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Environmental Pollution and Global Warming

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Abstract

Our planet earth being an evolutionary planet is capable of supporting life, including human life. The impact of man upon the environment has existed ever since man himself walked on planet earth. Now a days the environmental damage done, particularly the heating up of the atmosphere due to the discharge of so-called green house gases such as nitrous oxide, carbon dioxide, methane etc. are posing major threat to this planet. Green house gases concentration is increasing in the atmosphere, thereby increasing the temperature of the Earth and atmosphere. This increase in temperature can have catastrophic effects on weather, sea level, bio-diversity, human health etc. across the world threatening the survival of mankind on earth. Environmental sensitivity can only grow through a major public awareness campaign. In the present paper an attempt has been made to draw attention towards threatening impacts of global warming, measures to curb global warming and need of value based environmental education to transform the mind set of people.

Keywords: Evolutionary, impact, green house gases, catastrophic, global warming.

Introduction

Due to progress in atomic energy, there has been an increase in radioactivity in the biosphere. There are a number of industrial effluents and emissions particularly poisonous gases in the atmosphere. Mining activities also added to this problem particularly as solid waste. Since the industrial revolution, the efforts of removing pollutants from the natural environment have not been able to keep pace with the increasing amount of waste materials and a growing population that further aggravates the situation. This has often resulted in the transformation of lakes, rivers and coastal waters into sewage depots where the natural biological balance is severely upset and incases totally disrupted. At present there are many environmental issues which have grown in size and complexity day by day threatening the survival of mankind on earth.

Let's know some tit-bits of environmental and pollution related factors:

The environment consists of four segments: atmosphere, hydrosphere, lithosphere and biosphere. The atmosphere is the protective blanket of gases surrounding the earth, which sustain life on earth and saves it from the hostile environment of outer space. The hydrosphere consists of all types of water resources like seas, oceans, rivers, lakes polar ice-

caps, glaciers and ground water etc. only one present total water resources is available as fresh water from human consumption and other uses. Lithosphere is the outer mantle of the solid earth, consisting of minerals occurring in the earth's crust and the soil. Soil is a complex mixture of minerals, organic matter, air and water. Biosphere is the realm of living organisms and their interaction with the environment i.e. atmosphere, hydrosphere and lithosphere.

The Atmosphere is divided into three parts: the troposphere, the stratosphere and the ionosphere. The troposphere is the first 15 kms of the atmosphere above the earth's surface. Most clouds and weather conditions develop here. The stratosphere is that part of atmosphere that lies from about 15 kms to 40 km above the earth. The ionosphere is the uppermost part of the atmosphere that tends 40 kms to about 150 kms above the earth. The temperature in the upper level of ionosphere 250°C-300°C. Once we leave the ionosphere, we are in the outer space. It is here, where most of the satellites and space shuttles move.

Air is a mixture of number of gases. It contains mostly nitrogen, oxygen, carbon dioxide and argon besides water vapours. A number of other gases are also present in a very slight amount, but they are very crucial in the chemistry of atmosphere. We use atmosphere to supply gases for various purposes. Some gases are not actually the part of atmosphere but they occur due to human activities like: Sulphur dioxide, Nitrogen oxide, Chlorofluorocarbons. These are the gases which are responsible for many of the environmental problems associated with the atmosphere.

The term environment is derived from the French word "Environner" which means to encircle or surround. All the biological and non-biological things surrounding an organism are thus included in environment. Thus "Environment includes water, air, and land and the interrelationship which exists among and between water, air and land and human beings, other living creatures, plants, micro-organisms and property".

For normal and healthy living, a conducive environment is required by all the living beings, including humans, live stock, plants, micro-organisms and the wild life. The favorable unpolluted environment has a specific composition. When this composition gets changed by addition of harmful substance, the environment is called polluted environment and the substances polluting it are called pollutants.

Environmental pollution can therefore, be defined as any undesirable change in physical, chemical or biological characteristics of any component of the environment (air, water, soil) which can cause harmful effects on various forms of life or property.

The mad race among nations over the globe for development jeopardized the health of man itself. Progress in agriculture and industry is taken a general criterion of development of any

country. This craze resulted into unlimited exploitation of every bit of natural resources. Human interaction with a variety of resources and their excessive exploitation have resulted in many an irreversible damage to our environment. Unlimited exploitation of nature by man disturbed the delicate ecological balance between living and non-living components of the biosphere. The unfavorable conditions created by man himself threatened the survival not only of man himself but also of other living organisms. Some of anthropogenic changes have assumed global proportions and become issues of great concern. Global warming is one of them.

The Green House effect and Global Warming:

A green house is a bright, warm and humid environment for growing plants, vegetables and flowers even during the cold winter. It functions as a closed system where the concentration of water vapour is elevated and visible light streams through the windows, this creates an ideal climate for plant growth some of the visible light is absorbed by plants and soil in the green house and is emitted as infrared radiation. This radiated energy is blocked by the glass or absorbed by water vapours and carbon dioxide. This trapped energy warms the green house and is a form of solar heating system in which light energy is converted into heat energy. The same process takes place on global scale. The energy from the sun when strikes the earth surface, the energy changes from light to heat and warms earth. Earth's surface, in turn, releases some of this heat as long wave infrared radiation. Much of this radiation makes its way back out to space, but a portion remains trapped in earth's atmosphere. Certain gases in the atmosphere including water vapors, carbon dioxide, and methane provide the trap. The gases conserve heat as the glass in the green house does and thus known as green house gases. As the concentration of these gases in the atmosphere increases, more heat energy remains trapped below. All life on earth relies on this green house effect – without it, the planet would be colder by about 33 Celsius degree and ice would cover the earth from pole to pole. However, a growing excess of green house gases in earth's atmosphere threatens towards continual warming.

Types of Green House Gases:

Green house gases occur naturally in the environment and also result from human activities. By far the most abundant green house gas is water vapor, which reaches the atmosphere through evaporation from oceans, rivers, lakes etc.

Carbon Dioxide: CO₂ is the next most abundant green house gas. It flows into the atmosphere through many natural occurring phenomenons as volcanic eruption, the respiration of animals, burning and decay of organic matter, such as plants. CO₂ leaves the atmosphere when it is absorbed into ocean water and through photosynthesis that releases oxygen, in turn, to atmosphere and incorporate carbon into new plant tissue. However, its concentration is increasing sharply as a result of human activities as:

- ◆ **Fossil fuel burning:** Oil, gas and coal are stores of carbon, when these are burnt; carbon is released directly into the atmosphere as CO₂.
- ◆ **Deforestation:** Trees absorb CO₂ from the atmosphere and this has been greatly reduced by deforestation. So, CO₂ is released to the atmosphere at rates much faster than that at which earth's natural process can cycle this gas. Since the beginning of the industrial revolution, atmospheric concentration of CO₂ has risen by almost 30 percent. This rise currently accounts for most of the enhanced green house effect. CO₂ has an atmospheric lifetime of about 100 years.
- ◆ **Methane :** Methane is even more effective insulator, trapping over 20 times more heat than does the same amount of CO₂ (remains in the atmosphere for less time than CO₂) its lifetime in atmosphere is just 11 years. Methane is emitted during the production and transport of coal, natural gas and oil. It also comes from rotting organic waste in landfills, sewage treatment, released from certain animals as a byproduct of digestion. Since the beginning of the Industrial Revolution in the mid 1700s, its amount in the atmosphere has more than doubled.
- ◆ **Nitrous Oxide:** It is a powerful and long lived green house gas, it occurs naturally in the environment, but its concentration is increasing, mainly as a result of fertilizers use. N₂O traps about 300 times more heat than does the same amount of CO₂. The concentration of N₂O in the atmosphere has increased 17 percent over pre-industrial levels.

Chlorofluorocarbons and their replacements: Chlorofluorocarbons and their replacements are synthetic, their contribution to global warming is entirely due to human activity. Chlorofluorocarbons are the chlorinated gas, which are released from the refrigerators, air conditioners, cleaning solvents (in micro-electronic industries), aerosol propellants etc.

The CFCs compounds break down in the stratosphere and produce chlorine atoms which are six times more effective in destroying the ozone layer. Its concentration is rising at the rate of 5% per year. It has been estimated that 15 to 20 percent global warming is due to CFCs. They are replaced with Hydro chlorofluorocarbons (HCFCs) – a similar compound, but one that does not affect the Ozone layer but is still a very powerful green house gas.

Water Vapour : Water vapour constitutes approximately only about 0.2 percent of the volume of air. They are the source of all forms of precipitation; water is also added by transpiration from the leaves of the plants. It is the source of clouds and it has ability to absorb or release heat energy thus it also plays role in global warming. There are other gases also that contributed to the changes are:

- ◆ Carbon monoxide
- ◆ Nitrogen oxide
- ◆ Volatile organic compounds

These gases also alter the oxidizing power of the atmosphere. For most of the 20th century these chemicals have been accumulating in the atmosphere at unprecedented rates. But since 1995, the response to regulations forced by Montreal Protocol on substances that deplete the ozone layer and its amendments, the atmospheric concentrations of many of these gases are either increasing more slowly or decreasing.

In 2000, scientists identified a substantial rise in atmospheric concentration of a newly identified synthetic compound called tri flour methyl sulphur penta fluoride. Its concentration is increasing in the atmosphere but still it is rare in atmosphere. Scientists are more concerned about it because it traps heat more effectively than all other known green house gases. Moreover, industrial source of this gas is still unknown.

Measuring Global Warming: Green house gas concentrations are increasing. Temperatures are rising. But does the gas increase necessarily cause the warming, and will these two phenomena continue to occur together? In 1988 the United Nations Environment program and the World Meteorological Organization established a panel of 200 leading scientists to consider the evidence. In its Third Assessment Report, released in 2001, the intergovernmental panel on climate change (IPCC) concluded that global air temperature had increased 0.6 Celsius degrees (1 Fahrenheit degree) since 1861. The panel concluded that warming was caused primarily by human activities that add green house gases to the atmosphere. The IPCC predicted in 2001 that the average global temperature would rise by another 1.4 to 5.8 Celsius degree (2.5 to 10.4 Fahrenheit degree) by the year 2100. This panel cautioned that even if green house gas concentration in the atmosphere ceased growing by the year 2100, the climate would continue to warm for a century or more before nature can dispose of it. If green house gases continue to increase, experts predict that CO₂ concentrations in the atmosphere could rise more than three times the preindustrial levels early in 22nd century, resulting in dramatic climate changes. Large climate changes of the type predicted are not unprecedented, indeed, they have occurred many times in the history of earth. But human beings would face this latest climate swing with a huge population at risk.

Effects of Global Warming: Scientists have made several predictions about how global warming will affect weather, sea levels, coastlines, agriculture, wild life and human health. These predictions are based on the interpretation from the Computer models of temperature, precipitation patterns and atmosphere circulation which they use to study global warming.

Weather: Scientists predict that Northern parts of the Northern hemisphere will heat up more than other parts of the planet. Due to which glaciers will shrink, winds will be more hard and of different patterns. Hurricanes, which gain their force from the evaporation of water, are likely to be more severe. Greater humidity will increase rainfall. Storms are expected to be

more frequent and more intense. Weather patterns are expected to be less predictable and more extreme.

Some warming driven changes:

- ◆ In the last two decades, the surface of water of Eastern Pacific warmed by 3°C, jeopardizing the survival of several species of fish and seabirds.
- ◆ Warming is causing breaking up of Antarctic ice shelves that are fueling more frequent and severe EL Ninos. The EI Ninos of 1997-98 has apparently been the most severe on record.
- ◆ In June 1999, two uninhabited islands in South Pacific were submerged by rising sea levels.
- ◆ Most of the Earth's glaciers are retreating at accelerating rates. The biggest glacier in the Peruvian Andes was retreating by 5 meters a year 20 years ago, today it is shrinking by 33 meters a year. The second largest glacier on Earth- The green land ice-sheet is thinning at an unprecedented rate of 1 meter each year.
- ◆ The Arctic sea ice has thinned by 40 percent in the last two decades.
- ◆ Man has actually altered the timing of the seasons because of the buildup of atmospheric CO₂, spring is now arriving a week earlier in the Northern hemisphere that it did 20 years ago.

Sea Level: A 20 cm rise by 2030 is expected to result from glacial melting and from the thermal expansion of the oceans as water temperature rise. This would result in serious flooding in low lying coastal areas like Southern Louisiana and South Florida. This rise in sea level is further estimated as 50 cm by 2100. Small island nations like Maldives in Indian Ocean are considered highly vulnerable, to sea level rise. Some other vulnerable countries to sea level rise are Bangladesh, Egypt, Vietnam, Mozambique, etc. Besides, permanently frozen subsoil of Tundra and Taiga forests is also melting and this melting is making life complicated in Alaska as hundreds of homes and telephone poles are sinking into ground. A higher sea level will increase the erosion of cliffs, beaches and dunes. It is estimated that a sea level rise of 50 cm would result in the disappearance of about 70% of sandy beaches in Japan and submerge about half of the present coastal wetlands of United States.

Natural Disasters: Global warming accelerates the normal cycle of rainfall and evaporation destroying the balance of water supply and demand. There would be areas that may be frequently flooded, due to increased rainfall, on the one hand and areas constantly suffering drought and water shortage on the other hand.

Agriculture: A warmed globe will probably produce as much food as before, but not necessarily in the same place. Some places may be benefitted by more rainfall and longer growing season. Some places that get irrigation supply from distance Mountains may suffer if

the winter snow packs, which functions as natural resources melts before the peak growing months. Crops and forest may also be affected by more insects and plant diseases.

Animals and Plants: Many plant and animal species will have problems adapting, other may not. This will influence the mix of species at different locations. Many will be at risk from extinction, whereas more tolerant varieties often weeds and pests, will thrive. Under global warming, animals will tend to move towards the poles and towards high elevations and plants will shift their ranges, seeking new areas as old habitats grow warm. Species that will find cities or farm lands blocking their way may die out. Some type of forests, unable to propagate towards the poles fast enough, may disappear.

Human Health: Global warming will affect human health in many ways:-

- ◆ It is anticipated that in warmer world, more people will get sick or die from heat stress-less due to hotter days but more due to warmer nights.
- ◆ Diseases now found in tropics, transmitted by mosquitoes and other animal hosts, like malaria, yellow fever, dengue fever etc., will widen their range as these animal hosts move in regions formerly too cold for them.
- ◆ Scientists also predict rising incidents of allergies and respiratory diseases as warmer air grows more charged with pollutants, mold spores and pollens.

Measures to Curb Global Warming: The most important contribution to global warming is the increase in atmospheric carbon dioxide (CO₂) level due to human activities. To remedy the situation, the increase will not only need to be halted, but also reversed.

There are two major approaches to slow down the building up of green house gases. The first is to keep carbon dioxide out of the atmosphere by storing the gas or its carbon component somewhere else, a strategy, called carbon sequestration. The second major approach is to reduce the production of green house gases.

- ◆ Since CO₂ is consumed by plants and trees (known as carbon sinks), reversing deforestation and implementing reforestation programmes may reduce levels of CO₂ in the atmosphere.
- ◆ CO₂ emissions can be cut by reducing the use of fossil fuels by cutting back car use, investing in energy efficiency, implementing renewable resources such as wind, solar and hydropower. This will also reduce the emission of methane, nitrous oxide etc. The need to take such measures was recognized at the 'Rio Climate Change Convention' in 1992, after which over 160 countries pledged to limit emissions of CO₂ and to protect and enhance natural sinks of carbon dioxide.

Value Based Environmental Education:

The environment belongs to each one of us and our actions effect the environment. When the environment gets degraded it affects our health, well being and our future. Environmental education or environmental literacy is something that every person should be well versed with. The principles of ecology and fundamentals of environment can really help create a sense of earth-citizenship and a sense of duty to care for the earth and its resources and to manage them in a sustainable way so that our children and grand children too inherit a safe and clean planet to live on. It is Supreme Court's directive to include environmental education in the curriculum of schools, colleges and universities. The prime objective of this is to make everyone environment literate.

Ways by which Environment Education can be made value based:-

1. The text books and resource material about environmental education needs to be such as to infuse the 'Eco-Centric' values rather than the 'anthropocentric thinking'. This can play an important role in building the positive attitude about environment.
2. Our cultural customs and rituals, in many ways, teach us to perform such actions as would protect and nurture nature and respect every aspect of nature, treating them as sacred, be it river, earth, mountains or forests. Many cultural and religious values are contained in our Vedas like "Dehi me dadami te" i.e. you give me and I give you (Yajurveda) emphasize that man should not exploit nature without nurturing her.
3. Social values like love, care, compassion, tolerance and justice which are the basic teachings of every religion need to be woven into environmental education, so that all forms of life and biodiversity on this earth are protected.
4. Global values stress upon the concept that man, nature and every natural phenomenon over the earth are interconnected and interlinked with special bonds of Harmony. If we disturb this harmony anywhere, there will be an ecological imbalance that will lead to catastrophic results.
5. Spiritual values inculcate the principles of self restraint, self discipline, contentment, reduction of wants, freedom from greed and teach to live without luxuries comforts. All these values promote conservationism and transform consumeristic approach.

Conclusion

All the above mentioned values incorporated in environmental education can go a long in attaining the goals of sustainable development and environmental conservation. Value based environmental education can bring in a total transformation of our mind set, our attitudes and our life styles. "What is the use of building a beautiful house if you don't have a decent planet to place it on?"

Perhaps this single question can answer the main burning question – “what is real development and progress?” We certainly do not want development at the cost of environmental disasters, health hazards, loss of mental peace and merciless destruction of nature’s beauty and natural resources. The value elements in environmental education alone can succeed in achieving the real goals of environmental literacy.

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