EVS VA 1210: ENVIRONMENTAL SCIENCE - I

Credit: 2 (L-2: T-0:P-0) **Theory Lectures:** 20 hours

COURSE OBJECTIVES

The course prime objective of the course is to provide students with a solid foundation in environmental science by covering Human and environment, Natural resources biodiversity and our ecosystem It encourages students to analyse environmental problems critically and to develop effective problem-solving skills.

COURSE LEARNING OUTCOME

After completing this course students will be able to:

- Appreciate the historical context of human interactions with the environment.
- Gain insights into the international efforts to safeguard the Earth's environment and resources.
- Understand the concept of natural resources; identify types of natural resources, their distribution and use with special reference to India.
- Discuss the factors affecting the availability of natural resources, their conservation and management.
- Explain sustainable development, its goals, targets, challenges and global strategies for sustainable development.
- develop a critical understanding of the environmental issues of concern
- understand the concepts of spatial and temporal scales and their importance
- understand the sectoral effects on the local, regional, and global environmental issues
- Understand the concepts of ecosystems, biodiversity and conservation.
- Describe the main types of ecosystems and their distribution in India and the world.
- Discuss the factors impacting biodiversity loss and ecosystem degradation in India and
- the world.
- Explain major conservation strategies taken in India

BROAD CONTENTS OF THE COURSE

- Humans and the Environment:
- Natural Resources and Sustainable Development
- Environmental Issues: Local, Regional and Global
- Conservation of Biodiversity and Ecosystems

SKILLS TO BE LEARNED

- To analysis the various environment issues and its effect on human civilization.
- To preserve our environment in terms of pollution

DETAILED CONTENTS OF THE COURSE

MODULE 1

Humans and the Environment:

The man-environment interaction: Humans as hunter-gatherers; Mastery of fire; Origin of agriculture; Emergence of city-states; Great ancient civilizations and the environment; Middle Ages and Renaissance; Industrial revolution and its impact on the environment; Population growth and natural resource exploitation; Global environmental change.

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The emergence of environmentalism: Anthropocentric and eco-centric perspectives (Major thinkers); The Club of Rome- Limits to Growth; UN Conference on Human Environment 1972; World Commission on Environment and Development and the concept of sustainable development; Rio Summit and subsequent international efforts.**(5 Hours)**

Natural Resources and Sustainable Development:

Overview of natural resources: Definition of resource; Classification of natural resources- biotic and abiotic, renewable and non-renewable. ***Biotic resources:*** Major type of biotic resources- forests, grasslands, wetlands, wildlife and aquatic (fresh water and marine); Microbes as a resource; Status and challenges. ***Water resources:*** Types of water resources- fresh water and marine resources; Availability and use of water resources; Environmental impact of over-exploitation, issues and challenges; Water scarcity and stress; Conflicts over water. Water resources in North-East India. ***Soil and mineral resources:*** Important minerals; Mineral exploitation; Environmental problems due to extraction of minerals and use; Soil as a resource and its degradation. ***Energy resources:*** Sources of energy and their classification, renewable and non-renewable sources of energy; Conventional energy sources- coal, oil, natural gas, nuclear energy; non-conventional energy sources- solar, wind, tidal, hydro, wave, ocean thermal, geothermal, biomass, hydrogen and fuel cells; Implications of energy use on the environment. ***Sustainable development:*** Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs, Natural resources potential in North East India **(5 Hours)**

MODULE 2

Environmental Issues: Local, Regional and Global (5 Hours)

Environmental issues and scales: Concepts of micro, meso, synoptic and planetary scales; Temporal and spatial extents of local, regional, and global phenomena. ***Pollution:*** Types of Pollution- air, noise, water, soil, municipal solid waste, hazardous waste; Trans-boundary air pollution; Acid rain; Smog. ***Land use and Land cover change:*** land degradation, deforestation, desertification, urbanization. Biodiversity loss: past and current trends, impact. Global climate change: Ozone layer depletion; Climate change. Disasters – Natural and Man-made (Anthropogenic)

Conservation of Biodiversity and Ecosystems: (5 Hours)

Biodiversity - definition, Biodiversity as a natural resource, Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots; Species and ecosystem threat categories.

Ecosystems and ecosystem services: Major ecosystem types in India and their basic characteristics forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services- classification and their significance. Threats to biodiversity and ecosystems: Land use and land cover change; Commercial exploitation of species; Invasive species; Fire, disasters and climate change. ***Conservation policies:*** in-situ and ex-situ conservation approaches; Major protected areas in India; National and International Instruments for biodiversity conservation; the role of traditional knowledge, concept of biodiversity related IPR.

MODULE 3

Case Studies and Field Work:

(20 of Marks of the course is to be based on this Module)

In this module, the students have to be engaged in one activity on of the category listed below and they have to submit a report on the activity he/she has done.

Ecological Surveys: Students may conduct ecological surveys in various habitats, such as forests, wetlands, or coastal areas. They learn to identify different species, assess biodiversity, measure environmental parameters, and understand the ecological dynamics of the area.

Water Quality Assessment: Students may collect water samples from rivers, lakes, or groundwater sources to assess water quality parameters such as pH, dissolved oxygen,

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turbidity, and nutrient levels. They learn about water pollution sources, the impacts on aquatic ecosystems, and potential remediation strategies.

Air Pollution Monitoring: Students may measure air quality in urban or industrial areas using air quality monitoring equipment. They learn about the sources and impacts of air pollution, analyze data, and explore strategies for air pollution control.

Environmental Impact Assessment: Students may engage in conducting environmental impact assessments for development projects. They learn to evaluate potential environmental impacts, identify mitigation measures, and consider the social and ecological consequences of different development options.

Waste Management and Recycling: Students may visit waste management facilities, recycling centers, or landfill sites to understand waste management practices. They learn about waste generation, recycling processes, waste treatment technologies, and the importance of waste reduction and resource conservation.

Restoration Projects: Students may participate in ecological restoration projects, such as reforestation, wetland restoration, or habitat enhancement. They learn about the importance of ecosystem restoration, restoration techniques, and the role of ecological succession.

Environmental Policy Analysis: Students may analyze and evaluate environmental policies and regulations at the local, national, or international levels. They learn to assess policy effectiveness, identify gaps, and propose recommendations for improved environmental governance.

Community Engagement and Environmental Awareness: Students may collaborate with local communities, NGOs, or government agencies to raise environmental awareness and promote sustainable practices. They may organize community clean-up campaigns, tree plantations, or awareness workshops.

TEXT BOOKS

1. Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education, Erach Bharucha, (https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf)
2. Perspectives in Environmental Studies are authored by eminent environmental scientists Dr. Anubha Kaushik and Dr. C.P. Kaushik, NEW AGE International Publishers.

REFERENCE BOOKS

1. Fisher, Michael H. (2018) An Environmental History of India- From Earliest Times to the Twenty-First Century, Cambridge University Press.
2. Headrick, Daniel R. (2020) Humans versus Nature- A Global Environmental History, OxfordUniversity Press.
3. Hughes, J. Donald (2009) An Environmental History of the World- Humankind's Changing
4. Role in the Community of Life, 2nd Edition. Routledge.Perman, R., Ma, Y., McGilvray, J., and Common, M. (2003) Natural Resource and Environmental Economics. Pearson Education.
5. Simmons, I. G. (2008). Global Environmental An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning.
6. Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future.10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson.
7. John W. Twidell and Anthony D. (2015). Renewable Energy Sources, 3rd Edition, Weir Publisher(ELBS)
8. William P.Cunningham and Mary A. (2015) Cunningham Environmental Science: A Global Concern, Publisher (Mc-Graw Hill, USA)
9. Gilbert M. Masters and W. P. (2008). An Introduction to Environmental Engineering and Science, Ela Publisher (Pearson)

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10. Singh, J.S., Singh, S.P. & Gupta, S.R. 2006. Ecology, Environment and Resource Conservation. Anamaya Publications https://sdgs.un.org/goals
11. Harper, Charles L. (2017) Environment and Society, Human Perspectives on Environmental Issues 6th Edition. Routledge.
12. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley- Blackwell. 3. William P. Cunningham and Mary A. (2015). Cunningham Environmental Science: A global concern, Publisher (Mc-Graw Hill, USA)
13. William P. Cunningham and Mary A. (2015). Cunningham Environmental Science: A global concern, Publisher (Mc-Graw Hill, USA)
14. Manahan, S.E. Environmental Chemistry (11th ed.). CRC Press. https://doi.org/10.1201/9781003096238
15. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press.
16. Bawa, K.S., Oomen, M.A. and Primack, R. (2011) Conservation Biology: A Primer for South Asia. Universities Press.
17. Sinha, N. (2020) Wild and Wilful. Harper Collins, India.
18. Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022)Conservation through Sustainable Use: Lessons from India. Routledge.
19. Bhagwat, Shonil (Editor) (2018) Conservation and Development in India: Reimagining Wilderness, Earthscan Conservation and Development, Routledge.
20. Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK

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