Inspira- Journal of Modern Management & Entrepreneurship (JMME)
ISSN : 2231–167X, General Impact Factor : 2.3982, Volume 08, No. 01, January, 2018, pp. 314-322

BRIEF INTRODUCTION OF ENVIRONMENT, ECOLOGY AND ENVIRONMENTAL POLLUTION

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ABSTRACT

"Environment" is a difficult word to define because; the study of environment is based on different disciplines of knowledge, like environmentology, nature sciences, ecology atmosphere sciences, ocenology, life and living and many more. Its normal meaning relates to surroundings, but obviously that is a concept which is relatable to whatever object it is which is surrounded. Einstein had once observed, "the environment is everything that itself me"[1] Environment is a polycentric and multifaceted problem affecting the human existence. Progress and pollution go together; there can be no end to progress, and consequently, no escape from pollution. It industry is a necessary evil, pollution is the surest sufferance. Another words “pollution" means the direct or indirect discharge by man of substance or energy into the aquatic environment resulting in hazard to human health to living resources and aquatic ecosystem, damage to amenities on interference with other legitimate use water.[2]

KEYWORDS: *Environment, Environmentology, Ocenology, Ecology, Aquatic Ecosystem*.

Introduction

The protection of environment is a global issue and it is not an isolated problem of any area or nation. The problem of environmental pollution in an increasing small world concerns all countries irrespective of their size, level of development or ideology. The problem of environmental pollution is as old as the evolution of Homo sapiens on this planet and it was realized in the times of Plato 2500 years ago.[3] However, different dimensions of the problem of environment protection and its management have taken a serious turn in the present era. Today, society’s interaction with nature is so extensive that the question of environment has assumed proportions affecting all humanity. Industrialization, urbanization, population explosion, poverty, over-exploitation of resources, depletion of traditional resource of energy and raw materials are some of the factors which have contributed to environment deterioration the world over.

Concept, Meaning and Definition of Environment

The term ‘environment’ generally refers to ‘natural surrounding’, that is, it covers the physical surroundings that are common to all living beings and include air-space, water, land, plant, wildlife and flora-fauna etc.

Origin

The term ’Environment’ is formulated on the word ’Environ’ derived from the French work ’Environner’, which means "to surround" or “to encircle".

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1 See T.H. Godavarman Thirumulpad V.U.O.I (2002) 10 scc 606 at. 618.

2 Id; at 627-628. See also Halsbury’s law of england, 4th Edv. Vol. 38 Para 66; Karnataka industrial Areas Development Board V. Kenchappa, (2006) 6 Scc 371.

3 See Hambro, E., "The Human Environment - Stocholm and After," Year Book of world Affairs, 20 (1974).

Dictionary Meaning

The dictionary meaning of the word 'Environment' is two told.

- External condition or surroundings especially those in which people live and work.
- In Ecological sense it means the external surroundings in which a plant or animals lines which to influence its development and behavior.

Etymological Meaning

The word "Environment' in its etymological sense gives the meaning " surroundings, especially the material and spiritual influences which affect the growth, development and existence of a living being it means ' the circumstances or conditions that surround or organism or group organism,' or the complex of social or cultural condition that affect an individual or community." Thus, the context of human beings, environment is the sum of all social, economical, biological, physical or chemical factors which constitute the surroundings of man, who is both creator and molder to his own environment.

Definition of Environment

It is very difficult to define the term 'environment'. It has been defined widely as given below:

- **Simon Ball and Stuart Bell state that:** "Environment is a difficult word to define. Its normal meaning relates to 'surroundings', but obviously that is a concept that is relative to whatever object it which is surrounded. Used in that sense environment could include virtually anything, indeed, as Einsten once remarked; 'The environment is everything that isn't me'. However, 'environment' has now taken on a rather more specific meaning, though still a very vague and general one, and may be treated as covering the physical surroundings that are common to all of us including air, space, wastes, land, plants and wildlife."
- **According to Black's dictionary: "**Environment in its widest sense includes an aggregation of all those economic, social cultural and natural conditions and facts with influence human life and living organisms".
- **According to the Encyclopedia Britannica: "**The expression 'environment' to connotes the entire range of external influence acting on an organism, both the physical and biological, and other organism, i.e. forces of nature surrounding an individual."
- **Sir E.J. Ross:** has also defined environment as an aggregate of all those external conditions and effects which regulate life and development of organisms.
- **According to M.J. Herkovits: "**Environment refers to sum total of external conditions which surround man in a given inter-relationship which exists among them and human beings, other living creatures, plants, micro-organisms and property[4].
- **According to Alan Gilpin:** "From a scientific point of view environment is taken to mean everything that is physically external to the organism; organism includes human beings".
- **Justice P.N. Bhagwati:** observed that "the term refers to condition within and around an organism, which affect the behavior, growth and development or life process, directly or indirectly. it includes the condition with which the organism interacts".
- **Dr. T.N. Khoshoo [Secretary, Dept of Environment, Govt. of India]:** define environment as "the sum total of all conditions and influences that affect the development and life of all organs."
- **According K.R. Dikshit:** "a holistic view of the world as it functions at any point of time with a multitude of special elemental and social-economic systems distinguished by quality and attributes of space and mode of behavior of abiotic and biotic forms".
- **Gandhi A.:** has equated environment to nature which includes plants and all physical elements of all the earth in which the organisms live.
- **The United state council on environment:** Quality lays down that "Man's total environmental system includes not only the biosphere but also his interactions with his natural and man-made surroundings."

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[4] The definition of 'Environment' in section 2(a) of the Environment (Protection) Act, 1986 is similar to 'Herskovits' definition of environment.

- **Statutory Definitions:** The U.K Environment protection Act, 1990: According to section 1(2) of the Act, "Environment consists of all or any of the following media namely; air, water and land; and the medium or air includes the air, within the building and the air within other natural or man-made structures above or below ground."
- **The Environment (protection) Act, 1986:** According to section 2(a) of the Act, "Environment includes water, air and Land and the inter-relationship, which exists among and between water, air and land and human beings, other Living creatures, plants, micro-organism and property."

The above definitions make it clear that environment is the sum total of all external conditions and influences on the development cycle of biotic elements the earth surface. It is a polycentric and multi-faceted phenomenon affecting the human existence and one can understand it better in relation to eco-system, ecology and biosphere.

Basic Components of Environment

The basic components of environment consist of plants, animals including human beings. These components may broadly be placed two categories.

- Abiotic components: Its consist of the following:
  - Climatic elements including sun, energy, temperature, air, light, humidity, rain etc.
  - Isographic elements such as huge mountains, slopes etc.
  - Water-resource elements which includes sea, lakes, ponds, rivers, underground water etc.
  - Soil elements.
  - Mine, rocks and underground minerals.
  - Geographical elements which includes trans-regional parts of the earth, shores, deserts, mountainous region, forest-land etc.
- Biotic components: Biotic elements consist of living beings, tree, plants, micro-organisms, birds, flora-fauna etc.

Environment is a very complex Phenomenon. To understand the concept of environment, it is necessary to know about ecology, ecosystem and biosphere.

Biosphere

'Biosphere' is that of the earth and atmosphere, which is inhabited by living beings. It is the surface area of the earth, which is made up to the atmosphere, the oceans, upper surfaces of the land areas of the continents and island the fresh water associated with them and living thinks, which inhabit this area. In this area, energy of sun is available to activate living processes. Chemicals from air, water and soil are available as building blocks for living organism.

Origin and Definitions of 'Ecology'

- **Origin of Ecology**

The word 'ecology' comes from two Greek words, namely 'oikos' and 'logos', oikos means, 'household', place to live' or 'habitation', 'logos' means, 'study' or discourse' to denotes and deal with the organism and its place of living i.e. 'at home'. Ecology denotes such relationships between the organisms and their environment. In other words, it is a branch of biology dealing with relations of living organisms to their surroundings, their habits, and modes of life etc. The word ecology was the first used by Henry David Thoreau in one of his letters in 1858, but he did not give it a specific definition. The term 'ecology' has been defined vividly by different classical and modern ecologists as given below:

- **Ernst Haeckel (1866):** "Ecology is the body of knowledge concerning the economy of nature i.e. the investigation of the total relations of the animal to its inorganic and organic environment".
- **Warming (a Denish botanist)** (1895): Ecology (Oekologie) is "the study of organisms in relation to the environment".
- **Frederick Clements (an American ecologist) (1916):** "Ecology is the science of community".
- **Charles Elton (a British ecologist)** (1927): "Ecology is the scientific natural history concerned with the sociology and economics of animals".
- **W.P. Taylor (1936)**: "Ecology is the science of the relations of all organisms to all their

environments".

- **W.C. Allee (1949)**: "Ecology is the science of inter-relations between living organisms and their environment, including both the physical and biotic environments and emphasizing inter-species as well as interspecies relations".
- **G.L. Clarke** (1954): "Ecology is the study of inter-relations of plants and animals with their environment, which may include influences of other plants and animals present as well as those of the physical features".
- **A.M. Woodbury** (1955): "Ecology is the science which investigates organisms in relation to their environmental philosophy in which the world of life is interpreted in terms of natural processes".
- **Mac Fadyen** (1957): "Ecology is a science which concerns itself with the inter-relationships of living organisms, plants and animals and their environments".
- **S.C. Kendeigh** (1961): "Ecology is the study of animals and plants in their relation to each other and to their environment".
- **H.G. Andrewartha** (1961): "Ecology is the scientific study of the distinction and abundance of organisms".
- **L.R. Tayor (1967):** "Ecology is the study of the way in which individual organisms, populations of some species and communities of populations respond to these changes".
- **G.A. Petrides (1968):** "Ecology is the study of environmental interactions which control the welfare of living things, regulating their distribution, abundance, production and evolution".
- **United States Council on Environmental Quality (1970):** "Ecology is the science of the intricate web of relationships between living organisms and their living and non-living surroundings".
- **Eugene Odum (1971):** "Ecology is the study of the structure and function of ecosystems, or broadly the study of nature".
- **C.J. Krebs (1972):** "Ecology is the scientific study of the interactions that determine the distribution and abundance of organisms".
- **M.E. Clark** (1973): "Ecology is the study of ecosystems or the totality of the reciprocal interactions between living organisms and their physical surroundings".
- **E. Pianaka** (1973): "Ecology is the study of relations between organisms and the totality of biological and physical factors affecting them or influenced by them".
- **C.H. Southwick** (1976): "Ecology is the scientific study of the relationships of living organisms with each other and with their environments. It is the science of biological interactions among individuals, populations and communities".
- **R.L. Smith (1977):** "Ecology is a multidisciplinary science which deals with the organism and its place to live and which focus on the ecosystem".

Ecology may be placed under four sub-heads, Plants Ecology, Animals Ecology, Bio-Ecology and Ecosystem. Ecology is the science of intricate web of relationship between living organisms and their relationship with non-living surrounding. These interdependent living and non-living parts make up ecosystem.

- **Ecosystem**

The term ecosystem is an abbreviated from of 'ecological system'. Ecosystem consist of organisms (biotic/'living' factors), their environment (abiotic/ 'non living' factors), and all the interactions which take place between them. Man cannot escape from his physical environment, which includes plants and animals. An assemblage of species of plants and animals inhabiting a common area and having effects on one another is known as a 'biotic community.' A combination of such biotic community with the physical environment is called 'ecosystem.'

- **Concept of Ecosystem**

No living organism lives alone and always have associates influencing each other and also having functional relationship with the external factors. All the living organisms in an area live in communities of plants and animals. They interact with their abiotic environment and with each other at different points in time for a large number of reasons. Life can exist only in a small portion of the Earth's land, water and its atmosphere. At a global level, the thin skin of the Earth on the land, the sea and the

air, forms the biosphere. The concept of ecosystem stability is explored. This is of particular relevance when considering the impact of human activities on the environment[5].

Importance of Ecosystem

- Ecosystem study indicates the available solar energy and the efficiency of an ecosystem to trap the same.
- It gives information about the available essential minerals and their recycling periods.
- Gross and net productivity of an ecosystem are known.
- It provides information of productivity and number of producers and consumers.
- It provides knowledge about the web of interactions and interrelations amongst the various populations as well as between populations and the abiotic environment.
- It helps human beings to know about conservation of resources, protection from pollution and inputs required for maximizing.
- Ecosystems are the basis of life itself. The natural ecosystems in the wilderness provide a variety of products and are regions in which a number of vital ecological processes are present; without these processes, human civilization would not be able to exist

Environmental Pollution

Therefore, may be described as the unfavorable alteration of our surroundings and it occurs mainly because of the action of man. Environmental pollution may take place through changes in energy pattern, levels, chemical and physical constitutions and abundance of organism. Pollution include, inter alia: [6]

- release of material into the atmosphere which makes the air unsuitable for breathing;
- harming the quality of water by any released materials;
- harming the quality of the soil by any materials;
- emission of substances which damage the health of the human beings, plants and animals; and
- odours and noise which may cause danger to health.

The term 'Pollution' is derived from the word 'pollute', which literally means to make foul, unclean or dirty. Therefore, pollution may be defined as 'the release of substance and energy as waste products of human activities which result in changes usually harmful, within the natural environment. [7] In the Report of the national forest commission, 2010, 'Pollution', has been defined as "any introduction by man director indirect, of substance of energy into environment resulting in deleterious effects of such a nature as world endanger human health, harm to living resources, ecosystem and material property and which impairs amenities and interfere with other legitimate uses of environments.

Meaning of Environmental Pollution

The word 'Pollution" is derived from the Latin word 'Polluere' /polutus', which means 'to contaminate any feature of the environment' or 'defiled or to make dirty or to pollute'.

'Pollute': The expression 'Pollute' mean, "to get spoil or to make unclean or impure or unhealthy." Environmental pollution may be defined as "an undesirable change in the physical, chemical or biological characteristics of four air, water, and land that may or will harmfully affect human life.

Brief Definition of Environment Pollutions

"An unfavorable alteration of environment largely as result of human activities."

Working Definition of environment Pollution

Every substance existing in the environment have definite composition when a foreign body in introduced into it or the proportion of its constituents is modified, then that substance loses its original character and qualities. As a consequence of the changed constitution, the original substance does not serve its definite purpose. The modified version is termed as 'polluted' or 'adulterated substance' and the process is called 'pollution'. Thus, Pollution is a contamination of the environment by man- made substances or energy that have adverse affect on living or non-Living matter. This contamination of air,

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5 Cronon, William: Changes in the Land: Indians, Colonists, and the Ecology of New England. New York: Hill and Wang, 1983.

6 See Benimadhab Chatterjee, Environmental Laws, Deep& Deep Publication, 2002, p 2.

7 T.N. Godavarman Thirumulpat V.U.O.I (2002)10 Scc. 606(607)

water, or soil materials interferes with human health, the quality of life, or the natural functioning of eco systems. In simple terms, pollution can be seen as the wrong substance in the wrong place in the wrong quantities at the wrong time. Pollution, as we know it today, is the outcome of human activities, particularly carried out in connection with industrial carried out in connection with industrial development As such, pollution is a very recent Phenomenon. According to section 2 (C) of The Environment (protection) Act, 1986 definition of 'Environment pollution' is not comprehensive and should be read with' Environmental pollution and 'hazardous substance' as defined under sec. 2(b) and 2(e) of the Act.

Meaning of Pollutants

Pollutants are the materials of factors, which course adverse effects on the natural quality of any components of the environment. Pollutions are the waste products or by-products of the materials we make use or throw away. They are substances (e.g. smoke), chemicals (e.g. sulphur dioxide) or factors (e.g. heat) which cause a potential adverse effect on the environment quality.

Definition of Environment Pollutant

According to sec. 2(b) of the environment (protection) Act, 1986' Environmental Pollutant' means" any solid, liquid or gaseous substance present in such concentration as may be or tend to be injurious to environment."

The Characteristics of Pollutants are

- They are long-distance travellers and capable of spreading to the entire globe in relatively short time.
- They are persistent and long-lasting and remain dangerous indefinitely.
- They accumulate both in atmosphere and animal tissues.

Classification of Pollutants

Pollutants may be classified as natural and artificial (man-made).

- **Natural Pollutants**: Natural Pollutants are produced by pollution generated in nature by natural processes and phenomena. e.g., hydro carbons, volcanic gages and ash, solar radiations and oxides of sulphur in the atmosphere.
- **Artificial or anthropogenic (man-made) pollutants**: Artificial Pollutants are produced by human activities such as production of Co_2 and Co by combustion of fossil fuels, use of pesticides, motor vehicle exhaust- emitted pollutants, petroleum ail spilled in ocean by carrier tankers, municipal and industrial effluents and soon, in industrial and agricultural sectors.

According to the form in which they persist after release into the environment.

- Primary Pollutants: e.g. DDT and plastics.
- Secondary pollutants peroxyacetyl nitrate (PAN)

According to their natural disposal

- **Biodegradable pollutants**: They are the domestic waster that can be rapidly decomposed under natural conditions. They many create problems when they accumulate.
- **Non-degradable Pollutants**: aluminium cans, mercuric salts, long-chain phenolics, DDT, etc.

According to Their Existence in Nature

- **Quantitative Pollutants:** These are the substances, which occur in nature but become pollutants when their concentration reaches beyond a threshold value in the environment e.g. carbon dioxide, nitrogen oxide, etc.
- **Qualitative Pollutants:** These are the substances which do not occur in the environment but are passed into it through human activity, e.g. fungicides, herbicides, D.D.T. etc.
    - **Causes of Pollution:** Main factors responsible for environmental pollution are;
    - Deforestation
    - Development of Science and Technology
    - Industrialization
    - Urbanization
    - Population Expansion
    - Change in Methods of Farming and agriculture

- Rise in Living standard.

Effects of Pollution

The effects of a pollutants may vary depending or a number of factors. These are:

- The nature of pollutant.
- The concentration of the pollutant.
- The persistence of the pollutant.

Environmental Pollution may further be classified from the point of view of object which gets polluted. It may be placed under the following categories:

- Atmospheric (Air) Pollution;
- Water pollution;
- Soil pollution/land pollution;
- Radioactive pollution;
- Food pollution;
- Noise/sound pollution;
- Marine pollution;
- Thermal power plant;
- Pollution caused by hazardous substances and solid wastes;
- Acid rain;
- Smog.

Pollution can affect the very survival of our planets as its effects are felt not only by human, but by all the life-supporting systems of the earth-air, water, soil, flora and fauna.

Definition of Air Pollution

Air pollution means “the imbalance in quality of air so as to cause adverse effects on the living organisms existing on earth”. The World Health Organization (WHO) defines air pollution as “limited to situations in which the outer ambient atmosphere contains materials in concentrations which are harmful to man and his environment”. According to Bureau of Indian Standard IS - 4167 (1980), air pollution is the presence in ambient atmosphere of substances, generally resulting from the activity of man, in sufficient concentration, present for a sufficient time and under circumstances such as to interface with comfort, health or welfare of persons or with reasonable use or enjoyment of property.

According to the Air (Prevention and Control of Pollution) Act, 1981, “Air pollution means any solid, liquid or gaseous substance including noise present in the atmosphere in such concentration that may tend to be injurious to human beings or other living creatures or plants or property or environment.” Air pollution may be defined as “the presence of materials in the air in such a concentration which is harmful to man, and the environment”.

In other words, “the occurrence or addition of foreign particles, gases and other pollutants in the air, which has an adverse effect on human beings, animals, vegetation, buildings and other objects is called air pollution.” Generally, air pollution is defined as, “the presence in the outdoor atmosphere of one or more contaminants such as fumes, dust, gases, mist, grit, odour, smoke, smog, or vapors in considerable quantities for duration which is injurious to human, animal or plant life or which unreasonably interferes with the comfortable enjoyment of life and property. Air pollution is the contamination of the atmosphere by gaseous, liquid, or solid wastes or by-products that can endanger human health and the health and welfare of plants and animals, or can attack materials, reduce; visibility, or produce undesirable odours. Thus, air pollution is generally disequilibrium condition of air caused due to the introduction of foreign elements from natural or man - made sources into the air so that it proves injurious to biological community.

Water Pollution

When the quality or composition of water changes directly or indirectly is a result of man’s activities such that it becomes unfit for any purpose it is said to be polluted. Water pollution is the contamination of water by foreign matter such as micro-organisms, chemicals, and industrial or other wastes, or sewage. Water pollution can be defined as any aquatic contamination ranging between two extremes, viz., a highly enriched and over - productive (entropic) water body and one made injurious by

chemicals, metals industrial effluents, petrochemicals, radioactive materials, disease - causing pathogens, etc., which may eliminate many living organisms or even exclude all forms of life.

Water pollution may be defined as "the addition of some substance (organic, inorganic, biological or radiological) or factor (heat), which degrades the quality of water so that it either becomes health hazard or unfit for use". Water pollution may be defined as the introduction into a water body of substances of such character and in such quantity that the natural quality of the water body is altered. This alteration impairs its usefulness, affects the health of living organisms or renders it offensive to the senses of sight, taste and smell. Water pollution is defined, "The addition of any substance to water or changing of water's physical and chemical characteristics in any way which interferes with its use for legitimate purposes".

Noise Pollution

- **Meaning of Noise**

Noise is undesirable and unwanted sound. Sound is a physical phenomenon that stimulates the sense of hearing. In human beings, hearing takes place whenever vibrations of frequencies reach the inner ear. Such vibrations reach the inner ear when they are transmitted through air. And the term 'sound' is sometimes restricted to such airborne vibration waves. Modem physicists, however, usually extend the term 'sound' to include similar vibrations in liquid or solid media.

Sound is of two kinds, agreeable and so wanted, and disagreeable and so unwanted. It is the latter kind that constitutes noise. However, whether or not a sound is agreeable very much depends on the psychological state (mood) of a person. For a person, a film song may be agreeable but to a student preparing for examinations or a patient confined to bed, the same may turn out to be noise. Nonetheless, there are some sounds such as roar of an aircraft, cluttering of machines in a factory or the blaring of sirens and honking of cars on the road are noise to everybody. The sound depend upon-loudness, duration, rhythm and mood of a person. Sound is a main medium of communication and entertainment. A loud, unwanted or unpleasant sound that causes discomfort is called noise.

- **Noise Population**

Noise pollution is when harmful noise is released in an area; cities have a lot of noise pollution. The roaring vehicles, thundering machines, construction, train and allied bad sound etc. cause noise pollution. Noise disturbance is the disturbing or excessive noise that may harm the activity or balance of human or animal life. The noise of 95 decibel may increase are blood pressure (Deafness, Sleeplessness). Noise-wise India can be termed as the most polluted country in the world. Two types of noise standards are prescribed:

- Ambient air quality standards in respect of and
- Emission limits for designated types of machinery, appliances and fire crackers.

The Noise Regulation Rules, 2000 regulate noise levels in industrial (75 decibels), commercial (65 decibels) and residential zones (55 decibels), and also establish zones of silence (100 meters) near, school, court and hospitals.

Land Population

Land pollution is when pollutants are thrown on land such as landfills, or regular people throwing garbage on land etc. urbanization and industrialization are major causes of land pollution.

Smog

The most discussed topic of today is smog. Some is type of pollutant. It is the combination of 'smoke' and 'fog'. Smog is the result of coal burring in a sulpher dioxide. Recently India and Sri Lanka players became sick due to smog in test match. They had to wear masks.

Conclusion

Pollution hurts every living being and non-living being on the earth!

Human are the biggest producers of pollution. Pollution will shorten our life. The most pollution these are three main reasons, Transportation of mainly automobiles, trucks and buses, Burning in stationary sources, including residential, commercial, and industrial heating and cooling, Coal-burning power plants and trash incinerators. Pollution can take many forms the air we breathe, the water we drink, the ground where we grow our food, and the increasing noise we hear every day. All of these forms contribute to health problems and a lower quality of life.

We have started realizing that our economic activities are threatening our survival on the earth. We have started realizing that our existence is possible only when can live harmony with the various elements of the environment, which are interconnected. We know very well that these environmental problems have come to us as an ecological deficit created due to environmentally unsound developmental process. We need a holistic approach to environmental development, by updating ecology. We should device ways and means to develop without polluting and causing eco-degeneration or in simple term to device ways and means to make development sustainable. Equally important is the way we should follow to wipe out our past ecological deficit and to reconcile the apparently aspects of development and environment. Thus the Environmental pollution is a global problem. Entire atmosphere of our planet is afflicted and encircled the entire earth. Lewis Thomas vividly describes the earth as a living cell and the atmosphere as a protective membrane around it.[8] So, environmental pollution is a concern for all. In order to save the world from these hazards, we have to maintain ecological balance. Environmental protection is a matter of grave concern for human existence. All these lead us to think of environmental protection. Every person should feel his own responsibility in making the atmosphere pollution free. The government should punish the people who pollute the atmosphere. It is always better to light a candle than to curse darkness.

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[8] Lewis Thomas, "The Live of Cell", p. 1.