



ECOSYSTEM
STRUCTURE

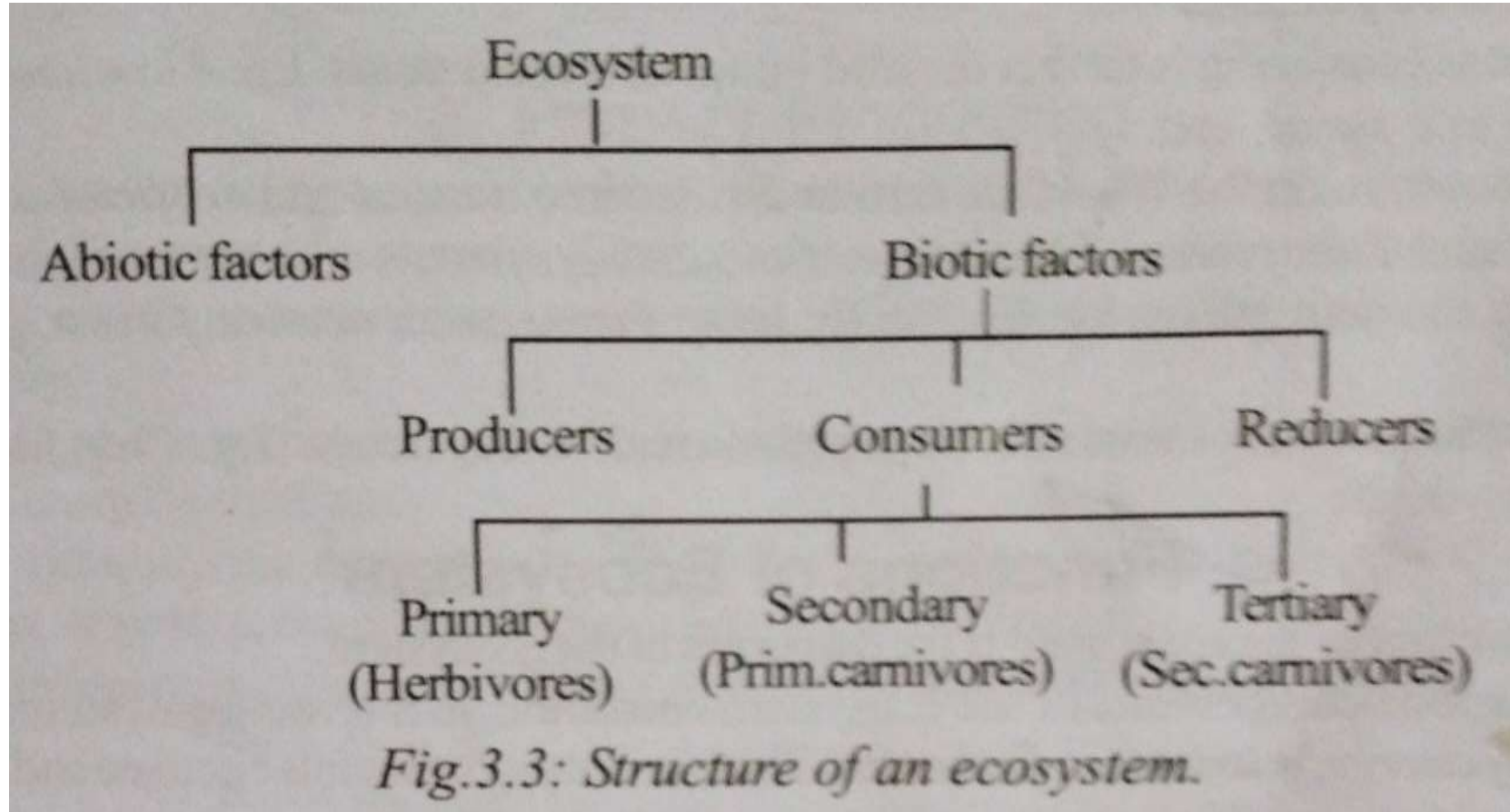
ECOSYSTEM

According to E.P.Odum, an American ecologist, an ecosystem is the basic functional unit of organism and their environment interacting with each other and with their own components.

An ecosystem includes all organisms that live in a particular place, plus the abiotic environment in which they live - and with which they interact – at that location.



Components of ecosystem



Biotic components are the living things that have a direct or indirect influence on other organisms in an environment. For example plants, animals, and microorganisms and their waste materials.

Abiotic components of an ecosystem include all chemical and physical elements i.e. non-living components. Abiotic components can vary from region to region, from one ecosystem to another. They mainly take up the role of life supporter. They determine and restrict the population growth, number, and diversity of biotic factors in an ecosystem. Hence, they are called limiting factors.

Abiotic factors

Water

Soil

Air

Light

Temperature

Minerals

Climate

pressure

ABIOTIC COMPONENTS

Inorganic
substances

Carbon cycle
Nitrogen cycle
Water cycle

Organic
substances

Lipids
Proteins
Carbohydrates

Climatic
factors

Sunlight
Precipitation
Humidity
Wind action

Edaphic
factors

Soil
topography
minerals
soil

ABIOTIC COMPONENTS

A. Climatic Factors

Sunlight

precipitation

humidity

wind action



TEMPERATURE



HUMIDITY



WIND ACTION



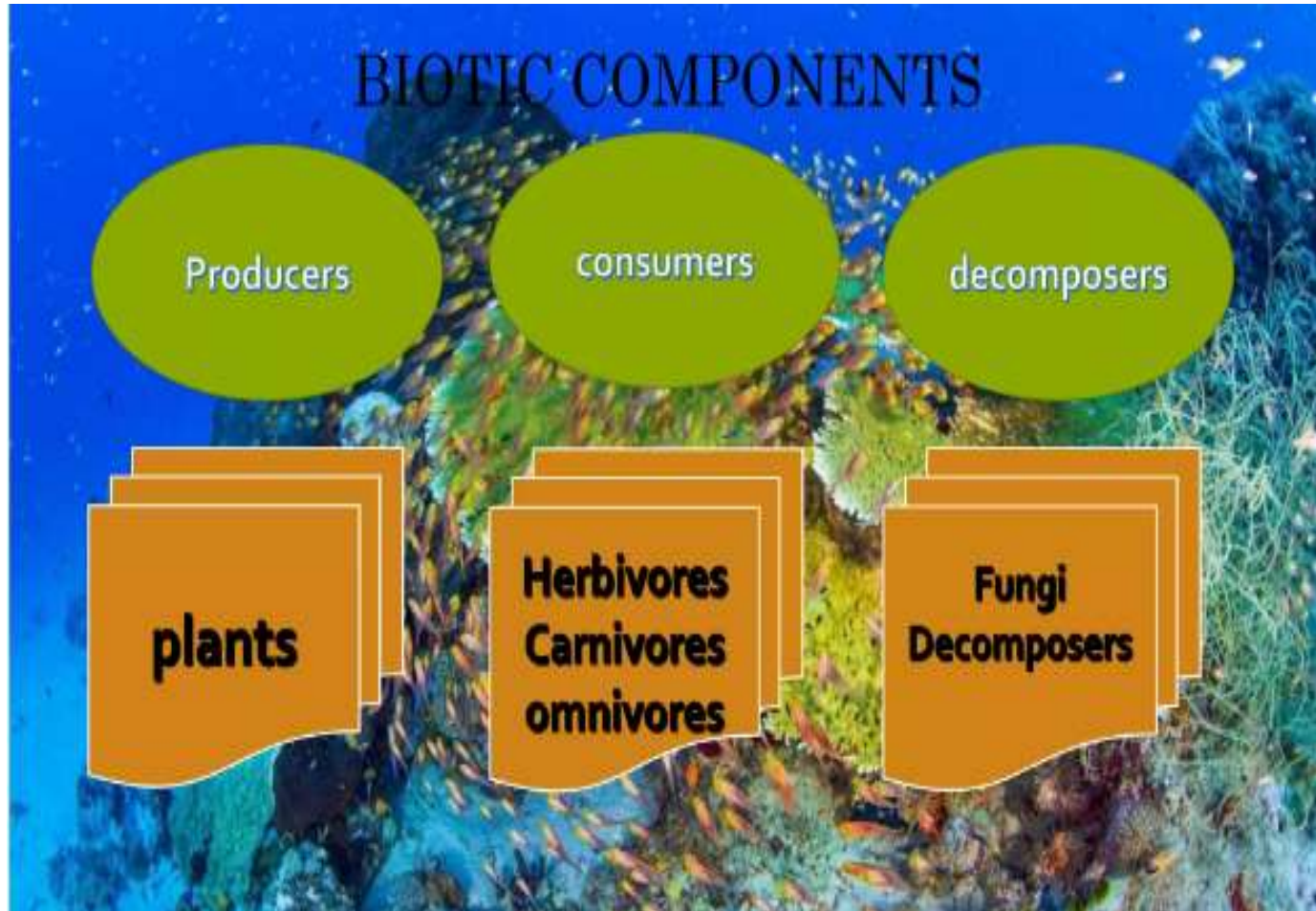
WIND



Biotic factors

Biotic factors depends on abiotic factors for their survival

- Producers
- Consumers
- Reducers or decomposers



Producers: Organism which produces its own food by using energy from the sun

Producers

They are generally chlorophyll bearing autotrophic organisms which prepare organic compounds from inorganic raw materials.

Example

green plants and photosynthetic bacteria

- Producers depends on the abiotic factors of the ecosystem for producing energy. They contain chlorophyll and carry out photosynthesis.
- The portion of the food synthesized is used by the producers for their growth and survival and the remaining food is stored for future use.
- In an ecosystem, producers are those organisms that use photosynthesis to capture energy by using sunlight, water and carbon dioxide to create carbohydrates, and then use that energy to create more complex molecules like proteins, lipids and starches that are crucial to life processes.
- **Producers, which are mostly green plants, and photosynthetic bacteria are called autotrophs.**

- Producers funnel into the ecosystem the energy needed for its biological processes.
- The carbohydrates and other organic chemicals formed by the producers are utilized by the heterotrophs, or consumers; first by the herbivores who eat the plants--the primary consumers--then by the predators who eat the herbivores--the secondary, tertiary, and so on consumers.
- But at each step, much energy is lost. Less than 10 percent of the energy stored in plants is converted to herbivore mass. The loss from herbivore to predator is similar. Thus energy needs to be added to the ecosystem continuously.

Consumers



CONSUMERS

- a. Herbivore
- c. Omnivores

- b. Carnivores
- d. decomposers



Consumers are organism which eat or devor other organisms.

Three types

Primary consumers: are the consumers that which eat the producers like plant, algae, and bacteria. The primary consumers are called **herbivores**.

Rabbit, deer cow, goat, etc

Secondary consumers: Secondary consumers are the consumers which kill and eat the herbivores. They are also called **carnivores**. As these carnivores directly depend on herbivores, they are called **primary carnivores**. Fox, wolf, etc., are the **secondary consumers** in the terrestrial ecosystem.

Tertiary consumers: are the consumers which kill and eat the **secondary consumers Or secondary carnivores**. Eg., lion, tiger

Reducers or decomposers

- These organisms that break up the dead bodies of plants, animals and their waste products.
- They include fungi and certain bacteria. They secrete enzymes.
- They digest the dead organisms and the debris into small bits or molecules.
- These molecules absorbed by the reducers. After taking energy the reducers release molecules to the environment as chemicals to be used again by the producers.

FUNCTIONS OF AN ECOSYSTEM



- Ecosystem have functional attributes which keep the component parts running together
- For example – green leaves prepare food and roots absorb nutrients from the soil. Herbivores feed on part of the plant production and in turn serve as food for carnivores.
- Decomposers carry out the function of breaking down complex organic materials into simple inorganic product which can be used by the producers.
- All these functions in an ecosystem occur through delicately balanced and controlled processes.

The functions of the ecosystem are as follows

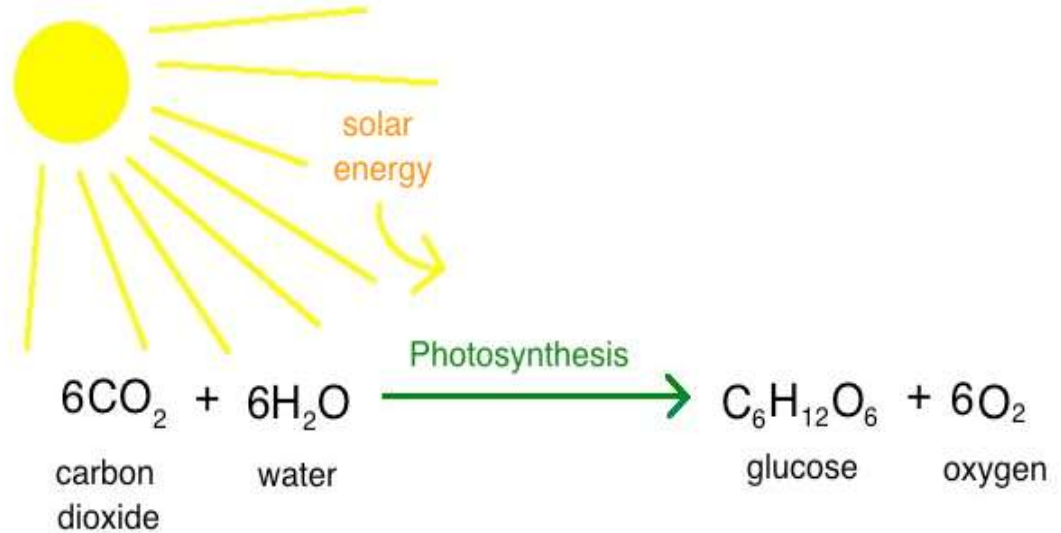
1. It regulates the essential ecological processes, supports life systems and renders stability.
2. It is also responsible for the cycling of nutrients between biotic and abiotic components.
3. It maintains a balance among the various trophic levels in the ecosystem.
4. It cycles the minerals through the biosphere.
5. The abiotic components help in the synthesis of organic components that involves the exchange of energy.

The dynamic functions of ecosystem includes the following

- Energy
- Primary production
- Secondary production
- Food chain
- Food web
- trophic levels
- Energy flow
- Ecological pyramids
- Biogeochemical cycles.

Energy (Productivity in an ecosystem)

- Energy is ability to do work.
- Main source of energy is sun light
- Plants capture energy from sun by photosynthesis.
- The sugar synthesised will be used for
 - Synthesis of starch
 - Cellulose
 - amino acids, proteins, nucleic acids, and hormones.



Primary production:

Primary production is the synthesis of **organic compounds** (starch) from atmospheric or aqueous **carbon dioxide**. It principally occurs through the process of **photosynthesis**, which uses light as its source of energy, but it also occurs through **chemosynthesis**, which uses the oxidation or reduction of inorganic chemical compounds as its source of energy. Almost all **life** on Earth relies directly or indirectly on primary production.

Gross primary production (GPP) is the amount of chemical energy, typically expressed as carbon **biomass**, that primary producers synthesise in a given length of time. Some fraction of this fixed energy is used by primary producers for **cellular respiration** and maintenance of existing tissues. The remaining fixed energy (i.e., mass of photosynthate) is referred to as **net primary production** (NPP).

$$\mathbf{NPP = GPP - respiration [by plants]}$$

Secondary production

The energy trapped by the producers is utilised by the consumers.

The producers are directly consumed by herbivores that are eaten by the primary carnivores that in turn consumed by the secondary carnivores.

The consumers store some amount of energy in their tissues. This energy is called secondary production.

About 10 to 20% of primary production is converted into secondary production. The remaining 80-90% is lost by the consumers in the form of feces.