**Title: Environmental sciences**

**Credit hours: 3**

**Level: BS Secondary Education**

**Environmental education is a learning process that increases people’s knowledge and awareness about environment and associated challenges develop necessary skills and expertise to address challenges.**

**INTRODUCTION TO ENVIRONMENTAL SCIENCES**

The science of Environment studies is a multi-disciplinary science because it comprises various branches of studies like chemistry, physics, medical science, life science, agriculture, public health, sanitary engineering etc. It is the science of physical phenomena in the environment. It studies of the sources, reactions, transport, effect and fate of physical a biological species in the air, water and soil and the effect of from human activity upon these.

1. **Definitions of Environment :**

Some important definitions of environment are as under:

1. **Boring**: ‘A person’s environment consists of the sum total of the stimulation which he receives from his conception until his death.’It can be concluded from the above definition that Environment comprises various types of forces such as physical, intellectual, economic, political,cultural, social, moral and emotional. Environment is the sum total of all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturation of living organisms.

2. **Douglas and Holland**: ‘The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms.’

Environment can be defined as:

“Environment consist of all the things around an organism,which in one way or the other,affect the life of that organism.”

“Environment is the collection of things present around an organism which affect the life in any way.”

**Element of Environment**

Environment is constituted by the interacting systems of physical, biological and cultural elements inter-related in various ways, individually as well as collectively. These elements may be explained as under:

(1) Physical elements

Physical elements are as space, landforms, water bodies, climate soils, rocks and minerals. They determine the variable character of the human habitat, its opportunities as well as limitations.

(2) Biological elements

Biological elements such as plants, animals, microorganisms and men constitute the biosphere.

(3) Cultural elements

Cultural elements such as economic, social and political elements are essentially manmade features, which make cultural milieu.

**(ii) Scope of Environment:** The environment consists of four segments as under:

1. Atmosphere: The atmosphere implies the protective blanket of gases, surrounding the earth:

(a) It sustains life on the earth.

(b) It saves it from the hostile environment of outer space.

(c) It absorbs most of the cosmic rays from outer space and a major portion of the electromagnetic radiation from the sun.

(d) It transmits only here ultraviolet, visible, near infrared radiation (300 to 2500nm) and radio waves. (0.14 to 40 m) while filtering out tissue-damaging ultraviolate waves below about 300 nm. The atmosphere is composed of nitrogen and oxygen. Besides, argon, carbon dioxide, and trace gases.

2. Hydrosphere: The Hydrosphere comprises all types of water resources oceans, seas, lakes, rivers, streams, reserviour, polar icecaps, glaciers, and ground water.

(i) Nature 97% of the earth’s water supply is in the oceans,

(ii) About 2% of the water resources is locked in the polar icecaps and glaciers.

(iii)Only about 1% is available as fresh surface water-rivers, lakes streams, and ground water fit to be used for human consumption and other uses.

3. Lithosphere: Lithosphere is the outer mantle of the solid earth. It consists of minerals occurring in the earth’s crusts and the soil e.g. minerals, organic matter, air and water.

4. Biosphere: Biosphere indicates the realm of living organisms and their interactions with environment, viz atmosphere, hydrosphere and lithosphere.

**ENVIRONMENT STUDIES: IMPORTANCE**

Environment studies have become significant for the following reasons:

1. Environment Issues Being of International Importance

It has been well recognised that environment issues like global warming and ozone depletion, acid rain, marine pollution and biodiversity are not merely national issues but are global issues and hence must be tackled with international efforts and cooperation.

2. Problems Cropped in The Wake of Development

Development, in its wake gave birth to Urbanization, Industrial Growth, Transportation Systems, Agriculture and Housing etc. However, it has become phased out in the developed world. The North, to cleanse their own environment has, fact fully, managed to move ‘dirty’ factories of South. When the West developed, it did so perhaps in ignorance of the environmental impact of its activities. Evidently such a path is neither practicable nor desirable, even if developing world follows that.

3. Explosively Increase in Pollution

World census reflects that one in every seven persons in this planted lives in India. Evidently with 16 per cent of the world's population and only 2.4 per cent of its land area, there is a heavy pressure on the natural resources including land. Agricultural experts have recognized soils health problems like deficiency of micronutrients and organic matter, soil.

4. Need to Save Humanity from Extinction

It is incumbent upon us to save the humanity from exinction. Consequent to our activities constricting the environment and depleting the biosphere, in the name of development.

5. Need for Wise Planning of Development

Our survival and sustenance depend. Resources withdraw, processing and use of the product have all to by synchronised with the ecological cycles in any plan of development our actions should be planned ecologically for the sustenance of the environment and development.

**Pollution and its Factors**

Pollution may be defined as an undesirable change in the physical, chemical or biological characteristics of air, water and land that may be harmful to human life and other animals, living conditions, industrial processes and cultural assets. Pollution can be natural or manmade. The agents that pollute are called pollutants.

**Pollutants**

Pollutants are by-products of man’s action. The important pollutants are

• Deposited matter, Gases, Metals, Industrial pollutants, Agriculture pollutants. Photochemical pollutants and Radiation pollutants

Classification of Pollutants:

(i) Non-degradable pollutants

These are the pollutants, which degrade at a very slow pace by the natural biological processes. These are inorganic compounds such as salts (chlorides).

(ii) Biodegradable pollutants

These include domestic sewage that easily decomposes under natural processes and can be rapidly decomposed by natural/ artificial methods.

**AIR POLLUTION**

The WHO defines **air pollution** as the presence of materials in the air in such concentration which are harmful to man and his environment.

**SOURCES OF AIR POLLUTION**

Various sources of air pollution are fossil fuels, industries, agricultural activities, wars, natural causes arid emissions from vehicles.

(i) Burning Fossil Fuels

(ii) Emissions from Automobiles

(iii) Industries

(iv) Agricultural Activities

(v) Wars

(vi) Natural Causes

**Effects of Air Pollution**

Effect on Plants

(*i*) SO2 causes chlorosis and also results in the death of cells and tissues.

(*ii*) Fluorides damage leafy vegetables such as lettuce and spinach.

(*iii*) Oxides of nitrogen and fluorides reduce crop yield.

(*iv*) Smog bleaches and blaze foliage of important leafy plants.

Effect on Man

The effect of pollutants on animals and man are as follows-

1. Ozone causes dryness of mucous membranes, changes eye vision, causes headache.
2. Ozone has been reported to produce chromosomal aberrations.
3. SO2 causes drying of mouth, scratchy throat, smarting eyes and disorders of respiratory tract.

**Control of Air Pollution**

(*i*) Some gases, which are more soluble in a particular liquid than air, for example,

ammonia in water, can be separated by dissolving in it.

(*ii*) SO2 pollution can be controlled by extracting sulphur from the fuel before use.

(*iii*) Trees should be planted on the roadside, riverbanks, parks and’ open places as they keep the environment fresh.

(i*v*) Population growth, which is the main cause of pollution should be checked.

(*v*) Nuclear explosions should be restricted.

**Water Pollution**

Water is extremely essential for life, this common fact is known to all. It is required to meet our basic needs in day to day life viz., cooking, drinking, bathing, disposal of sewage, irrigation, generating electricity in power plants, cooling and manufacturing different products in industries and the disposal of industrial wastes. During all these processes the undesirable substances are added to the water resources to a great extent. This alters the basic chemistry of water in rivers and streams.

**Sources of Water Pollution**

* Domestic sewage
* Industrial effluents
* Agricultural source
* Pesticides
* Pathogenic organisms
* Mineral oils
* Underground water pollution
* Marine water pollution

**CONTROL OF WATER POLLUTION**

(*i*) Separate ponds and tanks to be used for cattle and animals.

(*ii*) Use of pesticides, insecticides and fertilizers should be done judiciously. Rapid

biodegradable substitutes for pesticides should be employed.

(*iii*) In towns where sewage facilities are not available, septic tanks should be made in

the houses.

(*iv*) Rivers and lakes should not be used for bathing or washing as it contaminates

water. .

(*v*) Domestic sewage and industrial wastes should be treated before discharging them

into drains.

**SOIL POLLUTION**

**Soil Pollution**

Like water and air, soil is also equally important for living organisms. It supports

plants on which. all other living organisms depend. Any substance that reduces soil productivity is called **soil** **pollutant.**

**Sources of Soil Pollution**

There are several materials, which adversely affect physical, chemical and biological

properties of the soil and thus reduce its productivity. These are

1. Chemicals present in industrial waste.

2. Pesticides and insecticides that are sprayed on crops. .

3. Fertilizers and manures that are added to the soil to increase the crop yield.

**Effect of Soil Pollutants**

Chemicals and pesticides affect the structure and fertility of soil by killing the soil microorganisms. Pesticides are absorbed by the plants and then transferred to other organism. Hence, they affected food chains and food webs. Excretory products of livestock and human

being used as manure pollute the soil besides giving high yield. The faulty sanitation and unhygienic practices of the people add to the soil pollution. Pathogens present in the wastes and excreta contaminate the soil and vegetable crops causing diseases in man and domesticated animals.

**Control of Soil Pollution**

Various measure to control soil pollution are-

1. Transfer stations for bulk shifting of refuse should be constructed in cities and big towns.
2. Pneumatic pipes should be laid for collecting and disposing wastes.
3. Materials like paper, glass and plastics can be recycled.
4. Metals should be recovered from scrap and disposed materials.
5. Use of chemical fertilizers should be reduced by the use of bio fertilizers and manures.
6. Use of pesticides can be reduced by adopting biological control of pests.
7. Use of cattle dung and agricultural wastes in biogas plants should be encouraged.
8. Deforestation can check soil erosion to a great extent.

**Noise Pollution**

Noise can be defined as unwanted/unpleasant sound. So noise pollution is unwanted sound dumped into the atmosphere without regard to the adverse effects it may have.

**Effect of Noise Pollution**

1. Constant noise affects a man physically and mentally. Physical effects include blood vessels to contract, skin to become pale, muscles to constrict and rise in blood pressure leading to tension and nervousness.
2. High intensity sound emitted by industrial plants, bottling machines, supersonic aircrafts, when continued for long periods of time not only disturbs but also permanently damages hearing.
3. Offices, industries and crowded places where constant noise prevails can produce temper tantrums, headaches, fatigue and nausea. .
4. Loud and sudden noise affect the brain. Intermittent noise leads higher incidence of psychiatric illness and also a danger to health of pregnant mothers and small infants.
5. Noise has harmful effects on nonliving materials too, *e.g.* cracks develop under the stress of explosive sound.

**Control of Noise Pollution**

Following methods can control noise pollution:

1. Limited use of loudspeakers and amplifiers.

2. Excursing control over noise producing vehicles.

3. Industrial workers should be provided with ear plugs.

4. Delocalisation of noisy industries far away from dwelling units.

5. Within a radius of 10 miles of airport, no buildings or factories should be allowed.

6. Plants and trees should be planted all around the hospitals, libraries and schools and colleges.

7. Personal protection against noise can be taken by using, cotton plugs in the ear.

**Radiation**

The radiations from the atomic blasts cause several health hazards. The radiations

carry high energy and remove electrons from atoms and attach them to other atoms producing

positive and negative ion pairs. Hence, they are known as ionizing radiations. The ionization

property of these radiations proves to be highly injurious to the protoplasm. The ionizing

radiations of ecological concern are classified as follows:

**Corpuscular Radiations**

These consist of streams of atomic or subatomic particles, which transfer their energy

to the matter they strike.

1. Alpha particles
2. Beta particles
3. Electromagnetic radiations

**Other Types of Radiations**

Besides radioactive radiations, some other radiations are also present in the atmosphere.

1. Neutrons
2. X-rays
3. Cosmic rays

**Sources of Radiations**

The radiations are produced from the radioactive elements, which are known as

radionuclides or radioactive isotopes, e.g. Uranium. Radium, Thorium, and Carbon-14. These

contribute to background radiation. But isotopes of certain metabolically important elements

like Carbon-14, Cobalt-60, Calcium 45, Iodine-131, Phosphorus-32, etc. are not ecologically

harmful but are used as tracers.

**Control of Radiation Pollution**

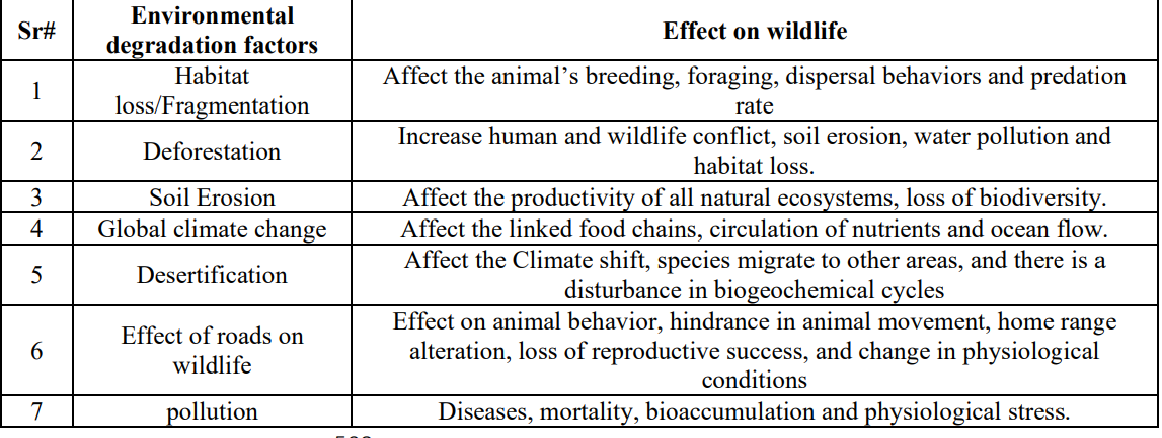
Following measures can help in controlling the radioactive pollution:

1. Workers in nuclear plants should be provided with nuclear gadgets and safety measures against accidents.
2. Leakage of radioactive elements from nuclear reactors, laboratories, transport, careless handling and use of radioactive fuels should be checked.
3. Level of radiation pollution should be monitored regularly in risk areas.
4. Disposal of radioactive wastes deserves special attention.

**Wildlife and the environment:**

Organism’s environment is its interactions with biotic and abiotic components of ecosystem that is required for its survival and continuity of species. When resources in an environment got depleted or disturbed by natural or manmade factors it is termed as environmental degradation which poses serious threats to the wildlife leading to its extinction . The major factors that are responsible for environmental degradation are Habitat loss, soil erosion, deforestation, desertification, Climate shift, flooding, resource depletion, invasive species and habitat fragmentation. All these factors are responsible to upset the environment and the resulting environment is unfit for the survival of animals, so major biodiversity is lost. The human population growth is the major deriving force for degradation of environment. The population of world increasing continuously, according to the estimation of 1999 there are 6 billion people in the world and in 2150 population will reach to 8-10 billion. Due to overpopulation urbanization trend increases, in each year about 20-30 million people leave rural areas for urban areas. Overpopulation leads to poverty so there is an increasing pressure on natural resources for the sustainment of life. The natural resources such as freshwater, coral reefs, fossil fuels are continuously depleted due to overpopulation and diminished the quality of life . Human population grows at unprecedented rate due to which urbanization and industrial revolution have major impact on global health, food scarcity, global warming and environmental change. It is considered that overpopulation and poverty is the major cause of environmental degradation, there is negative relationship between poverty and stable environment and if we reduce the human population and poverty these are the important factors to save the environment .

**Effect of environmental degradation on wildlife.**



**Factor affecting environment**

**Degradation of forests**

Deforestation and degradation of forests create ecological problems in every part of the world. Deforestation is occurring at a rapid pace, especially in tropical regions where millions of acres are clear cut every year. Remaining forests also suffer from pollution and selective logging operations that degrade the integrity of local ecosystems. Destruction of forests also effects the soil and water quality in the immediate area and can have an adverse effect on biodiversity over a range of connected ecosystems.

The most significant effect of forest degradation is loss of habitat leading to species loss. Forests are among the most biologically diverse ecosystems on the planet. Over half of all terrestrial species live in rainforests, which are subject to the greatest deforestation pressures. Biodiversity loss can occur during selective logging as well, as individual species may be intolerant to loss of a particular tree type or to the presence of logging operations. Species loss within forests can spread to surrounding ecosystems, as food chains often cross ecosystem boundaries.

**Urbanization**

An increasing concentration of the population in cities and a transformation of land use to an urban pattern of organization. Poor air and water quality, insufficient water availability, waste-disposal problems, and high energy consumption are exacerbated by the increasing population density and demands of urban environments.

**Industrial revolution:**

The Industrial Revolution impacted the environment. The world saw a major increase in population, which, along with an increase in living standards, led to the depletion of natural resources. The use of chemicals and fuel in factories resulted in increased air and water pollution and an increased use of fossil fuel.

**Chemical and pesticides**

Until 1940’s the following chemicals were used to control pests:

(1) Elements fungicides (S, Cu, Hg, organomercury) against fungal diseases.

(2) Copper sulphate, sodium aresenite and ferrous sulphate against weeds.

(3) Nature insecticides e.g. pyrethrum and nicotine, against beetles and aphids.

(4) Tar oil, petroleum, etc., against and red spider mite eggs.

(5) Lead arsenate against caterpillars.

A number of toxic substances that human ecounter regularly may pose serious health risk.pesticide residues on vegetable crops and many industrially produced chemicals may cause cancer,birth defects,or death.

**ECO-SYSTEM**

A.G. Tansley (in 1935) defined the Eco-system as ‘the system resulting from the integrations of all the loving and non-living actors of the environment’.

(krebs 1985) “It is self regulatory system in which all living organisms and non living components are interlocked”

The terms ecosystems is most preferred, where ‘eco’ implies the environment, and ‘system’ implies an interacting, inter-dependent complex. In this way, it can be said that any unit that includes all the organisms i.e. the communities in a given area, interact with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity and material cycle (i.e. exchange of materials between living and non-living components) within the system, is known as an ecological system or eco-system.

Eco-system may be visualized as 3-dimensional cutouts from the ecosphere. All primary and secondary producers composing the ecosystem are its essential elements. The unique feature of eco-systems is the maintenance of their chemical state and of their environment.

Thus an eco-system is an integrated unit, consisting of interacting plants and animals whose survival depends upon the maintenance of abiotic i.e. physicochemical environment and gradients such as moisture, wind and solar radiation with its concomitants of light and heat, as well as biotic structures and functions.

“Odum(1959) any system of landscape that includes abiotic and biotic components are called as eco-system.”

**ASPECTS OF ECO-SYSTEM**

The eco-system can be defined as any spatial or organizational unit including living organisms and non-living substances interacting to produce an exchange of materials between the living and non-living parts. The eco-system can be studied from either structural or functional aspects.

1. Structural Aspect

The structural aspects of ecosystem include a description of the arrangement, types and numbers of species and their life histories, along with a description of the physical features of the environment.

2. Functional

The functional aspects of the ecosystem include the flow of energy and the cycling of nutrients.

**Division of Ecosystem**

The ecosystem can be divided, from the energetic view point into three types of organisms: producers, consumers, and reducers. These can be explained as under:

(1) Producer

Photosynthetic algae, plants and bacteria are the producers of the ecosystem; all other organisms depend upon them directly or indirectly for food.

(2) Consumers

Consumers are herbivorous, carnivorous, and omnivorous animals; they eat the organic matter produced by other organisms.

(3) Reducers

Reducers are heterotrophic organisms like animals; they are fungi and bacterial that decompose dead organic matter.

**GENERAL CHARACTERISTICS OF AN ECO-SYSTEM**

According to Smith following are the general characteristics of eco-system.

(1) The ecosystem is a major structural and functional unit of ecology.

(2) The structure of an eco-system is related to its species diversity; as such the more complex ecosystem has high species diversity.

(3) The relative amount of energy required to maintain an ecosystem depends on its structure. The more complex the structure, the lesser the energy it requires to maintain itself.

(4) The function of the ecosystem is related to energy flow in material cycling through and within the system.

(5) Ecosystems mature by passing from less complex to more complex states. Early stages of such succession have an excess of potential energy. Later (mature) stages have less energy accumulation.

(6) Both the environment and the energy fixation in any given ecosystem are limited.They cannot be exceeded in any way without causing serious undesirable effect.

(7) Alterations in the environments represent selective pressures upon the population to which it must adjust. Organisms, which fail to adjust to the changed environment, must vanish.

To conclude the eco-system is an integrated unit or zone of variable size, it comprises vegetation, fauna, microbes and the environment. Most ecosystems process a well-defined soil, climate, flora and fauna and their own potential for adaptation, change and tolerance. The functioning of any ecosystem involves a series of cycles. These cycles are driven by energy flow, the energy being the solar energy.

**Functions of Eco-system**

The functions of Ecosystem are as under:

1. Transformation of Solar Energy into Food Energy

The solar radiation is major source of energy in the ecosystem. It is the basic input of energy entering the ecosystem. The green plants receive it.And is converted into heat energy. It is lost from the ecosystem to the atmosphere through plant communities. It is only a small proportion of radiant solar energy that is used by plant to make food through the process of photosynthesis. Green plants transform a part of solar energy into food energy or chemical energy. The green plants to develop their tissues use this energy. It is stored in the primary producers at the bottom of trophic levels. The chemical energy, which is stored at rapid level one, becomes the source of energy to the herbivorous animals at trophic level two of the food chain. Some portion energy is lost from trophic level one through respiration and some portion is transfereed to plant-eating animals at trophic level two.

2. The Circulation of elements through Energy Flow

It is seen that in the various biotic components of the ecosystem the energy flow is the main driving force of nutrient circulation. The organic and inorganic substances are moved reversibly through various closed system of cycles in the biosphere, atmosphere, hydrosphere and lithosphere. This activity is done in such a way that total mass of these substances remains almost the same and is always available to biotic communities.

3. The Conversion of Elements into Inorganic Flow

The organic elements of plants and animals are released in the under mentioned ways:

(i) Decomposition of leaf falls from the plants dead plants and animals by decomposers and their conversion into soluble inorganic form.

(ii) Burning of vegetation by lighting, accidental forest fire or deliberate action of man. When burnt, the portions of organic matter are released to the atmosphere and these again fall down, under the impact of precipitation, on the ground. Then they become soluble inorganic form of element to join soil storage, some portions in the form of ashes are decomposed by bacterial activities.

(iii) The waste materials released by animals are decomposed by bacteria. They find their way in soluble inorganic form to soil storage.

**Environmental issues in pakistan:**

Pakistan is facing a lot of climatic and environmental issues, including Water pollution, soil erosion, and land pollution, shortage of water, global warming, air pollution and natural disasters. According to the latest global environment performance index (EPI) ranking Pakistan is in the list of countries which suffer from poor air quality. The climatic changes and global warming are most alarming issues risking millions of life across country. The major reasons of these environmental issues are carbon emission, increasing populations, and deforestation.The global climate risk index 2018 is the index that indicates to what extent countries have been affected by weather related loss events, According to this index Pakistan is ranked 40th with 566 causalities, losing US $47.313 million (0.0048% of GDP).

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**Water scarcity**

The issue of water scarcity is accompanies by the acute climatic changes. In May 2015, Karachi experienced the deadly heat wave Pakistan has seen over 50 years. At least 1,200 people died during the extremely hot weather. The increased temperature is also the biggest reason of melting glaciers in Pakistan. Pakistan is the home of more than 5000 glaciers, which feeds Indus River in summer and monsoon. In 2013, Federal minister of Science and Technology, Zahid Hamid, stated that glaciers are continuously melting because of rising temperature, and by the year 2035, the country will not have reserve of water in the shape of glaciers.

**Deforestation**

Similarly, one of the biggest issues is the increasing deforestation in the country. According to a recent study, In between 1990 and 2005, Pakistan lost 24.7% of its forest cover (around 625,000 hectares). the reasons behind deforestation are energy crisis, urbanization, industrialization and domestic use. Though certain plans have been launched to increase forest cover, which includes Green Pakistan program, Billion Tree Tsunami and REDD Plus, but it definitely take years for these plants to grow and replace already cut big trees.

**Pollution**

Another big issue is the increasing pollution. According to the international study, around 92% of all pollution related deaths are in the middle-income developing countries like Pakistan, India, China and Bangladesh. The study has found that the nine million deaths worldwide are related to pollution in 2015. The releases of toxic gases from the factories, brick kilns, and carbon emission from vehicles are main contributors of day by day increasing air pollution in the country. The air pollution causes respiratory diseases, skin infection and eye infections as well.

**Waste disposal**

Another important environmental issue is the waste disposal. Our factories and hospitals dispose thousands of tons of waste in the lakes and river streams on daily basis. Similarly, the lack of proper waste management system, allocated landfills sites and negligence on local municipal corporations and public are main causes of waste dumped openly on roads and streets.

**Population growth**

The constant growth in the population is other massive challenge. With the passage of time, the country is growing economically but definitely it needs to shed light on the environmental factors. The quality of life and the standard of living still needed to increase. We have more money but not clean water to drink and pure air to breathe. There are many projects that are currently running in the country but we needed progress very soon.

**Population**

A population is a group of inter-acting individuals, usually of the same species, in a definable space. In this way we can speak of population of deer on an island, and the population of fishes in a pond. A balance between two aspects determines the size of a population of any given species:

(i) Its reproductive potential,

(ii) Its environmental resistance.

In this way population size is determined by the relative number of organisms added to or removed from the group as under:

(i) Addition

Recruitment into the population is a function of birth rate and immigration rate.

(ii) Removal

Loss from the population is a function of death rate and emigration.

**Factors Regulating Population**

Following factors does population regulation:

(i) Physical attributes of the environment (e.g. climate),

(ii) Food (quantity and quality),

(iii) Disease (host-parasite relationships).

(iv) Predation,

(v) Competition (inter-specific and intra-specific).

**Population education:**

Most of the people agree ‘Population Education’ with education of the population. If we go deep into the matter, we will find that population education is education about population matter, i.e., fertility, mortality, migration etc. It is an educational process which helps people to understand the nature, the causes, and consequences of population events.

It is a factual knowledge about population dynamic. Population education is an educational process, which helps individual to learn about population and particularly the effect of population dynamic and the related problem on the individuals, family, community, nation and the world.

**Definitions of Population Education:**

Burbson:

“Population education is an exploration of knowledge and attitude about population, the family and sex. It includes population awareness, family living, reproduction education and basic values.”

UNESCO:

“Population education is an educational programme which provides for a study of population situation of the family, the community, nation and world, with the purpose of developing in the students rational and responsible attitudes and behaviour towards that situation.”

**Need and Importance of Population Education:**

Population explosion affects every aspect of man’s life-individual, national and international. It affects health, wealth and happiness of individual and families.

It also affects the prosperity and progress of nations, international security and peace. In order to minimize the problems like food problem, economic problem, younger generation problem, environmental problem and educational problem, there is an urgent need of population education at all levels.Thus the idea of population education is based on the following assumptions:

(i) Rapid growth of population is a constant threat to our economic development.

(ii) Over-population affects the health and well being of the younger generation.

(iii) Population explosion creates an obstacle for raising the standard of living of the masses.

(iv) Population education is not to be mixed with sex education or the methods of family planning. Rather it should be a motivational force for creating the right attitude to family size.

(v) Population education is not a “once for all affairs”, rather, it should be continuous process.

Hence, population education needs to be given top priority in the present scenario. The younger generation needs to be informed about populations problems. They need to be properly educated with new ideas for leading a better adult life.

The present situation needs population education because it is a new content area and is highly relevant to the lives of the people. It also encourages improvements in methods of teaching, in the structure of the system of education, in the value of the students and the teachers and in so many other areas.

**General Aims of Population Education:**

The aims of population education are as follows:

(i) Population education aims at assisting the individual to understand the causes and consequences of population phenomena.

(ii) It enables the individual to understand how docs population situation affect the individual and society.

(iii) It aims at recognizing the causes of demographic phenomena and to enable the people to make changes in order to remove those obstacles for social progress.

(iv) It enables to acquire knowledge, skills, attitudes and values necessary to understand the concept of population education.

(v) It enables the learner to take a conscious and right decision about the prevailing population situations.

**Traffic education**

Traffic means the movement of vehicles or people along roads, or the movement of aircraft, trains, or ships along a route.

Traffic education is defined here as any kind of formal or informal education that is aimed at learning and improving the knowledge, insight, skills and attitudes that are necessary for safe traffic participation, including the wish to safely participate in traffic.

Traffic education is needed to encourage safe traffic activities. Traffic education is very essential for every age group. Traffic education for educated road users can be easily done through media, T.V. and video. For uneducated road users, road safety education should be simple and purposeful. Regular road Safety programs are to be organized at schools, colleges, industries, public places, etc. Propaganda (e.g. Miking at the road junction) and exhortation are powerful tools in the road safety campaign. Various countries start traffic education right from the primary schools, for instance, in the Netherlands, traffic lessons are taught in primary school and the first years of secondary school. Traffic education mainly involves making the rules known and motivating each individual to follow the traffic rules and regulations. Traffic rules are meant to encourage a traffic flow which is as safe and smooth as possible. Breaking these rules result in an increased risk of crashes, or a more serious outcome.

Our transport system is not on a sustainable path. Achievements in terms of mobility have come at some considerable environmental, economic and social cost. Sustainability is a long-term concept, also demanding attention to its social dimension. For transport, this underscores a need to link considerations of the environment and traffic safety together. Today, transport plans and projects generally takeaccount of both traffic safety and environmental concerns,but each factor is normally dealt with individually.

Considering the relationships of traffic accidentsand pollution, as exemplified by modelling, it is appar-ent that some variables are shared: traffic flow, speed,the composition and fluidity of traffic. On the individuallevel, there are common characteristics of vehicles, driv-ers, roads and traffic.

The strategies which aim to pre-vent accidents and pollution and to reduce damage arebased on similar principles of action:

• reducing the need to make a trip and its length

• improving the safety and environmental performanceof vehicles

,• providing a safer road system,

• promoting the use of modes which perform better withrespect to safety and environmental protection

• encouraging safe and environmentally friendly atti-tudes and behaviour.

The environmental impact of transport is significant because transport is a major user of energy, and burns most of the world's petroleum. This creates air pollution, including nitrous oxides and particulates, and is a significant contributor to global warming through emission of carbon dioxide.Within the transport sector, road transport is the largest contributor to global warming.

Environmental regulations in developed countries have reduced the individual vehicle's emission. However, this has been offset by an increase in the number of vehicles, and increased use of each vehicle (an effect known as the Jevons paradox). Some pathways to reduce the carbon emissions of road vehicles have been considerably studied.Energy use and emissions vary largely between modes, causing environmentalists to call for a transition from air and road to rail and human-powered transport, and increase transport electrification and energy efficiency.

**Environmental protection agency(EPA)**

Pakistan environmental protection agency was established in 1984 under the environmental protection ordinance 1983 and responsible to implement the pakistan environmental protection act 1997 in the country.

An Act to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development.

Pakistan environmental protection agency also provides all kind of technical assistance to the ministry of environment for formulation of environmental policy and programmes.

Functions of EPA

1. EPA administer the ordinance,rules &regulations for Environmental protection.
2. Establish national environmental quality standards
3. Coordinate environmental policy and programmes nationally &internationally .
4. Establish the system of survey
5. Prepare national environmental policy for approval from council
6. Provide information and education to public on environmental issues.
7. Initiate legislation in various sectors of environment.
8. Coordinate with provisional government for implementation of measures to control pollution.
9. Encourage the private organization for better work.

Environmental protection agency punjab

1. It was established in 1987
2. It was responsible for implementation of measures combined in pakistan environmental protection ordinance
3. Promote environment and social development
4. Create awareness among the people about environment

Environmental protection agency sindh

1. It was established in 1989
2. To provide clean air in major cities of sindh urban and clean water in major cities of sindh rural.

**Natural resources**

INTRODUCTION

A natural resource may be defined as any material given to us by nature which can be transformed in a way that it becomes more valuable and useful. For an example wood is used for making furniture. Yarn obtained from cotton is used for weaving cloth. Likewise, various machine, tools and household goods are made of metals. Now furniture, clothes, machine, tools are more valuable than their raw form i.e. raw form i.e. wood, cotton and metal, respectively. The wood, metal resources. It is impossible to obtain valuable items from any resources. Thus, water, minerals, forests, wildlife as well as human beings are resources. Any material may be called, as a resource provided and appropriate technology is available to transform that into more valuable goods.

Renewable and Non-renewable Resources

On the basis of continuity, the resources are classified as under:

(1) Renewable Resources

(2) Non-renewable Resources.

1. Renewable Resources

Resources, which can be renewed along with their exploitation, are always available for use. Hence they are called renewable resources. For instance, forests are renewable. If trees are felled for wood, original forest covers may be maintained through planning new trees i.e. a forestation. Likewise, solar energy and wind energy are examples of renewable resources.

2. Non-renewable Resources

The formation of some resources like iron ore, coal, mineral oil etc. has taken several thousand years. Once they are used in unlimited way, they cannot be easily replaced. Thus, their exploitation at large scale will result in their fast depletion. Some such resources are called non-renewable resources or exhaustible.

3. Cyclic Resources

For resources there is no final use as they can be used continuously. For example, water used in industry and domestic ways can be cleaned and used again for similar or other purpose. Such resources are given the name of Cyclic Resources.

Conservation of Natural resources

Meaning of Conservation

Conservation broadly means sound land or water use planning. It is concerned with the maintenance of natural systems and with their moderate, systematic, planned and regulated utilization and exploitation for the long-term benefit of mankind. Conservation has been defined as “As management of the benefit of all life including humankind of the biosphere so that it may yield sustainable benefit to the present generation which maintaining its potential to meet the needs and aspirations of the future generations.”

Need for Conservation

As expanding human population resulted into expanding needs of man, man started utilizing natural resources at a much larger scale with scientific progress and technological development. Continuous increase in population caused and increasing demand for resources. It created a situation when the non-renewable resources are likely to come to an end after some time. In fact, we would be using all those resources, which are, in real sense, the property future generation. As such, there must be some sort of balance between the population growth and the utilization of natural resources. It is apparent to all of us that, the non-availability of resources leads to their pricesrise which has an adverse affect on the economics of countries. During 1980s the world experienced a state of imbalance between the growth rates of food production and economic development suffered setbacks. We are facing contrary positions. In some areas, there is not enough water for agriculture and industry. On the country to it in other areas there are problems of waterlogging due to over-irrigation. In some countries much of underground water is being utilized for food grain production. It is resulting in lowering of water table in northern China

.As a consequence of increasing tampering of nature by man, natural reserves are greatly dwindling and are becoming the main sanctuaries for wild plants and animals. It has been proposed that adequate examples of all-important and representative biospheres be protected and conserved. A worldwide network of such protected ecosystems is extremely important for ecological research pertinent to national use and conservation of the biosphere.

Objectives of conservation

(1) To maintain essential ecological processes and life support system;

(2) To preserve biological dividers;

(3) To ensure that any utilization of species and ecosystems is sutainable.

Categories of Conservation

There are two categories of conservation as under:

(1) In Situ Conservation

This is the conservation of genetic resources through their maintenanced within natural or even human-made ecosystems in which they occur. It includes a system of protected areas of different categories, managed with different objectives to bring benefit to the society. For example National parks, Sociometries, Nature Reserves, Natural Monuments, Cultural Landscapes, Biosphere Reserve etc. Evidently in situ conservation is not practicable for domesticates.

(2) Ex Situ Conservation

This is conservation outside habitats by perpetuating sample population in genetic resource centers, zoos, botanical gardens, culture collections etc. or in the form of gene pools and gamete storage for fish; germplasm banks for seeds, pollen, semen, ova, cells etc. Plants are more readily maintained than animals. In this kind of conservation vital role is played by seed banks, botanical gardens, pollen storage, tissue culture and genetic engineering. Under Ministries of Environment and Forests, Agriculture, and Science and Technology a large number of institutions are involved in conservation and utilization of natural resources. Between them, they are dealing with in situ conservation including sphere reserves, national parks. Wildlife sanctuaries and ex situ conservation such as field gene banks, seed and other banks, and utilization involving gene and drug prospecting respectively.

Individuals Role in Conservation of Natural Resources

An individual can play his role in the conservation of natural resources as under:

1. Soil Conservation

An individual can play a vital role in conservation of soil. Main principles of soil conservation are as under:

(1) To Protect soil from impact of raindrops.

(2) To Slow down the water movement if it flowed along the slope.

(3) To slow down the water from moving down the slope in narrow path.

(4) To encourage more water to enter the soil.

(5) To increase the size of soil particle.

(6) To reduce the wind velocity near the ground by growing vegetation cover, ridging the land etc.,

(7) To grow the strips of stubble or the vegetation cover which might catch and hold the moving particles of soil.

Keeping in view the above said principles an individual may adopt several methods to prevent the loss of soil during its erosion.

**2. Less exploitation of Resources**

We must bear in mind that resource exploitation and pollution are two faces of the same coin since exploitation of resources in one place can become environmental degradation either in the same place or in a remote area. We are aware of the adverse effects on the ocean harvest, which are often caused by man’s activities on land. Thus,biocides and persistent inorganic pesticdes, which are used to increase crop yields on land, lead to decrease the yields of fish and other proteins from the oceans. Increasing use of biocides for boosting carbohydrate yields on land is likely to lead to such high increase in their concentration in the oceans as to significantly reduce its productivity.

**3. Control over Population Increase**

We should aim at striving for an optimum instead of maximum, sutainable population size

on Earth, and to arrive at the optimum figure after due consideration of the complex environmental problems. The optimum size permits long-term persistence of the population in equilibrium with its environment. The optimum represents that stage when any further addition o

**4.Proper Use of Water**

Agricultural use of soil is linked with the use of water which is required for irrigation. Much

progress has been achieved in the large-scale storage of water in Dams and Reservoirs for agricultural use and for generation of hydroelectric power, but economy in its use is paid no heed. We must remember that policies directed toward the maximum economic yield from a fixed amount of water will result in maximum conservation and also that planning for the maximum use of water ought to be correlated with planning for the optimum use of land resources.

**5. Proper Irrigation for Soil Conservation**

The land resources of India have been increasingly degraded. Excessive unplanned canal

irrigation without proper drainage and water management has resulted in seepage, water

logging and salinity. Seven million hectares are already affected and another ten million are

threatened. About 150 million hectare area suffers from wind and water erosion. This results

in the loss of valuable topsoil. Rising water tables is also responsible for increasing salinization

of farm lands. Soil erosion causes premature silting up on many reservoirs and tanks.

**6. Proper Use of Wood**

Our country is gifted with a fairly considerable potentiality for increasing the supply

of such renewable resources as forests and forest products that could substitute for some of the scarce non-renewable resources. As such, it is advisable to substitute wood and wood

products for the non-renewable fuel and energy sources, as has been commonly practiced in

villages since times immemorial. Wood has certain advantages as fuel. As compared to coal,

its sulphur content and ash content are very low. The ash which is left, can be used as a

fertilizer. Wood and vegetable fibres might also some day furnish us certain primary organic

chemicals. In our country and other tropical countries wood residues may profitably be

converted into liquid and gaseous fuels. This can relieve, to some extent the problem of

scarcity of large-scale exploitable oil and coal resources, which are non-renewable ones.

**7.Fuel Alcohol from Biomass**

Ethanol and methanol can be used as fuels or may be blended with petrol and used in

a spark type internal combustion engine. These alcohols can be produced from biomass and

agricultural residues, etc.

**8. Use of Solar Energy**

Solar thermal systems are the best developed and simplest of the solar technologies. It is proved that Solar energy can be gainfully conserved by suitable architectural designs that gainfully exploit the site and building materials to turn a building into a solar collector. In Active solar thermal systems the basic unit is the solar collector- a panel commonly made of aluminium, glass, plastic and copper. When fitted to a roof, these panels absorb direc

sunlight and transfer heat to a fluid that passes through the collector. The fluid flows through pipes into the building where it is used to heat water or warm the rooms. The solar cell is a device that converts sunlight directly into electricity.