

# ECOLOGY

## **Fundamentals of Ecology**

*Introduction:* Definition; evolutionary/historical background; principle and scope; aquatic and terrestrial ecology; community concept, succession process, competition and Coexistence; natural ecosystems; concept of species & individual; concept of carrying capacity.

*Autecology:* Introduction to Autecology; Population definition & characteristics; population parameters- growth, fluctuation, regulation and dynamics, r and k selection, species interaction and intra and inter specific competition, evolutionary consequences of competition, allelopathy, biotic potential

*Synecology:* Introduction to Synecology; community dynamics; community characteristics; community coefficients; cluster analysis; association analysis; gradient analysis; vegetation mapping; community classification concept.

*Ecosystem:* Ecosystem components and structure; abiotic and biotic factors, trophic relation, functional aspect of ecosystem, ecological succession, concept of climax.

*Vegetation sampling:* Purpose of studying plant communities, sampling units, size and shape of sampling unit, methods of sampling.

## **Ecosystem Analysis**

*Major ecosystems:* Concept of Biosphere and ecosystem; evaluation of ecosystem; major biomes & biogeographic regions of India and world..

*Biodiversity, Ecosystem stability and Management:* Biodiversity: concept and levels; speciation and extinction; terrestrial biodiversity hot spots etc.; Biodiversity status in India; Ecology of plant invasion; concept of ecosystem resistance and resilience.

*Functional aspects of ecosystem:* Ecosystem components; functional aspect of ecosystem analysis; biomass production & methods; litter production & decomposition in different ecosystem and biogeochemical cycles.

## **Forest Ecology**

Forest types of India; structure and biota; mycorrhizae and forests; forests and forestry in India; sacred groves; social forestry and agro-forestry, human impacts on forests; management and conservation of tropical forests.

## **Conservation Ecology**

*Introduction:* Definition of conservation, postulates of conservation biology; the origin and evolution of living organisms, ecological niches, adaptive radiation, genetic plasticity.

*Ecosystem instability:* Species of biological importance; Ecosystem fragmentation and edge effects; Red and Green data books, World Conservation Strategy; methods of biological conservation.

*Conservation of resources:* Energy sources - conservation and management of non-renewable fossil fuel resources, conservation and management of forest & water resources; conservation of biological resources.

## **Restoration Ecology**

*Introduction:* Definition, aims and objectives of restoration, principles, concepts and strategies, role of ecological principles in restoration, holistic approach in restoration.

*Restoration of natural and degraded resources:* Restoration of degraded lands/waste lands, range land, forest, river corridor, water resources; methods of soil and water conservation for reclamation of degraded land; concept of sustainable development.

*Microbial management:* Role of microbes, biofertilizers and biotechnology for restoration of degraded lands.

*People's participation in restoration:* Role of people's participation, government agencies, NGOs and environmental education in conservation and restoration.

*Soils and mineralization:* Soils - characters, formation, classification and major soil types of the world; soil quality assessment and factors affecting soil quality; mineralization, litter dynamics and biological management of soil fertility.

## **Pollution and Climatic Change**

Air, water, soil and noise pollution; bioremediation; Environment Impact Assessment; global warming and climatic change.