ORGANISMS IN THE ENVIRONMENT

Ecology

Ecology is the study of the interactions or interrelationships that exist among organisms and their environment.

Ecology is derived from the Greek word **"oikos"** meaning **Home**.

Therefore, Ecology is:

- The study of Home life of Living Organisms.
- The study of interactions that determine the distribution and abundance of organisms.

Biology and Organisms

- Biology is the study of organisms/living things.
- Organisms are plants and animals.
- Water, air and land are the natural surroundings or environment.

An organism is a body which is composed of one or more living cells.

- The nature of the cell in any given organism determines whether it is a plant or animal.
- A plant cell usually has cellulose cell wall and chloroplasts, both of which are lacking in an animal cell.

Types of Organisms

Unicellular or acellular organisms

- Consist of only one cell.
- E.g. Amoeba, Euglena, bacteria, viruses, Paramecium etc.

Multicellular organisms

- Consist of more than one cell.
- E.g. Fungi.

Microorganisms

- Organisms that cannot be seen without the aid of a microscope.
- They are unicellular.

Macro-organisms

- Organisms that can be seen with the naked eyes.
- They are mainly multicellular in nature.
- E.g. Rat, fish etc.

Environment

An environment is the natural surrounding of an organism.

Certain factors and phenomena outside the organisms exist in the environment and influence the life of organisms. These include:

1. Biotic or Living Factors

E.g. plants and animals and their various interactions.

2. Abiotic or Non-living Factors

Such as:

- Temperature
- Moisture
- Light
- Wind
- Gravity
- Soil types
- Elevation
- Essential nutrients e.g. nitrogen, carbon, iron etc.

Ecological Concepts

1. Habitat

The exact or natural dwelling place of an organism where it can successfully thrive.

Any organism that appears in any locality will depend on the ecological conditions, e.g.:

- Type of soil
- Rainfall
- Temperature etc.

Examples:

- A caterpillar lives and survives on plants.
- A roundworm lives and survives in the digestive system of vertebrates.

Therefore, there is:

- Aquatic (water) habitat
- Terrestrial (land) habitat
- Arboreal (tree trunks and tree tops) habitat

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2. Ecological Niche

This shows the exact place an organism lives as well as its behavior, feeding and breeding habits.

Some organisms like the tapeworm can only live in the intestine of its host.

A tadpole lives in water while the adult toad lives mainly on land.

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3. Species

A species is made up of members who can interbreed.

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4. Population

This is made up of organisms of the same species found in any given locality at a particular time.

So population deals with time and place of a species.

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5. Community

A community is made up of different populations of living organisms that exist together in a habitat.

It consists of plants and animals found in a given locality.

It is regarded as the biotic component of any ecosystem.

Examples:

- Freshwater community
- Nsukka community including human beings

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6. Ecosystem

One of the first ecological observations to be recorded was that organisms live in communities.

The interaction system of a community plus the habitat is known as the ecosystem.

Examples:

- Grassland
- Forest
- Desert

An ecosystem is a self-supporting unit that is made up of a living part and non-living part known as the biotic and abiotic component respectively.

An ecosystem therefore is all about the complex relationship between members of a community and the community as a whole.

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7. Biosphere

The zone life is found on earth.

The biosphere has different parts:

1. Atmosphere (involved with a larger air)
2. Hydrosphere (the part composed of water)
3. Lithosphere (the solid part)

The biosphere is made up of different ecosystems.

Types of Environment

1. Land or Terrestrial Environment

This is our own natural environment with a wide array of plant and animal life.

Organisms that move on hard ground are predominant and are called surface dwellers like:

- You and I
- Dogs
- Goats

The ones that dwell underground are called burrowers.

The ones on the trees like birds and apes are arboreal animals.

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2. The Water or Aquatic Environment

It is water based.

Naturally, it is about streams, lakes and the likes but could also exist as water collected in cans, pots, gutters as long as it has water.

It is divided into:

Marine/Ocean/Salt Water Habitat

Freshwater Habitat

Examples:

- Lakes
- Ponds etc.

Also note that an estuary is formed when rivers flow into the sea.

The water is a mixture of fresh and salty water known as Brackish water.

Therefore, estuarine organisms live in Brackish water.

Examples:

- Red Mangrove
- Avicennia
- Some molluscs
- Crabs

These organisms have to be adapted to withstand:

- Changes in salinity
- Poor aeration
- Soil mobility

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3. The Air or Atmospheric Environment

Air is the mixture of gases and is composed mainly of:

- Nitrogen
- Oxygen
- Carbon dioxide

It also contains water vapour.

The air environment is essentially the one above the sea level.

The environment of organisms with the power of flight.

Most organisms that are found here live in trees.

The ones who spend most of their time on trees are termed aerial organisms.

The amount of air changes with altitude.

Adaptations of Organisms

Adaptation is a process that allows an organism to adjust to a changed environment.

Adaptation can also be behavioral.

It is the modification in:

- Form
- Structure
- Function
- Behavior

There are 3 types of adaptation.

In Terrestrial Environment

Plants

Plants that live in dry places like deserts are called xerophytes.

Adaptations:

- Thick stems and leaves for storage

- Tiny leaves/thorns/spines
- Very thick barks
- Hairy leaves etc.
- All to reduce transpiration

Animals

Most of the adaptations of animals on land are in conserving water.

Examples:

- Scales
- Cuticle
- Shell

All reduce evaporating.

Hair and sweat glands regulate water loss and a kidney reabsorb water for urine etc.

In the Aquatic Environment

Plants

Plants that live in water are called hydrophytes.

Adaptations:

- Small root systems since water adoption is quite easy
- The ones that float have light bodies and air storage tissues
- Those that are fixed have flexible stem to avoid breaking under water current
- Little conducting tissues

Fish

Adaptations:

- Streamlined shape for easy movement
- Fins for swimming
- Gills for breathing in dissolved oxygen
- Sensitive skin and lateral line for sensation
- Well developed eyes for wider range vision

In Air Environment

Birds

Adaptations:

- Light skeletons with hollow bones for easy flight
- Rigid skeleton to withstand the shock on landing
- Feathers and wings for flight
- Sufficient respiratory system to supply sufficient energy for flight

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Types of Adaptation

Structural Adaptation

Involves the use of the organism's body parts to adjust to its mode of life.

Adaptive Colouration

It can be for:

Escape

- Camouflage
- Individual response
- Group response

Defence

- Physical defence
- Mimicry
- Chemical defence

Behavioral Adaptation

- Individual response
- Group response
- Modification of behavior that enables survival in a particular environment.