break down the organic matter, increases evaporation and make the soils vulnerable to erosion. To sum up we realize that erosion, desertification, deforestation, and poor agricultural practices in the bane of our soil fertility in Africa.
Cont’d

- Despite the great potential in Africa for irrigation estimated by FAO to be about 27 million hectares, only one-sixth has so far been developed.
- The future need not echo the past. Most African countries have a number of options that if applied wisely could boost agricultural production and slow down land and environmental degradation.
Though these options could be possible over the next 35 years, just less than a generation, it is however an important assumption that technical changes of these nature cannot and will not be implemented unless far reaching policies are introduced by African governments themselves, especially through a genuine democratization process.

The main technical options opened to Africa are:

- Land and optimal irrigation development or water policy in general;
- Increasing land and labour productivity with available technology.
Cont’d

• Developing additional technology to overcome production constraints that currently have no technical solutions; and

• Institutional framework including land tenure policy, desertification of rural communities’ income.

♦ These options are closely related and must be put into their proper perspective since misleading claims have been made for them.
The traditional responses to soil degradation vary from one ecological zone to another.

In the humid zone, traditional agricultural practices ensure that soil degradation is kept to a minimum.

The mixed crop canopy protects the soil from physical destruction and keeps organic matter up.

These systems are maintained by:

- Forest or bush fallowing techniques
- Retaining useful trees
- Inter-cropping
- Use of household fertilizers etc.
Cont’d

- It should however be pointed out that, not all the traditional practices have had favourable impact on the soil situation in the continent.
- A number of them like bush burning, cutting down trees for firewood etc have encouraged soil degradation.
- The impact of droughts in Africa is to be seen in a global context, and measures must be put in place to curb its incidence on our continent.
Land Mgt in Ghana

- **Rationale for land mgt in Ghana:**
  - The need for efficient mgt of land is necessary in the wake of rapid population increase.
  - There is also a growing demand in all activities based on the land.
  - The traditional indigenous system hold land in trust for the use and welfare of the community.
  - The state also seek ways to use land and its resources to improve the well being of its people.
The issue of land mgt is recognized as a central point in in any effort to address environmental and resource problems in Ghana.

This is obvious as over the years, considerable efforts have been made to streamline the inter-locking facets of land mgt in the country.

A major attempt of this is the work of The Land Use Planning Committee set up in 1987 to draw land use plans for the country.

Another great stride is the current project on stool lands through out the country
Cont’d

- **Land characteristics:**

- The characteristic of a land is an attribute of the land, which can be measured or estimated.

- It essential to estimate such attributes as size, slope, and slope characteristics, soil depth, and texture, water holding capacity, climate, rate of erodability etc.

- These characteristics help us to classify some lands as suitable for pasture, forestry, estate development or for agricultural activities.
Statistics indicate that welfare of lands have not increased in Africa since 1970, despite the fact that the economy on the whole has prospered:

While consumption is steadily increasing, the welfare keeps on declining on the other hand.

The reason why society cannot interpret the data of decline is in three folds:

- The main information flow on a nation’s state of affairs is in the statistics of the national accounts or the national or domestic products (GDP)
- Second, natural resources are still considered as a free good, to be consumed and depleted freely.
Thirdly, the relationship between environmental losses and general welfare loss is not understood.

- A number of basic principles have been established which provide guidelines for action.
- They are outlined in the world soil charter (FAO, 1982) and ought to be the basis for control and reversal of land degradation.

- The world soil Charter recommends the following:
  - Developing a policy for wise land use according to land suitability for different types of utilization and needs of the country.
Cont’d

- Incorporating the principle of rational land use into appropriate resource legislation.
- Developing an institutional framework for monitoring, supervising and coordinating the conservation of the country’s land resources.
- Assessing all lands of their suitability for different purposes and the likely hazards of degradation.
- Implementing education, training and extension programmes at all levels in soil management and conservation.
Cont’d

→ Disseminating as widely as possible knowledge on the subject of soil degradation and how it can be prevented.

→ Establishing link b/n administrators and land users for the implementation of soil policies

→ Striving to create socio-economic and institutional conditions favorable to rational land resource management and conservation.

→ Conducting research programmes which will provide practical solutions to soil degradation problems but give due consideration to prevailing socio-economic conditions.
Based on these guidelines, African government ought to consider the ff for immediate action:

- Conservation should be seen as integral part of farming systems and the general extension worker should be the one to provide the necessary technical advice.

- The extension worker needs adequate training to recognize problems requiring expert advice.
Cont’d

- Africa will continue to need the valuable technical and financial assistance of both bilateral and multilateral donors.
- The development of a conservation programme should be seen as a long term activity.
Ownership and control of natural resources

- Regimes of resource ownership:
  - Regime in this context refers to social and political structures or frameworks within which people manage their resources.
  - These frameworks relates to right of access to the resources and the powers to exclude others; to the right of withdrawal or taking of resources; to the right to manage the resource in a physical and technical and sense, and to sell or dispose of the resource.
We must note however that the right of an individual or a group to use or manage resource may be limited or regulated by the state.

Ownership and control systems may range from laissez faire at one end to centrally planned or socialism at the other end.

These control systems may develop spontaneously;

Or be negotiated by the parties with interest in the resource;

Or may be imposed by external authority
Ownership and control systems are dynamic rather than static.

Major changes have occurred in the ownership and control of environmental resources.
Types of resource regimes:

Two main types can be distinguished:

- one involves definitions of those individuals with right of access to the resource
- And the other relates to limitations on extraction rates or the level of use of resources by those holding the right to access.

Three main property regimes have been identified:

- Private
- State and
- Common property regimes
## Resource regimes

<table>
<thead>
<tr>
<th></th>
<th>Private ownership</th>
<th>Common ownership</th>
<th>Open access</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access or right to extract resource</strong></td>
<td>Owner/occupiers</td>
<td>Group members</td>
<td>Anyone</td>
</tr>
<tr>
<td><strong>Limitation on level of extraction by those holding the right to access</strong></td>
<td>Owner’s decision</td>
<td>Group rules</td>
<td>Unlimited</td>
</tr>
</tbody>
</table>
Cont’d

- Open resources:
  - Many resources are used initially on an open access basis.
  - Under open access individuals and groups take whatever resources they seek from a particular environment.
  - No organized regulation of their activities is imposed, and no mechanism exist for allocating products.
Although some open access regimes may have certain limitations on users, more typically, this type of regime is associated with completely open access and unlimited extraction.

The ‘owners’ are simply the custodians of the part of the world that ‘belongs’ to them.

Open access regime can be probably sustained if the pressure on the resource use is modest, but as soon as the pressure increases as a result of increasing population, various problems emerges.
Cont’d

- **Common-property resources:**
  - Common property and open property differ in that, under the **common property**, the use of resource is restricted to defined individuals or groups whiles
  - In the open property, resources are “free for all”
  - Though in some cases, a group control may be exercised over areas previously subject to open access
  - For example a hunting area may be taken over by a particular tribe.
  - In this case hunting may be restricted to only members
Cont’d

- Common-property ownership are not necessarily incompatible with individual use.
- For example, the ownership of farmland may be vested in a group and the group leaders then allocate portions of the land to the various families and individuals.
- Under common property regime, land is usually not viewed as a commodity that can be sold on the market, but rather as an inheritance that should be passed on to future generations.
However, it is possible to sell the land products on the market and the land can also be sold by the group to a private owner or purchaser.

Public land ownership:

In relation with the mgt of land, the basic premise is that the state has no useful or beneficial role in its management.

Private market forces are better able to identify needs, remedies, and opportunities for investment and therefore satisfy social goals.
Cont’d

- **Private-property resources:**
  - Common property ownership has in most instances given way to those involving private ownership, individuals or companies.
  - Under this type of ownership, control and access rights are vested in the private owner.
  - Limitations on right to access the resources rest in their sole decisions.
  - Since the concept of private ownership was strange and inconsistent to many people, particularly in the developing world, the significance of transfer of
Ownership was not necessarily understood by all those involved in the common property use of the resources.

Unlike the common-property resource land is usually viewed as a commodity that can be sold on the market, and not an inheritance that should be passed on to future generations.
Cont’d

- **State ownership:**
  - The simple sequence of ownership regime begins with *open access* through *common property* then to *private ownership* and complicated by *state ownership*.
  - However, state ownership can be established at various stages for various reasons.
  - State ownership have been established through a lot of means since post independence.
In one way, colonial powers and modern governments simply declare to themselves owners of the resource without regard to communal patterns and control by the indigenous people.

Another means by which state ownership can be established is a response to dissatisfaction with the established private pattern of ownership.

State ownership may also be established if private ownership proves unable to manage the resource in a sustainable manner.
The Tragedy Of The Commons

Introduction:

- The “commons” is any resources which is shared by a group of people.
- Things like the air we breathe in and the water we drink come from the commons.
- The tragedy of the common is a metaphor popularized by Garrett Hardin in 1968 which he used to illustrate the conflict between individual interest and the common good.
What is the logic of the common?

The logic is as follows:

- Each household has the right to take resources from and put waste into the commons.
- To accumulate wealth, each household believes it can take one unit of resources or dump one unit of waste while distributing one unit of cost across all of the households with whom the commons is shared.
- Thereby the gain to the household appears large and the cost very small.
Cont’d

- Note that some households accumulate wealth more rapidly than others and this in turn gives them the means to access even larger share of the commons.
- The fallacy in the logic of the commons is the failure to recognise that all households are attempting to do the same.
- Thus on the average, one unit of gain for a household actually produces a net one unit of cost for each household.
Cont’d

• However, selfish household accumulate wealth from the commons by acquiring more than their fair share of the resource and paying less than a fair share of the total cost.

• As a result, as population grows and greed becomes rampant, the commons collapses and ends in “the tragedy of the commons” (Garrett Hardin, Science 162:1243, 1968)
How does the commons work?

- The logic of the common break down when resources decline and/or population becomes large.
- An apparent solution to avert the collapse of the commons was the introduction of private ownership.
- However, private ownership did nothing to control greed.
- It merely shifted to a new arena; the number of landless households grew rapidly, each one descending deeper and deeper into abject poverty.
Cont’d

- Why does the commons continue?
- In many cases resources from these commons are no longer free for taking.
- Dumping our waste into commons is not free as it was. One must pay a fee or be licensed to get access.
- But all the same fisheries, wood, national parks, highways and many other resources are commons just the same.
- Access to them merely requires a desire to do so and the means.
Population growth, greed and the logic of the commons have virtually destroyed the world's ocean fisheries and the Amazon rain forest.

Huge tracks of land have given in to desertification.

Although national negotiations on managing the global commons for a sustainable yield continue, progress towards resolution is nil.

Without population growth control and greed, the logic of the common makes a global-wide tragedy of the commons inevitable.
Agriculture And Food Security

- **Meaning and nature of agriculture:**
  - Agriculture is rooted in the words- “ager” (field or soil) and “cultura” (the care of/the tilling of).
  - That is the care of or the tilling of the soil.
  - However, agriculture as we all know, goes beyond mere tilling of the soil or raising of field crops.
  - It include such activities as rearing of animals, tree, fishing etc.
  - But food production is the largest function of agriculture.
Cont’d

- **Agriculture's dependent on nature:**
  - The major characteristic of agriculture is its dependent on **Nature**.
  - Agriculture is heavily dependent on the unpredictable and uncontrolled weather, on a thin sheet of soil that covers much of the earth's surface and on the biological rhythm and changes of plant and animal life.
  - The implications of this three-fold dependence are infinite.
Managing nature:

Over the years, man has made some attempt to control these elements with some little success.

Climate:

To some extent, man can fight sunshine, rain, temperature, wind and frost but not air masses because he cannot change the seasons.

Soil:

Quite able to be altered by human influence than climate yet it took a long time to understand soil.
The life processes of plants and animals: here man has made great triumphant. The characteristics of plants and animals can be adapted to suit the needs and wishes of man.
Cont’d

- Results of man’s interference in Nature’s Food Production:
  - Man has seriously impaired the agricultural productivity of nature in many parts of the earth:
  - Examples: soil fertility have been ruins through various practices
  - There have been damage to water supply
  - Man has extinguished species of both plants and animals life.
Cont’d

- **Diversity of Agriculture:**
  - Agriculture is not far from being a global activity than any other form of human activity.
  - Simply because everybody must eat, and many of them raise most, if not all of what they eat.
  - Many things combine to make agriculture the most diverse or heterogeneous enterprise of man.
  - Examples include: rainfall and irrigation, extensive and intensive agriculture, labour intensive and capital intensive agriculture etc.
Cont’d

- Rural Dev't, Agriculture and Food Security:
  - Fostering the growth of national and global food supplies is necessary for eliminating hunger and reducing poverty, but it is not enough.
  - Even now, in the midst of sufficient global food supplies, millions of people are hungry because they cannot afford to buy.
  - Even those who are able to buy are at risk of micronutrients deficiencies.
Cont’d

- Reducing poverty and hunger will require encouragement of rural development in general and promoting agriculture economy.
- Rural development can contribute significantly to improve the management of natural resources and the environment.
Assuring food security:

Assuring food security is large and complex.

Action needs to be taken simultaneously at both the household, national and global levels to achieve the following goals:

- Increase agriculture output worldwide
- Reduce poverty
- Improve health and nutrition.
Diamonds in conflict:

Diamonds have often been associated with violence and misery.

The connection between diamonds and conflict goes far beyond rebel groups taking control of diamond-rich areas and selling the precious metal for arms and war supplies.

Large diamond companies are now involved in this deadly game, along with traders, transport companies, arms smugglers and financial firms.
Most of these conflicts occurred in the part of the continent where these precious metals were found.

Countries like Angola, Sierra Leone and Liberia have experience civil wars which were fuelled by diamonds.
• Oil and Natural gas:
  • Oil extraction has also been known to be a source of violence, contrary to the conventional wisdom that oil fosters prosperity and development.
  • Most of the time, petroleum producing countries are plagued by corrupt and authoritarian governments who seek to enrich their pockets with the revenue from these resources.
  • In addition, our environment can also be damaged by the extraction of these resources.
Water:

- Though water is a ‘renewable’ resource, population growth and growing consumption puts pressure on the world fresh water supplies.
- Water scarcity had led to conflicts in some parts of the world.
- As the demand for water hits the limits of finite supply, potential conflicts are brewing b/n nations that share boundary fresh water supplies.
Timber:
- Rampant timber exploitation has not only destroyed the environment but also fuelled illegal arms deals and bloody civil wars and regional instability.

Minerals:
- In addition to diamonds, the mining of cobalt, coltan, copper and gold has also fuelled illegal arms deals by rebels who take control of the mining area, and bloody civil wars and regional instability.
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Kaufiaheto/RPMUnit4

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< Kaufiaheto

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Resource Perception and Management - Unit 4
Answer All questions by clicking on the appropriate option or filling in the space where necessary. Finally, click on submit to view your scores.

1. Which one of the following explains the regimes of resource ownership?

○ political and geographical frameworks

○ social and political frameworks

○ physical and social frameworks

○ none of the above

2. Land includes the solid earth and all other resources that are based on it

○ True
3. Which one of the following is NOT a cause of land degradation.

- poor agricultural practices
- afforestation
- desertification
- erosion

4. Land degradation is usually considered as artificial because, they are generally caused by human activities.

- True
- False

5. Do you think good agricultural practices and technology cannot help in fighting against land degradation issues in Africa.

- True
- False

6. Land can be classified as an irreplaceable resource because

- it holds all other resources
- land cannot be sold
- of its fixity and special characteristics
- of its free gift of nature

7. The African continent can be divided into......major climatic zones.

- 2
8.

Identify any two major climatic zones in Africa

____________________ zone and ____________________ zone.

9.

The impact of ____________________ in Africa is to be seen in a proper global context

10. Because land is a broad concept, one can say that it includes the following, oil reserves, resources of the sea, access to sunlight and changing temperatures

   ○ True
   ○ False

11. In terms of land ownership in Ghana, select the odd one out.

   ○ State
   ○ Private Developers
   ○ Foreign Partners
   ○ Traditional Rulers

12. It is believed that land management activities should begin with members of the District Assembly.

   ○ True
   ○ False
13. Why is land management seen as a central point in addressing resource problems in our country?

- land is very expensive
- It is the most expensive resources
- all other resources are based on land
- land is free gift of nature

14. Which of the following resources are usually unpriced?
   I. Clean air
   II. Rainfall
   III. Open space
   IV. Sunshine

- I, II and III
- I, II and IV
- II, III and IV
- I, II, III and IV

15. What are the characteristics of land?

- attribute of nature, which can be measured or estimated
- attribute of land, which can be measured or estimated
- attribute of nature, which cannot be measured or estimated
- attribute of land, which cannot be measured or estimated

16. Environmental effects are the effects on the quality of land

- True
- False

17. Identify the most suitable importance of land that of the Traditional Indigenous System
the elders get more resources like money

it holds all other resources

it secures the future resources for the younger generation in the traditional area

it holds land in trust for the use and welfare of a community as a whole

18. The social and political frameworks within which people manage resources can be termed as

"typologies of resource regimes"

"open access resource ownership regime"

"public resource ownership regime"

"resource ownership regime"

19. Which of the following best describe features of resource ownership regimes?
I. Right to manage the resources in a physical or technical sense access
II. Right to sell or dispose of the resource
III. Right of withdrawal or taking of resource
IV. Right of access to the resources and the powers to exclude others

I, II and III

I, II and IV

II, III and IV

I, II, III and IV

20. Limitations of "passive" adaptation and natural selection" still hold all creatures and "Man in bondage". True/False.

True

False

21. "Laissez-faire" and "central planning and socialism" are extremes of control systems.

True
22. In the field of resource perception and management, "free for all" means ....
   - Common-property Resources
   - Open Access Resources
   - State Ownership
   - Public land ownership

23. What does the "trickle-down" theory means? It means that...
   - if the community benefit then the private interests also benefit
   - if private interests benefit then the rest of the community also benefit
   - free for all
   - Open-Access

24. Failure to recognise the activities of activities of other households in doing the same things constitute the fallacy in the logic of the commons commons states that individuals dump wastes outside the commons.
   - True
   - False

25. The logic of the commons states that individuals dump wastes outside the commons.
   - True
   - False

26. Any resources shared by a group of people is known as.....
   - the "logic of the commons"
27. Which of the following answers is NOT a major reason that has virtually destroyed the world or some critical resources?

- the "logic of the commons"
- population growth
- the "commons"
- greed

28. What is known to be the "second tragedy of the commons"?

- any resources shared by a group of people
- the freedom to take from and return the waste to the commons
- food insecurity
- the freedom to breed

29. Insufficient natural production of food led to the cultivation of plants and the domestication of animals.

- True
- False

30. With regard to food production, what are the two "defect of nature" from the standpoint of human beings?

- the wrong place and the wrong time
- the wrong place and the wrong people
31. All of the following are the main challenges of the agricultural man's dependence on nature except.

○ the current technological advancements

○ incomplete control or lack of control on his yield

○ limitation on the size of the agriculture enterprise

○ the seasons leave the farmer little control over the time cycle of production

32. The basic feature of Ghana's agriculture is the dependence on nature (e.g. rainfall).

○ true

○ false

33. Identify the negative outcomes that may occur with regards to mineral deposits in a country.
   I. civil war and corruption
   II. laws and democracy
   III. authorisation repression and initialization

○ I and II

○ I and III

○ II and III

○ I, II and III

34. Multinational oil companies often manoeuvre for control of oil fields.

○ True

○ False

35. Identify why the world's supply of freshwater should be under pressure.
   I. different countries and different water type
UNIT 5

THE NATURAL ENVIRONMENT
AND RESOURCES
BASIC NEEDS AND THE ENVIRONMENT

- What is Environment?
- It is defined as the sum total of the external surrounding conditions of an organism
- It offers the natural resource base of production and consumption; that is land, soil, water, atmosphere, flora and fauna species.
- The ecosystem is part of the environment and this refers to part of the physical environment and related biological communities as they interact with each other in a complex web of relationship.
Cont’d

- Women and the Environment.
- There has been a significant increase in the awareness of the specific role women play in promoting social and economic development.
- Women have always contributed significantly to primary environmental care through their extensive knowledge and skills in managing the environment.
In sub-Saharan Africa, for example, women account for more than 80% of agricultural production, 50% of animal husbandry, 90% of food processing and 60% of marketing. This means that access to and control over natural resources are critical for women. Other factors that affect women in their environmental management are:
Cont’d

- Their decision making power
- Access to appropriate training technologies
- Their development options (education and work) and
  - Micro-macro linkages on policy level

- Many past development efforts have not only ignored women’s need, skills and knowledge, but also accelerated environmental degradation.
- This has resulted in over-burdening of women
Due to environmental degradation, some women may spend more hours fetching water, firewood and food, leaving them little time to concentrate on their development opportunities.

Also as women bear this increasing burden, their health situation is adversely affected.
Cont’d

- However, women have developed their own strategy for dealing with the environmental degradation.
- Their first strategy is often to put more time, energy and effort into the supply of natural resources.
- They also make judicious use of resources or look for alternatives such as using cow dung as manure and crop residue instead of firewood.
Women also organize themselves into pressure groups and networks to prevent further degradation on the environment.

- They often initiate certain activities including waste disposal and recycling, soil conservation and intercropping.
Cont’d

- Development organizations need to modify development and environmental conservation processes and strategies, to encourage women participation and better reflection of their efforts.

- On this note, initiatives that could have a negative impact on the environment and women, should be avoided.
NGOs and other development organisations can devise strategies that could minimize the impact of environmental degradation on women.

This can be achieved through the provision of credit for income-generating activities, education and training facilities for women.
Cont’d

- **Children and the environment:**
  - Children are seen as the next generation to inherit the earth and all the resources in it.
  - However, they have little say in the management of our resources.
  - Current environmental degradation can limit children’s future potential social and economic development
Cont’d

- Appropriate environmental management could improve the living conditions the family, lower infant mortality rate and the incidence of other child killer diseases.

- Investment in environmental awareness and education programmes should be promoted among children.
The workplace and the Environment:

- One of the duties of every employer is to provide a safe working environment for his workers.

- Besides, workers health can affect the success of the company by reducing productivity.

- In one way, the impact of the environment on workers health, such as cost of drugs, treatment by a doctor etc can be valued
Cont’d

- However, psychological stress, discomfort and anxiety experienced by workers exposed to unsafe environmental conditions is a social cost which is difficult to quantify.
- Government’s participation in the ILO and UNCTAD, UNEP and other international organisations has promoted policies and conventions to protect workers’ health.
Cont’d

- Other policies such as the production, handling and transportation and storage of harmful substances, is aimed at ensuring workers safety at the workplace.
Energy resources and the environment

- Different manifestation of energy.
- Energy has been defined as the capacity to do work.
- Work can mean any manifestation of energy in time and space.
- The focus however will be on useful work, though the importance of destructive work of forces of nature is recognized as resistance.
Cont’d

- Functional appraisal of energy kinds:
  - Energy may also be appraised with regards to the functional differences with regards to the different energy forms.
  - For example the energy that may be required for locomotive engines may different from that required for work.
  - In the same way, gasoline may be more suitable for driving automobiles that to use firewood.
Basically, energy forms may be categorized into two:

- Animate
- Inanimate
<table>
<thead>
<tr>
<th>Types of energy</th>
<th>manifestation</th>
<th>comment</th>
</tr>
</thead>
</table>
| Animate         | Those functioning in and through living organisms | Two forms: 
a) Muscular energy applied by animals to do useful work 
b) Biotic energy associated with life and growth |
<p>| Inanimate       | Those derived from non-living matter especially-fossil fuels and falling water |         |</p>
<table>
<thead>
<tr>
<th>Potential energy</th>
<th>Snow at high altitudes or water falling from steep slopes</th>
<th>May be destructive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical or chemical energy</td>
<td>Hydro/mechanical</td>
<td>It is a characterless concept such as time and space Energy transformations</td>
</tr>
<tr>
<td>Elementary energy</td>
<td>Sunlight, which the green leaf through photosynthesis makes available to the growing plants as carbon and carbon compound.</td>
<td>Elementary energy furnishes the starting point of long row of derivatives that modern production process tend to lengthen</td>
</tr>
<tr>
<td>Derived energy</td>
<td>The chemical energy stored up in the sugar or starch of living plants. The carbon of coal and petroleum</td>
<td></td>
</tr>
</tbody>
</table>
Human energy:

- Though Man occupies a unique place in the realm of energy, he (man) is completely outclassed by animals and especially by power-driven machines.
- Indeed, man’s gift is brain, not brawn.
- Man uses his brain power to direct, invent, inspire, motivate and plan.
- There is no substitute for this type of energy.
Sources of energy:

As indicated by Eugene Ayres, all energy is of atomic origin.

To Ayres, our converted energy now comes from the sun where the transmutation of hydrogen to helium is believed to provide energy in the form of light with minor supplements of thermal and ultraviolet radiation.

All our power is from this source except for the relatively tiny amounts that come from radioactive transformation on the earth itself.
Uses of energy sources:

- Until recently, little use has been made of sunlight as a source of mechanical energy.
- From all indications, however, there will be increased usage of this inexhaustible source of energy.
- The extraction of gasoline and alcohol from vegetation is uneconomical, but will probably play a role in future energy sources.
- By far the most important source of energy in terms of mechanical work performed are the non-renewable fossil fuels; coal, oil, and natural gas.
Population, Agriculture and Env. Nexus in Sub-Saharan Africa

Introduction:

- Sub-Saharan Africa’s demographic, agriculture and environmental problems are closely linked in a mutual association reinforcing causality of chain.
- In other words, increasing population led to the quest for increase in food production and other resource utilization to satisfy the increasing wants of man.
- All these activities of man is the major contributing factor to the serious environmental degradation occurring on the continent.
Cont’d

- Three basic concerns:
  - Population growth:
  - Agriculture performance
  - Environmental degradation
Shifting cultivation and Pastoralism:

- Shifting or long fallow cultivation and transhumance pastoralism (seasonal migration of livestock to suitable grazing grounds) have been appropriate under conditions of slow population growth, abundant land, limited capital and limited technical knowledge.
- But in most sub-Saharan Africa, the scope for further expansion of crop land has drastically narrowed.
- Slow technical innovation because of ineffective agriculture research and extension systems, poor transportation, inappropriate agricultural marketing and pricing etc.
Cont’d

- **Women’s time, role in rural production and household maintenance systems:**
  - Most women in Sub-Saharan Africa bear heavy responsibilities for food crop production, weeding and harvesting on men’s field, post-harvest processing, fuel wood and water provision, and household maintenance.
  - This burden on rural women keeps increasing as population growth outpaces agricultural production and growing numbers of men leave their farm to seek industrial and urban jobs.
Land and tree tenure system:
- Traditional tenure system in Sub-Saharan Africa, with communal land ownership, provided considerable tenurial security on land farmed by community members.
- As long as population increased only slowly, customary systems were able to accommodate the emerging need to move towards de facto permanence of land rights assignation.
Cont’d

- Most government and development agencies have, however, mistakenly believed that customary tenure system provided in adequate tenurial security and not conducive to the introduction of modern agricultural technology and market oriented agriculture.

- Many governments have responded by nationalizing the ownership of land, and then allowing customary rules to guide the use of some lands, while allocating other land to private investors and public projects.
Forest and woodland exploitation:

- The heavy dependence on wood for fuel and building materials have combined with the ever increasing population to contribute to the growing forest and woodland degradation.

- This destruction has led to soil degradation and erosion, eliminates wildlife habitat, leads to soil biodiversity and has severe implications for local and regional climates and hydrological regimes.

- This in turn affects agricultural production
Cont’d

- An action plan:
  - Several policies have been in place to curb the menace but failed. It is necessary however to keep trying than never: below are some action plans:

- Some basic targets:
  - Agricultural production should grow at about 4 percent per annum.
  - The share of the population that is food insecure must be reduced from 25 percent to 10, 5 percent then to zero by 2020.
  - The rate of deforestation needs to be slowed
There should be reduction in population growth from the present annual average annual rate of over 3.1 percent to 2.3 percent per annum.

**Reducing fertility rates:**
- There should be increase in demand for fewer children.
- This can be achieved through public education on the benefits of having fewer children.
- Women’s work load need to be eased to reduce the need for more children.
Cont’d

- Promoting environmentally sustainable agriculture:
  - Farm productivity per unit area should be increased significantly to generate more output with little increase in the area farmed.
  - Agriculture research and extension services need to focus less on mono-crop technologies and farm mechanization and much more on the types of technologies mentioned, adapting them to local conditions and making them available to farmers for adoption.
Cont’d

- Intensive and resource conserving agriculture must be made less risky and more profitable.
- This requires appropriate marketing, price, tax and exchange rates policies as well as investment in rural infrastructure, health and education facilities.
- Creation of parks, reserves and community owned rage land and protecting these against conversion into crop land will help conserve natural resources.
- Also, reducing infrastructure developments in forests and other fragile areas will discourage settlement in these areas.
Easing women’s time constraints and improving their productivity:

- Initiatives in research, extension, infrastructure development, rural technology and education are needed to ease women’s time constraint and improve their productivity.

- This can be achieved through initiatives of NGOs and other agencies for the benefit of women.

- Examples include developing time saving and efficient stoves, providing improved farming and crop processing techniques and tools for women etc.
Cont’d

- Clarifying resource ownership:
  - Immediate action is needed in eliminating open access to resource ownerships and to provide legal protection to traditional and private lands owners.
  - Women need equal rights to land and tenurial; security as men, especially in view of the increasing number of heads of households in many rural areas.
Cont’d

- Addressing the fuel wood problem:
  - Efforts to promote agro-forestry need to be promoted because it has a significant impact on the agro-ecological environment, rural energy economy and women’s time.
  - Therefore open access sources of fuel wood should be eliminated, cutting in protected areas stopped.
  - There should be a great need for fuel efficient stoves, which will not put much pressure on the natural resources.
Infrastructure development and settlement policy:

- There should be heavy investment in rural infrastructure, health and transport facilities.
- Infrastructural facilities have a great impact on rural productivity.
- Better and healthier farmers are more productive and more likely to be innovators.
Cont’d

- Natural resource management and environmental protection:
  - Establishing conservation areas and protecting forests is conducive to promoting agricultural growth, because they protect watersheds and stabilize local and regional climate and hydrological systems.
  - Land use plans should identify areas to be protected, areas to be farmed, areas to be used for sustainable logging etc.
  - The local community should be involved in the design and implementation of such policies.
Water:

- There is an urgent need for effective hydrological planning and for prudent demand management.
- Water must be recognised as the critical and limiting resource which must be carefully allocated and protected against pollution.
- Since water resources are frequently shared among countries, it is important to cooperate closely in planning for long term water sharing.
Environmental Degradation in Africa

- **What is environmental degradation?**
- Degradation denotes a reduction in the capability of land to satisfy a particular use.
- Apart from decreased food production, degradation can also result in droughts, ecological imbalance and consequent degradation of the quality of life.
- In Africa, the most obvious symptom of land degradation on food production is the increased poverty levels and declining yields.
Cont’d

- The role of man in the degradation process:
- Any interference by human in the natural process of soil formation, evolution and erosion has effect on these processes often unforeseen.
- Though some (e.g. erosion, leaching, compaction etc.) happen naturally in the absence of any human intervention, human interference has sometimes modified and usually accelerated all these processes, and has created the conditions under which new sets of processes previously absent or insignificant came into play.
Human induced degradation occurs when the land is poorly managed or where natural forces are so powerful that there is no means of management that can check its progress.

Some degradation occurs when land that has never been interfered with is brought into active use (for example marginal lands and fragile ecosystems).
Some practical activates that lead to environmental degradation:
- Poorly managed crop farming
- When livestock exceed the lands carrying capacity
- Wood fuel extraction
- Bush fires
- Mining and industrial activities
- Quarrying
Cont’d

- **Combating Environmental Degradation:**
  - Changing our lifestyle; environmental friendly
  - The excessive demand on natural resources especially for fuel can be reduced by introducing other energy sources for fuel purpose.
  - Better agricultural practices must be encouraged
  - Waste disposal and excessive pollution of the atmosphere should be checked
  - Sand winning practices must be prohibited.
The Concept of Natural Resource Management

- **Meaning of management:**
  - The process of getting things done through people which involves planning, organizing, directing and controlling;
  - Taking responsibility for the efficient use of resources to achieve the set objectives effectively
  - A manager should also perform the ff roles:
    - Interpersonal, informational and decision roles.
What is Natural Resource management?

- It is the conscious process of decision making whereby natural and cultural resources are allocated over time and space to optimise the attainment of stated objectives of a society, within the framework of its technology, political and social institutions, and legal and administrative arrangements.

- It is therefore a multi-disciplinary area of study which uses the management principles indicated earlier for its stated objectives.
Resource management can also be described as “a process or system of decision making whereby resource use, conservation or environmental policies and practices are devised and implemented”

Such decisions are usually concerned with exploitation and allocation of resources over space and time, investment in renewable resources to enhance their flows, protection of the environmental resources and ensuring development and well being of humans.
Cont’d

- **Cultural and Natural Resources:**
  - Experiences of our culture allow us to give meanings and values to objects, and to the past, present, and future.
  - As noted in the earlier units, what may be a resource to one particular ethnic group may be different from what a different group of people may perceive it.
  - Culture influences the way we think about natural resources, how it should be used, and so on.
There are many competing cultural views of how best lands can be put to good use.

These include not only the beliefs and practices of various ethnic groups, but also the beliefs and practices of various government agencies.

Since resources are cultural appraisals, it is important that the users and beneficiaries are involved in the management process of particular resources.

Because any management decision which excludes resource users is bound to fail.
Population growth:

Population distribution and size are closely associated with the quality of the environment, since humans need to make use of natural resources in order to survive.

Large populations require large amounts of basic supplies such as food, water, housing, energy and land.

If the demand for these resources is not balanced with the sustainable supply, the environment can be seriously damaged and degraded.
Cont’d

- The quality of the environment affects conditions of the population.
- Poor environmental conditions often push people to have more children.
- Poor environmental quality often leads to increased mortality and morbidity.
- The fertility of a woman may also depend on the quality of dietary intake, and health conditions.
Cont’d

- Thus Demographic and environmental policies should not be considered in isolation.
- Environmental policies must consider the environmental and socio-economic characteristics of the population in order to protect the environment.
- Sustainable management of population also requires strategies in which the socio-economic factors that affect population densities and distribution are examined.
The urban environment:

Because of the massive rural-urban migration, it is important to focus attention directly on managing the urban living environment.

The cities are absorbing about two-thirds of our population, at the same time depleting large quantities of our natural resources and generating more waste than they can handle.

A typical example is the case of ACCRA.
Coping with environmental degradation will require policies and activities that emphasize:

- Adopting environmentally sound waste disposal practices
- Improving the efficiency of waste collection and transport system
- Extending waste collection services to low income areas, using affordable approaches
- Protecting the quality of air and water
- Promoting energy efficiency and fuel alternatives etc.
Cont’d

- Shifting to more simple and economical forms of transport
- Institutionalizing the planning, budgeting and accounting processes of waste collection systems
- Hiring, training and motivating staff to provide affective and efficient service
- Facilitating the participation of the private sector
The industrial sector:

- It is the interest of industry to protect, conserve and manage the environment.
- Appropriate environmental management practice in this sector will entail a total approach in which all the processes of manufacturing a product till it gets to the final consumer are taken into account instead of concentrating mainly on controlling emissions and effluents at the last stage.
- Production of environmentally friendly products should be encouraged.
Cont’d

- **Education, information and the environment:**
  - Environmental education begins with education itself by encouraging personal hygiene in our homes, workplaces and wherever we find ourselves.
  - Environmental literacy is an important part of effective, functional literacy and contributes to the development of national awareness of the importance of the environment in economic, social and cultural development.
Community participation:

Community participation in environmental protection and resource management activities is significantly important and has succeeded because:

- People want to protect the place they live and manage their resources sustainably.
- People who live in the community have better knowledge of their local environment than do planners or their local reps. etc.
Cont’d

- Preparation of resource management plans:
  - Nationwide plans have been developed for natural resource conservation and environmental protection at all levels of the country.
  - However, both their implementation and impact have been lower than expected.
  - This raises the question of whether such plans are too ambitious, inappropriate or have overlooked some critical assumptions.
Usually, implementation of resource management plans is assumed to be the responsibility of the government, and given that little benefit has accrued to government over the years, it is not surprising that implementation of such plans have suffered in the past.

There is therefore the need to identify some innovative ways of relieving African governments of some of the responsibilities of financing the implementation of resource management plans.
ENJOY THE WEEKEND
UNIT 6

SUSTAINABLE NATURAL RESOURCE DEVELOPMENT AND CONSERVATION
THE RESOURCE SCARCITY DEBATE

- Scarcities and limits:
  - Malthus thesis was one of the influential contributions to resource-scarcity.
  - He asserted that human population will tend to outpace food production.
  - As a result, the human population will suffer famine and distress.
Cont’d

- Neo-Maltusians have revived and extended the view of Malthus recently to include the supply of other resource materials.

- Other theorists have interpreted scarcity to be as a result of unjust social and political systems rather than physical shortages and environmental problems.
“Absolute” and “Relative” Resource Scarcities:

- **Absolute** scarcity exist when insufficient physical quantities of the resources are available to meet the demand for it.

- **Relative** scarcity on the other hand comes into play when the physical quantities of resources are sufficient to meet demand but problems arises over quantities of supplies.
The distinction between “Absolute” and “Relative” resource scarcities can also be viewed from Maltusian and Ricardian perspective of scarcity.

Malthus considered that a fixed amount of land existed, and therefore definite environmental limits existed.

David Ricardo, on the other hand, focused on the quality (rather than quantity) of land.
Rees’ Perspective of Resource Scarcity:

- Rees classified resource scarcity into three:
  - Physical scarcity
  - Economic scarcity
  - Geopolitical scarcity
  - Other forms of scarcity

- The fourth category was labeled ‘renewable and environmental resources scarcity’
Cont’d

- **Physical scarcity:**
  - Environmental materials such as land and water are limited in quantity; the earth is finite and limited in content.
  - Physical scarcity depends on the quantity of the materials that exists within the earth and on the level of consumption or demand.
Economic scarcity:
- Considers the market as an important factor in relation to demand, supply and scarcity.
- Fall in price of a resource may boost demand but reduce the supply for such resource.
- Scarcity is based on the idea that when limited supply of goods or services comes up against an ever increasing demand for it.
Cont’d

- Geopolitical Scarcity:
  - This is related to spatial patterns and control of the resource by restricting output.
  - For example Arab Oil Producers cut production and placed embargoes on sales to the United States and some other Western Countries.
  - Panic Buying allow OPEC to double the price of crude oil.
Cont’d

- Other forms of scarcity:
  - Renewable and environmental scarcity encompasses scarce qualities other than physical quantities of the resource.
  - These qualities may be aesthetic, as in the case of attractive landscape or may be physical.
  - Scarcity of this nature may increase through time, as the side effects of the exploitative use of environmental resources take their toll.
Cont’d

- The significance of resource scarcities:
  - Much improved transport and better distribution system
  - Technical improvements in agriculture and more intensive use of land.
  - Better conservation of resources because scarcity leads to changes in resource management.
Cont’d

- However, the idea that destruction leads to conservation ignores the possibility that resources may be completely exhausted, so that improvement to the resource becomes impossible.
Definition of Biodiversity:

1992, UN Earth Summit in Rio de Janeiro defined biodiversity as “the variability among living organisms from all sources, including, among other things, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and ecosystems”
Cont’d

- **Origin of life and Biodiversity:**
  - Biodiversity found on earth is as a result of 3.5 billion years of evolution.
  - Since the advent of humans, however, biodiversity has begun a rapid decline, with one species after another suffering extinction.
  - Most of the diversity is found in tropical forests.
Biodiversity in Africa:

- Africa has a large and diverse heritage of flora and fauna, including major domesticated agricultural crops such as sorghum.
- In some countries, areas that were particularly rich in biodiversity were often designated as sacred groves and protected areas.
- First National parks that were created includes Kruger National Park in South Africa (1928)
Cont’d

- And Toubkal National Reserve in Morocco (1944).
- Eastern Africa has the highest number of endemic species of mammals.
- Madagascar is the most endemic rich country in Africa, and sixth in the world for higher vertebrates and third rich most plant-rich country after DRC and Tanzania.
Cont’d

- Ecological role of Biodiversity:
  - All species provide some function to an ecosystem;
    - They can capture and store energy
    - Produce organic materials
    - Decompose organic materials
    - Control erosion or pests
    - Fix atmospheric gases
Cont’d

- Ecosystems also provide purification of the air and water;
- Stabilization and moderation of climate;
- Decrease of flooding, drought and other environmental disasters to support production.
Cont’d

- Economic role of Biodiversity:
- It is a source of resources for daily life in the form of:
  - Food
  - Medication
  - Industry
  - Tourism and recreation
Biodiversity: time and space:
- Biodiversity is not a static phenomenon, it’s a system in constant evolution.
- Biodiversity is not distributed evenly on earth.
- It is consistently richer in the tropics.
- Flora and fauna vary depending on climate, altitude, soils and the presence of other species.
Cont’d

- Hotspots of biodiversity:
- Biodiversity Hotspots is a region with many endemic species.
- Hotspots tend to occur in areas of historically limited human impact and are generally very productive.
- Increase in human population is mounting pressure in these areas as a result of human activities.
Threats to biodiversity:

Over the last decades, erosion of biodiversity has been on the ascendancy.

All agree that, these losses are due to human activities; in particular, destruction of plants and animal habitat and consumption of organic resources.
Cont’d

- Some of these threats can be attributed to:
  - Over-harvesting or illegal taking of species
  - Habitat loss or fragmentation
  - The introduction of exotic species
  - Pollution and land degradation
  - Climate change and land disasters.
Cont’d

- Biodiversity Management:
  - The sustainable use of ecosystems, species and genetic material.
  - Developing national strategies and action plans
  - Integration of biodiversity considerations into national development strategies.
  - Use traditional methods and knowledge
  - Foster the sharing and sustainable use of biotechnology
SUSTAINABLE RESOURCE DEV’T

- Carrying capacity concept:
- Human life depends on healthy ecosystems which supply life-sustaining resources and absorb waste.
- However, the rate of consumption levels and population growth is putting much pressure on the ecosystem.
- This implies that, there are thresholds at which the level of stress leads to the disruption of the ecosystem.
One concept that explains this phenomenon is the “carrying capacity concept”.

This concept assumes that there are finite number of people, who can be supported without degrading the natural environment and social, economic and cultural systems.

The concept measures the maximum number of stress that the ecosystem can maintain.
Resource use and the concept of sustainable development:

Sustainable development has been defined as “development that meets or satisfies the need of the present generation without compromising the needs of future generations to meet their own needs”.

It opposes policies and practices that support economic growth by depleting natural resources.
Cont’d

- Characteristics of the concept of sustainable development:
  - Sustainable dev’t respects and enhances the capacity of local communities to maintain and develop sustainable livelihood without destroying the economic and social resource base.
  - Sustainable dev’t is oriented to achieving explicit ecological, social and economic objectives.
Cont’d

- It may impose ecological limits on material consumption while fostering qualitative development at the community and individual levels.
- It also requires government intervention but also leadership and corporation from the private sector.
- It demand policy integration and coordination of all spatial skills
Cont’d

- **Principles of sustainable development:**
  - Peoples participation in development
  - Local self-reliance
  - Regional locus of control
  - Social entrepreneurship
  - The use of appropriate technologies
  - Long-term horizon
  - Supportive network
CONSERVATION OF NATURAL RESOURCES

- Brief history of conservation:
- Conservation is as old as mankind and has acquired many definitions.
- To some conservation meant protection of wild nature and to others it’s the sustained production of useful materials from the living resources of the earth. E.g forestry, fisheries.
Cont’d

- The conservation movement opposes the view that resources should be used up in the short run for immediate benefit of the present generation without responsibility toward the future generation.

- Conservation derived its knowledge from Ecology: the science that concerns with the relationship b/n living things and their environment.
Two major concerns for conservationists are the loss of tropical rain forest and the outbreak of coral bleaching.

Tropical rainforest are the major source of world's biodiversity.

Coral bleaching is a stress condition in reef corals that involves a breakdown of the symbiotic relationship between corals and unicellular algae.
Goals of conservation:

- Natural resources are definitely for man’s use, so they must be developed and used for our benefit, but not to be locked up or preserved.
- It stands for the prevention of waste in the exploitation, processing and utilization of natural resources.
- Natural resources need to be developed and preserved for the benefit of all and not few.
Cont’d

- Principles of conservation:
- Ensuring the beneficial use of resources
- Variability of use
- Substitution
- Harmonious property relation
- Allocation of resources
- Recycling
- Forecasting and planning
Cont’d

- Spiritual and aesthetic use of resources
- Individual responsibility for conservation
Widespread Malnutrition:

- As population grows pressure on arable lands water and biological resources also increases.
- Resources loss its nutrients that supports food production.
- This leads to fall in food production.
Cont’d

- Inadequate water resource:
- Competition for water resources among individuals, regions and nations increases as population grows.
- About 40 percent of the world’s population lives in regions that directly compete for shared water resources.
Cont’d

- Energy:
  - Fossil fuel is the greatest source of energy for food production.
  - Fossil fuel: Any carbon-containing fuel derived from the decomposed remains of pre-historic plants and animals, e.g. coal, peat, petroleum, and natural gas.
  - Because fossil fuel is a finite resource, its depletion accelerates as population needs for food and services increases.
Cont’d

- The way forward:
  - Improved technology will assist more effective management and use of resources.
  - Though it cannot support sustained agricultural production and preservation of water bodies.
- Responsibilities of policy makers:
  - Strategies must be based on conservation and careful management of land, water, energy and biological resources needed for food production.
SOME OTHER GLOBAL RESOURCE ISSUES

- The Earth Summit:
  - 178 governments were represented at the summit.
  - The framework convention on climate change introduced measures designed to reduce the threat of global warming.
Cont’d

- The Rio Declaration included 77 principles which it was believed should guide action on development and the environment.
- Finally, the forest principles emphasized the right of states to exploit their own forest resources while advocating a general principles of sustainable forest management.
The UN Commission on Environment and Development:

- It was an independent body established by the UN in 1983 to formulate “a global agenda for climate change”.
- The commission membership comes from 22 nations and is chaired by Gro Harlem Brundtland.
Its purpose was to propose strategies for sustainable development by the year 2000, promote co-operation between nations at different stages of economic development, and to consider ways by which the international community can deal with environmental concerns.
Cont’d

- Greenhouse effect and Global warming:
  - It is the planetary atmosphere-warming phenomenon, resulting from the absorption of infrared radiation by atmospheric constituents.
  - The heat caused by infrared radiation is absorbed by "greenhouse gases" such as water vapor, carbon dioxide, ozone and methane, which slows its escape from the atmosphere.
Cont’d

- Without these gases, heat could escape back into space and Earth’s average temperature would be about 60°F colder.
- The greenhouse effect is important.
- Without the greenhouse effect, the Earth would not be warm enough for humans to live.
- But if the greenhouse effect becomes stronger, as it has now become, leads to **global warming**.
Greenhouse effect

Solar radiation powers the climate system.

Some solar radiation is reflected by the Earth and the atmosphere.

The Greenhouse Effect

Some of the infrared radiation passes through the atmosphere but most is absorbed and re-emitted in all directions by greenhouse gas molecules and clouds. The effect of this is to warm the Earth’s surface and the lower atmosphere.

About half the solar radiation is absorbed by the Earth’s surface and warms it.

Infrared radiation is emitted from the Earth’s surface.
Some causes of this phenomenon have been identified as follows:

- Burning natural gas, coal and crude oil
- Many factories produce long-lasting industrial gases
- Deforestation
- Population growth
Ozone layer:
- Ozone (O₃) is a gas that occurs naturally in our atmosphere.
- It is produced by the action of ultraviolet light from the sun on oxygen (O₂) in the air.
- Most of it is concentrated in the ozone layer, a region located in the stratosphere several miles above the surface of the Earth.
Cont’d

• The ozone layer shields the earth from the harmful effects of the solar ultraviolet radiation, but can be decomposed by complex chemical reactions, notably involving chlorofluorocarbon.

• This substance is used as a pressurized propellant in refrigerating systems etc.
GOODLUCK