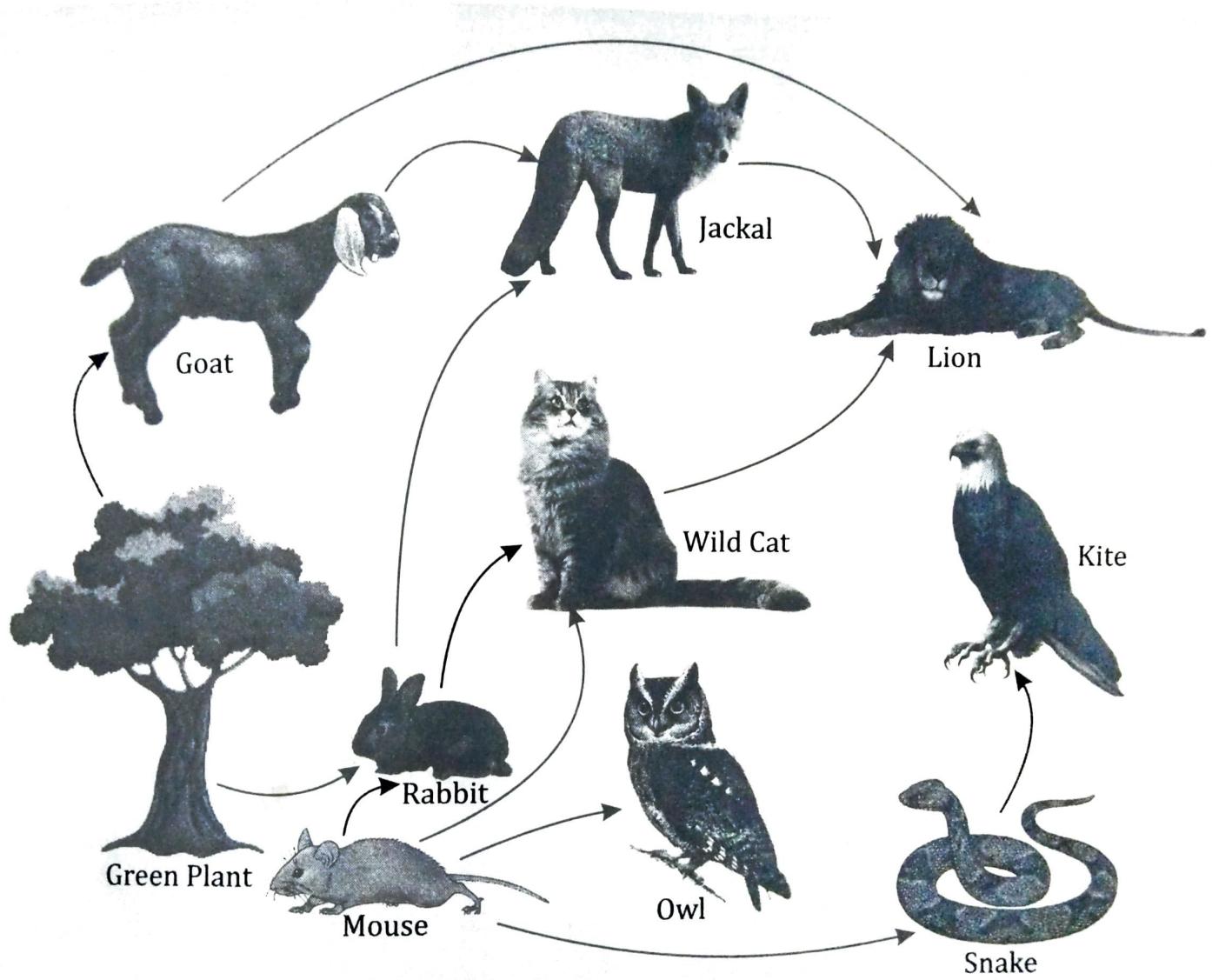


2.4 Food Web

Meaning: Food Web

Food web is an important conceptual tool for illustrating the feeding relationships among species within a community, revealing species interactions and community structure, and understanding the dynamics of energy transfer in an ecosystem.



Many food chains exist in an ecosystem, but as a matter of fact these food chains are not independent. In an ecosystem, one organism does not depend wholly on another. The resources are shared specifically at the beginning of the chain. The marsh plants are eaten by variety of insects, birds, mammals, fishes and some of the animals are eaten by several predators.

Similarly, in the food chain grass → mouse → snakes → owls, sometimes mice are not eaten by snakes but directly by owls. This type of interrelationship interlinks the individuals of the whole community. In this way, food chains become interlinked. A complex of interrelated food chains makes up a food web. Food web maintains the stability of the ecosystem. The greater the number of alternative pathways the more stable is the community of living things. The above diagram illustrates a food web in an ecosystem.

2.5 Ecological Pyramid



Meaning: Ecological Pyramid

An ecological pyramid (also trophic pyramid, eltonian pyramid, energy pyramid, or sometimes food pyramid) is a graphical representation designed to show the biomass or bio productivity at each trophic level in a given ecosystem.

The trophic structure of an ecosystem can be indicated by means of ecological pyramid. At each step in the food chain a considerable fraction of the potential energy is lost as heat. As a result, organisms in each trophic level pass on lesser energy to the next trophic level than they actually receive. This limits the number of steps in any food chain to 4 or 5. Longer the food chain the lesser energy is available for final members. Because of this tapering off of available energy in the food chain a pyramid is formed that is known as ecological pyramid. The higher the steps in the ecological pyramid the lower will be the number of individuals and the larger their size.

The idea of ecological pyramids was advanced by **C.E. Elton (1927)**. There are different types of ecological pyramids. In each ecological pyramid, producer level forms the base and successive levels make up the apex. Three types of pyramidal relations may be found among the organisms at different levels in the ecosystem.

Types of Ecological Pyramid

1. Pyramid of numbers

This shows the number of organisms in each trophic level without any consideration for their size.

2. Pyramid of biomass

This indicates the total mass of organisms at each trophic level. Usually, this type of pyramid is largest at the bottom and gets smaller going up, but exceptions do exist.

3. Pyramid of Energy

When production is considered in terms of energy, the pyramid indicates not only the amount of energy flow at each level, but more important, the actual role the various organisms play in the transfer of energy.

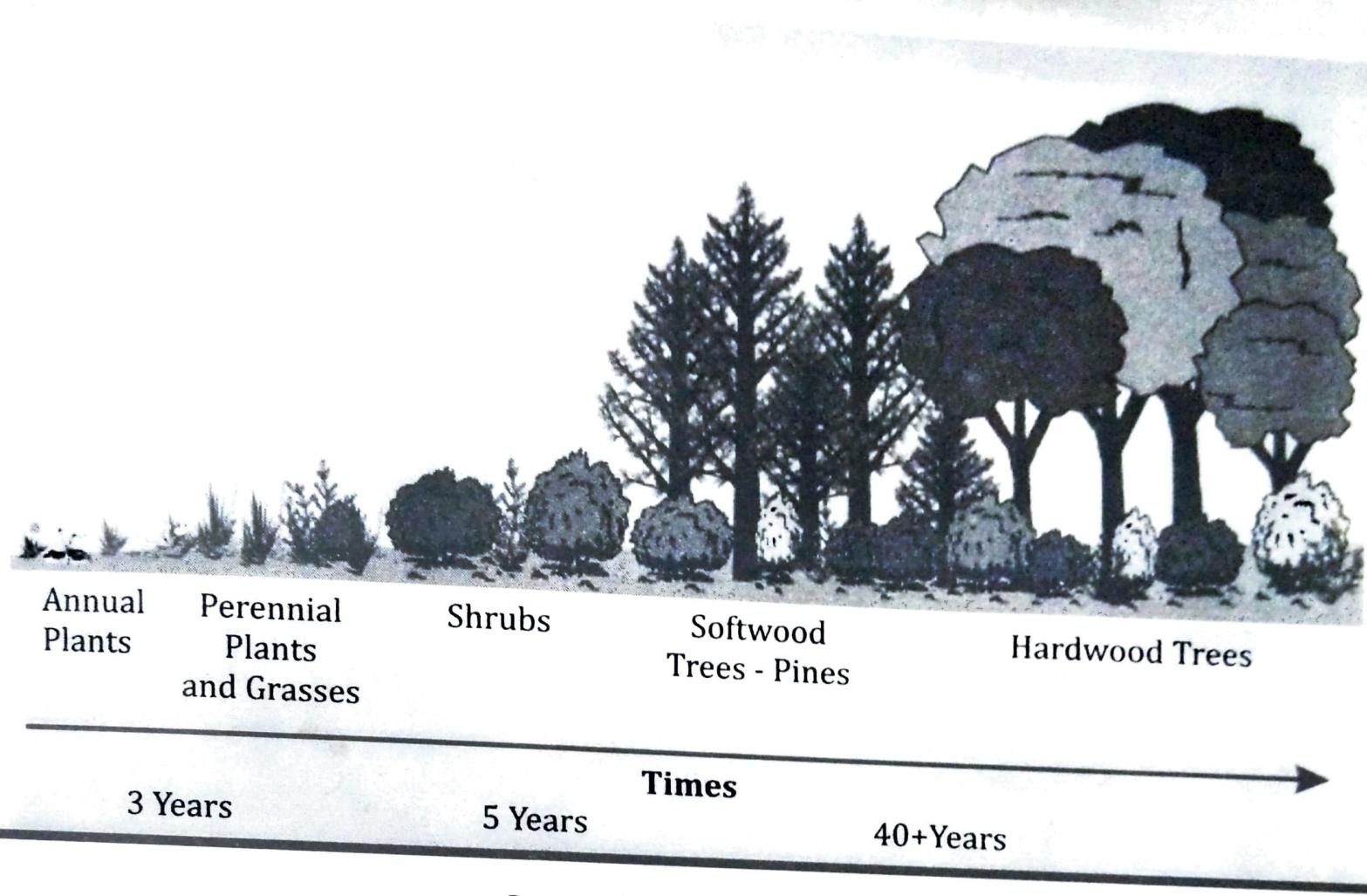
2.6 Ecological Succession



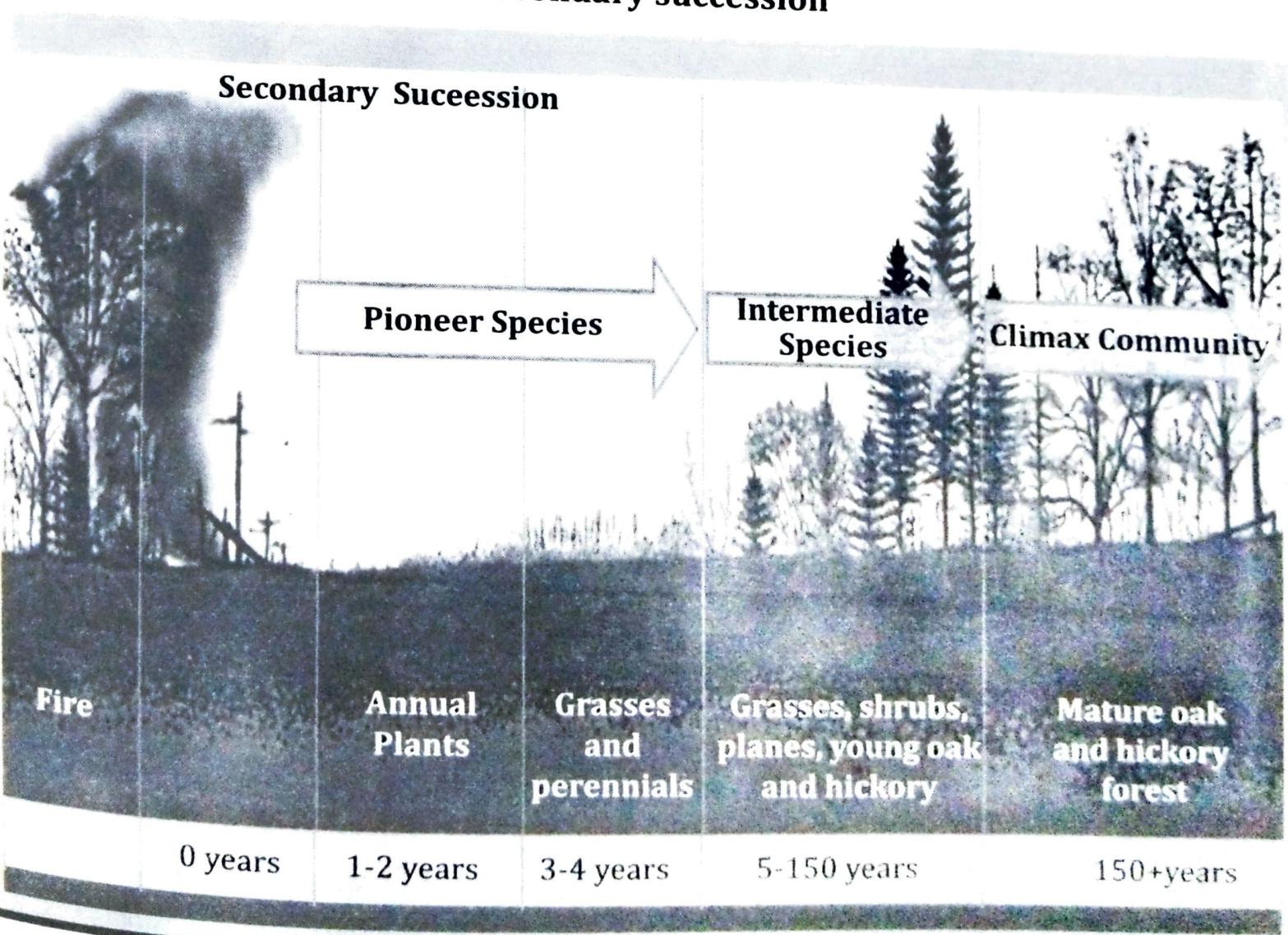
Meaning: Ecological Succession

Ecological succession is the process of change in the species structure of an ecological community over time. The time scale can be decades (for example, after a wildfire), or even millions of years after a mass extinction.

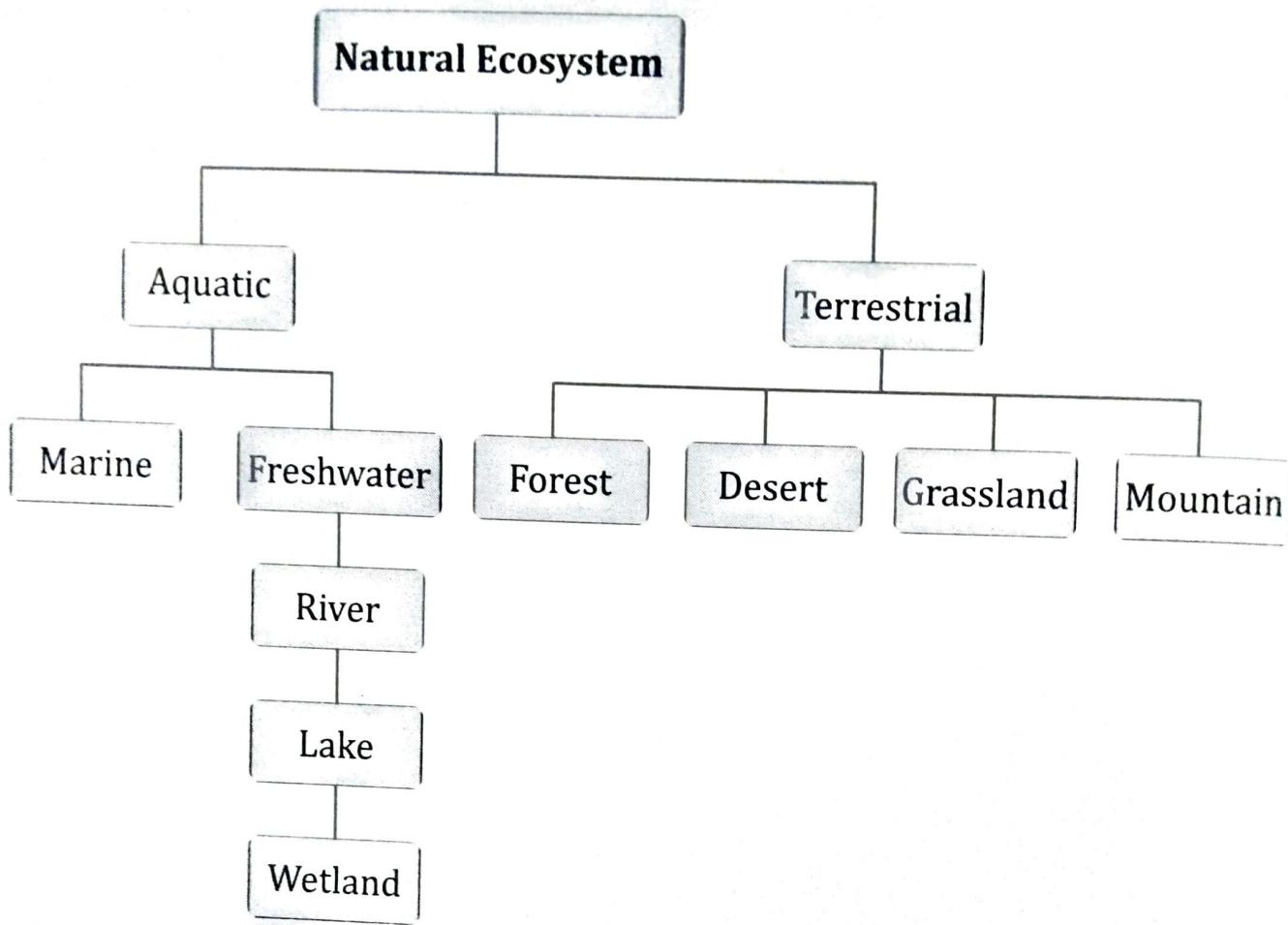
- In primary succession, newly exposed or newly formed rock is colonized by living things for the first time.
- In secondary succession, an area that was previously occupied by living things is disturbed and then re-colonized following the disturbance.
- In ecology, climax community, or climatic climax community, is a historic term for a biological community of plants, animals, and fungi which, through the process of ecological succession, the development of vegetation in an area over time, have reached a steady state.



Secondary succession



2.7 Types of Ecosystem



Meaning: Forest Ecosystem

forest ecosystem is a natural woodland unit consisting of all plants, animals and micro-organisms (Biotic components) in that area functioning together with all of the non-living physical (abiotic) factors of the environment.

Example: Deciduous forests

7.1 Types of forest in India

• Moist tropical Forest

Where the amounts of annual rainfall ranges between 200 and 250 cm, the mean annual temperature lies between 24°C and 27°C and humidity percentage is 80, the evergreen forests degenerate into semi evergreen forests; such forests are found along the Western Coast, in Upper Assam, lower slopes of the eastern Himalaya, Orissa coast and neighboring hills. Important plant varieties include bamboos, epiphytes, Aini, Semul, Gutel, mundane, Hopea Benteak, Kadamb, Irul, rosewood, Haldu, Kanju, Bijasal, Kusum, Bomsum, Indian chestnut Litsea, Holloch, Champa and Mesua etc.

• Dry tropical Forest

This types of forests mainly found in Indian Northern Hilly regions and some states of Southern India. Basically, these forests are generated when

51 cm to 151 cm. Trees of these forests drop its leaves in winter (when the weather is driest) and new leaves are generated after winter. During the rainy season these types of forest completely decorate lush green leaves. Some significant trees of dry Tropical Forest are Sal, Acacia, Mangoes and Bamboo.

• Montane temperate Forest

These types of forests are mainly generated in Northern middle Himalayas ranges (1801 to 3001 Meters) and Southern Nilgiri higher Mountain ranges. It takes about 201 cm average annual rainfalls to produce these types of forests. Some significant trees of Montane temperate Forest are Rhododendrons, Ferns, Oak, Maple, Juniper, Deodar, Chilgoza, etc.

• Montane sub tropical Forest

These types of forests mainly generated in the state of Assam, Nagaland, Mizoram, Meghalaya, Manipur, Arunachal Pradesh, etc. mountain ranges of Western Ghats are also the abode of these types' forests. Some significant trees of Montane sub tropical Forest are Poonspar, cinnamon, rhododendron, Sal, Sandan, Laburnum, pomegranate, olive, oleander, etc.

• Alpine Forest

These grasslands start at an elevation of above 3000m grow up to the region just below the snowline. They are common in both the main Himalayan regions as well as the barren cold deserts of the Tran Himalaya. Low alpine grasslands are common with the vegetation not growing higher than 1.5m.

Climatic conditions vary from the sub-arctic to arctic, with snow covering the ground for over 5 months a year. The growing season for the plants is thus stunted. Pastures are grazed by migratory cattle in summer. The vegetation consists mainly of the black juniper, the drooping juniper; honeysuckle and willow are the common trees.

• Sub Alpine Forest

These forests are found between 2901 and 3501 meters, near the snow line all over the Himalayas and the dry cold deserts. Average temperatures in summers range from 20°C to 22°C. Winter temperatures are usually below the freezing point accompanied by lots of snow. Major common trees of this type forest are Juniper, Rhododendron, Willow and Black Currant. In the eastern parts, Red Fir, Black Juniper, Birch and Larch are the common trees.



Meaning: Grassland ecosystem

A biological community that contains few trees or shrubs, is characterized by mixed herbaceous (nonwoody) vegetation cover, and is dominated by grasses or grasslike plants.

Example: Savanna, Shivalik Hills

Meaning: Desert ecosystem

Desert ecology is the study of interactions between both biotic and abiotic components of desert environment. A desert ecosystem is defined by interactions between organism populations, the climate in which they live and any other non-living influences on the habitat.

Example: Gobi, Great Basin, and Namib Deserts. Antarctica is a desert, but there are no camels or sand dunes.

Meaning: Aquatic ecosystem

An aquatic ecosystem is an ecosystem in a body of water. Communities of organisms that are dependent on each other and on their environment live in aquatic ecosystems. The two main types of aquatic ecosystems are marine ecosystems and freshwater ecosystems.

Examples: Ponds, streams, lakes, rivers, oceans, estuaries.

2.8 Pond Ecosystem

A pond is a self-sufficient and an ideal example of the ecosystem. In a pond, the intimate relationship between the inhabiting living and non-living components is well understood. The non-living objects are various types of organic and inorganic substances such as water, sun rays, CO_2 , oxygen, calcium, phosphorus etc. The living components are producers, primary consumers, secondary consumers, tertiary consumers and various types of decomposers.

Producers: Various types of photosynthetic algae and shallow water plants living in the pond are the producers. The floating organisms are called plankton. The minute plants of plankton type are known as phytoplankton. Green aquatic algae and other aquatic plants can live by producing food through the process of the photosynthesis, so they are called producers.

Primary consumers: These are various types of floating minute insects, larvae of mosquito and other microscopic animals like zooplankton etc. Floating minute animals are called zooplankton. These consumers cannot manufacture their own food and they live on by eating the producers directly.

Secondary consumers: Small fishes, some aquatic insects, prawns, frog etc. are secondary consumers. They can neither manufacture their own food nor accept the producers as food. They live on by eating the primary consumers.

Tertiary consumers: Small fishes, prawn and all other animals that feed, upon the secondary consumers are known as tertiary consumers. Large fishes like shoal, boal, vetki, stork and heron are the tertiary or highest consumers.

Decomposer: In pond water, various types of fungi and bacteria live as, saprophytes which are known as a decomposer. These decomposers can live by floating on water or live at the bottom of the pond. They attack living or dead consumers and help to rot. As a result, organic and inorganic chemical substances usable by the producers have formed again. The producer community of the pond uses these decomposed elements. The flowchart gives an idea about the components of the pond ecosystem.

2.9 Marine Ecosystem

A marine ecosystem is any that occurs in or near salt water, which means that marine ecosystems can be found all over the world, from a sandy beach to the deepest parts of the ocean. An example of a marine ecosystem is a coral reef, with its associated marine life – including fish and sea turtles – and the rocks and sand found in the area.



Know This: Estuary, Wetland Mangrove, Coral reef.

Estuary: An estuary is a partly enclosed coastal body of water with one or more rivers or streams flowing into it, and with a free connection to the open sea. (Ex: Thane creek)

Wetland: is a zone of flat lands that has groundwater of shallow depth and that ascend to the surface in determined periods, forming lagoons and marshes, until where they come to live hundreds of species. There are five classes of wetlands: marine, estuarine, lake, riparian and marshy.(Ex: Chilika lake)

Mangrove: is a grouping of semi-submerged trees that have been flooded with water, with high levels of salinity and therefore they develop and survive in coastal lands. The trees grow on long roots, which like stilts raise the trunks above the level of the waters.(Ex: Sunderbans)

Coral reef: it is one of the richest aquatic ecosystems of the planet, product of the great amount of species that inhabit in them (fish, snails, corals and algae). (Ex: Andaman and Nicobar island)

Case Studies on some ecosystem in India

- <https://www.witpress.com/elibrary/sdp-volumes/8/1/657>
- https://www.jstor.org/stable/4313937?seq=1#page_scan_tab_contents
- <unesdoc.unesco.org/images/0012/001271/127196eo.pdf>

- 1. An is a dynamic entity composed of a biological community and its associated environment.**
- a. Ecosystem b. Environment c. Society d. Niche
- 2. The term "ecosystem" was first used in in a publication by British ecologist Tansley.**
- a. 1956 b. 1935 c. 1987 d. 1990
- 3. used the term ecosystem for the first time**
- a. Arthur Tansley b. Aristotle
c. Jagadish Chandra Bose d. John Mendal
- 4. include soil, pH, topography minerals etc.,**
- a. Climatic factor b. Biotic factor c. Edaphic factor d. Natural factor
- 5. are the living organisms in the ecosystem that take in energy from sunlight and it to transform carbon dioxide and oxygen into sugars.**
- a. Decomposers b. Producers c. Consumers d. Carnivores
- 6. are living organisms in the ecosystem that get their energy from consuming other organisms.**
- a. Decomposers b. Producers c. Consumers d. Carnivores
- 7. Plants, algae and photosynthetic bacteria are all examples of**
- a. Decomposers b. Producers c. Consumers d. Carnivores
- 8. Producers are also known as.....**
- a. Heterotroph b. Saprotoph c. Autotroph d. Decomposers
- 9. are the animals which feed on plants or the producers.**
- a. Herbivores b. Carnivore c. Omnivores d. decomposers
- 10. Rabbit, deer, goat, cattle etc., are example of.....**
- a. Herbivores b. Carnivore c. Omnivores d. decomposers
- 11. The animals which feed on the herbivores are called.....**
- a. Herbivores b. Carnivore c. Omnivores d. decomposers
- 12. are the living component of the ecosystem that breaks down waste material and other organisms.**
- a. Herbivores b. Carnivore c. Omnivores d. decomposers
- 13. The decomposers are known as**
- a. Heterotroph b. Saprotoph c. Autotroph d. decomposers
- 14. Many species of fungi and bacteria are example for.....**
- a. Herbivores b. Carnivore c. Omnivores d. decomposers
- 15. Almost all organisms on earth, the primary source of energy is the**
- a. Solar Energy b. Wind energy c. Tidal energy d. Bio energy
- 16. The producers and consumers in the ecosystem can be arranged into different groups and are known as**
- a. Energy level b. Network level c. Web level d. Trophic level

30. Savanna, Shivalik Hills are examples of **Ecosystem**.

- a. Forest Ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Pond ecosystem

31. Gobi, Great Basin, Thar etc., are examples of.....

- a. Forest Ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Pond ecosystem

32. ecosystem is an ecosystem in a body of water

- a. Forest Ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystem

33. Photosynthetic algae and shallow water plants living in the pond are the example for

- a. Decomposers
- b. Producers
- c. Consumers
- d. Carnivores

34. Larvae of mosquito and other microscopic animals like zooplankton etc., in pond ecosystem are the example of.....

- a. Primary consumers
- b. Secondary consumers
- c. Tertiary consumers
- d. Decomposers

35. Large fishes like shoal, boal, vetki etc., in pond ecosystem are the example of.....

- a. Primary consumers
- b. Secondary consumers
- c. Tertiary consumers
- d. decomposers

36. is a partly enclosed coastal body of water with one or more rivers or streams flowing into it, and with a free connection to the open sea.

- a. Lagoon
- b. Estuary
- c. Man grove
- d. Reefs

37. Is grouping of semi-submerged trees that have been flooded with water, with high levels of salinity.

- a. Lagoon
- b. Estuary
- c. Mangrove
- d. Reefs

38. Sunderban is an example for.....

- a. Lagoon
- b. Estuary
- c. Mangrove
- d. Reefs

39. can be seen in Andaman and Nicobar island.

- a. Coral reefs
- b. Estuary
- c. Mangrove
- d. Reefs

40. Red Fir, Black Juniper, Birch and Larch are examples of Found in sub alpine forest.

- a. Birds
- b. Animals
- c. Mangrove
- d. Sweet water

41. Terrestrial ecosystems are

- a. Land based
- b. Water based
- c. Space based
- d. Trees

- a. Land based
- b. Water based
- c. Space based
- d. Algae

42. Aquatic ecosystems are

- a. Land based
- b. Water based
- c. Space based
- d. Underground based

- a. Land based
- b. Water based
- c. Space based
- d. Underground based

○○○○