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STUDY OF RELATIONSHIPS BETWEEN MAN AND ENVIRONMENTAL

JV'n Dr. Y Chandrakala

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PREFACE

Indeed it gives us great honor to put forth this book entitled "Study Of Relationships Between Man And Environmental" and implementation of the knowledge in teaching learning process. The content of the book are very precise, will be helpful for student to understand about the basics of environment.

Dr. Y. Chandrakala

ACKNOWLEDGEMENT

Our Sincere thanks to Dr.Panckaj Garg (Founder and Advisor) and JV'n Prof.(H).Vidushi Garg (Chairperson) and Staff of Faculty of Education and Methodology, Jayoti Vidyapeeth Women's University, Jaipur, for support. The author will be highly indebted for any type of suggestion or expert opinion so as to further improve the content of the book.

Dr. Y. Chandrakala

Contents

Chapter 1

ENVIRONMENT

All physical environments on earth are called environment. The environment includes all living and non-living things. The non-living part of the environment consists of three main parts: the atmosphere, the hydrosphere and the lithosphere. An environment is everything around us, including both living and non-living things like land, water, animals, and plants that adapt to their surroundings. It is a gift from nature that helps feed life on earth.

Biotic and abiotic are the two main factors that are responsible for the formation of the ecosystem. Biotic factors refer to all living things present in an ecosystem, and abiotic factors refer to all non-living components such as physical conditions (temperature, pH, humidity, salinity, sunlight, etc.) and active substances. Chemicals (various gases and minerals in air, water, soil, etc.) in an ecosystem. Therefore, abiotic and biotic sources influence the survival and reproductive processes.

The term "biotic" is formed from the combination of two terms, "bio" means life and "ic" means how. So the term means life and refers to all living things that are present in an ecosystem. Biotic factors affect all living things in the ecosystem. Their presence and their biological by-products influence the composition of an ecosystem. Biotics are made up of all living organisms, from animals and humans to plants, fungi and bacteria, that are present in an ecosystem. The interactions between different biotic factors are necessary for a species to reproduce and to meet basic requirements such as food, etc., consumers, decomposers and detritivors.

The term abiotic refers to all non-living factors that are present in an ecosystem. Sunlight, water, soil, these are all abiotic factors. Abiotic factors refer to all non-living, i.e. H.

Chemical and physical factors present in the atmosphere, hydrosphere and lithosphere. Sunlight, air, precipitation, minerals, and soil are some examples of abiotic factors. Without enough sunlight, autotrophic organisms may not be able to survive. When these organisms eventually die, there will be a food shortage for major consumers. This effect flows through the food chain and affects all organisms. Abiotic examples generally depend on the type of ecosystem. The abiotic components of a terrestrial ecosystem are, for example, air, climate, water, temperature, humidity, altitude, soil pH, soil type, etc. Abiotic examples in an aquatic ecosystem include the salinity of the water, the oxygen content, the pH value, water flow, water depth and temperature.

Biotic (living)	Abiotic (non-living)
Biotic factors, all the living components present in an ecosystem	Abiotic factors refer to all the non-living, i.e. physical environment and chemical environment that influence an ecosystem
Biotic components originate from the biosphere	Non living things originate from the lithosphere, hydrosphere and atmosphere
Biotic factors depend on abiotic factors for survival and reproduction.Examples of biotic resources include plant and animal kingdom.	Non living things are totally independent of biotic factors.Examples of abiotic factors include sunlight, water, air, humidity, pH, temperature, salinity, precipitation, altitude, type of soil, minerals, wind, dissolved oxygen, mineral nutrients present in the soil, air and water, etc.

Chapter 2

ECOSYSTEM

The simplest definition of an ecosystem is that it is a community or group of living organisms that live in a specific environment and interact with one another.

The main types of ecosystems are forests, meadows and deserts, tundra, fresh water and the ocean. The word "biome" can also be used to describe terrestrial ecosystems that cover a large geographic area such as the tundra.

The ecosystem is the structural and functional unit of ecology in which living organisms interact with each other and with the environment. An ecosystem is a series of interactions between organisms and their environment. The term "ecosystem" was first coined in 1935 by A G Tansley, an English botanist. An ecosystem can be defined as a biological community of living things that communicate with the physical environment and other non-living things. It can also be defined as a chain of communication or interaction between living organisms and their environment.

The clearest definition of an ecosystem is that it is a community or group of living organisms that live in a specific environment and interact with one another.

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An ecosystem varies in size and can be as small or as large as an ocean. The two main components of an ecosystem are 1. Abiotic components: All non-living components of an ecosystem, including air, water, light, soil, rocks, minerals, and nutrients, are examples of abiotic components.

2. Biotic components: All living components of an ecosystem, including producers, consumers, and decomposers, are examples of abiotic components.

Importance of the ecosystem:

1. Provides habitat for plants and wildlife.

2. Promotes various food chains and food webs.

3. Control essential ecological processes and promote life.

4. Involved in the recycling of nutrients between biotic and abiotic components.

5. Helps maintain normal flow of energy in an ecosystem, including the carbon cycle, energy cycle, nitrogen cycle, oxygen cycle, and water cycle. And grassland weed control, forest management, biological research, soil protection, wildlife, etc.

Ecology is the science that studies the relationships between living organisms, their physical environment, and each other. Ecology can be seen in terms of (1) the environment and the demands it makes on the organisms it contains, or (2) organisms and how they adapt to their environmental conditions. An ecosystem consists of a number of interacting organisms and their environment in which materials are cyclically exchanged on a large scale. An ecosystem consists of physical, chemical and biological components, energy sources and pathways for the exchange of energy and matter. The environment in which a certain organism lives is called habitat. The role of an organism in a habitat is called a niche.

For the study of ecology it is often useful to divide the environment into four broad categories.

1. Terrestrial environment: The terrestrial environment is terrestrial and consists of biomass such as grassland, one of many types of forests, savannas or deserts.

2. Freshwater environment: The freshwater environment can be divided into stationary aquatic habitats (lakes, reservoirs) and liquid aquatic habitats (streams, rivers).

3. Oceanic Marine Environment - The oceanic marine environment is characterized by salt water and can be broadly divided into the shallow waters of the continental shelf that make up the Neritic Zone. The Neritic Zone extends from the intertidal zone to a depth of approximately 200 m (or 650 ft) at the edge of the continental shelf. Since light can penetrate this depth, photosynthesis can take place in the neritic zone. The water here contains sludge and is well oxygenated, pressure and temperature stable.

4. Ocean Area: The deepest water in the ocean that makes up the ocean area. There are two main divisions of modern ecology.

Ecosystem ecology - ecosystems that are viewed as large units, and

• Population ecology - tries to explain the behavior of ecosystems based on the properties of individual units.

Ecosystems are broadly divided into natural and artificial. Natural ecosystems are ecosystems that occur in nature. They are also classified as terrestrial and aquatic. Terrestrial includes hot deserts, grasslands, tropical and temperate forests, and aquatic includes ponds, rivers, creeks, lakes, estuaries, oceans, mangroves, swamps and bays, etc., and includes other systems. Artificial ecosystems are simple, man-made, unstable and subject to human intervention and manipulation. It is usually formed by cutting down part of the forest or meadows, for example. Farmland. Structure and function of an ecosystem

An ecosystem consists of two components: the biotic components, which are made up of living things, and the abiotic, which are made up of elements that are not alive. Non-living components should include the following category: habitat, gas, solar radiation, temperature, humidity, and inorganic and organic nutrients. Living organisms can be divided into producers, consumers and decomposers. Abiotic components encompass the basic organic and inorganic components of the body's environment or habitat. The inorganic components of an ecosystem are carbon dioxide, nitrogen in water and calcium phosphate, all of which are involved in the material cycle (biogeochemical cycles). The organic components of an ecosystem are proteins, carbohydrates, fats and amino acids, all of which are synthesized by the biota (flora and fauna) of an ecosystem and reach the ecosystem in the form of waste, dead residues, etc. Microclimate ", temperature, lightness of the soil, etc. They are abiotic components of ecosystems.

Functions of an ecosystem

The function of the ecosystem is the ability of natural processes and components to provide goods and services that directly or indirectly meet human needs. Ecosystem functions are a subset of ecological processes and ecosystem structures. Every function is the result of the natural processes of the entire ecological subsystem to which it belongs. Natural processes, in turn, are the result of complex interactions between the biotic (living organisms) and abiotic (chemical and physical) components of ecosystems through the universal driving forces of matter and energy. There are four main groups of ecosystem functions: (1) regulatory functions, (2) habitat functions, (3) production functions, and (4) information functions. This grouping affects all ecosystems, not just forests.

The general characterization of ecosystem functions is:

(1) Regulatory functions: This functional group relates to the ability of natural and near-natural ecosystems to regulate essential ecological processes and life-sustaining systems through biogeochemical cycles and other processes in the biosphere. In addition to maintaining the ecosystem (and the health of the biosphere), these regulatory functions provide many services that have direct and indirect benefits for humans (i.e., clean air, water, and soil, and biological control services).

(2) Habitat functions: Natural ecosystems offer wild plants and animals a refuge and breeding ground and thus contribute to the maintenance (in situ) of biological and genetic diversity and to the evolutionary process.

(3) Production functions: Photosynthesis and nutrient uptake by autotrophs convert energy, carbon dioxide, water, and nutrients into a variety of carbohydrate structures which are then used by secondary producers to create a wider variety of living biomass. This variety of carbohydrate structures offers many ecosystem goods for human consumption, from food and raw materials to energy sources and genetic material.

(4) Information functions: As most of human evolution has taken place in the context of an untamed habitat, natural ecosystems contribute to the maintenance of human health by

providing opportunities for reflection, spiritual enrichment, cognitive development, recreational activities and aesthetic experience.

Components of an ecosystem: A complete ecosystem consists of four basic components such as producers, consumers, decomposers and abiotic components, e.g. B. Pond. If one of these four components is missing, it will, for example, merge with an incomplete ecosystem. For example. Depth of the ocean or cave.

Productivity in the environment: The productivity of an ecosystem is the speed with which the vegetation in the ecosystem binds solar energy. It is also divided into primary productivity, secondary productivity, and net productivity.

Primary productivity refers to the rate at which radiant energy is stored by photosynthetics and chemosynthetics by manufacturers.

Activity. It is also characterized by gross primary productivity (BPM) and net primary productivity (NPP). It is expressed in weight (g / m2 / year) or in energy (kcal / m2). Secondary productivity is related to the energy storage rates at the consumer level. Understanding ecology is essential to managing modern industrial societies in a way that is consistent with preserving and improving the environment. The branch of ecology that deals with predicting the effects of technology and development and making recommendations that these activities will have minimal negative or even positive effects on ecosystems can be called applied ecology. It's a multidisciplinary approach.

Interactions between living organisms are divided into two main groups

• Positive interactions

• Negative interactions

I. Positive interactions

The populations help each other, the interaction is one-way or two-way. These include (i) commensalism, (ii) collaboration protocol, and (iii) reciprocity.

1. Commensalism

One type enjoys the benefits while the other is unaffected. For example. (i) Cellulolytic fungi produce a number of organic acids from cellulose that serve as carbon sources for bacteria and non-cellulolytic fungi.

(ii) Growth factors are synthesized by certain microorganisms and their excretion enables the population of nutritionally complex soils to multiply.

2. Collaboration protocol

It's also known as non-committal reciprocity. It is a union of mutual interest to the two species without any cooperation required for their existence or reaction.

For example. Azotobacter can bind N2 using cellulose as an energy source, provided there is a cellulose decomposer that converts cellulose into simple sugars or organic acids.

3. Reciprocity

Both beneficial inter-species interactions are more common between organisms. Both benefit from this. In such an association there is close contact, which is often permanent, compulsory and more or less important for everyone's survival.

For example. (i) Pollination by animals. Bees, moths, butterflies, etc. They get their food from the hectare or other vegetable products and in turn ensure pollination.

(ii) Symbiotic nitrogen fixation

Plant symbiosis - Rhizobium. Bacteria get their food from legumes and bind nitrogen gas to make it available to the plant.

II. Negative interactions

A member of one population can eat members of the other population, compete for food, dispose of harmful waste, or disturb the other population. Includes (i) competition, (ii) robbery, (iii) parasitism and (iv) antibiosis.

(i) competition

It is a condition in which an organism is suppressed because both types have difficulty limiting the amounts of nutrients in the O2 space or other needs.

For example. Competition between Fusarium oxysporum and Agrobacterium radiobacter.

(ii) Predation

A predator lives free and catches and kills a species other than food. Most predatory organisms are animals, but there are also plants (carnivores), particularly mushrooms, that feed on other animals.

For example. i) grazing and animal research for plants.

(ii) Carnivorous plants such as Nepenthes, Darligtoria, Drosera, etc. They consume insects and other small insects as food.

(iii) Protozoa that feed on bacteria.

(iii.) Parasitism

A parasite is the organism that lives on or in the body of other organisms and gets its food more or less permanently from their tissue. A typical parasite lives in its host without killing it, while the predator kills the one it feeds.

For example. Cuscuta species (total stem parasite) grow on other plants that they depend on for food.

Parasitism can occur even within the species. Hyperparasites, these are mainly fungi that grow parasitically on other parasites, (ie) parasites on one parasite for example. *Cicinnobolus cesatii* occurs as a hyperparasite in several powdery mildew fungi.

(iv) Antibiosis

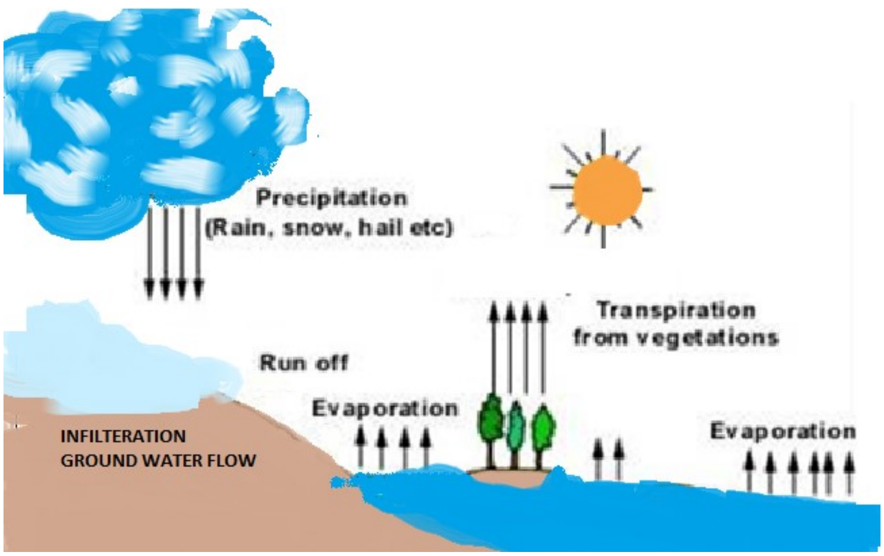
The phenomenon of antibiotic production is called antibiosis. Antibiotic is an organic substance that is produced by one organism and, in low concentration, inhibits the growth of another organism.

For example. Streptomycin - *S. griseus, penicillin* - *P. notatum, Trichoderma harzianum* inhibit the growth of Rhizoctonia sp.

Chapter 3

BIOGEOCHEMICAL CYCLES

Biogeochemical cycles describe the movement of matter, especially plant and animal nutrients, through ecosystems. These cycles are ultimately powered, refined, and powered by solar energy that is consumed by organisms. In a way, the solar water cycle works like an endless conveyor belt to move important materials through ecosystems.



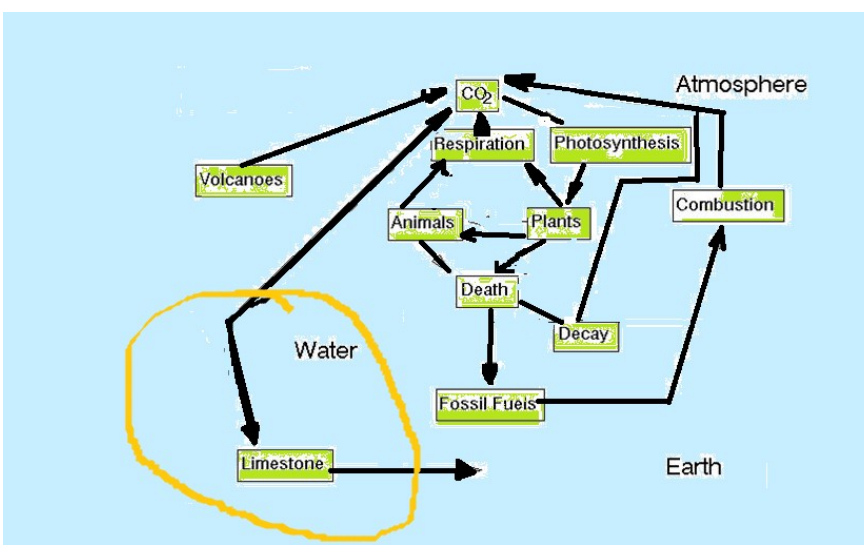
Most biogeochemical cycles can be described as elementary cycles containing nutrients such as carbon, oxygen, nitrogen, sulfur and phosphorus. Many are gas cycles in which the element.

A part of the cycle through the atmosphere is O2 for oxygen, N2 for nitrogen, CO2 for carbon. Others, especially the phosphorus cycle, have no gas components and are called sediment cycles. All sediment cycles refer to saline or soil solutions that contain solutes extracted from weathered minerals that settle as mineral formations or can be ingested by organisms as nutrients. The sulfur cycle, which can contain H2S or SO2 in the gas phase or minerals (CaSO4.2H2O) in the solid phase, is a combination of gas and sediment cycles.

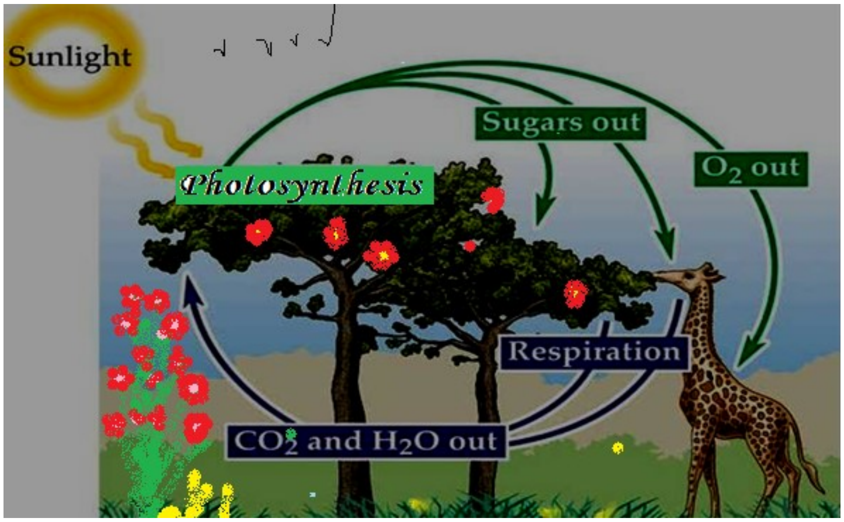
Carbon cycle

Carbon, the building block of life molecules, circulates in the carbon cycle. This cycle shows that carbon can exist as gaseous atmospheric CO2, dissolved in groundwater as HCO3 or molecular CO2 (aq), in rock layers below as limestone (CaCO3) and as an organic substance, simply represented by (CH2O). Photosynthesis fixes inorganic carbon as biological carbon, which is part of all molecules in life.

An important aspect of the carbon cycle is that it is the cycle through which energy is transferred to biological systems. Organic or biological carbon (CH2O) is a high-energy molecule that can biochemically react with molecular oxygen O2 to regenerate carbon dioxide and generate energy. This can happen in an organism, as evidenced by the "decomposition reaction", or it can take the form of a combustion, for example when wood is burned.



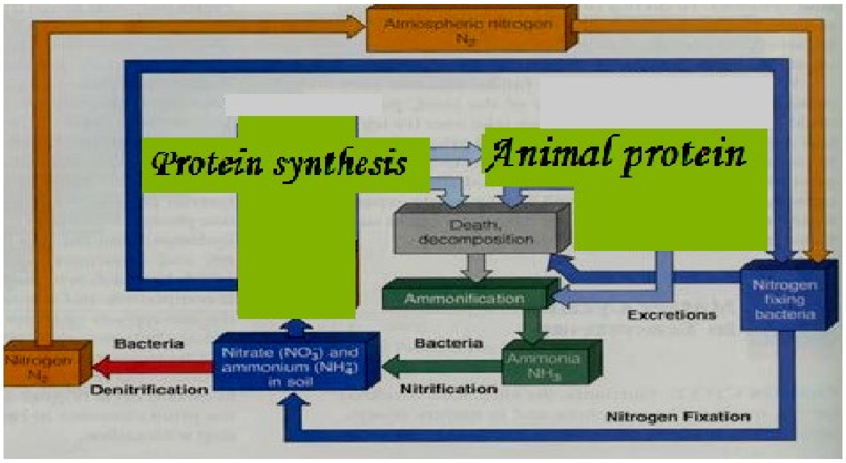
Oxygen Cycle



The oxygen cycle involves the exchange of oxygen between the elementary form of O2 gas in the atmosphere and chemically bound O in CO2, H2O and organic matter. Elemental oxygen is chemically linked to various energy production processes, in particular to combustion and metabolic processes in organisms. It is released during photosynthesis.

Nitrogen cycle

Nitrogen is an essential part of protein even though it contains much less biomass than carbon or oxygen. The atmosphere consists of 78% by volume of elemental nitrogen, N2, and forms an inexhaustible reservoir of this essential element. The N2 molecule is very stable, so its breakdown into atoms that can be incorporated into inorganic and organic chemical forms of nitrogen is the boundary phase of the nitrogen cycle. This is done by high-energy flash processes in which nitrogen chemically combines with hydrogen or oxygen in the form of ammonia or nitrogen oxides. Elemental nitrogen is also found in forms that are chemically bound or fixed by biochemical processes mediated by microorganisms. Biological nitrogen returns to its inorganic form when biomass is broken down through a process called mineralization.



Nitrogen cycle

Phosphorus cycle

The phosphorus cycle is critical as phosphorus is generally the limiting nutrient in ecosystems. There are no common stable gaseous forms of phosphorus, so the phosphorus cycle is strictly sedimentary. In the geosphere, most of the phosphorus is contained in poorly soluble minerals such as hydroxyapatite, a calcium salt. The soluble phosphorus from these minerals and from other sources such as fertilizers is absorbed by plants and incorporated into the nucleic acids of the biomass. As a result of the mineralization of biomass through microbial decomposition, phosphorus is returned to the salt solution, from which it can precipitate as a mineral.

Sulfur cycle

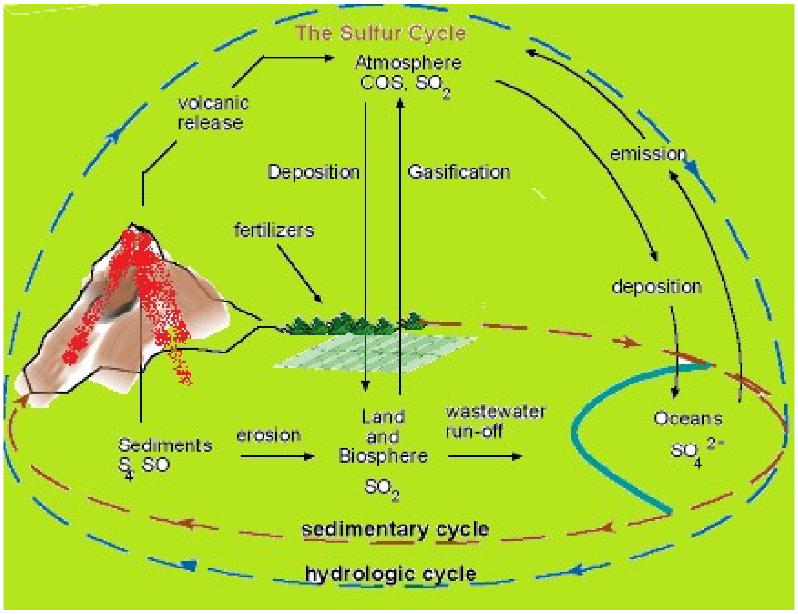
The sulfur cycle is relatively complex. It involves several gaseous species, poorly soluble minerals, and several species in solution. It is involved with the oxygen cycle in that sulfur combines with oxygen to form gaseous sulfur di oxide (SO_2) an atmospheric pollutant, and soluble sulfate ion, (SO_4^{2-}). Among the significant species involved in the sulfur cycle are gaseous hydrogen sulfide, H_2S; mineral sulfides, such as PbS; sulfuric acid, H_2SO_4, the main constituent of acid rain; and biologically bound sulfur in sulfur-containing proteins.

The phosphorus cycle is critical as phosphorus is generally the limiting nutrient in ecosystems. There are no generally stable gaseous forms of phosphorus, so the phosphorus cycle is strictly sedimentary. Most of the phosphorus in the geosphere is contained in poorly soluble minerals such as hydroxyapatite, a calcium salt. Soluble phosphorus from these minerals and other sources such as fertilizers is absorbed by plants and processed into nucleic acids in biomass. Due to the mineralization of biomass through microbial degradation, phosphorus is returned to the salt solution, from which it can precipitate as a mineral.

Sulfur cycle

The sulfur cycle is relatively complex. These are different gaseous types, sparingly soluble minerals and different types in solution. It participates in the oxygen cycle by combining sulfur with oxygen to form gaseous sulfur dioxide (SO2), an air pollutant, and a soluble sulfate ion (SO42-). The important species involved in the sulfur cycle include the gaseous hydrogen sulfide H2S; Mineral sulfides such as PbS; Sulfuric acid, H2SO4, the main component of acid rain; and sulfur, which is biologically bound in sulfur-containing proteins.

Sulfur cycle



Energy and cycles of energy

Biogeochemical cycles and virtually all other processes on Earth are drive by energy from the sun. The sun acts as a blackbody radiator with an effective surface temperature of 5780 K (Celsius degrees above absolute zero). It transmits energy to earth as electromagnetic radiation. The maximum energy flux of the incoming solar energy is at a wavelength of about 500 nanometers, which is in the visible region of the spectrum. A 1 square meter area perpendicular to the line of solar flux at the top of the atmosphere receives energy at a rate of 1,340 watts, sufficient, for example, to power an electric iron. This is called solar flux.

Energy in natural systems is transferred through heat, which is the form of energy that circulates between two bodies due to its temperature difference, or through work, which is an energy transfer that does not depend on a temperature difference, depending on how it is regulated according to the Laws of thermodynamics. The first law of thermodynamics says that although energy can be transferred or converted, it remains and is not lost. Chemical energy from food ingested by organisms is converted through metabolic processes into work or heat that organisms can use, but overall there is no net gain or loss. The second law of thermodynamics describes the tendency towards disturbance in natural systems. This shows that every time the energy is converted; Some are wasted because they cannot be used for work, so only a fraction of the energy that organisms get from metabolizing food can be turned into work. The rest is dissipated as heat.

Energy flow

Since materials are recycled through ecosystems, the usable flow of energy can essentially be viewed as a one-way process. Incoming solar energy can be considered high quality energy as it can produce useful reactions, the most important of which is photosynthesis in living systems. Solar energy, which is obtained from green plants, stimulates chlorophyll, which in turn drives metabolic processes that produce carbohydrates from water and carbon dioxide. These carbohydrates represent stored chemical energy that can be converted into heat by metabolic reactions with oxygen in organisms and can function. Ultimately, most of the energy is converted into low-quality heat, which is ultimately released outside the earth via infrared radiation.

Chapter 4

SUCCESSION

The environment is constantly changing over time due to (1) different climatic and physiographic factors, (2) the activities of the species of the communities themselves. These influences lead to significant changes in the dominance of the existing community, which therefore earlier or is later replaced by another community in the same place. This process continues and successive communities develop one after the other in the same area until the final terminal community is more or less stable again for a certain period of time. This happens in a relatively defined order. This orderly change in communities is known as succession. Odum called this orderly process ecosystem development / ecological succession.

Since materials are recycled through ecosystems, the usable flow of energy can essentially be viewed as a one-sided process. Incoming solar energy can be considered high quality energy as it can provoke useful reactions, the most important of which is photosynthesis in living systems. Solar energy, obtained from green plants, stimulates chlorophyll, which in turn drives metabolic processes that produce carbohydrates from water and carbon dioxide. These carbohydrates represent stored chemical energy that can be converted into heat by metabolic reactions with oxygen in organisms and can function. Ultimately, most of the energy is converted into low quality heat, which is ultimately released outside the earth via infrared radiation.

Succession is an orderly process of community development that involves changes in the structure of species and community processes over time and is reasonably directional and therefore predictable. Succession is controlled by the community, although the physical environment dictates the pattern.

Causes of Succession

Succession is a series of complex processes caused by (I) initial / triggering cause: both climatic and biotic. (II) Ecese / ongoing process Ecese, aggregation, competitive reaction, etc. (III) Cause of stabilization: Causes the community to stabilize. Climate is the primary cause of stabilization and other factors have secondary value.

Types of inheritance

• Primary sequence: part of the primitive substrate in which no living matter was previously present. The first group of organisms to settle there are the Pioneers, Primary Community / Primary Colonizers. Very slowly is the series of community changes that take place in disturbed areas where soil and vegetation have not been completely removed.

• Secondary sequence: starts with substrates previously formed with existing living matter. The action of an external force, such as a sudden change in climatic factors, biotic interference, fire, etc., causes the existing community to disappear. Thus the area is devoid of living matter, but its substrate is constructed rather than primitive. These sequences are comparatively faster.

• Autogenous Succession: Community - the result of their reaction to the environment, changing their own environment, and thus their own replacement by new communities. This course is an autogenic consequence.

Succession is an orderly process of community development that involves changes in species structure and community processes over time and is fairly directional and therefore predictable. The following is controlled by the community, although the physical environment dictates the pattern.

Causes of Succession

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Types of inheritance

• Primary order: part of the primitive substrate in which no living matter was previously present. The first group of organizations to settle there are the pioneers, the primary community / primary settlers. The series of community changes that occur in disturbed areas where soil and vegetation have not been completely removed is very slow.

• Secondary order: starts with substrates previously formed with existing living material. The action of an external force, such as a sudden change in climatic factors, biotic disturbances, fire, etc., causes the existing community to disappear. Thus the area is devoid of living matter, but the substrate is constructed rather than primitive. These sequences are relatively faster.

• Autogenous Succession: Community - the result of their reaction to the environment, the change in their own environment and thus their own replacement by new communities. This course is an autogenic sequence.

• Allogeneic Succession: The replacement of the existing community is largely caused by other external conditions and not by existing organisms.

• Autotrophic sequence: characterized by an early and continuous predominance of autotrophic organisms such as green plants. Gradual increase in the content of organic matter, supported by the flow of energy.

• Heterotrophic sequence: characterized by an early predominance of heterotrophs such as bacteria, Actinomyces, fungi and animals. The energy content gradually decreases.

General succession process

(i) Knotting: developing a sterile area devoid of any life form. Cause of the knot: It can be (a) topographical soil erosion by wind (b) climate - storm, frost, etc. (c) Biotics - humans, diseases and epidemics.

(ii) Invasion: successful establishment of a species in a sterile area. Indeed, through (i) migration, (ii) Ecesis, and (iii) aggregation from any other area, this species comes to this new location.

Declining succession

Continuous biotic influences have a degenerative influence on the process. Because of the destructive nature of organisms, disturbed communities do not develop. The succession process will not be progressive, but regressive. (For example) The forest can become a shrub or herb community.

• Allogeneic Succession: The replacement of the existing community is largely caused by other external conditions and not by existing organisms.

Autotrophic sequence: characterized by an early and continuous predominance of autotrophic organisms such as green plants. Gradual increase in the content of organic matter, supported by the flow of energy.

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(ii) Invasion: Successful establishment of a species in a sterile area. Indeed, through (i) migration, (ii) Ecesis and (iii) aggregation of another area, this species comes to this new location.

Loss of succession

Persistent biotic influences have a degenerative influence on the process. Because of the destructive nature of organisms, disturbed communities do not thrive. The follow-up process will not be gradual, but regressive. (For example) The forest can become a community of shrubs or grasses.

Different order:

Sometimes, due to changes in local conditions such as soil character or microclimate, the subsequent process deviates in a different direction than assumed under the climatic conditions of the region. Therefore, climate communities are likely to differ from the supposed climate community.

In India with a monsoon climate, in some habitats like temporary ponds, ponds, etc., it is common to see the development of different types of communities at different times of the year - seasonal order. However, these changes are only recurring and not related to development and should not be considered successful. Cash doesn't stay the same indefinitely. Over time, many species will die forever. Or a species can form one or more new species that differ from the original. All of these changes are the result of evolution (that is, the evolutionary process of the organism which is the result of the changing life forms of the ancestors.

Chapter 5

ECOLOGICAL PYRAMIDS

• The pyramidal representation of the trophic levels of different organisms according to their ecological position (from producer to end user) is called an ecological pyramid.

• The pyramid consists of a series of horizontal bars that represent specific trophic levels. The length of each bar indicates the total number of individuals or biomass or energy at each trophic level in an ecosystem.

• The food producer forms the base of the pyramid and the top carnivore forms the point. The other trophic consumption levels are in the middle.

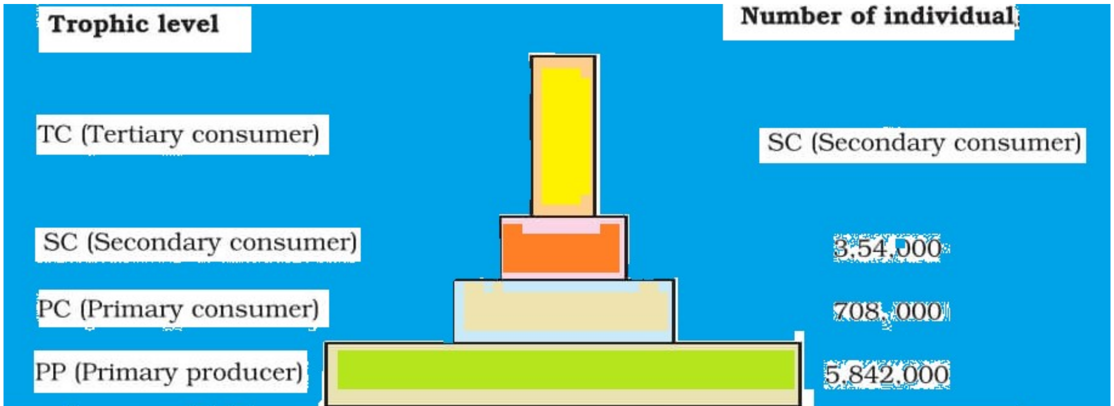
• Ecological pyramids can be divided into three categories

Number pyramid,

2. Biomass pyramid and

Pyramid of Energy or Productivity.

PYRAMID NUMBER



Pyramid of numbers in a grassland ecosystem. Only three top-carnivores are supported in an ecosystem based on production of nearly 6 millions plants

• The number pyramid represents the total number of individuals of different species (population) on each trophic level.

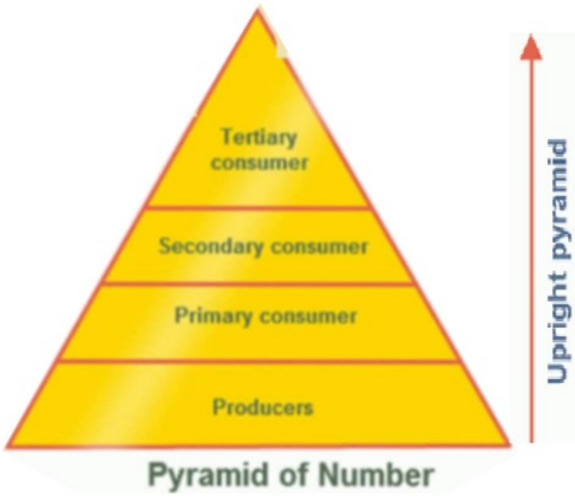
• Depending on its size, the pyramid of numbers may not always be vertical and may even be completely inverted.

• It is very difficult to count all organisms in a number pyramid, and therefore the number pyramid does not fully define the trophic structure of an ecosystem.

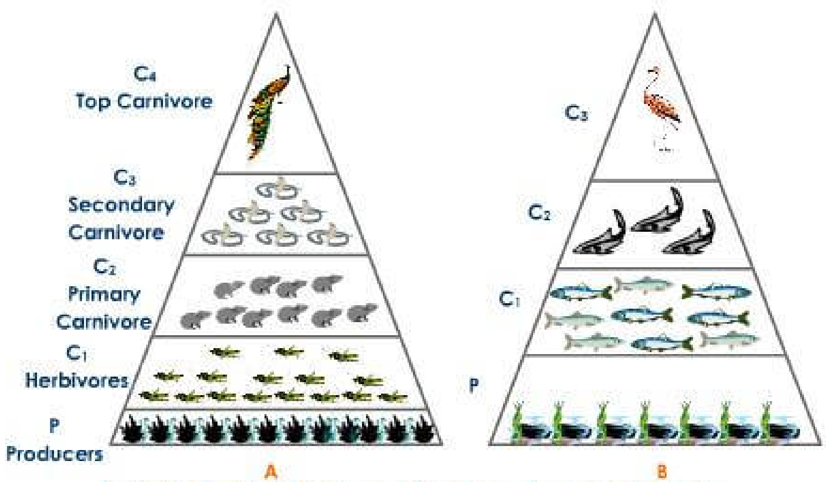
Number pyramid - standing

- In this pyramid, the number of individuals is reduced from the lowest to the
- • The number pyramid represents the total number of individuals of different species (population) on each trophic level.
- • Depending on its size, the pyramid of numbers may not always be vertical and can even be completely reversed.

- • It is very difficult to count all organisms in a number pyramid, and therefore the number pyramid does not fully reflect the trophic structure of an ecosystem.
- Number pyramid - portrait
- • In this pyramid, the number of people is reduced from the lowest to the highest

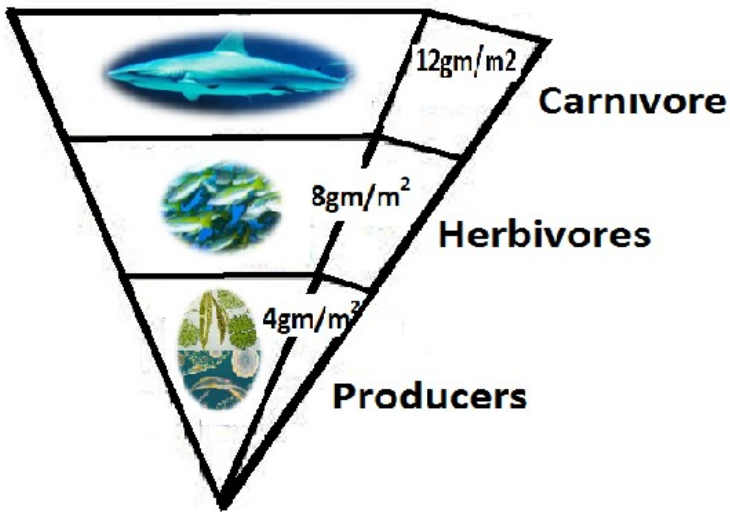


highest trophic level.



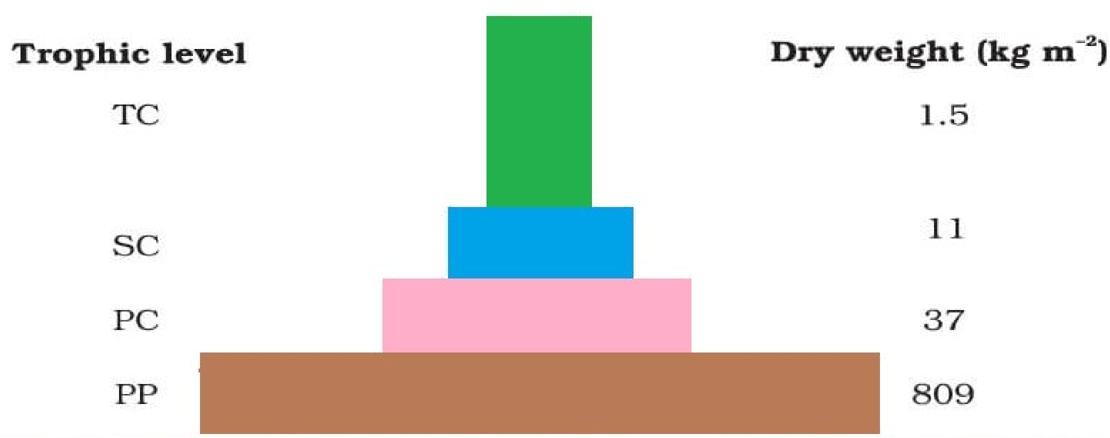
Upright Pyramids of Numbers. (A) In a Grass Land (B) In a Pond

• This type of



INVERTED PYRAMID IN AQUATIC ECOSYSTEM

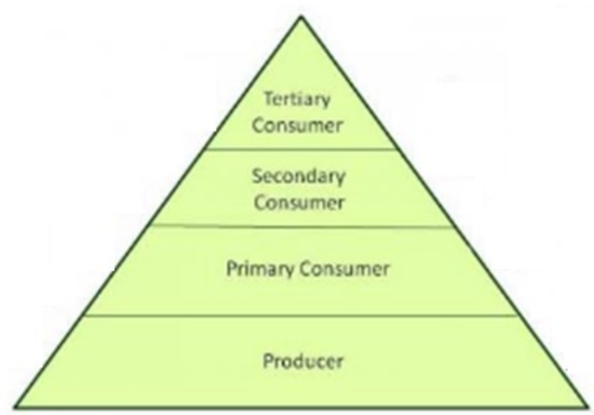
Pyramid of Biomass



Pyramid of biomass Shows a sharp decrease in biomass at higher trophic level

INVERTED PYRAMID OF BIOMASS SMALL STANDING CROP OF PHYTOPLANKTON SUPPORTS LARGE STANDING CROP OF ZOOPLANKTON

Pyramid of energy •



10% rule - 10% of the energy transferred from one trophic level to next trophic level

To compare the functional roles of trophic levels in an ecosystem, an energy pyramid is preferable.

• An energy pyramid represents the amount of energy at each trophic level and the energy loss with each transfer to another trophic level. Hence the pyramid is always directed upwards, with a large base of energy at the base.

• Suppose an ecosystem receives 1000 calories of light energy on a given day. Most of the energy is not absorbed. some are reflected in the room; Only a small part of the energy absorbed is used by green plants, which the plant uses for breathing and 1000 calories. Hence, only 100 calories are stored as high energy materials.

• Now suppose an animal like a deer eats the plant, which contains 100 calories of food energy. Venison uses some of it for its metabolism and stores only 10 calories as food energy. A lion that eats the deer gets even less energy. Therefore, the usable energy decreases from sunlight to producer, from herbivore to carnivore. Therefore, the energy pyramid always remains.

• The concept of the pyramid of energy helps explain the phenomenon of biological increase: the tendency of toxins to gradually increase in concentration with higher trophic values.

Ecological efficiency

• Ecological efficiency describes the efficiency with which energy is transferred from one trophic level to another.

• The number of trophic levels in the pasture food chain is limited as energy transfer follows the law of 10%: only 10% of the energy is transferred from the lower trophic level to each trophic level.

• The declines at each subsequent trophic level are due to two reasons:

With each trophy, some of the available energy is lost in breathing or used for metabolism.

• With every transformation, part of the energy is lost.

Limitations of ecological pyramids

• Do not consider that the same species belongs to two or more trophic levels.

• Adopts a simple food chain that is rare in nature. There is no food web.

• In addition, saprophytes (plants, fungi or microorganisms that live in decomposing substances) have no place in ecological pyramids, although they play an important role in the ecosystem.

Chapter 6

POLLUTANTS AND TROPHICAL LEVEL - BIOMAGNIFICATION

• Pollutants traverse the different trophic levels of an ecosystem.

• Non-degradable pollutants (persistent pollutants), which cannot be broken down by the trivors, not only pass through the various trophic levels, but also stay on this tropical level for a long time.

• Chlorinated hydrocarbons (organochlorinated hydrocarbons) are the most harmful and long-lasting non-degradable pollutants.

Chlorinated hydrocarbons (CHC)

• CHCs are hydrocarbons in which one or more hydrogen atoms have been replaced by chlorine, for example. B. DDT (dichlorodiphenyltrichloroethane), endosulfan, chloroform, carbon tetrachloride, etc.

Chlorinated hydrocarbon (CHC) applications

• CHCs are used to make polyvinyl chloride (a synthetic plastic polymer used to make PVC pipes).

• Chloroform, dichloromethane, dichloroethane, and trichloroethane are useful solvents.

• These solvents are immiscible with water (they do not form a homogeneous mixture when mixed with water) and are suitable for cleaning applications such as degreasing and dry cleaning.

• DDT, heptachlor and endosulfan are often used as pesticides.

Effects of HCC

• Dioxins (toxic by-products that are formed when organic materials are burned in the presence of chlorine in industrial or natural processes such as volcanic eruptions and forest fires) and some insecticides such as DDT are persistent organic pollutants.

• DDT was widely used as a powerful pesticide and insecticide decades ago.

• It was later identified as a persistent organic pollutant and is no longer used in almost all industrialized countries.

• It has accumulated in food chains and has thinned the eggshells of some species of birds.

• In India it is still used by the authorities as a repellent against mosquitoes (carriers of the disease).

• Traces of DDT spray were found on the walls of houses in India three decades ago.

• Plants that have grown on fields sprayed with DDT in the last few decades show significant traces of the insecticide.

• DDT residues are still found in mammals around the world.

• Particularly high values are observed in marine mammals in arctic regions.

• There are traces of persistent organic pollutants in breast milk.

• With some species of breastfeeding marine mammals, men generally score much higher scores because women decrease their concentration by passing it on to their breastfeeding cubs.

• Endosulfan, one of the most widely used pesticides, is an endocrine disruptor (increases the effects of estrogen, which affects reproduction and development in animals and humans).

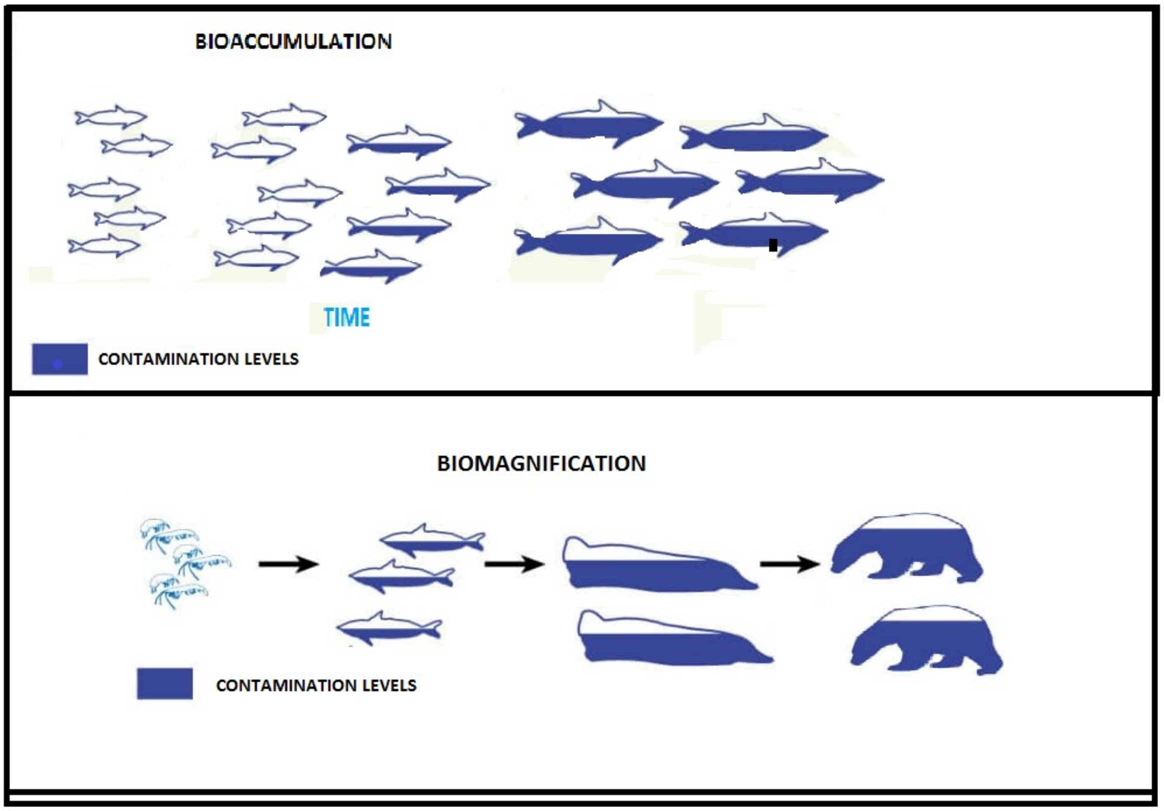
Due to the threat to human health and the environment, a global ban on the manufacture and use of endosulfan was negotiated in 2011 as part of the Stockholm Convention.

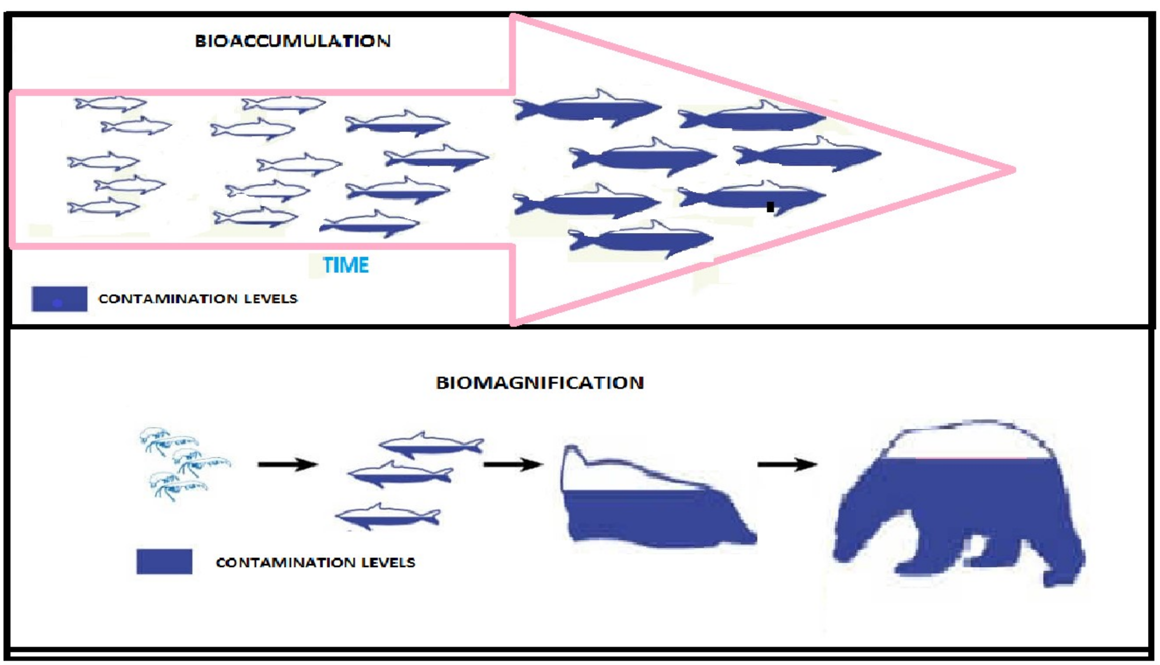
The movement of these pollutants involves two main processes:

1. Bioaccumulation

2. Biomagnification

Bioaccumulation


BIOACCUMULATION
TIME
CONTAMINATION LEVELS
BIOMAGNIFICATION
CONTAMINATION LEVELS


BIOACCUMULATION
TIME
CONTAMINATION LEVELS
BIOMAGNIFICATION
CONTAMINATION LEVELS

• Bioaccumulation is the gradual accumulation of pollutants, chemicals (chronic poisoning) or other substances in an organism.

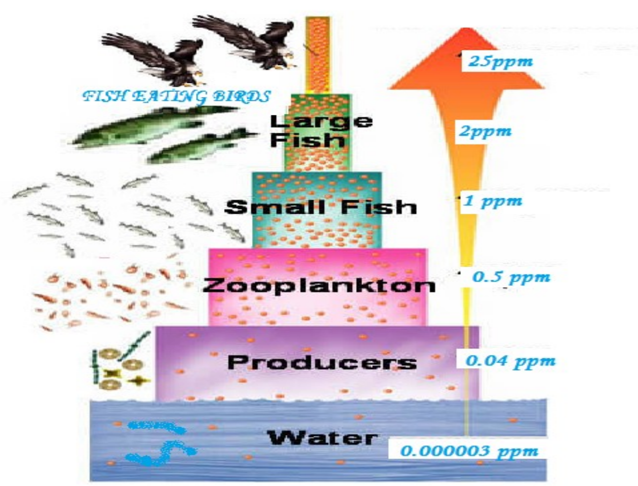
• Bioaccumulation occurs when the rate at which the substance is lost through catabolism (breakdown of complex molecules in living organisms) or excretion from the body is less than the rate at which the substance accumulates.

• Persistent organic pollutants such as DDT persist for a long time, the risk of bioaccumulation is high, even if the pollution of the pollutant is not high.

Biomagnification

• Persistent organic pollutants such as DDT persist for a long time, the risk of bioaccumulation is high, even if the contamination of the pollutant is not high.

Biomagnification



Magnification of DDT Concentration (ppm)

• Biomagnification refers to a gradual bioaccumulation (increase in concentration) at any tropical level over time.

• For biomagnification to take place, the pollutant must have a long biological half-life (long half-life), it must not be water-soluble, but it must be fat. For example. DDT.

• If the pollutant is water-soluble, it is removed from the body.

• Impurities that dissolve in fat are retained for a long time. Therefore, it is common practice to measure the amount of contaminants in the adipose tissue of organisms such as fish.

• In mammals, milk produced by women is tested for contaminants because milk is high in fat.

REFERENCE

Benz, G., 1987. Environment, in: Fuxa, J.R., Tanada, Y. (Eds.), Epizootiology of Insect Diseases. John Wiley & Sons, New York, pp. 177-214.

Cheney, D.P., Macdonald, B.F., Elston, R.A., 2000. Summer Oyster Mortality, Crassostrea gigas (Thunberg): First Findings on Several Environmental Stressors in Puget Sound, Washington, 1998. J. Shellfish Res. 19, 353- 359

Christian, P.D., Richards, A.R., Williams, T., 2006. Differential adsorption of occluded and non-occluded insect pathogenic viruses on soil-forming minerals. Appl. Over. Microbiol. 72, 4648- 4652.

Cook, S.P., Webb, R.E., Thorpe, K.W., 1996. Possible improvement of the nuclear polyhedrosis virus of the gypsy moth (Lepidoptera: Lymantriidae) with triterpenazadirachtin. Over. Entomol. 25, 1209-1. 1214.

Crowe, J. H., 2014. Anhydrobiosis: An Unsolved Problem. Plant cell Ca. 37, 1491-1. 1493.

Hernández, A., Marina, C.F., Valle, J., Williams, T., 2005. Persistence of iridescent invertebrate virus 6 in artificial tropical waters. Fall. Virol. 150, 2357- 2363.

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