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Ecosystems



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Definition

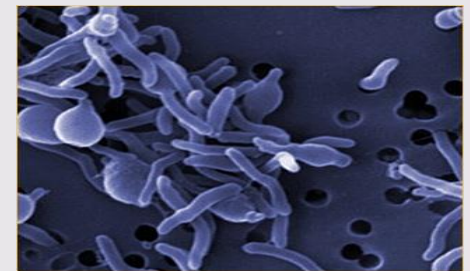
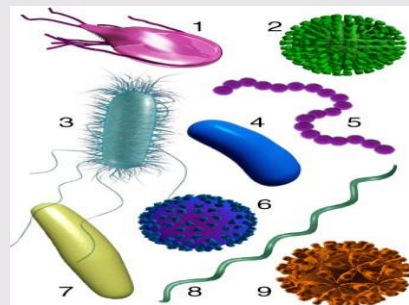
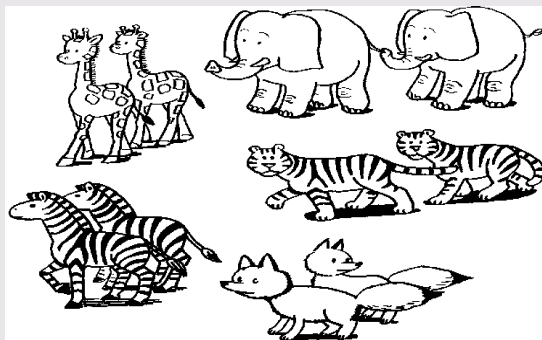
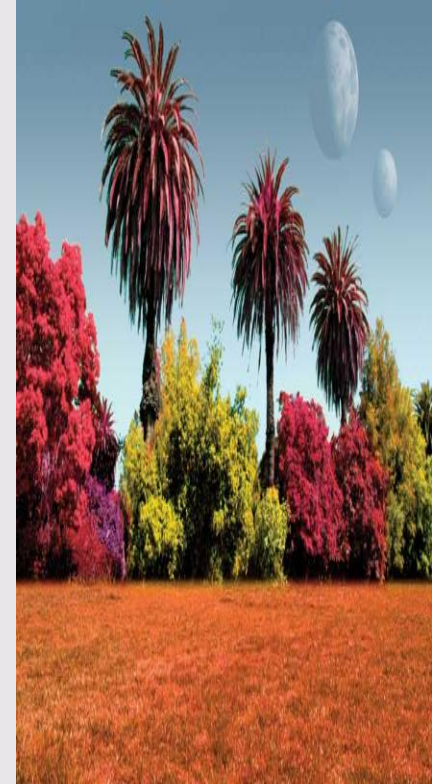
- Organism: cell is basic component of organism; accordingly we have single cell/multi cell organisms
- Species: a set of organisms that resemble(/same) one another ,are capable of reproducing naturally and produce a fertile/rich and live off (/rotten/bad) spring;
- Populaton: all the members of a species living and inteacting within a specific geographical region.
 - Ex., neem trees in a forest, people in country,gold fish in a pond.



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ECOSYSTEM

An ecosystem is a biotic assemblage of plants, animals, and microbes, taken together with their physicochemical environment.





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- It is a group of biotic communities of species(**living**) interacting with one another and with their **non living** environment exchanging energy and matter.
- So the study of these ecosystems is often known as **ECOLOGY**



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Living things

+ Nonliving things

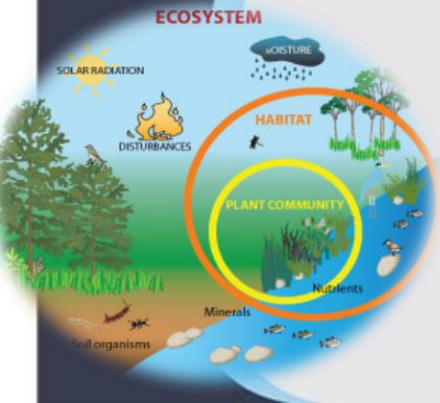
ECOSYSTEM



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Definition of ecosystem

- The living community of plants and animals in any area together with the non-living components of the environment such as soil, air and water, constitute the ecosystem.
- Natural ecosystems include the forests, grasslands, deserts, and aquatic ecosystems such as ponds, rivers, lakes, and the sea.
- Man modified ecosystems include agricultural land and urban or industrial land use patterns.





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Concept of an ecosystem

- The nature of the ecosystem is based on its geo graphical features such as hills, mountains, plains, rivers, lakes, coastal areas or islands.-----constitutes
GEOGRAPHICAL FEATURES OF THE AREA
- It is also controlled by **climatic conditions** such as the amount of sunlight, the temperature and the rainfall in the region.



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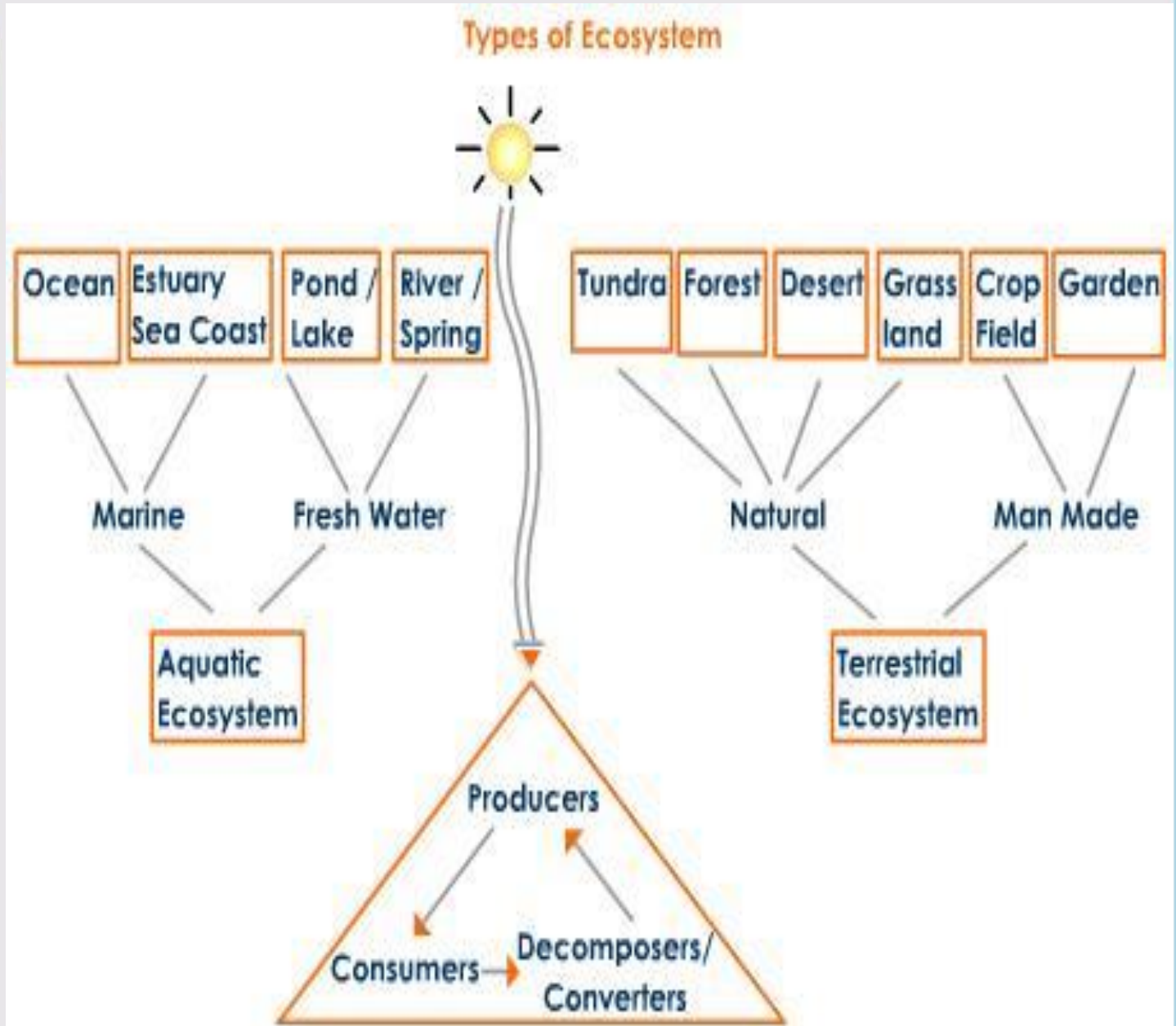
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- Ecosystems are divided into terrestrial or land-based ecosystems, and aquatic ecosystems in water.
- These form the two major habitat conditions for the Earth's living organisms.
- Ecosystems have been formed on land and in the sea by evolution/growth that has created species to live together in a specific region.
- Thus ecosystems have both non-living and living components that are typical to an area giving it its own special characteristics that are easily observed.



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Understanding Ecosystems





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- Different biogeographic regions in India - the Himalayas, the Gangetic Plains, the Highlands of Central India, the Western and Eastern Ghats, the semi-arid desert in the West, the Deccan Plateau, the Coastal Belts, and the Andaman and Nicobar Islands.
- Each area has structurally and functionally identifiable ecosystems such as different types of forests, grasslands, river catchments, mangrove swamps in deltas, seashores, islands, etc.



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- **Robust ecosystem** - less affected by a certain level of human disturbance.
- **Fragile ecosystem** - are quickly destroyed by human activities.
- **Mountain ecosystems** are extremely fragile/delicate - degradation of forest cover leads to severe erosion of soil and changes in river courses.
- **Island ecosystems** are easily affected by any form of human activity which can lead to the rapid extinction of several of their unique species of plants and animals.
- **River and wetland ecosystems** can be seriously affected by pollution and changes in surrounding land use.



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Ecosystem degradation

- Ecosystems are the basis of life itself!
- Some species, if eliminated seriously affect the ecosystem. These are called ‘keystone’ species.
- Ecosystems are however frequently disrupted by human actions which lead to the extinction of species of plants and animals that can live only in the different natural ecosystems.
 - Extinction occurs due to changes in land use.
 - Forests are deforested for timber
 - Wetlands are drained to create more agricultural land
 - Pollution from industry and waste from urban settings can also lead to extinction of several species

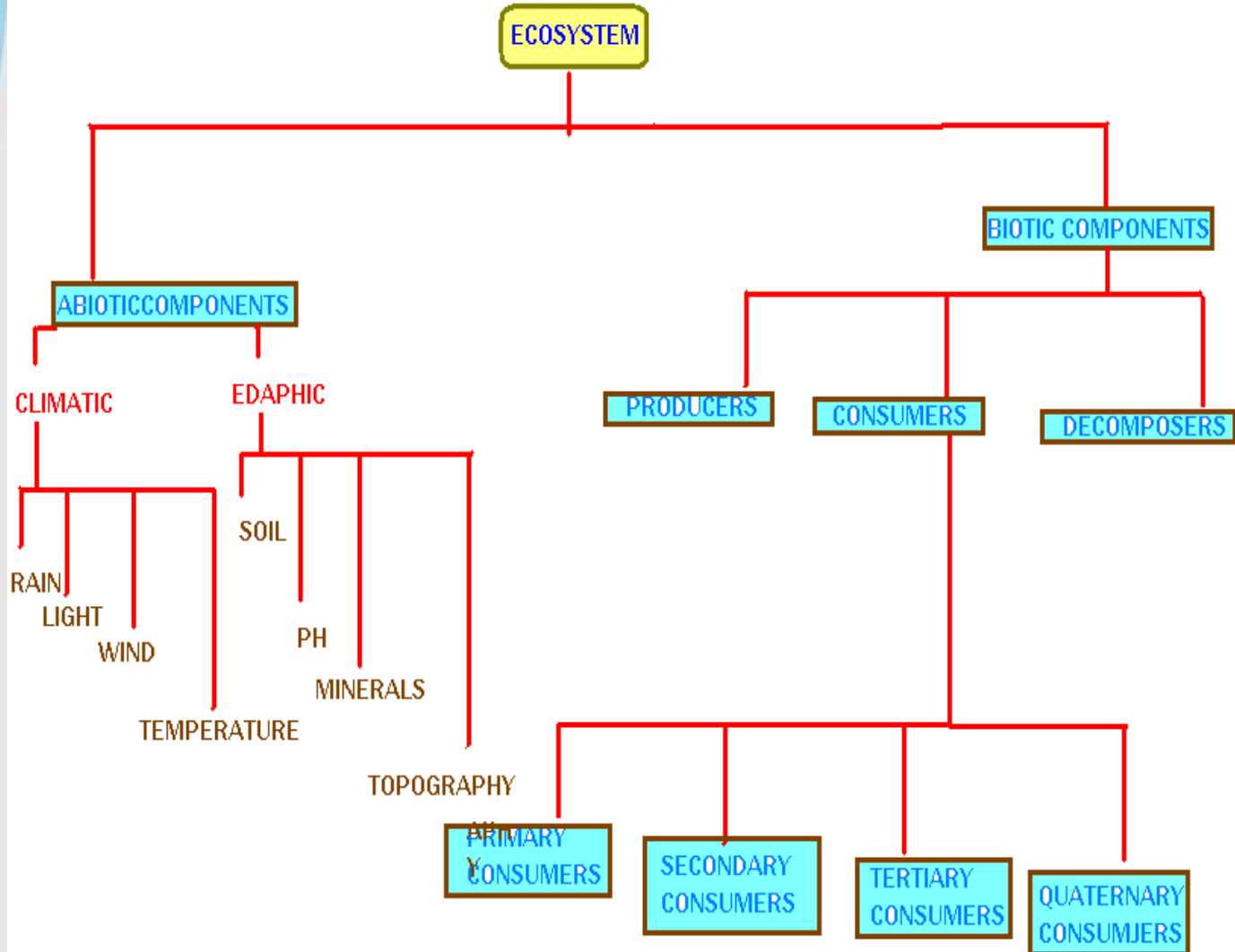


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- The reason for the depletion of natural resources is twofold our rapidly **exploding population consumerism** or the growth of affluent societies, which consume and waste a very large proportion of resources and energy



STRUCTURE OF ECOSYSTEM





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ABIOTIC FACTORS

- This is broken down into 4 different areas.
- 1: CLIMATIC FACTORS:
Light, temperature, water availability, wind
- 2: EDAPHIC FACTORS: (soil)
Aeration, drainage, humus content, mineral content, soil pH
- 3: GEOGRAPHIC FACTORS/FEATURES:
Aspect (direction), slope, altitude, shelter.
Ex: Hills, mountains, plains, rivers, lakes, coastal areas, islands, estuary
- 4: CHEMICAL FACTORS:
Oxygen, pH, mineral availability, salinity



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Functions of Ecosystem

- All the Functional aspects of Ecosystem(every) relates to the growth and Regeneration of Plants and Animals.
- This is possible through the Mechanism(in-built system) of biogeological cycles and other functions of Ecosystem(every)
- The in -built mechanism also controls the population size of all the species contained in it.
- They leads to maintain distinct abiotic/biotic components and Ultimately influence the Quality of Human life.



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Functions of Ecosystem

- Functional aspects of ecosystem:
 - 1) Productivity & Energy cycles.
 - Productivity is measured in $\text{Kcal}/(\text{m}^2 \cdot \text{year})$
 - The rate of biological energy flow i.e. production and respiration rates of the community.
 - 2) Food chains.
 - Rate of materials or nutrient cycles.
 - 3) Diversity-inter linkages between organisms.
 - Biological or ecological regulations which include regulations on organisms by the environment and regulations on environment by the organisms (N_2 fixation by organisms).
 - 4) Nutrient cycles-biogeochemical cycles.
 - 5) Evolution.



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Producers, Consumers and decomposers

- Ecosystem consists of basically following biotic components:
 1. Producers
 2. Consumers
 3. Decomposers



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Contd...

- Every living organism is in some way dependent on other organisms.
- Plants are food for herbivorous animals which are in turn food for carnivorous animals.
- Thus there are different trophic levels (specific feeding stage/level) in the ecosystem.



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Producers

- Plants are the 'producers' in the ecosystem as they manufacture their food by using energy from the sun.
- Plants manufacturer organic compounds from inorganic substances from their environment.
- Green Plants are able to do this by photosynthesis where the sun provides necessary energy.
- Green Plants are autotrophic organisms or primary producers.





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- **I. Procedures (Autotrophs)**
- Procedures synthesize their food themselves
- through photosynthesis
- **Example :** All green plants, trees.
- **Photosynthesis**
- The green pigments called chlorophyll, present in the leaves of plants, converts CO_2 and H_2O in the presence of sunlight into carbohydrates.
- $$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow{\hspace{10em}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$$
- This process is called photosynthesis



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Consumers (heterotrophs)

Consumers are organisms which can not prepare their own food and depend directly or indirectly on the producers.

Ex:

Plant eating species

Insects, rabbit, goat, deer, cow, etc.

Animal eating species

Lions, tigers etc



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Classification of consumers

- Consumers are further classified as
- (i) **Primary consumers (Herbivores)**
(Plant eaters) Primary consumers are also called herbivores, they directly depend on the plants for their food. So they are called plant eaters.
- **Examples :** Insects, rat, goat, deer, cow, horse, etc.,





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- **Secondary consumers (primary carnivores)**
- Secondary consumers are primary carnivores, they feed on primary consumers. They directly depend on the herbivores for their food.
- **Example**
- Frog, cat, snakes, foxes, etc.,



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- **Tertiary consumers (Secondary carnivores) (Meateaters)**
- Tertiary consumers are secondary carnivores, they feed on secondary consumers.
- They depend on the primary carnivores for their food.
- **Examples**
- Tigers, lions, etc.,





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Omnivore:

They feed on both plants and animals.

Detritivores:

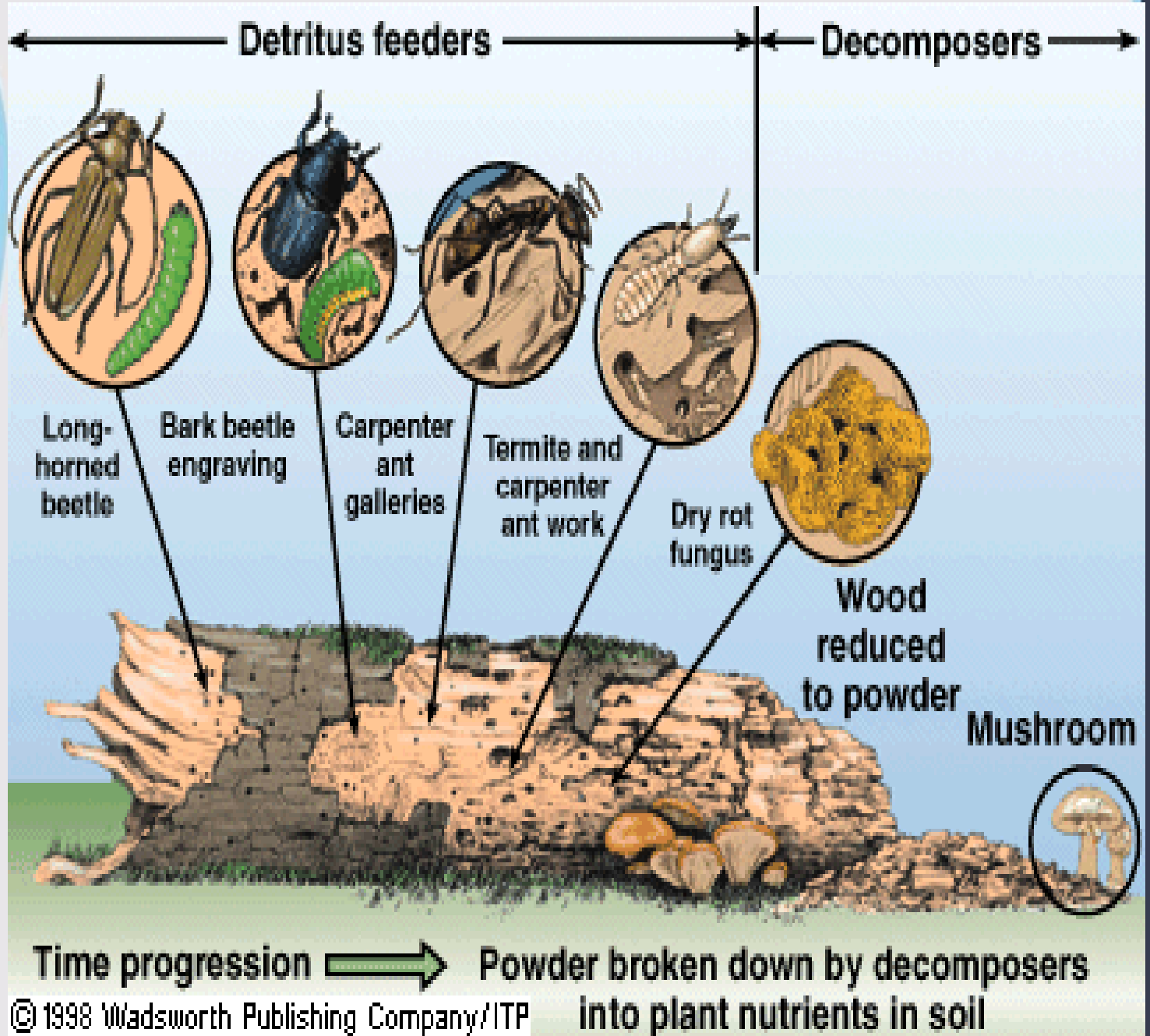
They feed on the parts of dead organisms, wastes of living organisms, their castoff and partially decomposed matter.

Ex: beetels, termites, ants, crabs



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