

Global Environmental Issues

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Ever since the man noted that some seeds of the grasses can be grown and eaten, he has been draining from Earth's natural resources variety of things as and when required. It was after industrial revolution few decades ago that many unwanted products of Man's action entered into our environment that lead to its annihilation many times. Famous among them are atom bomb attack on Japan in Second World War, Chernobyl disaster, Minamata disease, Bhopal gas tragedy etc. These accidents though restricted to a country or place but were given due attention by international organisations like UNO, UNESCO or UNEP. It was in 1968 that UNESCO emphasized research on international Ecology. Consequent to it around 80 scientists from different countries met in Paris in 1969 to discuss some important ecological issues. It was International Conference on Human Environment in Stockholm in 1972 which has the credit to give impetus to coordinated environmental studies at international level. Since then we are celebrating 5th June as Environment Day every year. Follow it, Montreal protocol, Kyoto protocol and Earth summit raised various environmental issues having global impact.

Most recent amongst them is the climate change. Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. The earth is warming up, and there is now overwhelming scientific consensus that it is happening, and human-induced. With global warming on the increase and species and their habitats on the decrease, chances for

ecosystems to adapt naturally are diminishing. Many are agreed that climate change may be one of the greatest threats facing the planet. Recent years show increasing temperatures in various regions, and/or increasing extremities in weather patterns. Beside this various global environmental issues are:

1. Green house effect
2. Global warming and Climate change
3. Global dimming
4. Acid Rains
5. Photochemical smog
6. Loss of Biodiversity
7. Ozone depletion

1. *The greenhouse effect* is the rise in temperature that the Earth experiences because certain gases in the atmosphere trap energy from the sun. Without these gases, heat would escape back into space and earth's average temperature would be about 60°F colder. Without the greenhouse effect life on this planet would probably not exist as the average temperature of the Earth would be a chilly – 18° Celsius, rather than the present 15° Celsius. The current balance of energy between earth and atmosphere shows that earth receives 240 Watts for each square metre of the earth surface (W/m^2) and radiates about 236 W/m^2 . The surplus of about 4 W/m^2 of the absorbed over emitted radiation (the calculated value for a sudden doubling of CO_2) is called radiative forcing. Over time the warmer surface will cause a sufficient increase in emitted infrared energy to bring the earth back into balance with the incoming solar radiation – but with a warmer surface than before. This would require a 1.2°C increase in surface temperature to bring it back up to the balancing figure of 240 W/m^2 .

The various gases responsible for this change in temperature are: carbon dioxide

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accounts for about 55% of the change in the intensity of the Earth's greenhouse effect, Chlorofluorocarbons 25%, Methane 15%, Nitrous oxide 5% and Ozone's contribution to the enhancement of greenhouse effect is still yet to be quantified. Different countries contributions to global CO₂ in tones/capita is: USA (23), Luxembourg (27.5), Canada (18.0), Australia (17), USSR, Saudi Arabia, Germany, Netherlands (12-13), Japan (10), Mexico, China, Brazil (<4) & India (1). Global average was 3.0 (Sharma et al, 2000). They have also reported that India's absolute level of GHG emissions in 2020 will be below 5 per cent of global emissions. OECD (Organization for Economic Cooperation and Development) average is (12.5 tonnes/capita) and world average is around 4.5.

2. *Consequences of global warming.* It will have the following major impacts.

- Arctic shrinkage and Arctic methane release.
- Alongside large reductions in the Greenland and West Antarctic Ice Sheets.
- Accelerated global warming due to carbon cycle feedbacks in the terrestrial biosphere.
- Releases of terrestrial carbon from permafrost regions and methane from hydrates in coastal sediments are accelerating.
- Sea level rise – Sea level is expected to rise 18 to 59 cm (7.1 to 23.2 inches) by the end of the 21st century.
- High local temperature and changes in rainfall pattern
- Change in land use and vegetation pattern

Indian Himalaya has about 15,000 glaciers and majority of them are shrinking. They will disappear by the year 2035 as per the report of International Commission of Snow and Ice on Asian glaciers. Gangotri glacier is receding @ 120 feet per year and will disappear by 2030. Startling result in temperature change in higher reaches of HP has been recorded. There is no marked change in average maximum temperature but the average minimum temperature has risen by 1°C in past 2-3 decades. One study suggests that 15-37% of terrestrial species may be

'committed to extinction' by 2050 due to climate change. IUCN (2008) released a data stating that 10% birds, 24% amphibians and 19% corals threatened species are climate change susceptible. They further reported that 35% birds, 52% amphibians and 70% corals are climate change susceptible.

3. *Contrary to Global Warming is Global Dimming.* Gerry Stanhill (past Soviet Union) studied decline in solar influx worldwide and coined the term "global dimming". It is the gradual reduction in the amount of global direct irradiance at the Earth's surface that was observed for several decades after the start of systematic measurements in the 1950s. The effect varies by location, but worldwide it has been estimated to be of the order of a 4% reduction over the three decades from 1960-1990. It is thought to have been caused by an increase in particulates such as sulphate aerosols in the temperature due to human action. Aerosols and other particulates absorb solar energy and reflect sunlight back into space. The pollutants can also become nuclei for cloud droplets. Water droplets in clouds coalesce around the particles. Increased pollution causes more particulates and thereby creates clouds consisting of a greater number of smaller droplets (that is, the same amount of water is spread over more droplets). The smaller droplets make clouds more reflective, so that more incoming sunlight is reflected back into space and less reaches the earth's surface. Global dimming has interfered with the hydrological cycle by reducing evaporation and may reduce rainfall in some areas. It also creates a cooling effect.

4. *Another global environmental issue is the Acid Rain.* "Acid Rain" is popular term referring to the deposition of wet (rain, snow, sleet, fog and cloudwater, dew) and dry (acidifying particles and gases) acidic components. A more accurate term is "acid deposition". "Clean" or unpolluted rain has a slightly acidic pH of about 5.2, because carbon dioxide and water in the air react together to form carbonic acid, a weak acid (pH 5.6 in distilled water). Due to air pollution it may attain a pH ranging from 3.5 to 4.5, and then it is called as 'Acid Rain'. Sulphur dioxide (SO₂) and nitrogen oxide (NO_x) are the primary causes of acid rain. 70Tg(S) per year

in the form of SO₂ comes from fossil fuel combustion and industry, 2.8 Tg(S) from wildfires and 7-8 Tg(S) per year from volcanoes. Major human activities responsible for acid rain are electricity generation and motor vehicles.

Adverse effects of acid rain can be (a) Acidification: The United States Environmental Protection Agency's (EPA) states "Of the lakes and streams surveyed, acid rain caused acidity in 75 percent of the acidic lakes and about 50 percent of the acidic streams" (b) change in soil biology and chemistry: soil microbes are killed. The hydronium ions of acid rain also mobilize toxins such as aluminium, and leach away essential nutrients and minerals such as Magnesium. Calcium and Magnesium are leached (c) adverse forest health: high altitude forests are especially vulnerable as they are often surrounded by clouds and fog which are more acidic than rain (d) agriculture damage (e) human health damage: premature deaths and cancer like diseases (f) architecture damage.

5. *Photochemical smog* is also considered now as a potent environmental problems in the big cities around the world. Photochemical smog is brown smog, the gray-brown haze that fills the air in many cities. The gaseous exhaust of motor vehicle contains gases which react in presence of sunlight to produce photochemical smog.

The aldehydes produced during reaction can undergo complex reactions with OH ions to produce PAN (Peroxyacetylnitrate) or PB₂N (Peroxybenzoyl Nitrate). These compounds are effective eye irritants can be very dangerous.

6. *Loss of biodiversity* is another issue which has resulted on account of change in habitats of animals and plants due to human interventions resulting in drastic changes in the environments as discussed earlier. The variety of life on Earth, its biological diversity, is commonly referred to as biodiversity. Biodiversity boosts ecosystem productivity where each species, now matter how small, all have an important role to play. It is feared that human activity is causing massive extinctions from various animals species, forests and the ecosystems that forests support, marine life. The World Resources Institute

reports that there is a link between biodiversity and climate change. IUCN (2008) has reported that 1575 plants are critically endangered, 2280 plant species are threatened and 4602 plant species as vulnerable. Likewise they have put around 10,000 animal species under similar list. Any drastic change in habitats or acute biotic interference will make them extinct. The point of worry is that these numbers are increasing appreciable from years to years.

7. *Ozone depletion* has become an important since the Antarctica expedition started. Ozone depletion describes two distinct but related observations: a slow, steady decline of about 3 percent per decade in the total amount of ozone in Earth's stratosphere since around 1980; and a much larger, but seasonal, decrease in stratospheric ozone over Earth's polar regions during the same period. The latter phenomenon is commonly referred to as the ozone hole. Halogen ions especially chlorine and Nitrogen dioxide are the main compounds which are responsible for reducing Ozone molecule to Oxygen at low temperature (-80°C) in presence of Polar Stratospheric clouds (PSC). The result is that at the onset of spring in polar region there is 40-50% decline in Ozone concentration in the atmosphere. Possible effects of this decrease in ozone concentration has been considered as a) Damage to the Eyes - 0.5% increase in cataracts for every 1% decrease in stratospheric ozone b) Skin cancer -UV-B radiation can decrease human immune resistance to skin cancer, may lead to a decrease in human immune resistance to skin cancer, c) Changes in plant metabolism, leaf structure, delay in flowering etc. d) Disturbances in basic aquatic food chain and loss of biodiversity.

To conclude a growing concern from developing countries and various NGOs for public participation is the need of the hour of protect and conserve the environment for our coming generations like our forefathers have done for us. The impacts of environmental change will be felt on the world's poorest countries the most. Equal rights to the atmosphere for all human beings and equity within and between nations are paramount. Hence it is the duty of every citizen to protect and improve environment as mentioned in schedule 51 of the Indian constitution.