



Ecology & Ecosystem

पारिस्थितिकी और पारिस्थितिक तंत्र

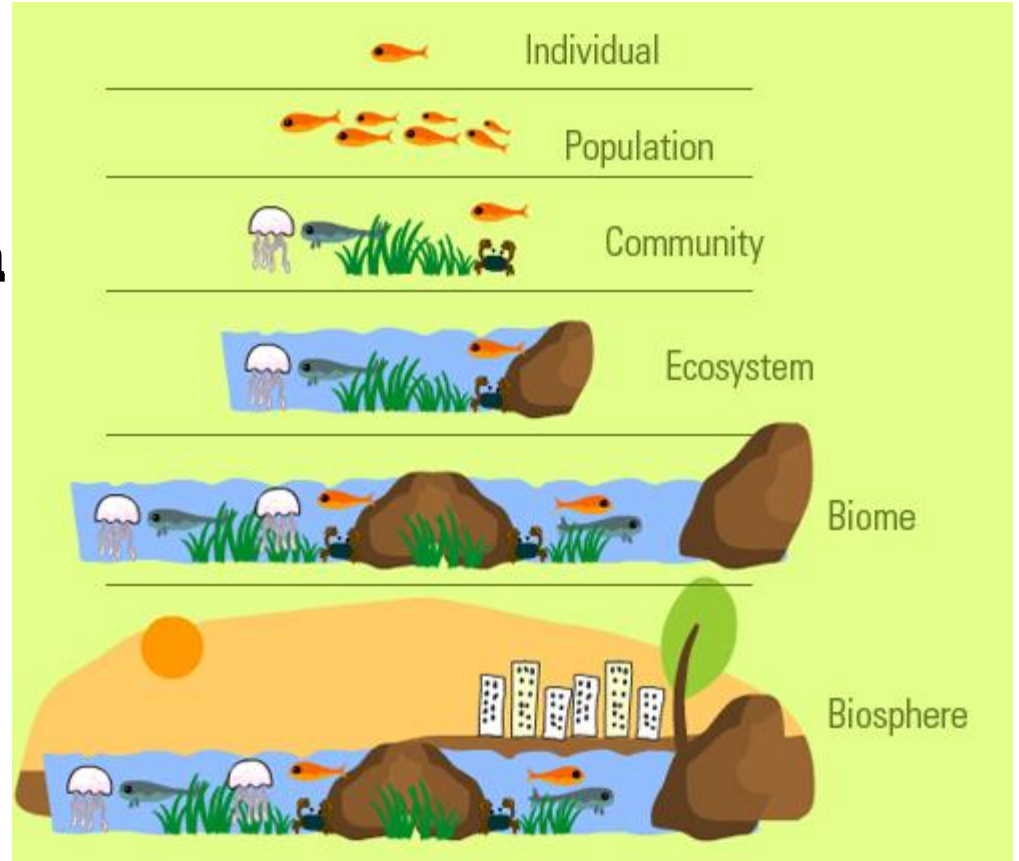
- The term **'ecology'** was first coined in 1869 by the German biologist Ernst Haeckel.
शब्द 'पारिस्थितिकी' पहली बार 1869 में जर्मन जीवविज्ञानी अर्नेस्ट हैकेल द्वारा गया था।
- It was derived from two Greek words, **'Oikos'**, meaning **home or estate** and **'logos'** meaning **study**.
- Ecology may be defined as the **scientific study of the relationship of living organisms with each other and with their environment**.
- वातावरण और जीव समुदाय के पारस्परिक संबंधों के अध्ययन को पारिस्थितिकी कहते हैं
- It studies the **interactions among organisms and their environment**.
- Study of **interaction between populations and intraspecific relationships**.
परस्पर संबंध
- Study of **structure and composition of the community and interspecific interactions** between members of the community. अंतराजातीय स्पर्धा

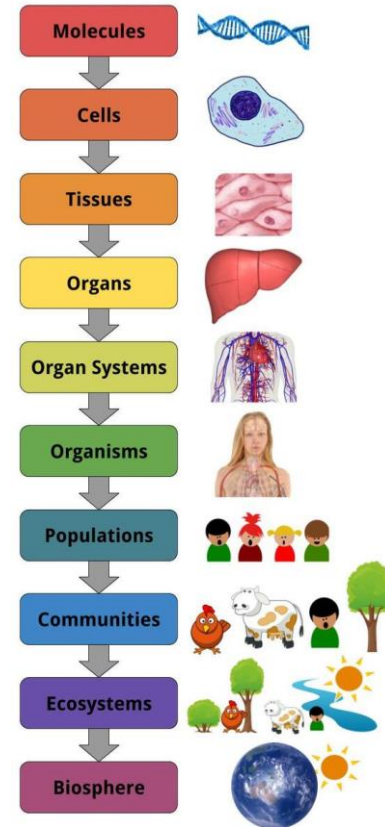
What is Environment ?

- The environment may be defined as the **surroundings or conditions** in which an organism **lives or operates**. पर्यावरण को उस परिवेश या परिस्थितियों के रूप में परिभाषित किया जा सकता है जिसमें कोई जीव रहता या संचालित होता है।
- The environment broadly **includes living and non-living components** i.e. biotic and abiotic components.
- **All organisms depend on their environment for survival.**
- Every living organism is constantly interacting with its environment comprised of **air, light, water, land or substratum and the various kinds of living organisms.**

Levels of Ecological Organisation

पारिस्थितिक स्तर





1. Individual/ Organism जीव

- An individual (organism) is a living being that has **the ability to act or function independently**. जो स्वतंत्र रूप से कार्य करने या कार्य करने की क्षमता रखता है
- Individuals make the **basic unit of study** in ecology.
- **The organisms of a similar type have the potential for interbreeding** and produce fertile offspring, which are called **species**.
अंतर प्रजनन
- An organism is **fully adapted to its environment**. It has a **definite series of stages** like birth, hatching, growth, maturity, aging, and death

Autecology the ecological study of a particular species.
स्वयं पारिस्थितिकी

Species प्रजाति

- **A group of similar organisms which is capable of interbreeding and producing offsprings** are referred to as **species**.

ऐसे दो जीव जो लैंगिक प्रजनन कर सकते हैं तथा जिन से बनने वाली संतान लैंगिक रूप से सक्षम हो

- **Interbreeding and reproduction are possible only for organisms belonging to the same species.**

Habitat of an organism आवास

- The **physical environment in which an organism lives** is called its habitat.
- वह भौतिक वातावरण जिसमें कोई जीव रहता है, उसका निवास स्थान कहलाता है।
- **Each organism has specific needs for its survival** and lives wherever the surroundings provide for those wants.
 1. Space
 2. Food
 3. Water
 4. Shelter

A **keystone species** is a [species](#) which has a disproportionately large effect on its [natural environment](#) relative to its abundance, a concept introduced in 1969 by the zoologist [Robert T. Paine](#).

Keystone species

जिसके प्राकृतिक वातावरण पर इसकी प्रचुरता के सापेक्ष काफी प्रभाव पड़ता है,

Indicator species, organism—often a microorganism or a plant—that serves as a measure of the environmental conditions that exist in a given locale. संकेतक प्रजाति

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पारिस्थितिकी निकेत Niche

- It refers to the **functions that a species perform in its habitat.**
- In other words, a **niche** can be considered as the ‘**occupation**’ of the species while **habitat** refers to its ‘**address**’.
- **A niche cannot be shared by two species as sharing would lead to competition between the species until one of the species gets displaced.**

पारिस्थितिकी निकेत दो प्रजातियों द्वारा साझा नहीं किया जा सकता है क्योंकि साझा करने से प्रजातियों के बीच प्रतिस्पर्धा हो जाएगी जब तक कि प्रजातियों में से एक विस्थापित नहीं हो जाती

Types of Niche

1. **Habitat niche** - place where an organism lives
2. **Food niche**- includes consumption, decomposition, and competition for food
3. **Reproductive niche**- mode and time of reproduction of organisms
4. **Physical & chemical niche** - temperature, land shape, land slope, humidity & other requirements.

Adaptation अनुकूलन

helps it to survive in its environment.

यह अपने वातावरण में जीवित रहने में मदद करता है

- Some examples are **gills in fishes** which help them to survive in water, **thick fur of animals** which enable them to survive cold environments, etc.
- **Desert plants have thick cuticles on their leaf surfaces** रेगिस्तानी पौधों की पत्तियों की सतहों पर मोटी छल्ली होती **and stomata arranged in deep pits to minimize water loss**; a special photosynthetic pathway that keeps the stomata closed during day time; **spines instead of leaves**
- Crassulacean Acid **Metabolism** Plants. In some plants adapted to very dry (desert) conditions, the stomata are closed during the daytime and open at night. These plants are said to show the crassulacean acid **metabolism (CAM) pathway**

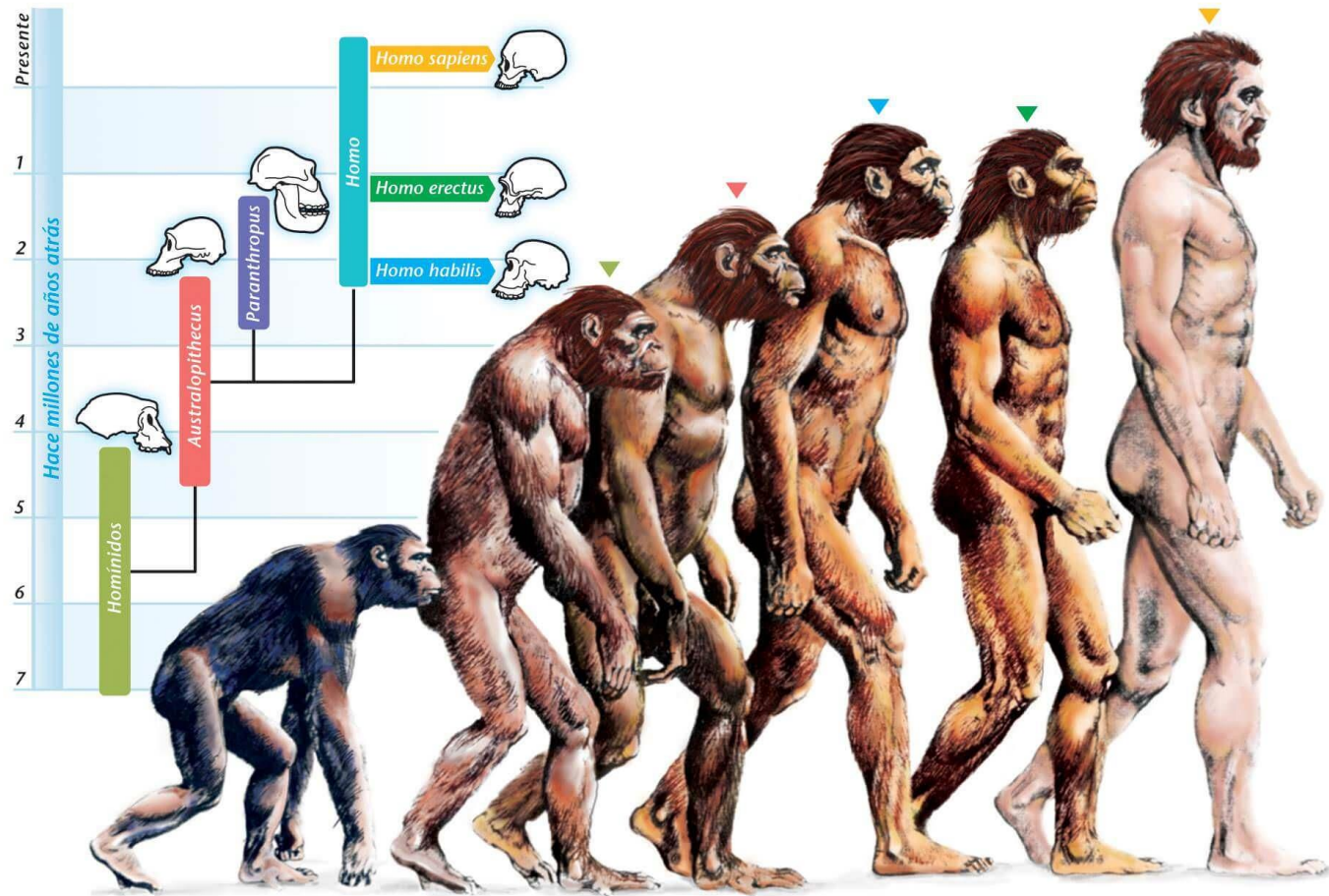
- **Mammals in cold climates have short ears and limbs** to minimize heat loss.

- Chaperone (protein)
- kangaroo rat adaptations



Evolution विकास

- Evolution is the **change which gives rise to new species**. विकास वह परिवर्तन है जो नई प्रजातियों को जन्म देता है।
- It happens in order to make the organism better suitable to the present environment
- **Evolution involves the processes of natural selection, adaptation, variation etc**
- विकास में प्राकृतिक चयन, अनुकूलन, भिन्नता आदि की प्रक्रियाएँ शामिल हैं



प्रजातीकरण

Speciation is the process by which **new species are formed**, and **evolution is the mechanism by which speciation is brought about**

Geographic isolation leads to speciation

- **Extinction**

- The primary reason behind extinctions is environmental change or biological competition.
- Extinction occurs when species cannot evolve fast enough to cope with the changing environment.
- At present, the 6th Mass Extinction (Anthropogenic Extinction – human induced) is in progress.

Population

- A population is a **group of organisms usually of the same species**.
- For example, the **population of an area refers to the total number of individuals in that area**.
- Population growth rate can be positive due to birth and/or immigration **आप्रवासन** or negative due to death and/or emigration. उत्प्रवासन

the population density may be determined by counting the **pugmarks**

जनसंख्या आमतौर पर एक ही प्रजाति के जीवों का एक समूह है।

Community

समुदाय

- Many populations having **different kinds of organisms sharing the same environment** constitute a community. एक ही वातावरण को साझा करने वाले कई प्रकार के जीवों में एक समुदाय का गठन होता है।
- The organisms that survive in an environment **have adaptations and variations** to suit their surroundings.
- **Climate plays an important role in deciding the community** of a region as it influences the environment of the region.

Synecology the ecological study of whole plant or animal communities. समुदाय पारिस्थितिकी

Ecosystem पारिस्थितिकी तंत्र

- An ecosystem is the **structural and functional unit of the biosphere.**
एक पारिस्थितिकी तंत्र जीवमंडल की संरचनात्मक और कार्यात्मक इकाई है।
- It includes the **community of living beings along with their physical environment**, both interacting and exchanging materials between them.
- All organisms in an ecosystem are **dependent on all other species and the components** which are part of that community.

जीवोम Biomes

- Biomes are **divisions of the terrestrial part of the biosphere.**
- A biome is **characterized by its climate, vegetation, animal life, and general soil type.**
- Every biome **differs from each other.**
- **The boundaries and abundance of flora and fauna in a biome are determined by the climate in the biome**

Biosphere

- The biosphere is **a part of the earth where life exists.**
- It is **a zone comprising the atmosphere (air), hydrosphere (water), and lithosphere (land).**
- It forms **a narrow layer around the surface of the earth.**
- **Sun is the source of energy** for life within the biosphere.
- **Air, water, and soil** supply the nutrients required for living organisms.