National Curriculum
Environmental Studies
Grades IX-X

GOVERNMENT OF PAKISTAN
MINISTRY OF EDUCATION
ISLAMABAD

(Developed under Environmental Education Promotion at School and College level project funded by Swiss Agency for Development and Cooperation through UNDP)
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ENVIRONMENTAL EDUCATION

"Environmental Education is a learning process that increases people's knowledge and awareness about the environment and associated challenges; develops the necessary skills and expertise to address these challenges and fosters attitudes, motivations and commitments to make informed decisions and take responsible actions".

(The Belgrade Charter and the Tbilisi Declaration, the definition resulted from two United Nations conferences held in 1977)
PREFACE

Pakistan National Conservation Strategy approved by the Federal Cabinet in 1992 emphasized the need for making efforts to strengthen and to reinforce the educational curricula at all levels so as to develop educated believers and practitioners of sustainable development. The strategy also outlined policies and measures for incorporating environmental education both in formal and non-formal sectors. Ministry of Education, therefore, undertook the initiative of integrating environmental education concepts in curriculum, textbooks and teacher education and training.

For this purpose, an Environmental Education Promotion at School and College level project was jointly designed by the Curriculum Wing, Ministry of Education and the Ministry of Environment under the auspices of National Environmental Action Plan-Support Program with a view to address the issue of lack of environmental awareness and education in Pakistan. The project envisaged and completed different activities including a Situational Analysis Study on the state of environmental concepts within the curriculum and textbooks, and development of age appropriate environmental concepts to be incorporated in the curriculum and textbooks at various levels.

Curriculum Wing Ministry of Education, in line with the recommendations of the Situational Analysis Study proposed the incorporation of a new subject namely “Environmental Studies IX-X” in the new Scheme of Studies 2006 as an elective subject for Humanities Group. The project followed the existing policy and procedures of the government and consulted all the stakeholders at the national and provincial levels while developing the draft curriculum for the new subject. Six workshops at provincial and federal level were conducted with all the stakeholders and experts on environmental education curriculum development, the draft was circulated to the provinces and regional education departments and the curriculum for Environmental Studies IX-X was finalized in the light of input and feedback of four provinces, FANA and AJK.

The draft curriculum has been divided under the broad themes of environmental education. The concepts of sustainable development with inclusion of topics of environmental conservation have also been incorporated in the curriculum. It is hoped that these broad outlines will serve as the basis for future development of the textbooks and teacher training material.

Financial inputs from Swiss Agency for Development and Cooperation and support for the project by UNDP are gratefully acknowledged. The contributions of the focal persons and experts of the four provinces, FANA and AJK in the development and finalization of this curriculum of national importance are appreciated. Any suggestions for the improvement of this effort would be welcomed.

(Arif Majeed)
National Project Director/
Joint Educational Adviser
Curriculum Wing, Ministry of Education
INTRODUCTION:

Environmental Education is a multi-disciplinary approach to learning that develops the knowledge, attitudes, values and skills for enabling the students to contribute towards maintaining and improving the quality of the environment in general and quality of life in particular. The concepts related to environment and its associated issues although have been integrated and infused in various disciplines such as languages, social sciences, physical sciences and natural sciences for grades I-XII but introduction of Environmental studies as an elective subject at secondary level will indeed provide an opportunity to have a coherent, comprehensive and in-depth understanding of the issues related to environment and to move further towards acquiring a professional approach to address these issues.

Working towards a sustainable future requires planned production of goods and services to meet the human needs together with more fair distribution of resources. In other words, the need of the hour is an education that prepares students not only to learn how to reduce the harmful effects of industry and new technology but also to challenge company policies that are harmful to people and the environment. Moreover, education should induce individuals to stop programs which are inappropriate and damaging, reduce over-consumption and waste, reduce population growth-rate, distinguish clearly between wishes and needs, and organize locally; nationally and internationally for appropriate changes.

Environmental studies should, therefore, be interdisciplinary and holistic in nature, with a focus on the learning process which has a socially critical approach to learning that recognizes the importance of changing both individual and society. Thus, a more broad and balanced menu of curriculum, textbooks, teacher resource materials and programs need to be developed to install skill development, citizen participation, the courage to admit and bear the pain of the present world, whilst at the same time keeping a steady eye on the vision of a better tomorrow.
RATIONALE

Environmental Education is one of the most powerful tools for providing awareness and knowledge and for modifying human behavior towards the environment. It is indeed our duty that a holistic civic awareness and sense of responsibility be laterally embedded into the curriculum for improving the quality of life and for producing effective policy makers of the future.

Environmental studies provides the opportunity for students to understand the structure, function and diversity of natural ecosystems on this planet and evaluate the impacts of human activities on them. It provides ways and means to examine strategies to maintain and protect the ecological health of the environment while meeting the needs and desires of human populations.

Environmental studies investigates the interactions between natural and human systems. It examines the application of knowledge to ecologically sustainable development and environmental management. Students thus can understand the values and attitudes that underpin environmental decisions and reflect on effective ways for modifying behavior of individuals and groups for positive environmental outcomes.
DOCUMENTS CONSULTED

Critical study of the following international curricula and related documents was carried out during the process of formulating the themes and structuring the units of National Curriculum for Environmental studies at grades IX- X.

1. The Gazette of Pakistan
   Extraordinary
   Published by authority
   Islamabad, Saturday, December 6, 1997

2. Victorian Certificate of Education;
   Environmental Science Curriculum,
   Victorian Curricula & Assessment Authority 2004, 41-St. Andrews Place, East Melbourne, Victoria
   - www.vcaa.vic.edu.au

3. Tennessee State Board of Education;
   Secondary Science Course on Environmental Science
   - www.state.tn.us/sbe/

4. The Ministry of Education & Training, Ontario;
   Environmental Studies Curriculum (grade 9 & 10)
   - www.edu.gov.on.ca

5. Needham Public School;
   Curriculum on Environmental Science (grade 9 & 10)
   - www.needham.k12.ma.us/

6. The National Academies Press USA;
   Science; Personal and Social Perspectives
   Science Content Standards (grade 9 & 10)
   - www.nap.edu/readingroom/
7. Public Schools and North Carolina, State Board of Education;
   Earth and Environmental Science (grade 9 to 12) Standard Course of Study
   - www.ncpublicschools.org/

8. The Department of Education, Georgia;
   Performance Standards of Environmental Science (grade 9 & 10)
   - www.doe.k12.ga.us/

9. Ontario Elementary Curriculum, Canada
   - www.edu.gov.on.ca/eng/

10. Cambridge overseas A' level Examination System for Environmental Physics
    - www.cambridge.org/series/sSeries.asp?code=CIE

11. Situational Analysis Study report on the Environmental Education in Pakistan, (conducted by the Curriculum Wing Ministry of Education and UNDP) was studied for findings and recommendations about the inclusion of Environmental Education in the existing curricula of Pakistan. The study sorts out the specific areas of Environmental Education and aligns them in specific classes' curricula. From the recommendations, mentioned in the report, about the inclusion of these areas in existing curricula, guidance was sought that helped a lot in the identification of subject areas to be assembled as a separate subject in the form of Environmental Studies for classes IX-X.
    - www.undp.org.pk/

12. Newspaper articles / reports / news were collected to ensure a reflexive involvement of stakeholders' opinions.

13. Consultations were held with the professionals from all the provinces, Azad Jammu and Kashmir, FATA, FANA, Ministry of Environment, and CSOs.
CURRICULUM DESIGN

The curriculum is designed to emphasize less on purely factual material and greater on the understanding and application of concepts and principles related to environment. This approach has been adopted in recognition of the need for students to develop skills in investigation/field survey/ work, report writing, research and analysis that will be of long term value in an increasingly technological world.

The curriculum has been built on the format of Standards and Benchmarks, as defined in the national curriculum framework. In order to specify the syllabus as precisely as possible and also to emphasize the importance of higher order abilities and investigation skills/library/field work other than recall, learning outcomes have been used throughout. Each chapter of the curriculum initiates by an overview of the chapter then it includes content section / major concepts followed by detailed learning outcomes. The intended level and scope of treatment of content is defined by the stated learning outcomes with easily recognizable domains of (i) recalling (ii) understanding (iii) applying (iv) analyzing (v) evaluating (vi) and creating.

Under the subhead “Application/Inquiry/Research/Communication and Graphic Skills”, observing, recording, interpreting/analyzing, predicting, communicating abilities and investigative skills are expected to be developed through related investigations, activities and field work.

The relevance and significance of the concepts to student’s everyday life and to the natural and man-made world is given under the subhead “environment and society connections”. This section preferably be delivered through novel questions or activities based on real life experiences. The activities / applications which are slightly of higher level may be tackled through guided inquiry approach.

Chapter-wise weightage and time allocation for each chapter has been proposed. Assessment pattern has also been included in the curriculum document.
STANDARDS, BENCHMARKS AND LEARNING OUTCOMES

STANDARDS are what students should know and be able to do. They are broad descriptions of the knowledge and skills students should acquire at a particular age group. The knowledge includes the important and enduring ideas, concepts, issues, and information. The skills include the ways of thinking, working, communication, reasoning, and investigating that characterize a subject area. Standards emphasize interdisciplinary themes as well as concepts in the core academic subjects. Standards are based on higher order thinking, deep knowledge, substantive conversation, and connections to the society beyond the classroom.

BENCHMARKS indicate what students are expected to know and be able to do at various developmental levels in a specific subject/discipline.

LEARNING OUTCOMES indicate what students should know and be able to do for each topic in any subject area at the appropriate developmental level. The learning outcomes sum up the total expectations from the student.

When someone reads the learning outcomes of the domain of skills together with the learning outcomes of the domain of understanding, the reader finds the breadth and depth of coverage expected. The standards and the accompanying benchmarks will assist in the development of comprehensive curriculum, foster diversity in establishing high quality learning outcomes, and provide an accountability tool to individuals involved in the education marketplace. These provide a common denominator to determine how well students are performing and also assure that all students are evaluated on the basis of same knowledge and skills while using the same method of assessment.
STANDARDS AND BENCHMARKS
ENVIRONMENTAL STUDIES IX-X

1. Using knowledge

Students of Environmental Studies are better able to understand and appreciate the living and nonliving environment around them and are also better able to make informed decisions and take responsible actions. Activities that need a learning thought include the description and explanation of the environment; the prediction of the future events on our earth; and design of action that help individuals adapt to and modify (for better) the environment.

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<td>The students will be able to:</td>
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<tr>
<td>• understand the nature of the environmental studies, the planet earth</td>
<td>1. understand the aims and objectives of the environmental studies, the</td>
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<tr>
<td>with its ecosystems, resources, population dynamics, pollution,</td>
<td>planet earth, its ecosystems and resources.</td>
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<td>environment degradation and management, biodiversity, social changes,</td>
<td>2. understand the population dynamics, pollution, environmental degradation,</td>
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<td>quality of life, and environmental issues.</td>
<td>and its relation with the quality of life.</td>
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<td>3. understand the importance of biodiversity and the behavior patterns of</td>
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<td>human beings.</td>
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<td>4. understand global and regional environmental issues and the strategies</td>
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<td>adopted to address these issues</td>
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<td>The students will be able to:</td>
<td>The students will:</td>
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<tr>
<td>• understand the investigative processes; identify the problems; design</td>
<td>1. observe and identify the root causes that are devastating the</td>
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<td>and conduct surveys; and communicate their findings.</td>
<td>environment on global and regional level.</td>
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<td>2. design and conduct surveys to investigate different types of pollution</td>
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<td>and environmental degradation in their local vicinities.</td>
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<td>3. communicate the findings and present the data about the human</td>
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<td>population dynamics and other related issues in graphical forms and</td>
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<td>evaluate graphs.</td>
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2. Constructing new Knowledge
The students of Environmental Studies possess the ability to ask questions about environment and find solutions to problems by using their knowledge. In the process of finding solutions, students may use their own knowledge and reasoning abilities, search out additional knowledge from other sources, and engage in the investigation by interpreting text, graphs, tables, pictures, or other representations of the data of environmental studies. Students will thus remember key points and use sources of information to reconstruct the previously learned knowledge.

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<td>The students will be able to:</td>
<td>The students will:</td>
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<tr>
<td>• display a sense of curiosity and wonder about the environment and demonstrate an increasing awareness that environmental study has led to new developments</td>
<td>1. display a sense of curiosity, based on observation, and generate questions about the environment.</td>
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<td>2. demonstrate an increasing awareness that environmental studies has led to new developments.</td>
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<td>3. evaluate the strengths and weaknesses of claims, arguments or environmental data.</td>
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<td>4. develop an awareness of and sensitivity about the impacts of environmental degradation.</td>
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3. Reflecting Knowledge
The students of Environmental Studies are able to analyze and reflect on their own knowledge.

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<th>Standards</th>
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<tr>
<td>The students will be able to:</td>
<td>The students will:</td>
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<tr>
<td>• demonstrate an understanding of the impact of the study of environment on society, identify problems and effectively address them in their personal, social and professional lives.</td>
<td>1. demonstrate an understanding of the impact of the study of environment on society</td>
</tr>
<tr>
<td></td>
<td>2. identify problems and effectively address them in their personal, social and professional lives.</td>
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AIMS AND OBJECTIVES

AIMS:
The curriculum of Environmental Studies at grade IX-X level aims to help individual students to:

- promote awareness about ecological systems, their interrelationship and biodiversity and its role in nature;
- develop understanding, skills and attitudes necessary to address environmental issues;
- develop sensitivity and concern for the environment so that they can actively participate in efforts towards solving environmental issues of the community;
- examine the impacts of human intervention on ecosystems and investigate ways to minimize them;
- develop an attitude of responsible and productive citizenship including respect for the environment and commitment to the wise use of resources.

OBJECTIVES:

a. **AWARENESS**: to help students acquire awareness and sensitivity to the total environment and its allied problems.

b. **KNOWLEDGE**: to help students acquire a basic knowledge and understanding of the environment, active participation in its improvement and resolution of its associated problems.

c. **PARTICIPATION (APPLYING KNOWLEDGE)**: to provide students with an opportunity to be actively involved at all levels in working towards resolution of the environmental problems.

d. **SKILLS**: to help students acquire the skill for identifying and solving environmental problems.

e. **ATTITUDE**: to help students acquire a set of values and feelings of concern for the environment and motivation for active participation in the activities regarding environmental improvement and protection.
CONTENTS

ENVIRONMENTAL STUDIES

Grade IX

1 NATURE OF THE ENVIRONMENTAL STUDIES
   ◦ 1.1 Environmental studies
   ◦ 1.2 Introduction to environment
   ◦ 1.3 Need and importance of environmental education
   ◦ 1.4 Historical background of environmental education at global level
   ◦ 1.5 Environmental education and management at national level

2 OUR PLANET - EARTH
   ◦ 2.1 Earth as part of the Solar System
   ◦ 2.2 Earth … the only planet that can support life
   ◦ 2.3 Introduction to Spheres of Earth
      ▶ 2.3.1 Atmosphere
         ▶ 2.3.1.1 Composition
         ▶ 2.3.1.2 Layered Structure (Troposphere, Stratosphere)
      ▶ 2.3.2 Hydrosphere
      ▶ 2.3.3 Lithosphere
      ▶ 2.3.4 Biosphere

3 ECOSYSTEM
   ◦ 3.1 Introduction to Ecology and Ecological Organization – Species, Population, Community and Ecosystem, Humans as part of ecosystem
   ◦ 3.2 Components of Ecosystem: Abiotic and Biotic
   ◦ 3.3 Interactions in Ecosystems – Feeding and non feeding relations
   ◦ 3.4 Flow of material and energy in the ecosystem (water, carbon and nitrogen cycles)
3.5 Balance in Ecosystems
3.6 The Concept of Habitat
3.7 Major Aquatic ecosystems and Biomes... Forests, Deserts, Fresh and Marine water (brief introduction)
3.8 Human Intervention in the Natural Ecosystems

4 POPULATION GROWTH, DEVELOPMENT AND ENVIRONMENT
4.1 History of Human Population
4.2 Human Population Growth and its consequences
4.3 Population Dynamics (birth rates, death rates, growth rate, density,
Migration & Urbanization, exponential Growth, concept of Doubling Time)
4.4 Population Projection
4.5 Relationship between Population Growth, Development and Environment

5 AIR, WATER AND LAND POLLUTION
5.1 Definition and Explanation of pollution
5.2 Types of Pollution (air, water, land) and Pollutants –
5.3 Air Pollution
  5.3.1 Sources – fossil fuels combustion, transport, industries
  5.3.2 Impact on human health, animals, plants and environment
  5.3.3 Control measures
  5.3.4 Controlling air pollution
5.4 Water Pollution
  5.4.1 Sources – sewage, municipal, industrial effluents, Agricultural run-off (organic left outs and excreta, fertilizers, pesticides, insecticides)
  5.4.2 Impact on human health, aquatic life and soil
  5.4.3 Reducing Water Pollution and Waste Water Treatment
5.5 Land Pollution
  5.5.1 Solid Wastes
  5.5.2 Sources – Municipal, industrial wastes, Agrochemical, Hospital & Nuclear Wastes
6  **Noise and Radiation Pollution**

- 6.1 Noise Pollution
  - 6.1.1 Sound and Noise
  - 6.1.2 Measuring noise
  - 6.1.3 Classification of noise
  - 6.1.4 Effects of noise
  - 6.1.5 Control of noise pollution

- 6.2 Radiation Pollution
  - 6.2.1 Nuclear radiation; its sources and harmful effects
  - 6.2.2 Radioactive waste disposal

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**ENVIRONMENTAL STUDIES**

*Grade X*

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7  **BIODIVERSITY**

- 7.1 Biodiversity
- 7.2 Importance of Biodiversity – Medicines, Gene source, Wilderness areas
- 7.3 Endangered, Threatened and Extinct Species, with special reference to Pakistan
- 7.4 Causes of loss of Biodiversity – habitat destruction, pollution, hunting & poaching, introduction of Alien species
- 7.5 Conservation of Biodiversity
8 SOCIAL CHANGE IN BEHAVIOR PATTERNS IN RELATION TO ENVIRONMENT

● 8.1 Social Behaviour and Social change
● 8.2 Change in Consumption pattern – from simple living to comforts/ luxuries
● 8.3 Change in Production Pattern – from simple to complex (automation and use of machines)

9 RESOURCE UTILIZATION AND ITS IMPACT ON ENVIRONMENT

● 9.1 National Resources
● 9.2 Nature of Resources and their Importance
● 9.3 Changing needs of societies for Energy and Resources
● 9.4 Utilization of Energy Resources and their Impacts
  ▶ 5.4.1 Energy from Fossil Fuels
  ▶ 5.4.2 Nuclear Energy
● 9.5 Safer sources of Energy – Hydroelectric, Wind, Solar
● 9.6 Mineral resources – Impact on Environment during exploration, treatment and use

10 ENVIRONMENT AND QUALITY OF LIFE

● 10.1 Indicators of quality of life in relation to environment – food, water, health, education, housing, energy, transport
● 10.2 Socio-economic impacts of with reference to human intervention: decline in productivity, loss of employment in deforested, waterlogged and saline areas.
● 10.3 Gender equity and environment
● 10.4 Literacy and environment
### NATIONAL AND GLOBAL ENVIRONMENTAL ISSUES
- 11.1 Deforestation
- 11.2 Desertification
- 11.3 Urbanization
- 11.4 Wetlands and Oceans
- 11.5 Greenhouse Effect and Global Warming
- 11.6 Acid Rain
- 11.7 Ozone Layer Depletion

### ENVIRONMENTAL MANAGEMENT
- 12.1 Sustainability of the environment – wise use of resources, efficient resource utilization, reuse and recycling
- 12.2 Environmental Ethics
- 12.3 Introduction to Environmental Impact Assessment (EIA)
- 12.4 Policies, legislation, and regulatory mechanisms
- 12.5 Civic responsibilities of individuals, communities, CSOs, and Government organizations
Chapter 01

NATURE OF ENVIRONMENTAL STUDIES

Overview:
Environmental Studies investigates the interactions between the natural and human-made systems. While beginning this study, students should have a broad look at the historical as well as the future perspectives of it. They should be aware of the aims, objectives and the scope of environmental studies.

Major concepts
- Environmental studies
- Introduction to environment
- Need and importance of environmental education
- Historical background of environmental education at global level
- Environmental education and management at national level

Conceptual Linkages:
This chapter is built on;
- Environment (Class VIII)

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<th>LEARNING OUTCOMES</th>
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<tr>
<td><strong>Knowledge / Understanding:</strong></td>
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<tr>
<td>The students will;</td>
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<tr>
<td>• describe the meaning of environment with examples;</td>
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<td>• explain environmental studies as an interdisciplinary subject;</td>
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<tr>
<td>• list the objectives of the environmental studies;</td>
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<tr>
<td>• describe the need and importance of environmental studies as a powerful tool to modify human behavior towards the environment;</td>
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<td>• describe in brief the historical perspective of environmental education;</td>
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<tr>
<td>• Make a list of actions taken towards environmental education and management at national level;</td>
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| Application / Inquiry / Research / Communication and Graphic Skills: |
| The students will; |
| • prepare lists of concepts from other disciplines that are related to Environmental Studies; |
| • make chronological chart showing main events in historical perspective of Environmental Studies; |
| • list the careers that the students of environmental studies can adopt; |
| • list some important organizations (UN agencies, CSOs, EPA, and the Government departments) that are working for environmental protection; |
Chapter 02

OUR PLANET - EARTH

Overview:
The earth's structure may be classified into three major categories; hydrosphere, lithosphere and atmosphere. The biosphere consists of the parts of hydrosphere, lithosphere and atmosphere which support life. This area of study examines the diagnostic characteristics of these categories, the processes occurring within the sphere of the earth, and the interactions that occur in and between the ecological components of each major category.

Major concepts
- Earth - as a part of solar system
- Earth - the only planet that can support life
- Introduction to spheres of earth
  (i) Atmosphere (composition and layered structure (troposphere and stratosphere))
  (ii) hydrosphere
  (iii) lithosphere
- Biosphere

Conceptual Linkages:
This chapter is built on;
• Environment (Class VI)

LEARNING OUTCOMES

Knowledge / Understanding:
The students will;
- describe briefly solar system and the importance of earth in solar system;
- describe physical features which enable earth to support life;
- name the spheres of the earth;
- name different layers of the atmosphere;
- describe characteristics of two lower layers i.e. troposphere and stratosphere;
- describe the composition of air.;
- describe the importance of hydrosphere and its two major types;
- discuss characteristics of sea water and fresh water;
- explain why fresh water is a valuable resource for living organisms;
- list sources of fresh water;
- define and explain lithosphere
- describe the importance of lithosphere;
- define biosphere and biomes;
Application / Inquiry / Research / Communication and Graphic Skills:

The students will;

- locate earth in the diagram of the solar system;
- compare the distance of the earth from sun and its size with other planets;
- make a diagram showing thickness of the layers of atmosphere;
- make a library / internet search to estimate the amount of fresh water in comparison to sea water;
- discuss and make a list of water saving practices at home, mosque, mohalla / locality;
- collect soil samples from different places and find out their constituents by mixing them with water;
- predict how changes in the environment might affect the organisms;
- organize a tree plantation campaign in school and discuss how it affects on change in the environment.
Chapter 03
THE ECOSYSTEM

Overview:
The basic concepts of ecology such as ecosystem, population and community serve as key concepts in understanding of environment and environmental problems. When students go through this chapter and perform activities, they will not only clearly understand the basic concepts but also acquire skills to communicate and transfer the knowledge about environment to others more effectively. This chapter focuses on the environment and its components. The function of ecosystems and the interaction in and between the ecological components will be explored.

Major Concepts
- Introduction to ecology and ecological organization -- species, population, community and ecosystem; human beings as part of the ecosystem
- Ecosystem and components of ecosystem -- biotic and abiotic
- Interactions in ecosystem -- feeding and non-feeding relationships
- Flow of materials and energy in the ecosystem (water, carbon and nitrogen cycles)
- Balance in ecosystem
- Habitat
- Major Aquatic ecosystems and biomes -- forests, deserts, fresh and marine water
- Human intervention in the natural ecosystems

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LEARNING OUTCOMES

Knowledge / Understanding
The students will;
- define ecology as the study of the interactions between organisms and their environment;
- describe the levels of ecological organization in terms of population, community, ecosystem and biomes;
- define Ecosystem and explain the position of human beings as a part of ecosystem;
- describe the structure and functions of ecosystems;
- classify the components of ecosystem into abiotic and biotic with examples;
- describe the feeding relations among the biotic components of the ecosystem, in terms of trophic levels, food chains and food webs;
- explain important non-feeding relationships in the ecosystem with examples;
- explain the flow of materials and energy in the ecosystem;
- explain how natural ecosystems are self-regulatory and self-sustained;
- argue that although natural ecosystems are stable yet they have limited capacity to withstand disturbances;
• list human activities that can disturb the intricate balance in the ecosystem;
• describe at least one aspect in which each of the aforementioned activities have contributed in disturbing ecosystem balance;
• explain the effect of human activities on other species;
• define habitat;
• list different types of habitats;
• locate (using map or globe) aquatic ecosystem and the major biomes of the earth (e.g. forests, deserts, fresh water and marine water);
• list and explain at least five ways in which forests are important for human beings;
• explain how forests moderate climatic conditions of an area and protect the environment;
• write down important features and location of major types of forests;

**Application / Inquiry / Research / Communication and Graphic Skills:**
*The students will;*
• draw simple sketches of Water Cycle, Carbon Cycle and Nitrogen Cycle;
• label the parts of a water cycle;
• explore the living organism of a pond, lake or a garden and investigate the interrelationships and interdependence of organisms;
• categorize organisms as producers, consumers, and decomposers;
• trace energy flow diagram in ecosystem;
• prepare a list of human activities which have direct or indirect effects on the ecosystem;
• identify some human activities that can disturb the natural balance;
• select animals or plants indigenous to an environment by examining different pictures;
• prepare a poster that reflects flow of energy in a forest ecosystem;
• draw food chains and food web on the basis of the observations of a pond's or garden's ecosystem.
• locate major biomes on a chart
• record observations from their immediate environment as to how environment has been affected by human actions;
• prepare a report on a visit of a nearby zoo to observe the differences in the habitats of different animals.
Chapter 04

POPULATION GROWTH, DEVELOPMENT AND ENVIRONMENT

Overview:

The students have a concept of populations of organisms, but this chapter enhances their understanding of the relationships among populations within a community and population growth particularly with reference to human population and development.

Population can reach limits to growth. Carrying capacity is the maximum number of individuals that can be supported in a given environment. The limitation is not the availability of space, but the number of people in relation to resources and the capacity of each system to support human beings. Changes in technology can cause signified changes, either positive or negative, in carrying capacity of the earth.

Major Concepts

- History of human population
- Human population growth and its consequence
- Population dynamics (birth rates, death rates, growth rates, density, migration and urbanization, exponential growth, concept of doubling time)
- Population projection
- Relationship between population growth, development, and environment

Conceptual Linkages:

This chapter is built on:
- Environment (Class VI & VIII)

LEARNING OUTCOMES

Knowledge / Understanding:

The students will;
- describe, in terms of figures, the history of human population in global and national perspective;
- describe briefly the growth in the population of Pakistan from 1947 to date;
- describe the terms, linear and exponential population growths;
- identify how the high growth of population has an impact on depletion of natural resources thus reducing carrying capacity;
- define population dynamics and examine the factors affecting human population dynamics;
- explain the following "statistical" attributes of population; natality (birth rates), mortality (death rates), age distribution and sex ratios, and rural-urban migration;
- explain how populations grow or decline through the combined effects of births and deaths, and through emigration and immigration;
- state the influences of various factors, such as levels of affluence and education, health care, child labour, employment of women, costs of raising children, religious beliefs, cultural norms and lack of leisure activities on population growth;
• describe the concepts of carrying capacity and of doubling time and its usefulness to demonstrate the long-term effect of a growth rate;
• explain the concept that number of "human beings" increases at a geometric growth rate but food supply increases at an arithmetic growth rate;
• state the phenomenon of population projection;
• explain how the population projections are useful for planning development strategies;
• describe the links between human population, sustainable development and the environment;
• describe the role of agriculture in relation to human population growth;
• identify the major causes of the population explosion;
• list the ecological consequences of continued population growth;
• identify natural and social factors that limit population growth such as carrying capacity and family planning;
• investigate ways and means to address over population;

▲ Application / Inquiry / Research / Communication and Graphic Skills:

The students will;
• read and interpret a population graph;
• discuss in groups the topics relating to high growth of population and its effects;
• plot a graph of the history of human population growth, giving the years and the population numbers and predict the world population in the next 50 years;
• discuss in groups the relationship of population growth and development in the context of creating healthy environment;
• describe how demographers compute the population projections;
• investigate the relationship between population and economic growth;
• compare population profiles for different countries;
• use Mass Media for developing awareness about population welfare and quality of life;
• collect data on a Questionnaire prepared with the help of teachers to observe features of Population of their area and prepare a brief report;
• prepare population charts/graphs showing year-wise increase in the population of Province / Pakistan as well as comparison of population of various big cities;
• participate in walks on population welfare arranged by community members / education authorities/ CSOs and then write short reports;
• visits to polluted industrial areas, posh areas and slums and then prepare short reports based on observations concerning population size and pollution;
• make charts/ graphs showing Population Projections from the years 1999-2100 and discuss apprehensions regarding sustainable development.
Chapter 05

AIR, WATER & LAND POLLUTION

Overview
Human beings are part of the world's ecosystems. Increasingly, human beings modify ecosystems as a result of population growth, technology, and consumption. Destruction of habitats, pollution, climatic changes, and other factors are threatening current global stability. This area of study examines the concept of pollution, the sources of pollutants and the effects of pollution on the human health and the environment. It advances further understanding of managing the environment to ensure development meet human needs while maintaining ecological integrity of the environment.

Major Concepts
- Definition and explanation of pollution
- Types of pollution (air, water & land) and their pollutants
- Impact on human health
- Control measures for air, water, and land pollution.

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LEARNING OUTCOMES

Knowledge / Understanding:
Air Pollution

The students will:
- define the terms of pollution and pollutants;
- describe how fossil fuel combustion, transport and industries cause air pollution;
- describe adverse effects of smoking not only on smokers but also on passive smokers;
- identify major pollutants and their sources in the environment;
- name and describe weather condition that may aggravate the air pollution problem;
- describe how air pollution is affecting human health, animals and plants;
- identify the sources of indoor air pollution and suggest ways to reduce it.

Application / Inquiry / Research / Communication and Graphic Skills:
The students will:
- observe a busy road / bus-stand and discuss the consequences of poor transport practices on the environment;
- discuss how can one contribute in maintaining or improving air quality on personal and community level;
- synthesize the data related to some kind of pollution in their locality;
- visit a park and an area near some chemical factory, brick kiln, busy motorway and collect leaves from nearby plants and compare physical differences in leaves;
- identify three areas from their locality where air pollution has adverse effects;
- discuss WHO parameters with the recorded air pollution data of different cities of Pakistan collected through library / internet;
Water Pollution

Knowledge / Understanding:
The students will;
- discuss the sewage, industrial effluents, and agricultural runoff as the major causes of water pollution;
- describe the prevailing methods of disposing off wastes;
- describe the impacts of polluted water on human health, agriculture and aquatic life;
- list various water-borne diseases;
- suggest ways and measures to reduce water pollution;

Application / Inquiry / Research / Communication and Graphic Skills:
The students will;
- discuss and identify the types of pollution caused by the fertilizer / cement / paper / factories and tanneries in their locality;
- compare the effluents released by the factories in their locality and suggest to the responsible persons; the proper measures to reduce pollution;
- visit a nearby factory and enquire about the waste treatment methods being used;
- visit the affected sites and write the effects of water logging and salinity.

Land Pollution

Knowledge / Understanding:
The students will;
- describe the municipal, industrial, agrochemicals and hospital wastes as the major factors contributing towards land pollution;
- differentiate between biodegradable and non-degradable materials;
- describe the effects of municipal, industrial and hospital wastes on human health and environment;
- give the most appropriate methods for waste disposal;
- list and describe problems stemming from land filling of refuse and suggest alternatives to land filling;
- list effects of dumping wastes in rivers and seas;
- describe refuse disposal through recycling and composting;
- describe how refuse may be converted to energy and also give the pros and cons of doing this;
- describe importance of soil and its various degradation issues such as water logging, salinity and soil erosion;
- discuss environmental implications of natural disasters e.g., earthquakes, landslides, flood, storms etc.

Application / Inquiry / Research / Communication and Graphic Skills:
The students will;
- discuss and list the general contents of municipal solid wastes;
- discuss the impact of erosion in their locality and suggest remedies;
- prepare a report after observing the situation of solid waste management in their locality;
Chapter 06

NOISE AND RADIATION POLLUTION

Overview:
Noise and Radiation pollutions are a gift of technological era. The harmful effects of noise and radiation are not less than those of air and water pollutions. But their effects are not immediately become visible except those of very high intensity. We need proper care to avoid unnecessary exposure to both noise and nuclear radiations.

Major Concepts
- Sound and Noise
- Measuring noise
- Classification of noise
- Effects of noise
- Control of noise pollution
- Nuclear radiation; its sources and harmful effects
- Radioactive waste disposal

Conceptual Linkages:
This chapter is built on:
- Environment (Class VI - VIII)

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<th>LEARNING OUTCOMES</th>
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<tr>
<td><strong>Noise Pollution</strong></td>
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<tr>
<td>✍ Knowledge / Understanding:</td>
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<tr>
<td><em>The students will;</em></td>
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<tr>
<td>• list the sources of noise pollution and the techniques used to measure noise pollution;</td>
</tr>
<tr>
<td>• differentiate between acceptable and non-acceptable level of noise;</td>
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<tr>
<td>• describe effects of noise pollution on human health and suggest various ways to reduce noise pollution;</td>
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<tr>
<td>✍ Application / Inquiry / Research / Communication and Graphic Skills :</td>
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</tbody>
</table>
| *The students will;*
| • do a simple research in the city / area to identify the quite/ calm and noisy areas ; |
| • conduct a survey to identify the effects of noise pollution on people in their locality and suggest the ways to reduce it; |
| • discuss about noise pollution in the class, and identify different areas of city or locality, which have more noise. |

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<tr>
<th>Radiation Pollution</th>
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<tr>
<td>✍ Knowledge / Understanding:</td>
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<tr>
<td><em>The students will ;</em></td>
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<tr>
<td>• describe the natural and human caused sources of radiations;</td>
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<tr>
<td>• describe the effects of various radiations on human health</td>
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<tr>
<td>• explain different precautionary measures to avoid radiation exposure due to excessive use of cell phones, X-rays, colour T.V./ monitor, Radon Gas etc.;</td>
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<tr>
<td>• describe radioactive waste disposal problem and propose suggestions for safer disposal;</td>
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</tbody>
</table>
Application / Inquiry / Research / Communication and Graphic Skills:

The students will:

- prepare a small report on various radiation sources and their effects;
- collect information from library/internet about the nuclear disasters in the world and their effects;
- make a list of somatic and genetic effects of radiation;
Chapter 07

BIODIVERSITY

Overview:
Diversity in life is an essential part of environmental studies. It becomes also an important indicator for the pro-life or anti-life conditions of an ecosystem. The environmentalists are much concerned about the biodiversity of different regions of the world and are trying to maintain and conserve it.
This area of study examines the concepts of biodiversity and its role in sustaining ecological integrity and the survival of populations. Students will investigate process that threaten biodiversity and examine scientific principles applied in managing biodiversity.

Conceptual Linkages:
This chapter is built on;
- Environment (Class VIII)

Major concepts
- Biodiversity
- Importance of biodiversity
- Endangered, threatened and extinct species with reference to Pakistan
- Causes of the loss of biodiversity
- Conservation of biodiversity (habitat destruction, pollution, hunting and poaching, and introduction of alien species)

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<tr>
<td><strong>Knowledge / Understanding:</strong></td>
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</table>
| *The students will;*
| define the term biodiversity and interrelate it with life conditions of an environment; |
| explain the role of biodiversity in terms of the benefits human beings are getting from different species; |
| describe the recommended criteria to declare particular species as endangered, threatened or extinct; |
| list the animal and plant species referred to as endangered threatened and extinct in Pakistan; |
| explain the causes and factors that contribute to the loss of biodiversity globally as well as in Pakistan; |
| define conservation and explain the need for conservation of bio-diversity; |
| describe some methods of conservation of bio-diversity. |
| **Application / Inquiry / Research / Communication and Graphic Skills:** |
| *The students will;*
| investigate the threats to biodiversity in Pakistan; |
| motivate the people in their community to reduce threats to biodiversity; |
- prepare a small report on possible causes of extinction of various species;
- locate the protected areas of Pakistan on the map;
- write a report on biodiversity after a visit to National Park / Protected Area.
- summarize measures taken for conservation of endangered species of Pakistan.
Chapter 08

SOCIAL CHANGE IN BEHAVIOR PATTERNS IN RELATION TO ENVIRONMENT

Overview:
Human activities for greater production of goods for comfort and luxury can enhance environmental degradation. Extravagant use of resources, urbanization, and improper waste disposal can adversely affect the natural environment. There is a need for human beings to assess potential danger and risk of environmental degradation. Changes in behavior patterns of the human beings can bring benefits to society as well as cause risk. This chapter will provide ideas for debate and activities potentially helpful in making environmental friendly decisions.

Major Concepts:
- Social behaviour and social change
- Change in consumption Patterns – from simple living to comforts / luxuries
- Change in production patterns – from simple to complex (automation and use of machines)

Conceptual Linkages:
This chapter is built on;
- Environment (Class VI & VIII)

LEARNING OUTCOMES

Knowledge / Understanding:
The students will;
- define social behaviour and social change;
- describe the changes in consumption patterns from simple living to luxury food habits, housing, transportation, automation, energy consumption etc.
- explain changes in patterns of production affecting environment.
- appreciate the importance of Islamic teachings regarding healthy and clean environment.

Application / Inquiry / Research / Communication and Graphic Skills:
The students will;
- propose the ways to bring about a change in behavior patterns in relation to environment;
- estimate the effects of changes in life styles on natural resource.
- develop a waste reduction plan to keep a record of how much refuse they generate in a week and separate their trash into paper, glass, plastic, and metals.
- prepare a newsletter based on research on local environmental issues, collecting information from a variety of sources, including printed and electronic media, and community surveys;
- write a report based on observations of general behavior of the people during a visit to the areas where automation of machines and use of chemical pesticides is polluting the environment;
- report about the activities of the local council regarding sanitation, solid waste and sewerage;
Chapter 09
RESOURCE UTILIZATION AND ITS IMPACT ON ENVIRONMENT

Overview:
Since the origin of societies, human beings have been exploring and utilizing energy and natural resources. However, in modern times, the demand for resources has multiplied manifold. The earth does not have infinite resources. Increasing human consumption places severe stress on natural processes that renew some resources and it depletes those resources that cannot be renewed.

Major Concepts
- National resources
- Nature of resources and their importance
- Changing needs of the societies for energy and resources
- Utilization of energy resources and their impacts:
  - Energy from fossil fuels
  - Nuclear energy
- Environment friendly sources of energy – hydroelectric, wind, solar
- Mineral resources – Impact on environment during exploration, treatment and use
- Resource management practices (electricity, oil, gas & coal).

Conceptual Linkages:
This chapter is built on;
• Environment (Class VI - VIII)

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<tr>
<td>Knowledge / Understanding:</td>
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<tr>
<td>The students will;</td>
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<tr>
<td>• define a natural resource;</td>
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<tr>
<td>• identify and make a list of the natural resources of Pakistan</td>
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<tr>
<td>• compare the impacts of different energy resources on the environment (fossil fuels, hydroelectric, wind, solar and nuclear energy)</td>
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<tr>
<td>• explain renewable and non renewable resources and make a list of each;</td>
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<tr>
<td>• describe the patterns of production and consumption;</td>
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<tr>
<td>• explain the wise use of resources in the prosperity and growth of a country</td>
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<td>• explain some resource management functions to conserve resources at individual levels (electricity, oil, gas and coal);</td>
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<td>• explain the daily (peak hour) and seasonal variations in the demand for electrical power;</td>
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<tr>
<td>• discuss in groups the mineral resources availability, their utilization and limitations;</td>
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<tr>
<td>• describe the economic and social aspects of the development and use of hydroelectric, wind and solar energy;</td>
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<tr>
<td>• show an understanding that solar cells produce electrical energy whereas solar panels produce thermal energy;</td>
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<tr>
<td>• discuss the existing mining practices and their impact on environment;</td>
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<tr>
<td>• describe how the modern mineral processing technologies promote more efficient</td>
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and sustainable use of natural resources;

*Application / Inquiry / Research / Communication and Graphic Skills:*

The students will:
- solve a problem related to the production and consumption data i.e. fluorescent vs. incandescent;
- discuss in groups the utilization of energy resources, their types and impacts;
- visit a mine etc (wherever available) for observing the exploration process and prepare a report on the activity;
- make a list of renewable and non-renewable energy sources;
- identify the use of energy/natural resources in school;
- observe and estimate the consumption of energy, water and paper in school and at home;
- discuss the patterns of consumptions in their locality;
- start energy saving practices (comparison of the utility bills on monthly basis) and the students who have saved maximum will make a list of the energy saving practices used by them;
- discuss and list the ways through which their community conserves and wastes resources;
Chapter 10
ENVIRONMENT AND QUALITY OF LIFE

Overview:

Quality of life is influenced by several factors. For instance, Industrialization has increased demand for and use of energy. Quality of life leads to greater consumption of energy and it leads to rapid depletion of natural resources. Excessive use of energy resources is bound to bring about environmental degradation. Factors that students might investigate include resources use, energy consumption, availability of unadulterated food, drinking water, health and sanitation facilities, transport and housing.

Conceptual Linkages:
This chapter is built on;
- Environment (Class VI - VIII)

Major Concepts
- Indicators of quality of life in relation to environment
  (Food, health, education, sanitation, housing, drinking water, transport, energy etc)
- Socio economic impacts with reference to human Intervention, decline in productivity, loss of employment in deforested areas and waterlogged & saline areas
- Gender equity and environment
- Literacy and environment

LEARNING OUTCOMES

Knowledge / Understanding:
The students will:
- explain the following indicators of quality of life in relation to environment – food, drinking water, health, education, housing, sanitation, energy and transport;
- explain the socio-economic impacts of human intervention on productivity and loss of employment in deforested, waterlogged and saline areas;
- describe the change in socio-cultural values in promoting the awareness for healthy environment
- identify the role of females in promoting healthy environment at home;
- describe the role of literate persons in promoting healthy environment;
- elaborate how the common illiterate people may be given orientation about healthy environment through various means of mass media.
Application / Inquiry / Research / Communication and Graphic Skills:

The students will:

- prepare reports after collecting data on survey questionnaire from their homes, neighbours, school and community about the indicators of quality of life e.g. food, water, health, education, housing, sanitation, transport, energy etc.;
- construct techniques to enhance awareness of need for healthy environment among illiterate people;
- use documentary sources in schools to create awareness for various environmental issues among fellow beings;
- prepare reports based on discussions with local councilors / Nazims about the sanitation issues of the area;
- perform role plays comparing the quality of life in healthy and unhealthy environment;
- collect the information from the newspapers and magazines about the growing role of females in promoting healthy environment in the town / city / province.
Chapter 11
GLOBAL AND REGIONAL ENVIRONMENTAL ISSUES

Overview:

This chapter focuses on major ecological issues which provide challenges for the present and future. The consequences on the atmosphere of natural and enhanced greenhouse effect, and other issues and their significance will be analyzed.

Major Concepts
- Deforestation
- Desertification
- Urbanization
- Protection of wetlands and oceans
- Greenhouse effect and global warming
- Acid rain
- Ozone layer depletion

Conceptual Linkages:
This chapter is built on;
- Environment (Class VII)

LEARNING OUTCOMES

1- Deforestation

Knowledge / Understanding:
The students will:
- define deforestation;
- list causes of deforestation;
- identify the causes of deforestation that you think are mostly operative in your locality;
- explain consequences of deforestation;
- elaborate how our Mangrove and Pine forests are threatened;
- differentiate reforestation and a forestation;
- discuss reforestation and a forestation as methods of replenishing forests.

Application / Inquiry / Research / Communication and Graphic Skills:
The students will:
- give a short oral presentation in the school assembly on the consequences of deforestation.
- discuss the problem of deforestation in Pakistan with reference to their locality;
- list, if any, consequences of deforestation vividly observable in their locality;
- gather Information about Juniper forests in Baluchistan and suggest the measures for their protect being a National Heritage;
- actively participate in reforestation campaign organized by the school or the local community;
- write a report on the reforestation activity in their locality;
- identify the important features of Changa Manga and Galliyat Forests.
2- Desertification

Knowledge / Understanding:
The students will;
- define desertification;
- describe the sources which directly or indirectly become the cause of desertification;
- explain the short-term effects and long-term impacts of desertification at local as well as regional / international level;
- suggest the ways to cope with the threat of desertification;

Application / Inquiry / Research / Communication and Graphic Skills :
The Students will;
- collect data from various sources that depict the current situation of desertification in the world;
- prepare a small report after discussions in groups on various aspects of the Issue of desertification.
- locate on the world map the areas in Pakistan where desertification is expanding;

3- Urbanization

Knowledge / Understanding:
The students will;
- define urbanization;
- describe the consequences of faster urbanization with respect to environmental degradation;
- describe the risks for social cohesion for human rights due to urbanization;
- describe trends and causes leading to urbanization at national and global levels;
- explain socio-economic and socio-cultural health problems associated with increasing urban population;

Application / Inquiry / Research / Communication and Graphic Skills :
The Students will;
- prepare a small report after discussions in groups and with peers / elders about various aspects of the Issue of urbanization;
- perform role plays regarding the issue of Urbanization.

4- Greenhouse Effect and Global Warming

Knowledge / Understanding:
The students will;
- describe the factors responsible for heat-trapping effect of carbon dioxide in atmosphere;
- explain how human activities are affecting the level of carbon dioxide in the atmosphere;
- describe greenhouse effect and global warming;
- enlist the probable impacts of global warming on environment, atmosphere, oceans
and biota;
• enlist measures that have been taken to reduce greenhouse gases.

**Application / Inquiry / Research / Communication and Graphic Skills:**
The students will:
• visit a greenhouse in a nearby nursery and write their observations regarding the difference in climate inside and outside the greenhouse;
• suggest ways to mitigate the effect of global warming;
• design a model that represents greenhouse effect and analyse its mechanism;
• make a concept map that demonstrates the interrelation between energy use, human activities and greenhouse gases;
• go far a library / internet research and debate the effectiveness of various options for reducing greenhouse effect such as Kyoto Protocol, increasing energy efficiencies, large scale vegetation etc;

### 5- Acid Rain

**Knowledge / Understanding**
The students will;
• define acid rain;
• name the two major acids involved in acid rain and describe how they are formed;
• describe how acid rain affects aquatic ecosystems and terrestrial ecosystems;
• describe how statues and monuments are being affected by acid rain;
• suggest methods to reduce acid-forming emission;
• explain the importance of protection of our Marine life;

**Application / Inquiry / Research / Communication and Graphic Skills:**
The students will;
• prepare a small report after collecting information from newspapers / magazines / internet on global events which caused Acid Rain effect.

### 6- Wetlands and Oceans

**Knowledge / Understanding:**
The students will;
• define wetlands;
• explain how wetlands are important for biodiversity;
• explain the importance of protection of our marine life;
• describe the major initiatives taken by international community to protect the wetlands.

**Application / Inquiry / Research / Communication and Graphic Skills:**
The students will;
• collect information through library research and Internet about any wetlands in Pakistan and write a short report for presentation in the school assembly;
• discuss in groups various aspects of the Issue and prepare a small report.
# 7. Ozone Depletion

**Knowledge / Understanding:**

The students will:

- describe the nature and importance of the ozone layer and state its formation and breakdown;
- list the sources of chlorine entering the stratosphere;
- identify the effects of ozone layer depletion;
- define CFCs and list their sources;
- elaborate the efforts to cope with depletion of the ozone layer shield;

**Application / Inquiry / Research / Communication and Graphic Skills:**

The students will:

- collect information through library research and internet to find when and where ozone depletion was first observed.
- collect information through library research/ internet, the steps taken to reduce emission of CFCs.
Chapter 12
ENVIRONMENTAL MANAGEMENT

Overview:

Natural ecosystems provide an array of basic processes that affect us. Those processes include maintenance of the quality of the atmosphere, protection of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to them. Many factors influence environmental sustainability: population growth, resource use, population distribution, over consumption, the capacity of technology to solve problems, poverty, the role of economic, political, and religious views, and different ways humans view the earth.

Decisions to slow the depletion of energy sources through efficient technology can be made at many levels, from personal to national, and they always involve trade offs, economic costs and social values.

Legislation, policies and regulatory mechanism have been devised at international and national level from time to time to protect the environment or at least to slow down the degradation processes. However, environmental activities and social values are the most effective tools to address the environmental sustainability.

Major Concepts

- Sustainability of the environment – wise use of resources, efficient resource utilization, reuse and recycling
- Environmental ethics
- Introduction to Environmental Impact Assessment (EIA)
- Policies, legislation, and regulatory mechanisms
- Civic responsibilities of individuals, communities, CSOs, and Government

Conceptual Linkages:
This chapter is built on;
- Environment – VI-VIII

LEARNING OUTCOMES

1- Sustainability of the Environment – Wise Use of Resources, Efficient Resource Utilization, Reuse and Recycling

כ Knowledge / Understanding:
The students will:
- describe the relationship of environmental management to sustainable development;
- state the role of modern technologies in environmental protection
- discuss the five “R” for better environmental management i.e refuse, reduce, recycle, reuse and rethink.
Application / Inquiry / Research / Communication and Graphic Skills:
The students will:
- collect information about environmental management measures in locality about reducing use of polythene bags, food adulteration, use of dust bins, use of bicycle as an alternate to auto-transport, solid waste management (collection and disposal) etc.;

2- Environmental Ethics

Knowledge / Understanding:
The students will:
- define environmental ethics;
- describe that why we have a moral obligation to allow the environmental aspects to exist and to allow them to continue;
- explain the need for placing a value on some aspects including living things of our environment;
- describe the aesthetic arguments which relates to our appreciation of the beauty of nature in the context of environmental ethics;
- describe why some aspects of environment are valuable for provision of benefits to individuals;
- discuss wise-use, reuse, substitution and recycling conservation strategies

Application / Inquiry / Research / Communication and Graphic Skills:
The students will:
- collect Islamic teachings about our moral obligations to leave the environment in good conditions for our next generation;
- discuss the solutions of environmental problems in the context of value judgment in groups keeping in view examples from daily life and prepare small reports;
- collect data on the basis of a questionnaire, prepared by the teacher, from their home, school and neighbourhood and prepare short reports;
- be involved in some activities to develop ownership sense among them regarding environment.

3- Introduction to Environmental Impact Assessment (EIA)

Knowledge / Understanding:
The students will:
- define Environmental Impact Assessment (EIA), Risk Analysis and Environmental Impact Statement;
- elaborate scoping, impact prediction, impact evaluation, mitigation and monitoring as steps of EIA;

Application / Inquiry / Research / Communication and Graphic Skills:
The students will:
- discuss various concepts regarding Environmental Impact Assessment in groups and then prepare reports. The reports will be presented in the classroom;
- discuss the risks associated with any project being set-up in their area e.g. factory, mines or a dam, with their peers and elders at home, school and neighborhood and
then prepare small reports for discussion in the classroom;
- hold discussions in the classrooms how the personal biases may be minimized and objectivity maximizes in Environmental Impact Assessment;
- compare the energy efficiency of major appliances;

4- Policies, Legislation, and Regulatory Mechanism

 Knowledge / Understanding:

The students will;
- describe the history of development of policies with reference to environment at international and national level;
- identify the responsibilities of government agencies, community/CSOs for monitoring and protecting the environment at local, state and national levels;
- describe various policies which can be more effective for promoting healthy environment at local level;
- describe that to what extent participation of Individuals can be effective in policy making for solving environmental problems at local level;
- name important laws enacted by Pakistan’s Government for protecting the environment;
- list salient features of environmental protection law of 1997 in Pakistan;
- name significant International Conventions, Protocols and Treaties in relation to Environment to which Pakistan is a signatory;
- identify the role of policies of government and other regulatory bodies in protecting the environment;
- explain various traditional practices related to protection of environment.

Application / Inquiry / Research / Communication and Graphic Skills:

The students will;
- collect materials from the newspapers and magazines (library research) as well as from internet (if possible) regarding various international conventions, protocols and treaties and discuss their salient features in classroom;

5- Civic Responsibilities

Knowledge / Understanding:

The students will;
- identify that how they can contribute to environmental quality in their community;
- describe the role of education in environmental management;
- describe the potential impact on citizen participation on issues related to the environment and their community;

Application / Inquiry / Research / Communication and Graphic Skills:

The students will;
- hold discussions regarding cultivating and nurturing civic culture and values in maintaining healthy environment;
- identify and undertake activities that contribute positively to the sustainability of the environment;
- participate in role plays regarding civic responsibilities for maintaining healthy environment;
- prepare the charts with the help of teachers with reference to civic responsibilities;
• celebrate International Environment Day (5th June) and plan projects in groups on
different environmental issues such as planting trees, owning a tree, cleanliness
campaign at school, community, picnic spots, lakes and sea shores etc;
• specify value of conservation in the home and create a personal conservation plan;
• recognize their rights and responsibilities as a citizen in maintaining a healthy
environment;
• analyze the effects of their personal actions on the environment;
• collect data on the basis of a Questionnaire regarding civic responsibilities of
citizens towards promoting healthy environment from their parents, relatives,
neighbours, teachers and prepare short reports;
# TIME ALLOCATION AND ASSESSMENT WEIGHTING

**Grades IX-X**

<table>
<thead>
<tr>
<th>Units</th>
<th>Contents</th>
<th>Number of Periods</th>
<th>Assessment Weighting for Contents (in percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Teaching</td>
<td>Application/Inquiry / Research /Communication and Graphic Skills:</td>
</tr>
<tr>
<td>1</td>
<td>Nature of Environment Studies</td>
<td>08</td>
<td>05</td>
</tr>
<tr>
<td>2</td>
<td>Our Planet - Earth</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>Ecosystem</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>Population Growth, Development and Environment</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Air, water and land pollution</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>Noise and Radiation pollution</td>
<td>12</td>
<td>09</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>164</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Grade - X**

<table>
<thead>
<tr>
<th>Units</th>
<th>Contents</th>
<th>Number of Periods</th>
<th>Assessment Weighting for Contents (in percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Biodiversity</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Social Change in Behavior patterns in relation to Environment</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>Resource Utilization and its Impact on Environment</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>10</td>
<td>Environment and Quality of Life</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>11</td>
<td>Global and Regional Environmental Issues</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>12</td>
<td>Environmental Management</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>174</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Note: There will be 6 periods per week of minimum 40 minutes duration.*

National Curriculum - Environmental Studies Grades IX-X
ASSESSMENT OBJECTIVES

The knowledge, skills and change in attitude towards environmental studies are broadly categorized as:

a. Knowledge with understanding
b. Application / Inquiry / Research / Communication and Graphic skills

Overall Expectations / Assessment Objectives for Environmental Studies at Grade IX-X Level are as under:

(a) Knowledge / Understanding:

The students will;

1. recall and understand the knowledge and concepts of Environment Studies;
2. demonstrate understanding of environmental vocabulary and terminology;
3. apply the knowledge and concepts of environment studies set out in the syllabus to explain simple phenomena or effects which are not already familiar to them;
4. understand the application of concepts of the environmental studies with their social, economic and environmental implications.

(b) Application/Inquiry/Research/Communication and Graphic Skills

The students will:

1. search, select, understand and interpret information from a variety of sources, including everyday experiences;
2. present and communicate information in appropriate forms;
3. translate information from one form to another;
4. draw graphs and interpret information from them;
5. manipulate numerical and other data for report writing;
6. make and record observations, record data and write reports with due regard to environment and its associated issues;
7. analyze and interpret information and result obtained in investigation and field work, identify patterns and trends, and draw valid conclusion.
GLOSSARY OF TERMS USED IN LEARNING OUTCOMES/ASSESSMENT

It is hoped that the glossary will prove helpful to students as a guide, although it is not exhaustive. The glossary has been deliberately kept brief not only with respect to the number of terms included but also to the descriptions of their meanings. The students should appreciate that the meaning of a term must depend in part on its context. They should also note that the number of marks allocated for any part of a question is a guide to the depth of treatment required for the answer.

1. Define (the term(s) ...) is intended literally. Only a formal statement or equivalent paraphrase, such as the defining equation with symbols identified, being required.

2. What is meant by ... normally implies that a definition should be given, together with some relevant comment on the significance or context of the term(s) concerned, especially where two or more terms are included in the question. The amount of supplementary comment intended should be interpreted in the light of the indicated mark value.

3. Explain may imply reasoning or some reference to theory, depending on the context.

4. State implies a concise answer with little or no supporting argument, e.g. a numerical answer that can be obtained 'by inspection'.

5. List requires a number of points with no elaboration. Where a given number of points is specified, this should not be exceeded.

6. Describe requires students to state in words (using diagrams where appropriate) the main points of the topic. It is often used with reference either to particular phenomena or to particular experiments. In the former instance, the term usually implies that the answer should include reference to (visual)
observations associated with the phenomena. The amount of description intended should be interpreted in the light of the indicated mark value.

7. **Discuss** requires students to give a critical account of the points involved in the topic.

8. **Deduce/Predict** implies that students are not expected to produce the required answer by recall but by making a logical connection between other pieces of information. Such information may be wholly given in the question or may depend on answers extracted in an earlier part of the question.

9. **Suggest** is used in two main contexts. It may either imply that there is no unique answer or that students are expected to apply their general knowledge to a 'novel' situation, one that formally may not be 'in the syllabus'.

10. **Calculate** is used when a numerical answer is required. In general, working should be shown.

11. **Measure** implies that the quantity concerned can be directly obtained from a suitable measuring instrument, e.g. length, using a rule, or angle, using a protractor.

12. **Determine** often implies that the quantity concerned cannot be measured directly but is obtained by calculation, substituting measured or known values of other quantities into a standard formula, e.g. the Young modulus, relative molecular mass.

13. **Show** is used where a student is expected to derive a given result. It is important that the terms being used by students are stated explicitly and that all stages in the derivation are stated clearly.

14. **Estimate** implies a reasoned order of magnitude statement or calculation of the quantity concerned. Students should make such simplifying assumptions as may be necessary about points of principle and about the values of quantities not otherwise included in the question.
15. **Sketch**, when applied to graph work, implies that the shape and/or position of the curve need only be qualitatively correct. However, students should be aware that, depending on the context, some quantitative aspects may be looked for, e.g. passing through the origin, having an intercept, asymptote or discontinuity at a particular value. On a sketch graph it is essential that students clearly indicate what is being plotted on each axis.

16. **Sketch**, when applied to diagrams, implies that a simple, freehand drawing is acceptable: nevertheless, care should be taken over proportions and the clear exposition of important details.

17. **Compare** requires students to provide both similarities and differences between things or concepts.

**Acknowledgement:**

*Extracted from Physics A/AS Level 2007 of Cambridge University, England*
ASSESSMENT AND EVALUATION

Being an integral part of the learning process, assessment and evaluation devices are an important unit of the curriculum document. Assessment devices enable teachers not only to verify students’ learning but also to diagnose the shortcomings in the learning process.

Continuous Assessment Devices:
The continuous assessment should be a part of the classroom learning. Following may be the devices on which the said objectives can be achieved.

- Review questions
- Classroom discussions
- Field Surveys / Reports
- Observation
- Objective enhancement-worksheets, quizzes, and tests
- Flow chart completion

The continuous assessment should be cumulative and comprehensive and cover all objectives as per the curriculum. Grading of students should be done through the use of assessment instruments that cover the expectations as defined by the objectives of the curriculum.

Evaluation (final examination) Strategy:
An external examination is recommended at the end of each year’s course. This evaluation should measure all the domains of learning for the attainment of the objectives.
The Scheme for Final Examination Paper

The final examination paper is suggested to be consisted of two parts; each containing a variety of questions. The paper is suggested to be designed in the following pattern.

<table>
<thead>
<tr>
<th>PAPER: Environmental Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class - IX / Class - X</td>
</tr>
<tr>
<td>Part-1</td>
</tr>
<tr>
<td>(Objective Type)</td>
</tr>
<tr>
<td>Time allocated: 30 minutes</td>
</tr>
<tr>
<td>Maximum Marks: 20%</td>
</tr>
<tr>
<td>Q: 1- 20 Multiple Choice Questions (MCQs) (20 Marks)</td>
</tr>
</tbody>
</table>

| Part-2                        |
| (Subjective Type)             |
| Time allocated: 150 minutes   |
| Maximum Marks: 80%            |

| Section-1 (50% Marks)         |
| Q: 2- It will contain 25 compulsory Short Answer Questions / Constructed Response Questions (CRQs), covering the whole content area. |

| Section-II (30% Marks)        |
| Q: 3, 4 & 5- It will contain three long or comprehensive questions, each carrying 15 Marks and candidates would have a choice of attempting any two of them. |

INSTRUCTIONS AND SUGGESTIONS for Textbook writers

An important dimension of curriculum is the translation of learning experiences or contents at the cognitive level of the target students. It is highly technical and delicate task to assist both teachers and students in learning and transmission of the life experiences. The concept to be introduced must be explained informally before providing the formal definition or statement along with tangible examples from real life situation. Keeping this strategy in view the author should observe the following guidelines while writing the textbooks.

1. Learning outcomes should be given at the start of each unit/ chapter.
2. Each chapter should be opened with a brief recalling statement, and then it should move to a brief introduction to its contents. Afterwards the introduction should be given continuity with knowledge and comprehension of the content.
3. Headings and sub headings should be clearly indicated.
4. The language used in the text should be concise and simple, consisting of short sentences using active tone.
5. Key words, terms and definitions should be highlighted in the text.
6. Ensure gender equity as well as the textual matter should be urban/rural oriented and relevant to daily life.
7. Relevant Quraanic Verses with translation and teachings of the Holy Prophet (SAW) may be given wherever appropriate.
8. The text should be free from material repugnant to Islam and Pakistan Ideology and other biases.
9. Tables, flow charts/diagrams and concept maps may be given wherever appropriate.
10. The amount of information to be covered by the chapter must match the number of hours of instructional time.
11. It is recommended that depth of the concepts must be restricted to the scope and in accordance with desired learning outcomes given in this document. Going much beyond the proposed scope may be avoided.
12. Suggested activities are given simply for the guidance of the authors. They are free to select activities suggested or may include other activities which they consider appropriate.
13. While writing the textbooks, it is recommended that there should be enough reflection of an emphasis on development of environmental concepts through activities and field survey etc.
14. As environmental studies is related to the everyday life of the children, emphasis may be given on practical activities, field studies and discussions in the classroom. Such activities should be made part of the textbooks.
15. Objectives of environmental studies set for each class include attitudinal, behavioural and skills objectives; conscious efforts should be made that these objectives are reflected in the textbooks.

16. Textbook should be supported with art i.e. illustrations and photographs possibly in colour which should be clear, properly labelled and captioned to make the substance interesting and stimulating.

17. Concepts, applications and relationship should be developed from concrete to abstract or simple to complex. Provide transition from previous information covered and new information presented.

18. Boxed “Tidbits”, “interesting information”, “do you know”, and “point of ponder” may be given to highlight additional information and interesting knowledge about environments, ecosystems, biodiversity, resource use and management.

19. Interesting sidelights such as case studies, discoveries, related technologies etc. may be given in the form of “boxed essays”.

20. The text of the suggested activities should by very simple, informative and interactive with verbal questions to provoke the students to think and apply.

21. Several forms of questions/activities should be given at the end of each chapter. They should test not only knowledge but particularly the higher abilities such as understanding, handling information, analyzing, application of ideas and solving problems and relevant Investigation Skills/ Laboratory work and processes. For this purpose, there may be: ‘self quiz’ MCQs’, review question, ‘short questions’, essay type questions, and thought /free response questions.

22. Some thought provoking questions may also be given within the chapter.

23. All questions should be very appropriately and clearly worded/constructed to test varying abilities and Investigation Skills on the basis of Bloom’s taxonomy.

24. Each chapter should have, in its exercise, the Think Tank. It should consist of open-ended questions, which encourage students to think critically and creatively.

25. Coherent and precise summary should be given at the end of each chapter.

26. Glossary of technical terms should be given at the end of each chapter.

27. Concept Maps should be included for important topics.
28. Index should be given at the end of the book for ready reference.
29. The teachers guide and workbooks should also be developed along with textbook which should include suitable strategies that a teacher can adopt for teaching a particular topic and should contain instructions how to explain a topic and how to show relevant demonstration.
30. At the end of each chapter addresses of relevant Websites and Online Learning Centers should be mentioned so that students and teachers can get update information about the concepts.
Criteria / Checklist for the Selection of Learning Material

The Curriculum recommends the following parameters to be considered while selecting the learning material:

1. Do the materials focus on big ideas and/or essential questions?
2. Do the materials require learners to be thoughtful, reflective and use high-level skills?
3. Do the materials include valid and varied assessments- both traditional and performance based?
4. Do the materials contain effective and engaging activities?
5. Do the materials continually revisit big ideas?
6. Do the materials reflect a “developmentally appropriate” approach to student learning?
7. Do the activities provide for opportunities to diverse learners to cater different learning styles based on the learning intelligences.
8. Are the materials geared to the diverse abilities, interests and needs of students?
9. Is the curriculum program based on text alone, or does it include many different types of materials, including technology-based learning?
10. Do the materials encourage interdisciplinary connections?
11. Are outside experiences, including family involvement, part of the learning experience?

Teaching-Learning Program:

The topics, or the sub-topics based on the Learning Outcomes, can be taught in any order keeping in view the needs of the teachers and the students. It should be kept in mind that achievement of the educational objectives requires thoughtfully designed teaching situations. It is assumed that students will achieve the educational objectives through ongoing interplay between theoretical information and skillful investigation; it therefore, follows that the teaching approaches and materials used should:
• represent Environmental Studies as part of the process of inquiry (rather than a rhetoric of conclusions);
• use inquiry-based teaching strategies where possible;
• be student-centered, assisting students to derive their own concepts from evidence and providing opportunities to develop individual reasoning abilities and motor skills
• exemplify the concept from local scenario;
• provide very direct, concrete experience, when beginning a new area of study, – through classroom and field work – or the next best substitute when direct experience is not feasible;
• provide rewarding opportunities to apply understanding and ways of thinking to problems, especially everyday ones;
• provide opportunities to refine ideas through dialogue with others, and work with them in ways likely to foster cooperative abilities.

**PRACTICAL ASPECT OF ENVIRONMENTAL STUDIES CURRICULUM**

Field work and library /Internet investigations have been proposed with respect to various areas of environmental studies, in the form of activities under the sub-head of learning outcomes i.e., application / inquiry / research / communication and graphic skills. These activities have been so designed in a way that they do not require sophisticated equipment and apparatus. Most of these are low cost / no cost activities. Moreover these activities include not only individual investigations but also group tasks, in the form of field works. The purpose of suggesting activities in the curriculum is to help learners achieve the objectives concerning behavioural and participative skills. These are related to their immediate environment and locality. These need just the will and direction.
Teachers' Training and Refresher Courses

Effective and meaningful environmental studies education can only be guaranteed if the capacity of the teachers, the key pivot of the change, is developed enough with reference to content knowledge as well as teaching pedagogy. In-service trainings may help the teachers to become familiar with the concepts and a variety of strategies for successful delivery of the curriculum.

The curriculum development and revision is a continuous process in all stages of education so the updating of the teacher education programs at pre-service as well as in-service stages is indispensable. If the teacher is not fully equipped and trained to handle the new curriculum, the transmission of the knowledge and change in behaviours of the students would not be possible. Teacher's training needs the following actions:

1. Pre-service teacher training institutions be strengthened and “Teaching of Environmental Studies” should be included in their Scheme of Studies to meet the demands of fast changing and developing world.

2. In-service trainings should cover contents and methodologies. Workshops, seminars and extension lectures should be organized for the teachers more frequently and regularly and particularly in winter and summer vacations.

3. Well-equipped resource centers should be established at the training institutions for a ready help to the needy teachers.
NATIONAL SELECT COMMITTEE FOR CURRICULUM DEVELOPMENT


3. Prof. Shahnawaz Cheema, Forman Christian College University, Ferozepur Road, Lahore.


5. Mr. Aurangzeb Rehman, Deputy Educational Adviser, Curriculum Wing, Ministry of Education, Islamabad.

EXPERT COMMITTEE ON DEVELOPMENT OF COURSE OUTLINE (WORKSHOP FROM 10-14 JULY, 2006 ISLAMABAD)


2. Mr. Fazl-e-Rabbi, Focal Person, Sindh Additional Director, Bureau of Curriculum Extension Wing, Jamshoro.

3. Prof. Javaid Ali Chaudhary, Dy Director (Focal Person), Punjab Textbook Board, Lahore.

4. Prof. Shahnawaz Cheema, Forman Christian College University, Lahore.

5. Prof. Abdul Kabir Hashmi, Ex-Director (Humanities), Punjab Textbook Board, Lahore.

6. Dr. Ubaidullah, Assistant Professor, IER, University of the Punjab, Lahore.

7. Prof. Tariq Chaudhry, IER, University of the Punjab, Lahore.

8. Mr. Kashif Shafiq, Lecturer of Geography, Forman Christain College University, Lahore.


10. Mr. Muhammad Ilyas, Focal Person NWFP, Haripur.


15. Mr. Munawar Din Awan, AEA Curriculum Wing, Ministry of Education, Islamabad.


FOLLOW UP WORKSHOPS

The experts from all the Provinces shared their views and submitted valuable suggestions for improvements in the National Curriculum Draft for Environmental Studies for classes IX-X in the following workshops:


6. Environmental Education Curriculum Development Workshop at Lahore from 23 to 25 March, 2008 to finalize the draft by incorporating the comments of the provinces.

PARTICIPANTS OF ENVIRONMENTAL EDUCATION CURRICULUM DEVELOPMENT WORKSHOP FROM 31 JULY TO 2 AUGUST, 2006


2. Prof. Shahnawaz Cheema, Forman Christian College University, Ferozepur Road, Lahore.

3. Prof. Javaid Ali Chaudhry, Dy Director (Focal Person), Punjab Textbook Board, Lahore.


9. Mr. Jahangir Durani, Weiland Center, Karachi.


11. Prof. Dr. Muhammad Mazhar Hussain, Director Operation, Clariant Chemical Company Jamshoro,

12. Mr. Fazl-e-Rabbi, Additional Director, Bureau of Curriculum, Jamshoro.


15. Dr. Rasool Bux Bozdar, Department of Chemistry, Sindh University, Jamshoro.

16. Dr. Khalil Ahmed Koria, Assistant Professor, Government Elementary College of Education (Men), Hyderabad.

17. Mr. Afzal Ahmed, Assistant Professor, Government Elementary College of Education (Men), Hyderabad.

**PARTICIPANTS OF ENVIRONMENTAL EDUCATION CURRICULUM DEVELOPMENT WORKSHOP AT QUETTA FROM 18-20 AUGUST, 2006**

1. Mr. Nazar Muhammad Kakar, Deputy Director, (Focal Person), Bureau of Curriculum & Extension Centre, Quetta.

2. Abdul Bari Khadim, Deputy Director (Extension), Bureau of Curriculum & Extension Centre, Quetta.

3. Mr. Ijaz-ul-Haq, Senior Research Officer, Bureau of Curriculum & Extension Centre, Quetta.

4. Mr. Arshad Mehmood, Senior Subject Specialist, Bureau of Curriculum & Extension Centre, Quetta.

5. Hafiz Muhammad Saleem, Subject Specialist, Bureau of Curriculum & Extension Centre, Quetta.

6. Mr. Mushtaq Ahmad Bajwa, Subject Specialist, Bureau of Curriculum & Extension Centre, Quetta.
7. Mr. Mujeeb-ur-Rehman, Deputy Director, Provincial Institute for Teacher Education, Quetta.
8. Syed Abdul Majeed Shah, Subject Specialist/Assistant Director, Provincial Institute for Teacher Education, Quetta.
9. Mr. Muhammad Riaz, Senior Subject Specialist, Provincial Institute for Teacher Education, Quetta.
10. Mr. Ilyas Tahir, Subject Specialist, Govt. College of Education, Quetta.
11. Mr. Zahir Kasi, Subject Specialist, Govt. College of Education, Quetta.
12. Ms. Khalida Saleem, Subject Specialist Govt. College of Education (F), Quetta.
13. Mr. Aftab Ahmed, Subject Specialist Govt. College of Elementary Education, Quetta.
14. Mr. Abdul Majeed, Subject Specialist Govt. College of Elementary Education, Quetta.
15. Mr. Asmatullah, Subject Specialist, Balochistan Textbook Board, Quetta.
16. Mr. Kaleemullah, Subject Specialist, Balochistan Textbook Board, Quetta.
17. Mr. Azam Michle, Coordinator, IUCN, Quetta.
18. Dr. Tariq Javed, Senior Subject Specialist, Govt. College of Education, Quetta.
19. Mr. Sardar Muhammad, Subject Specialist, Govt., College of Education, Quetta.
21. Prof. Shahnawaz Cheema, Forman Christian College University, Ferozepur Road, Lahore.
22. Prof. Javaid Ali Chaudhary, Dy Director (Focal Person), Punjab Textbook Board, Lahore.

**PARTICIPANTS OF ENVIRONMENTAL EDUCATION CURRICULUM DEVELOPMENT WORKSHOP AT ABBOTTABAD FROM 28-30 AUGUST, 2006**

1. Ms. Nasreen Zaheer, Instructor Regional Institute of Teacher Education (F) Mandian, Abbottabad.
2. Mr. Amin Dad, Subject Specialist Directorate of Curriculum and Teacher Education, Abbottabad.
3. Mr. Hamid Khan, Subject Specialist, Directorate of Curriculum & Teacher Education, Abbottabad.
5. Mr. Shafqat Khan, Principal, Govt. High School, Muslimabad, Abbottabad.
6. Dr. Arshad Parvez, Department of Environmental Education Comsats Mandian, Abbottabad.

7. Mr. Saeed Ahmed, Instructor Regional Institute of Teacher Education (M), Haripur.

8. Mr. Muhammad Ilyas, Subject Specialist, Girls High Secondary School, Bagra, Haripur.

9. Ms. Tahira Jabeen, Regional Institute of Teacher Education (F) Ambar, Swabi.

10. Mrs Sadaf Adnan, Assistant Subject Specialist, NWFP Text Book Board Peshawar.

11. Mr. Waqar Ahmed, Assistant Subject Specialist, NWFP Textbook Board, Peshawar.

12. Dr. Masood Khan, Subject Specialist, NWFP Textbook Board, Peshawar.

13. Mr. Bashir Muhammad, Subject Specialist, NWFP Textbook Board, Peshawar.

14. Raja Muhammad Qadir Khan, Senior Subject Specialist EEC, Muzaffarabad.

15. Mr. Abdul Hameed Afghani, Senior Subject Specialist, Directorate of Curriculum Research and Development Muzaffarabad.

16. Muhammad Afzal Baig, Senior Subject Specialist DEE, Muzaffarabad.

17. Mr. Darvesh Ali (Environmental Education), Assistant Director, Education (EMIS), Directorate of Education FANA, Gilgit.

18. Mr. Akbar Shahzad, Deputy Director/Focal Person Directorate of Education FANA, Gilgit.

LIST OF PARTICIPANTS- ENVIRONMENTAL EDUCATION CURRICULUM DEVELOPMENT WORKSHOP AT LAHORE FROM 7-9 SEPTEMBER, 2006


3. Prof. Shahnawaz Cheema, Forman Christian College University, Ferozepur Road, Lahore.

4. Professor Abdus Samad, Dean, University of Management & Technology (UMT) Lahore.

5. Professor Abdul Kabir Hashmi, Director (R), Punjab Textbook Board, Lahore.


7. Mrs. Shahnawaz Cheema, Associate Professor, Govt. College for Women, Samanabad, Lahore.

8. Prof. Tariq Chaudhary, Institute of Education & Research, University of the Punjab, Lahore.
9. Ms. Lubna Amir, Lecturer, Chemistry Department, Forman Christian College University, Ferozepur Road, Lahore.

10. Ms Amna Zafar, Lecturer in Environmental Science, Lahore College for Women University, Jail Road, Lahore.

11. Mr. Nadeem Asghar, Subject Specialist, Punjab Textbook Board, Lahore.

12. Mr. Muhammad Akram, Research Associate, Punjab Textbook Board, Lahore.

13. Dr. Abida Mubashar, Principal, Govt. Central Model School for Girls, Gulberg, Lahore.

14. Dr. Nasir Mahmood, Assistant Professor, Research Wing, Institute of Education & Research, University of the Punjab, Lahore.

15. Dr. Ubaidullah, Assistant Professor, Institute of Education & Research, Research Wing, Punjab University, Lahore.

16. Prof. Iqbal Ahmed, Professor, Chemistry Department, Govt. College, Civil Lines, Lahore.

17. Dr. Saleema Bashir, Assistant Professor, Kinnaird College University, Jail Road, Lahore.

18. Mr. Kashif Shafiq, Lecturer, Department of Geography, Forman Christian College University, Lahore.

19. Mrs. Seemal Ijaz, Assistant Professor, Department of Botany, Govt. College for Women, Samanabad, Lahore.


21. Mr. Babar Khan, Director, Environmental Education for Northern Areas, WWF Pakistan, Islamabad.

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EXPERT COMMITTEE MEETING AT ISLAMABAD FOR REVIEW / FINALIZATION OF ENVIRONMENTAL STUDIES CURRICULUM 21-22 SEPTEMBER, 2006


2. Prof. Javaid Ali Chaudhary Dy Director (Focal Person), Punjab Textbook Board, Lahore.

3. Prof. Shahnawaz Cheema, Forman Christian College University, Ferozepur Road, Lahore.

4. Professor Abdul Kabir Hashmi, Director (R), Punjab Textbook Board, Lahore.

5. Dr. Nasir Mahmood, Assistant Professor, Institute of Education & Research, Punjab University, Lahore.

6. Ms Saira Jaffery, Environmental Education Officer, WWF Pakistan, Islamabad.
7. Professor Zahoor Anwar, Associate Professor, Govt. College of Science, Wahadat Colony, Lahore.

8. Mr. Kashif Shafiq, Lecturer Geography, Department of Geography, F.C College University, Lahore,

9. Mr. Darvesh Ali, Assistant Director Education (EMIS), Directorate of Education, Northern Area, Gilgit.

10. Mr. Nazar Muhammad Kakar, Deputy Director, Bureau of Curriculum & Extension Centre, Quetta.

11. Mr. Nazim Ali Khan, Subject Specialist (Urdu), Sindh Textbook Board, Jamshoro.

12. Mr. Fazl-e-Rabbi, Additional Director, Bureau of Curriculum & Extension Centre, Jamshoro.

13. Ms Unaiza Alvi, Senior Instructor, Institute of Education Development, Aga Khan University, Karachi.

14. Mr. Abdul Hameed Afghani, Senior Subject Specialist, Directorate of Curriculum Research and Development, Muzzaffarabad.

15. Mr. Abdul Qadir Rafiq, Programme Officer, UNDP, Islamabad.

16. Mr. Arshad Gill, Programme Officer, SDC, Islamabad.


18. Mr. Munawar Din Awan, Assistant Education Adviser Curriculum Wing, Ministry of Education, Islamabad.

19. Mr. Riaz Hussain Malik, Education Officer, Curriculum Wing, Ministry of Education, Islamabad.

20. Mr. Shafqat Janjua, Education Officer, Curriculum Wing, Ministry of Education Islamabad.
PARTICIPANTS OF ENVIRONMENTAL STUDIES IX-X CURRICULUM DEVELOPMENT WORKSHOP AT LAHORE ON MARCH 23-25, 2008 (FINALIZATION OF CURRICULUM)

1. Mr. Arif Majeed, Joint Educational Adviser/National Project Director, Curriculum Wing, Ministry of Education, Islamabad.

2. Mr. Aurangzeb Rehman, Deputy Educational Adviser/National Project Manager, Curriculum Wing, Ministry of Education, Islamabad.

3. Mr. Azizur Rehman, National Project Coordinator EEPP, Ministry of Education, Islamabad.


5. Mr. Abdul Hameed Afghani, Senior Subject Specialist, Directorate of Curriculum Research and Development, Muzzaffarabad.

6. Mr. Nazar Muhammad Kakar, Deputy Director, Bureau of Curriculum & Extension Centre, Quetta.

7. Mr. Nadeem Asghar, Subject Specialist, (Biology), Punjab Textbook Board, Lahore.

8. Mr. Anwarul Haq, Deputy Director, (Sociology) Focal Person, Punjab Textbook Board Lahore.

9. Mr. Atta Ullah Khan, Director Directorate of Curriculum and Teachers Education, Abbottabad.

10. Mr. Muhammad Idris Jatoi, Deputy Director, Curriculum and Education Extension Centre, Jamshoro,

ENVIRONMENTAL EDUCATION PROMOTION PROJECT

1. Mr. Arif Majeed, Joint Educational Adviser/National Project Director, Curriculum Wing, Ministry of Education, Islamabad.

2. Mr. Aurangzeb Rehman, Deputy Educational Adviser/National Project Manager, Curriculum Wing, Ministry of Education, Islamabad.

3. Mr. Azizur Rehman, National Project Coordinator EEPP, Ministry of Education, Islamabad.