CHAPTER NINETEEN

ECOLOGY, EVOLUTION AND WEATHERING:

Ecology:

This is the branch of biology that deals with the relationship living things have with each other, and with their environment or surroundings.

Biosphere:

This is the part of the earth and the atmosphere where life exists, and It consists of land, sea, fresh water and air.

Biome:

This is a region which has the characteristic physical conditions which support animals and plants, which show adaptation to these conditions.

Habitat:

- This is a place where living organsims live, are able to multiply and survive.
- Habitats are characterized by their main physical features, e.g fresh water habitats include streams, rivers, lakes and ponds.

Autecology: This is the study of the relationship of one organism or population with its environment.

Syncology: This is the study of the relationship of a communiity with the environment.

Community:

This is a group of animal and plant population, living together in the same environment.

In short, a community is made up of many different kinds of plants and animals living together and depending on each other.

Ecological community will always include:
(i) Producers.

(ii) Consumers.
(iii) Decomposers.

Producers: These are green plants or autrophs, which synthesize or prepare their own fod through the process of photosyntheses, on which the whole community depends.

Consumers: These are animals or heterophs which feed on plants or other animals.

- Consumers can be further subdivided into primary consumers, secondary consumers, and tertiary consumers.
- Primary consumers consists of the herbivores which feed on plants.
- Secondary consumers are those carnivores which eat herbivores.
- Tertiary consumers refers to the carnivores which eat the secondary consumers.

Decomposers:

- These are consumers which feed on dead organic materials.
- They decay organic materials and add humus to the soil.

Food Chain: Refers to the series of stages that energy goes through in the form of food.

The role of herbivores in food chain:

- They feed directly on leaves, roots, seeds, grains and fruits to build their bodies which serve as food for omnivores and carnivores.
- They are fewer than the producers, and examples are goat, sheep and grasshopper.

Role of green plants in food chain:

- They are the producers and start the food chain.
- They use the sun`s energy to manufacture their food, and provide food for the consumers within the community.

Role of carnivores in food chain:

- They are flesh eaters and feed directly on herbivores.
- They are called secondary consumers and are fewer than the herbivores.
- Examples are cat, lion and hawk.

Role of decomposers in food chain:

They feed on dead organic matter, cause decay and return nutrients to the soil.

Ecosystem:

This is the most complex level of organization in nature, which consists of communities and their abiotic (non living or physical) environments such as soil, water and climate.
- An ecosystem can be an old bucket containing rain water, dissolved salts, bacteria, algae and mosquito larvae.
- Lakes such as the volta lake and its constituents, consistute a much larger ecosystem.

The components of an Ecosystem:

These are:

(1) Green plants (primary producers).
(2) Fungi (saprophytes).
(3) Animals (consumers).
(4) Bacteria (decomposers)

Uses of some ecological items:

Pit fall trap: Is used to sample the population of small animals.

Sweep net: Is used to trap insects on the ground and on land.

Pooter: Is used to collect small animals such as insects and spiders.

Butterfly net: Is used in catching flying insects.

Wicker-work trap: Is used to trap larger aquatic organisms such as tilapia and prawn.

Quadrat: Is used to estimate the populationn of plant species in an environment (land).

Plankton net: Is used to collect phytoplankton and zooplanktoon that inhabit the surface of water bodies.

Population:

- This is a group of organisms of the same species, living within a given area at the same time.
- The human population therfore refers to the human beings living within an area.
- Also, a forest may have populations of spiders, monkeys, silk cotton trees and beetles.

Population density:
This refers to the number of human beings who occupy an identifiable area.

Census: Refers to the counting of people living in an area.

Population growth:
Is the rate of increase or growth of population.

Factors affecting the growth of population:

(a) Fertility: This is the average number of children, born to mothers of child bearing age within a time period.
(b) Migration: This is the movement of man or animals from one place to a more favourable area. Migration is due to the fact that general development is not evenly distributed with respect to different areas.
(c) Mortality: Mortality rate is the rate at which individuals die, as a result of old age and other causes. In developed countries, mortality rate is low and vice versa.

Problems associated with the growth of population:

These are:
(1) Unemployment.
(2) Inadequate supply of utilities such as schools, water and electricity.
(3) Development of shanty towns, leading to the spread of diseases.
(4) Increase in social vices such as prostitution and crime.
(5) Traffic jams.

Population control:

- To check population growth and explosion, family planning must be practised in order to limit and space the number of children.
- Family planning clinics provide useful information with respect to the prevention of babies, and the spacing of children.

Birth control methods:

These includes:

(1) The calender method:
In this, mating takes place only during the safe period of a woman.

(2) The condom:
This is a rubber sheath which prevents the sperm from getting to the egg to fertilize it.
(3) The foaming tablets:
This is inserted into the female reproductive organ before mating. It foams and kills all the sperms and as such, prevents any of them from reaching the egg to fertilize it.
(4) The contraceptive pill:
This is taken daily and contains chemicals similar to oestrogen and progesterone, which are the main female sex homones. The chemicals produced by the pill stops the ovary from releasing the egg. It is almost 100% effective.
(5) The loop:
It consists of a small plastic strip which is coiled or bent into a loop and placed in the uterus.
(6) Vasectomy: This involves the cutting and sealing of the ends of a man`s spermduct, to prevent sperms from forming part of the semen.
(7) The diaphram (Dutch cap):
This is a special rubber which is inserted into the female organ before mating. It prevents the sperm from getting to the egg.

Ecological factors:

- All the organisms within a habitat make up a community.
- Each organisms within a community is affected by two main factors and these are:
(i) Abiotic factors. (ii) Biotic factors.

Abiotic factors: These refers to all the non-living influences experienced by an organism. There are three main main types of abiotic factors and these are:

(1) Climatic factors (rainfall, humidity,wind speed and wind direction, temperature and light instensity).
(2) Physiographic factors (slope of land, altitude e.t.c).
(3) Edaphic factors (soil factors).

Climatic factors:

The main climatic factors that affect life on land are light intensity, wind, temperature, rainfall, relative humidity and turbidity.
(a) Light intensity: This is measured using the photometer.

Effects of light intensity:

- It provides the energy needed by plants for photosynthesis.
- It increases the temperature of a habitat.
- It controls the opening and closing of the stomata.

- It makes dunal animal active.

(B) Wind: Wind speed is measured with the anemometer, whilst wind direction is measured with the wind vane.

Effects of wind:

- It increases the rate of transpiration.
- It breakes trees or branches of trees.
- It causes erosion.
- It enhances cross-pollination.
- It causes dispersal of seeds and fruits.

Effects of Temperature:

- High temperature causes rivers and streams to dry up during the dry season, leading to irregational problems.
- High temperature makes habitats warm, resulting in a high rate of evaporation.
- High temperature causes a high rate of metabolism in cold blood organsims.
- High temperature causes a high rate of decay of organic matter and vice versa.

(d) Rinfall: This is measured using a rain gauge.

Effects of rainfall:

- It makes water available to plants and animals.
- It increases the humidity of an environment.
- It determines the level of water in streams and lakes.
- It causes erosion.
- It determines the pattern of distribution of plants and animals.
- It decreases the temperature of a habitat.

Relative humidity: It is measured with the hydrometer.