

◦ Adaptations

- Cursorial - repetitive cyclic pattern of limb movement to run fast - cockroach - three pairs of legs.
- Fossorial - Underground, digging - living in burrows short forelimbs with sharp claws long hind limbs to jump-run. - wolf, kangaroo rat.
- Arboreal - Tree dwelling - climbing - clinging & balancing on branches - long tails & toes
 - ① Branch runners - squirrels, marsupials, lemur
 - chameleon
 - ② Branch suspenders - powerful curved claws - sloth bears & lemurs.
 - ③ Branch Swingers - forelimbs & tails for balancing - apes, gibbons.
- Terrestrial / Desert - stored water in muscles, cells of stomach & connective tissues - Camel has hump & long henle's loop.
- Aquatic - Respiration by gills, locomotion by fins Streamlined bodies with mucus & scales.
- Volant / Flying - Forelimbs modified to wings, bones spongy & hollow, feathers on body surface, only left ovary & oviduct present.

◦ Competition

Intraspecific - between same species.

Interspecific - between 2 separate species.

has potential to change population, community & evolution of species. eg - leopards, lions - feed on same prey & share same geographical areas.

Mutualism :- between different species - both favour each other. eg. Lichen - algae living inside fungus, bacteria of a ruminant stomach & roots or mycorrhiza - a fungal biofertilizer almost 48% land plants for easy uptake of nutrients.

Commensalism :- between 2 different species where

where one is benefitted while other - neutral.

eg - orchid growing as an epiphyte on trees.

barnacles on whales, cattle egrets on cattle

Parasitism :- between 2 species - one benefits & other suffers. Parasites benefit and they have faster reproduction rate than host. eg - tapeworms, fleas, plasmodium, flukes and vertebrate host.

Vectors - are carriers required to transmit parasites to host. eg mosquito - plasmodium - host.

Parasitoid - grow in host multiply & kill the host eg - larval development of some insects on muscles of vertebrate or invertebrate host.

Ectoparasite - live on surface of host eg flea & dog sacculina & crab.

Endoparasite - Lives ^{within or} between cells of host.

Hyperparasite - Parasite Living / feeding on another parasite eg protozoan - inside → flea → on dog.

kleptoparasite - Social parasites steal from host. eg - Cuckoo stealing the nest of crow, ants & termites steal food stored by other host.

Adelphoparasite - Parasite and host are closely related (same family or genus) to exhibit parasitoid phenomenon. eg - Unmated female of citrus blackfly lay their haploid eggs in the fully developed larvae of their host to produce male offsprings.

Camouflage - Modify / change body shape / colour to hide or merge with surrounding as a protection from predators. eg - Some frog species display bold colours, monarch butterflies give out toxic secretions - gives bad taste to prevent from birds feeding on them.

Population - Group of individuals belonging to same species.

Population Dynamics - Study of changing populatⁿ.

Demography - Quantitative & statistical study of human populatⁿ. Census every 10 years first census - 1891.

Natality - Rate of production of new individuals in a population per unit time per unit area.

(factor required for Demography)

$$N = \frac{\text{Number of births in a year} \times 1000}{\text{mid year population}}$$

Mortality - Rate of deaths in a population per unit per unit area.

$$M = \frac{\text{Number of deaths in a year} \times 1000}{\text{mid year population}}$$

(factor required for Demography).

Growth rate - Increase in population due to actual number of individuals added to the population.

Depends on Natality & Mortality.

$$\text{Growth rate} = \frac{\text{Natality} - \text{Mortality}}{\text{unit time.}}$$

Population Density - Total number of individuals in a population per unit area.

(Main factor of Growth rate - Directly proportionate).

Migration affects popⁿ density.

Age Structure - Relative proportion of individuals of various age groups. Population is divided into 3 groups according to age.

- Pre reproductive - (0-14 yrs) - Young population.
- Reproductive ~~as~~ (15-49 yrs) - Adults.
- Post reproductive - (50 & above) - Old populatⁿ.

Trends in Population - Depends on distribution of

Population - 3 types

- 1 - Growing Population - larger number of pre-reproductive age grp. \therefore faster growth.
- 2 - Steady population - Equal number of pre & post reproductive age group \therefore steady growth.
- 3 - Declining population - larger no. of post-reproductive age groups. \therefore Stagnant growth.

Natural Resources & Conservation :-

Conservation - Wise management of biosphere. Natural ecosystem maintained & utilised in a planned manner \therefore Benefits all.

Aims of conservation * maintain ecological process & life support system. * Prevents wastage, Spoilage of natural resources * Improves & renews the quality of resources * Preserves biological diversity.

Endangered species - Species or organisms whose number has been reduced to critical levels or their habitats have been adversely affected & they become extinct soon. \therefore need to be protected.

IUCN - International Union of Conservation of Nature & natural resources. Maintains a Red list or Red Data book listing all species into 4 categories - Endangered, Vulnerable, Rare & Intermediate species.

Efforts in Conservation - IN-SITU - protects & preserves endangered species in their own habitat by prohibiting grazing, cultivation, collecting forest products. National parks, Wild life sanctuaries. India has 80 national parks, 441 Wild life sanctuaries. Maharashtra has

there are 5 Nat. Parks & 11 Wildlife Sanct.

eg - Tadoba National Park, Jim Corbett Nat. Park
Kaziranga Wild L. Sanct.

Ex-SITU - Protecting & conserving endangered species outside their natural habitats.

During this gene pool, cells, tissues etc are also preserved. Endangered species are given priority to vulnerable species.

• Prevention of human disturbances in such areas.

• only natural / ecofriendly resources are used & allowed in these areas.

• species to be ^{protected} are tamed & domesticated first then eventually left back into their natural habitats. • Strict implementation of W.L. Protection Act - 1972.

Examples of endangered species -

plants - Rauwolfia serpentina - Sarpagandha.

Nepenthes khasiana - pitcher plant

Procera indica, Psilotum nudum, cycas bedomei.

animals - Great Indian bustard, Musk deer, Antelope

Red Fox, white eyed duck, one horned Rhino,

Asiatic lion, wild ass, Red panda, Crocodile.

Air Pollution: - Substances present in air due to human activities in concentrations sufficient to cause harmful effect on health, food, vegetation & property.

Sources - gaseous matter - burning of fossil fuels such as coal, petroleum. Particulate

matter - Condensation process or dispersion

process - erosion, grinding, spraying, digging

• automobile exhausts - produce $2/3^{\text{rd}}$ Carbon

monoxide & $1/2$ hydrocarbons & nitrous oxides, gaseous lead & particulate lead. Industrial processes, paper mills, cotton mills, rubber manufacturing heating plants, transportation industry etc.

Hazards of air pollution:

Sulphur-di-oxide - damage to materials & property - deterioration of buildings & sculpture. SO_2 & H_2SO_4 irritate respiratory system of plants & animals, leaf lesions, defoliation.

causes headaches, nausea, conjunctivitis, irritation of mucus membrane, colic diarrhoea, bronchial pneumonia, coma-death.

CO - carbon monoxide combines with haemoglobin reducing O_2 carrying capacity. causes impairment of mental thinking, inhibits cellular respiration in plants - reacts with cytochrome oxidase enzyme.

NO nitrous oxide - laughing gas causes acute respiratory disease - lethal to both humans & animals.

Prevention of air Pollⁿ

Establish desirable & harmless limits of airpollⁿ. strict legislation to compel control & convert pollutants to harmless forms before release.

Devices like +ve crank case ventilation valve, catalytic converter, electrostatic precipitators differential solubility of gases, scrubber etc. - PUC certificate mandatory for all vehicles.

Bombay Motor Vehicles Amendment act 1984 has authority to suspend the registration of vehicles for 14 days.

Replace 2 stroke engines by 4 stroke engines

Banning burning of garbage & other wastes
Water Pollution :- Addition of excess material even heat to water is harmful to human, animal or aquatic life.

Sources - Domestic waste from homes & commercial establishments, petrochemical complexes, fertiliser factories, oil refineries, paper, textile, steel industries.

Minamata disease - Mercury poisoning 1956 in Japan. Fish, crab, shell fish contaminated with methyl mercury - caused deaths.

fatal disease. Japanese coastal industries heavy metals causing health hazards

Mercury - leads to abdominal pain, headache, diarrhoea, haemolysis, chest pain.

lead - Anemia, vomiting, loss of appetite, convulsions, brain, liver, kidney damage.

Arsenic - Disturbed peripheral circulation, mental disturbance, liver cirrhosis, hyperkeratosis

Names of rivers polluted in Maharashtra:

Mulla Mutha - Pune, Panchganga - Kolhapur, Patalganga - Panvel, Ganga - Haridwar to Kolakotta.

Prevention - Recycling of waste effluents.

Physicochemical processes like absorption, electrolysis, reverse osmosis, ion exchange to remove chemical or radiobiological pollutants.

Radioactive wastes are closely protected.

Marsh lands have bio-diversity \therefore should be protected. Conventional sedimentation, filtration & chlorine treatment plants should be used & bacteria, fungi should be re-settled to allow natural ecosystems survive.