



MCC Department of Botany

**Paper 10 a ECOLOGY, ENVIRONMENT, FORESTRY
AND REMOTE SENSING**

M.Sc. va (Candidates admitted from the academic year 2008-2009)

Core Theory

Paper 10 a ECOLOGY, ENVIRONMENT, FORESTRY AND REMOTE SENSING

M.Sc. va (Candidates admitted from the academic year 2008-2009)

Core Theory

UNIT I

Ecosystem ecology: Structure, function and dynamics. Terrestrial and aquatic ecosystems with special reference to: Tropical moist forests, grasslands, mangroves and deserts. Global habitat classification: World ecosystems (Olsons); Ecoregions of the continents (Bailey), Biogeographical biomes (Udvardy), and Life zone classification (Holridge).

Human modification of ecosystem processes: Interference with food chains and nutrient cycling. Relationship between human perturbations to global cycling of carbon, nitrogen, sulfur and phosphorus and environmental pollution.

UNIT II

Community ecology: Forest community as an interacting system. Synusia in a forest community and their relationship with forest environment. Microclimate and macroclimate. Patterns of species richness in forests and their ecological implications. The concept of climax.

Population Ecology: Growth forms. Human population growth - demographic transition and demographic trap. r-selection and k-selection in species populations. Demography and survivorship curves. Competition exclusion principle - evidences. Plant pollinator guilds and plant-herbivore co-evolution. Secondary metabolites and population structure. Keystone mutualisms.

UNIT III

Plants and Environment: Plant responses to low and high temperature. The principle of limiting factor. Photoenergetic, photocybernetic and photodestructive effects on plants. Global climate change and biodiversity. Habitat fragmentation and mechanism of loss of species. Biodiversity hotspots.

UNIT IV

The Environmental Triad and Pollution: Atmosphere, hydrosphere and lithosphere as resources. Environmental pollution and human health with special reference to India. Atmospheric water and soil pollution. Multiple threats of global warming and stratospheric ozone depletion. Toxic and hazardous substances and environmental health. Basal convention, environmental hotspots, legislation and environmental management and protection in India.

UNIT V

Forestry: Introduction to forestry, their ecology, distribution and extent. Classification of Indian forests by Champion and Seth (1968). An outline of series classification by Gausson *et al* (Gadgil and Meher-Homji, 1990). Biogeographic classification of Rodgers and Panwar (1988). Timber and Non-timber forest products.

Social Forestry and Silviculture: Silviculture of Indian trees (teak and sal). Plantation Forestry, silvipastures. National forest policy and forest conservation act (1980). Forest management and conservation, forestry in India.

UNIT VI

Remote Sensing: Principles of remote sensing. The electromagnetic spectrum. Data acquisition platforms: Aircrafts, LANDSAT, SPOT, ERS, IRS, INSAT. Sensors: Visible, infrared and microwave (RBV, MSS, TM, ETM, MICROWAVE, WiFS, AVHARR, LISS & PAN Systems). Resolution. Data acquisition and interpretation. Data products: Photographs and False colour satellite imageries, CCT. Principles of visual interpretation, Digital analysis and ground truth. Stereo viewing, CCD's..

Applications of remote sensing: Forest estimation and vegetation studies. Applications in agriculture, water resources, geology and geomorphology, environment, coastal and ocean management, land use mapping and planning. GIS. Indian Remote Sensing Programme and future perspectives in remote sensing.

Suggested Reading

- BEGON, M., J.L. HARPER, AND C.R. TOWNSEND. 1990. Ecology: Individuals, Population and Communities. Second edition. Blackwell Scientific Publications. London.
- CURREN, P. 1983. Principles of Remote Sensing. ELBS Edition, U.K.
- INDIAN ACADEMY OF SCIENCES. 1996. Current Science. Vol.70. No.7.
- GADGIL, M., D. PRESTON, AND P.R.S. RAO. 1995. A Comprehensive Framework for nurturing Practical Ecological Knowledge. Centre of Ecological Studies, Indian Institute of Science, Bangalore, India.
- GADGIL, M AND MEHER-HOMJI. 1990. 'Ecological Diversity'. In J.C. Daniel and J.S. Serrao: Conservation in Developing Countries: Problems and Prospects. BHS and Oxford Univ. Press, Bombay.
- GATES, D.M. 1980. The Biophysical Ecology. Springer - Verlag, New York.
- HAYNES, R. 1982, 1992. Environmental Science Methods. Chapman and Hall Ltd. New York.
- JACOBS, M. 1981. The Tropical Rain Forest: A First Encounter. Springer - Verlag, London.
- KAUFMAN, D.G., AND M.F. CECILIA. 1993. Biosphere 2000: Protecting our Global Environment. Harper Collins College Publishers. New York.
- KORMONDY, E. 1989. Basic Concepts of Ecology. Third Edition. Prentice - Hall of India, New Delhi.
- KOTHARI, A. 1997. Understanding Biodiversity - Life, Sustainability and Equity. Tracts for the times. Orient Longman, New Delhi.
- LARCHER, W. 1983. Physiological Ecology of Plants. Springer - Verlag, New York.
- LEVINE, J.S., AND R.M. KENNETH. 1992. Biology: Vol.1. Core Concepts. D.C. Heath and Company, Lexington, U.S.A.
- ODUM, E.P. 1978. Fundamentals of Ecology. Third Edition. Saunder's International Students Edition. Philadelphia, U.S.A.

- PURI, G.S., V.M. MEHER-HOMJI, R.K. GUPTA, AND S. PURI. 1983. Forest Ecology. Vol.1. Oxford & IBH Publishing Co. New Delhi. India.
- RAMPAL, K.K. Text Book of Photogrammetry. Oxford & IBH Publishing Co. New Delhi. India.
- SALISBURY, F.B. AND C.W. ROSS. 1986. Plant Physiology. Third Edition. CBS Publishers and Distributors. New Delhi. India.
- WILSON, E.O. 1993. Biodiversity. National Academic Press. Washington DC.
- WORLD CONSERVATION MONITORING CENTRE. 1992. Global Biodiversity: Status of the Earth's Living Resources. Chapman and Hall. London.
- WWF AND IUCN. 1994-1995. Centres of Plant Diversity: A Guide and Strategy for their Conservation. Volume 1-3. IUCN Publication Unit. Cambridge. UK.
- WYMAN, R.L. 1991. Global Climate Change and Life on Earth. Routledge. Chapman and Hall Inc. New York.