

**DEPARTMENT OF ENVIRONMENTAL STUDIES
UNIVERSITY OF DELHI**

Environmental Studies*
(Six-month Module for Undergraduate Courses)

Unit 1 : Introduction to environmental studies

- Multidisciplinary nature of environmental studies
- Scope and importance
- Need for public awareness.

(2 lectures)

Unit 2 : Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Energy flow in an ecosystem: food chains, food webs and ecological pyramids.
- Ecological succession.
- Case studies of the following ecosystems :
 - a) Forest ecosystem
 - b) Grassland ecosystem
 - c) Desert ecosystem
 - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit 3 : Natural Resources : Renewable and Non-renewable Resources

- Land resources and land use change : Land as a resource, land degradation, landslides (natural & man-induced), soil erosion and desertification.
- Forests & forest resources : Use and over-exploitation, deforestation, case studies.
- Impacts of deforestation, mining, dam building on environment, forests, biodiversity and tribal populations.
- Resettlement and rehabilitation of project affected persons; problems and concerns, case studies
- Water resources: Use and over-exploitation of surface and ground water, floods, drought, conflicts over water (international & inter-state).
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

(8 lectures)

Unit 4 : Biodiversity and Conservation

- Levels of biological diversity : genetic, species and ecosystem diversity.
- Biogeographic zones of India
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational values
- Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity : Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions.
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

(8 lectures)

Unit 5 : Environmental Pollution

- What is environmental pollution and its types?
- Causes, effects and control measures of :
 - a) Air pollution

- b) Water pollution – freshwater and marine
- c) Soil pollution
- d) Noise pollution
- e) Thermal pollution
- Nuclear hazards and human health risks
- Solid waste management : Control measures of urban and industrial waste.
- Role of an individual in prevention of pollution.
- Pollution case studies.

(8 lectures)

Unit 6 : Environmental Policies & Practices

- Concept of sustainability and sustainable development.
- Water conservation & watershed management.
- Climate change, global warming, acid rain, ozone layer depletion.
- Disaster management : floods, earthquake, cyclones and landslides.
- Wasteland reclamation.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Environment: rights and duties.

(7 lectures)

Unit 7 : Human Population and the Environment

- Population growth, demographic variation among nations.
- Environment, human health and welfare; infectious and lifestyle diseases in contemporary world.
- Value Education: Environmental ethics.
- Environmental communication and public awareness, case studies.

(6 lectures)

Unit 8 : Field work

- Visit to an area to document environmental assets river/ forest/ grassland/ hill/ mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

(Equal to 5 lectures)

Suggested Further Readings:

- 1 Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.
- 2 Carson, Rachel. 1962. Silent Spring (Boston: Houghton Mifflin, 1962), Mariner Books, 2002
- 3 Cheney, J. 1989. Postmodern environmental ethics. *Environmental Ethics* 11: 117-134.
- 4 Economy, Elizabeth. 2010. The River Runs Black: The Environmental Challenge to China's Future.
- 5 Gadgil, M. & Ramachandra, G. 1993. *This fissured land: an ecological history of India*. Univ of California Press.
- 6 Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
- 7 Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Development.
- 8 Environment and Security. Stockholm Environmental Institute, Oxford University Press.
- 8 Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of conservation biology.

Sunderland: Sinauer Associates, 2006.

- 9 Grumbine, R. Edward, and Pandit, M.K. Threats from India's Himalaya dams. *Science* 339.6115 (2013): 36-37.
- 10 Heywood V.H. & Watson, R.T. 1995. *Global Biodiversity Assessment*. Cambridge University Press.
- 11 McCully, P. 1996. *Silenced rivers: the ecology and politics of large dams*. Zed Books.
- 12 McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
- 13 Norton, B. G. 1984. Environmental ethics and weak anthropocentrism. *Environmental Ethics* 6: 131-148.
- 14 Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
- 15 Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic press, 2011.
- 16 Philander, S. George (Ed.). (2012). *Encyclopedia of global warming & climate change*. (2nd ed., Vols. 1-3). Thousand Oaks, CA: SAGE Publications, Inc.
- 17 Rao MN and Datta AK, 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
- 18 Raven, P.H., David M. H., & Linda R. B. *Environment*. De Boeck, 2009.
- 19 Reaka-Kudla, Marjorie L., Don E. Wilson, and Edward O. Wilson, eds. 1996. *Biodiversity II: understanding and protecting our biological resources*. Joseph Henry Press.
- 20 Ricklefs, R. E., & Miller, G.L. 2000. *Ecology*. W. H. Freeman, New York.
- 21 Robbins, P. 2012. *Political ecology: A critical introduction*. John Wiley & Sons.
- 22 Rosencranz, A., Divan, S. & Noble, M.L.. *Environmental law and policy in India*. 2001. Tripathi 1992.
- 23 Rothmun, H.K. 1998. *The Greening of a Nation? Environmentalism in the United States since 1945*.
- 24 Sengupta, R. 2003. *Ecology and economics (OUP): An approach to sustainable development."* OUP Catalogue.
- 25 Singh, J.S., Singh, S.P. and Gupta, S.R. 2006. *Ecology, Environment and Resource Ecology, Environment and Resource Conservation*. Anamaya Publishers.
- 26 Sodhi, N.S., Gibson, L. & Raven, P.HG. (eds). 2013. *Conservation biology: voices from the Tropics*. John Wiley & Sons.
- 27 Thapar, V. 1998. *Land of the Tiger: A Natural History of the Indian Subcontinent*.
- 28 Van Leeuwen, C. J., & Vermeire, T. G. 2007. *Risk assessment of chemicals*.
- 29 Warren, C.E. 1971. *Biology and water pollution control*.
- 30 Wilson, E. O. 2006. *The creation: An appeal to save life on earth*. New York: Norton.
- 31 World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford University Press.

***Note:** The course is uploaded as sent by the Department concerned. The scheme of marks and number of periods/lectures will be determined by the University and will be corrected in the syllabus according to Academic Council and Executive Council Minutes (dated 19th July 2014) and guidelines framed by the Course Implementation Committee, University of Delhi. Editing, typographical changes and formatting will be undertaken further.

Undergraduate Programme Secretariat