

Pollution-a grave threat to the environment, mankind and the living world-1

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Introduction

Definition: Pollution of environment is the state of contamination of the various components of our natural environment caused by various economic and other human activities, at a pace that the natural forces fail to diffuse the effects of this contamination of these components of the environment viz. air, water, soil, serenity, temperature etc.

Nature has gifted us with a very hygienic and congenial environment to live in, with inbuilt devices to diffuse the effects of the various contaminants being produced by plants and animals in their normal course of living. But we are now contaminating the environment so rapidly, that the natural forces are proving to be incapable to diffuse the effects of various contaminants or pollutants being produced by us. Burning of hydro-carbons and other fuels in automobiles and factories, release of toxic industrial wastes in air or water, decay of domestic waste in open, deforestation, growing noise, rising temperature, nuclear research, explosions and power generation and many other individual and industrial activities are continuously polluting the environment. As a result, humans and all living beings have to face the fury of numerous diseases such as bronchitis, hypertension, hyperacidity, viral and bacterial infectious diseases, worm infestations and even cancer and also turbulence in the environment including global warming. So, to show disregard and to remain unconcerned to pollution is nothing but creeping suicide by all of us,

The acts polluting the environment are legion, but the resultant effects or pollution may be classified into following categories:

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| 1. Air pollution | 5. Noise Pollution |
| 2. Water pollution | 6. Thermal pollution |
| 3. Land or soil pollution | 7. Radio-active pollution |
| 4. Solid Waste Pollution | 8. Germ-plasm pollution
or pollution of Biological wealth |

Air-Pollution

Air Pollution has been attaining serious dimensions with growing vehicular emissions, traffic congestion, fuel adulteration and burning of coal and other fuels in generating power along with burning of fuel wood and biomass. Emission of various gases in course of manufacturing, refrigeration and other industrial activities is equally serious.

The Asian brown cloud, causing monsoon delay is also

largely the result of air pollution. Contamination of air by various gaseous and particulate contaminants has been causing deterioration in the quality of air we breathe and warming the environment (commonly called as global warming), to the prejudice of survival of mankind and other living beings. Every particle of contaminant mixed in air reduces the percentage of oxygen and other gases essential for life, and thereby availability of these gases in breathed-in air reduces, i. e, a person gets lesser oxygen per breath and thus his capacity to work retards and the vital organs like lungs and heart have to overwork, as the air contains lesser percentage of oxygen. When the air contains lesser proportion of oxygen, the heart has to pump blood to lungs more rapidly to procure the required amount of oxygen and consequently lungs have to manage more blood. Secondly, many contaminants being toxic, cause several diseases such as bronchitis, hyperacidity, allergy, cancer, skin diseases, hypertension and many other diseases connected with nose, throat, eyes, lungs and heart. Thirdly visibility in the air also reduces due to the presence of smoke in the atmosphere so chances of traffic accidents also rise. Air pollution has been causing global warming, leading to melting of glaciers and polar ice, causing a rise in sea level and so on. It has also been damaging the ozone layer in the atmosphere, which is necessary to protect us from ultraviolet radiations. These radiations result in global warming and diseases like skin cancer.

Emission of carbon dioxide, a major greenhouse gas responsible for global warming, from burning of fossil fuels has crossed 39.683 billion tones in 2013, as per a report of 49 researchers from 10 countries. It is 2.1 percent more than 2012 emissions and 61% increase since 1990. Governments need to reverse this trend and bring substantial reduction on CO₂ emissions rapidly, if we are to limit global climate change to below 2 degrees centigrade from pre-industrialization temperature level. UN-backed scientists have warned that a gain of above 2 degrees from the pre-industrialization revolution level temperature will trigger extreme floods, droughts, storms and decline in agri-productivity.

Globally, China is the worst culprit in causing air pollution leading to most fateful global warming, as it alone emits 35% of the CO₂ being emitted worldwide. US, the second largest emitter of CO₂ emits only 50 percent the amount of emissions by China. In the year 2012, China emitted 9.8 gigatons (Gt). US had emitted 5.19 Gt per year, India 1.97 Gt, Russia 1.77 Gt, Japan 1.32 Gt, International transport 1.06 Gt and Germany 0.8 Gt. The Chinese per capita

emissions is 7.1 tonnes against a global average of 4.9. On per capita basis, India is a small emitter of CO₂, which comes to 1.06 tonnes i.e. only, one third of the global average.

But in aggregate, India stands at the third position after China and US. The US has also curbed its emissions 10% since 2005 in aggregate besides bringing down the per capita emission from 17.5 to 16.4 tonnes by substituting coal by natural gas.

Second, and a bigger source of air pollution is combustion of hydrocarbon and other fuels in automobiles (cars, trucks buses, tractors and two and three wheelers) railway locomotives, planes, power plants, ships and factories. As a result of combustion of these fuels, crores of tonnes of Carbon-monoxide and other pollutants like Sulphur dioxide and compounds of Lead etc. are added in the environment. These pollutants cause many diseases like asthma, bronchitis, fatigue, skin diseases, restlessness, gastritis, hyperacidity, lethargicness, nausea, burning of eyes and nose and other diseases connected with respiratory and circulatory systems and even cancer. Carbon monoxide which occupies the oxygen absorbing sites of hemoglobin can even cause death if it is inhaled in excess quantity.

Thirdly, various manufacturing processes in factories emit crores of tonnes of various gases like oxides of nitrogen, sulphur, methane, Chloro-fluoro carbons etc. which are deadly poisonous and their concentration is continuously rising at an alarming rate. The six Green House gases (GHG_s) are chiefly responsible for global warming. These GHG_s are carbon dioxide (CO₂) methane, nitrous oxide, hydro fluorocarbons (HFCs) Perfluoro-Carbons (PFCs), Sulphur hexafluoride (SF₆).

This is a well known fact that over a third of the population of major industrial cities is suffering from diseases connected with the respiratory system due to inhaling of polluted air. Besides damaging human beings, air pollution also spoils metals and buildings, reduces visibility and due to reduced visibility frequency of accidents rises.

We are not only adding toxicants in the environment but we are also curtailing the sources of augmenting oxygen supply by cutting the forests., Thus this is nothing but an attempt towards suicide.

Water Pollution

Pollution of water is even more grave as its effects are persistent and hard to diffuse. The first and foremost contaminant of water is domestic waste. Discharge of untreated sewage is the single most dreaded cause for pollution of surface and under-ground water, including all rivers. Ganga, Yamuna and all the rivers are polluted to the worst possible extent. In the absence of adequate sewers, the rivers are used as sewers and at many places where sewers

are there, then these sewers terminate into water reservoirs. As a result, on one hand the water becomes undrinkable and on the other, it acts as a fertile bed for disease spreading organisms. The sewage produced by a single person can destroy dissolved oxygen in about 4000 to 5000 litres of water and the lack of dissolved oxygen in water results in death of aquatic life. When water is devoid of aquatic animals (fishes, frogs, turtles etc.) or aquatic animals are very few in the water, then the diseases spreading organisms multiply very rapidly in that water as otherwise these would have been eaten up by the aquatic animals.

According to a World Health Organization (WHO) study, out of 3100 plus towns and cities only 210 have partial sewage treatment facilities and 12 have full waste water treatment facilities. Over 100 cities are reported to be dumping untreated sewage directly into the Ganga. Huge investment has to be made as the present sewage treatment capacity is only 7000 million litres per day against the 30,000 million litres of sewage being generated. Various diseases such as typhoid, jaundice, wormal infestation and consequential dysentery, paralysis, filarial infection and other bacterial and viral infected diseases are often caused by drinking polluted water. Apart from these diseases among human beings, polluted water also turns plots of fertile land into deserts.

Secondly, the waste substances being released by various industrial undertakings such as coal washeries, oil refineries, tanneries, dyeing units, fertilizer industries, detergent industries and other chemical industries are highly toxic. With lack of any legal ban, these are also released in water bodies. As a result, water turns useless and harmful. When this polluted water containing toxic chemicals is used for irrigation purposes by innocent farmers, the fertile plots of land turn reh.

Diseases and death of men and animals is also very frequent now a days, due to their drinking polluted water.

Even if polluted water is not used for any purpose and neither the toxicants are released in water reservoirs, then also it plays havoc in due course of time. When the liquid toxicated water is released in the open, it reaches fresh water wells by percolating in the soil and toxicates it. Living example of percolation of polluted water into fresh water is visible in Pali (a district in Rajasthan), where due to the operation of a large number of dyeing units the incidence of cancer is on a rising phase and traces of colours and colour chemicals are seen in well water also.

Thirdly, when farmers use various pesticides, insecticides and weedicides in an unprudent manner and in a disproportionately high quantity then, during the rainy season the undecomposed pesticides, insecticides and weedicides find their way into rivers. This water, containing

these mild toxicants when used for irrigation or drinking purposes affects the plant and animal life consuming it. In various surveys and researches many samples of cereals, vegetables and fruits have showed the presence of insecticide residue in more than the permissible limits.

Land or Soil pollution

Land or soil pollution takes many forms ranging from erosion of soil, salination of soil, chemical contamination from detergents, chemicals, fertilizers insecticides etc., creation of ravines, total loss of soil cover, decline in fertility of soil to fluorosis. Ruthless cutting of trees results in soil erosion and continued cultivation with disproportionate application of fertilizers also results in loss of fertility of land. Indiscriminate and excessive use of pesticides, insecticides and weedicides and percolation of polluted water in soil contaminates the soil and the crops reaped from the contaminated soil definitely contain the traces of these toxic contaminants.

Contamination of soil from Uranium, fluorides, arsenic etc. is also a major issue, due to excessive exploitation of water, which results in leaching of rocks bearing these minerals. The issue of Uranium poisoning in Punjab, caused by fly ash ponds of thermal power stations was a headline issue in March 2009. This has led to severe birth defects in children in Faridkot and Bhatinda districts of Punjab. In the year 2012, the Government of India also confirmed, on the basis of 1000 samples of water, that the ground water in Malwa belt of Punjab has Uranium content, 50% above the trace limits set by the World Health Organization (WHO).

Solid Waste Pollution

In India, due to lack of proper and adequate handling, dumping and recycling facilities, domestic waste is heaped in open. As it decays, this waste emits foul gases, harmful for the life and, these heaps of waste also act as fertile bed for disease spreading organisms such as various bacteria and viruses, insects like mosquitoes and flies, and parasites like entamoeba, hookworm, tape-worm, liverfluke etc. which can cause diseases like typhoid, jaundice, malaria, dysentery and many others. The average solid waste in the urban areas in our country varies from 0.5 to 1.00 kg. per person and thereby the total domestic waste in urban areas mounts to the tune of 60 crore tonnes per year. Trash and garbage in urban and semi-urban as well as in rural areas are a common sight throughout the length and breadth of the country. In aggregate the cities in India generate millions of tones of solid waste and almost a third of municipal waste remains uncollected. Open spaces, street corners, side-walks and several public parks are often despoiled with filth, litter and trash. Half of medical waste is also not properly disposed off, same is true with e-waste.

In 2000 the supreme court of India had directed all Indian

cities to implement a comprehensive waste management programme. It stressed on segregated collection of house hold waste and then recycling and composting it. But it is of no avail.

Noise Pollution

The next threat to the human life and living beings because of pollution comes from the unabated and tremendous noise arising from operation of noisy and defective machines in factories, heavy vehicles, congested cities, aircrafts, loud speakers etc. Noise in the environment has been continuously rising and is attaining intolerable proportions. According to environmental scientists, noise has been increasing more than one decibel per year in India. Persistent noise deteriorates physical and mental health, undermines efficiency, causes constriction of muscles and blood vessels, raises blood pressure, develops hyperacidity which may result in peptic ulcers, damages liver and develops many other ailments. Noise above the level of 140 decibels is enough to turn a person insane. Moreover, persistent noise and lack of sound sleep can turn a man wicked or cruel or can cause depression. The former effects will turn him into a criminal and later may drive him to use tranquilisers. Further it has been statistically proved that workers working in a noisy environment are more prone to accidents than those working in peaceful environment.

Despite so many undesirable effects, no effective attempt has so far been made to abate the noise level. Many vehicles move without silencers and cause much noise. In industrial undertakings noise can be abated to a large extent by using appropriate devices but nothing is done in this respect. Even the defective and noise making exhaust fans are not silenced for years. The supreme court of India had passed a significant verdict on noise pollution in 2005. In January 2010, the central government had also published norms of permissible noise levels in urban and rural areas. The daily use of loud speakers in mosques and in marriage processions etc. are routine. Noises of aircraft engines, horns, traffic noises also add to the noise pollution.

Thermal Pollution

Global warming due to rise in global mean temperature mainly on account of growing emission of green house gases like carbon dioxide (CO_2) methane, nitrous oxide, hydro fluorocarbons (HFCs) Perfluoro-Carbons (PFCs), Sulphur hexafluoride (SF_6) etc is a serious threat to life on earth. The Global Mean Temperature has increased by more than a degree Celsius in last hundred years, and sea level has risen by 19 cms. The ice cover of June month in northern hemisphere has declined to just half of what it was 50 years ago. Vast glaciers from Himalaya in India to Africa are melting fast. Ganga may turn into a seasonal river from the perennial one if the Himalayan glaciers would disappear by

2035, due to global warming.

Rise in temperature is a serious environmental threat to mankind. Like noise, temperature is also rising in the urban and the industrial areas due to fast urbanization with faulty town planning. In the urban areas the lanes between rows of tall buildings are very narrow. These lanes are also not straight so the air becomes stagnant and thereby the heat radiations absorbed by various objects in day light are not reradiated because the surrounding air also remains hot and stagnant. This is further aggravated due to the lack of green vegetation. If adequate green beds are developed, then thermal pollution can be diffused. As in the process of transpiration in plants water is evaporated continuously from the leaves of plants. The water while vaporizing takes its latent heat from the leaves and surroundings and causes a cooling effect and thus brings a fall in temperature. But the urban areas are deprived of vegetation and thus there is no outlet for accumulating heat. If there are encircles with green bed then the stagnation of air will also be reduced. As explained above, the process of transpiration keeps the environment cool while the temperature in urban/residential areas will be higher. Due to difference in temperature, the winds will flow from areas of lower temperature towards the areas of higher temperature. And wind, while flowing through the urban areas will absorb heat and the temperature of these areas will also reduce. Heat radiated during manufacturing processes in industrial undertakings is another and even bigger source of thermal pollution.

High temperature undermines efficiency of people, raises blood pressure, turns the people lethargic & mental power also deteriorates. At high temperature, rate of catabolism in the body tissues enhances and thereby physical growth remains poor and physique starts deteriorating early in mid thirties. It is also an established fact now that sexual maturity is also attained at an earlier age in temperate places and thereby problems like rapid population growth and crimes related with sex raise their heads.

Release of water used for cooling purposes in various casting industries kills the aquatic life because it being hot when released to water streams kills the aquatic life.

Radio Active Pollution

Last and recent but the most horrifying environmental threat comes from radio-active pollution. The radio-active pollution is the most harmful and its effects last for thousands of years and they are most grave. These radiations can cause cancer, child deformity in offsprings and a number of other diseases which can last for many generations. Tonnes of radio-active waste are created in nuclear research and nuclear power generation. Safe handling and disposal of these wastes is a great problem and the methods so far used in storing them are not fool-proof. However, recently

techniques have been developed to turn the radio-active elements of very long half-life periods into non-active ones. We should adopt it. Atomic explosions whether made in atmosphere, sea or underground have emitted enough radiations which has caused harmful effects. Radiations from nuclear power plants & X-ray machines, unsafe disposal of heavy water, mining of nuclear or radioactive elements, nuclear accidents like those of Fukushima in Japan and Chernobyl in erstwhile USSR (Russia) are all a serious radioactive hazard.

Germ-plasm pollution or pollution of Biological wealth

These days pollution of germ plasm from genetically modified organisms (GMOs), spread of harmful alien weeds or other living beings, spread of harmful and contagious micro-organisms insects, pests, fungi or other living beings, extinction of certain species constituting the flora and fauna of an area are a serious cause of concern.

Pollution of Biological wealth from GMO:

In genetically modified (GM) crops, an alien gene from any other plant, animal or micro-organism is transplanted to import an attribute of that alien specie; the pollen grains of the GM crops bearing that alien gene can contaminate the germ plasm of the neighboring flora (including normal crops or a related wild specie), through cross pollination. Hundreds of plant varieties have already been engineered by importing genes from other plant or animal species. For example, a frost resistant tomato is developed by transplanting the gene of cold water fish, which gives cold resistance to that tomato. Likewise, the genetically modified B.T. Cotton which is resistant to boll-worm is developed by transplanting the gene from a bacteria, *Bacillus Thuringiensis*, which produces a toxin capable to kill the boll worm that attacks cotton crop. This toxin producing gene might also reach our food chain by cross pollinating any food crop. Though It does not happen normally, but cannot be altogether ruled out in the years to come. Any mutation, either benign or malevolent, may also occur in the GM crops and this mutation, if takes place and the malevolent mutation can contaminate the neighbouring vegetation silently with that malevolence. The mutation may occur within next generation or may not occur for millenniums to come. Since, a mutation can neither be predicted nor be ruled out in the GM crops, or even in the vegetation contaminated by the pollens of the GM crops, outcrossing can play havoc.

Outcrossing (i.e. movement of alien genes transplanted into the GM crops into conventional crops or related species in wild) or mixing of crops obtained from ordinary non-GM seeds, with those grown from GM seeds, may have fatal effect on food safety and food security as well as on the biosafety of the flora of the country. Traces of a maize type,

approved for cattle feed have also appeared in the maize products for human consumption in the US.

Contamination of the conventional crops from the GM crop has been occurring very fast world over, wherever the GM crops have been grown commercially or in trials in the open. Mexico has already imposed a moratorium on new plantings of GM maize since 1998, though, it still allows the import of GM crops for consumption. Yet, the DNA from a genetically modified corn has been discovered in wild maize even on remote mountains in Mexico. Contamination of local corn varieties from genetically engineered corn in Mexico might even cause their extinction. If this diversity of local corn in Mexico is lost, future food security would be at stake. The GM contamination register of Greenpeace International and Green Watch UK has reported 26 instances of contamination of normal crops or food from GM crops, world over ranging from Saudi Arabia, Switzerland, Germany, Philippines, China, US, Slovakia, Finland, Belgium, France, Austria, South Africa, Netherland, Namibia, Romania, Italy etc., while many of these countries have a moratorium on GM crops. The case of the Star-Link Corn, a GM maize of the Aventis company is also worth mention here; wherein, this ill fated GM corn was alleged to have caused allergy in Japan and Korea which had to be recalled. Aventis had to pay \$ 60 million (Rs. 400 crore at today's exchange rate) in damages in 2000 for contamination of taco shells (a food product). In the US, large farming companies can maintain separate inventories of GM and non GM crops. Shall it be feasible for small illiterate Indian farmers and traders in India to maintain segregated inventories?

The permission granted to conduct field trials of genetically modified (GM) crops in the country by the environment minister, inspite of the matter being subjudice before the Supreme Court, might lead to a most fateful and irreversible contamination of the germ plasm of the farm and forest wealth of the country. Sensing the seriousness of such a perpetual, environmental and health menace with cascading

effects, the six member technical experts' committee of the Supreme Court has unequivocally recommended for an indefinite moratorium on such trials, unless the shortcomings in the regulatory process were plugged. However, out of respect for the dissenting note of the nominee of the ministry of agriculture, R.S. Paroda, the Supreme Court has offered an opportunity to the government to further clarify its stand, by issuing a show cause notice to the government before deciding on the petition seeking a moratorium against such fateful trials. But, the government instead of filing the reply and waiting for the apex court's decision, has shown undue haste in granting this controversial permission.

Spread of Alien weeds

These days two weeds-one herb and another tree are posing most formidable threat to the bio-diversity, ecological balance, and healthful environment. These are parthenium or carrot type grass called Gaajar ghaas in hindi or also called as congress grass. Since it grows in contagious bunch or cluster it is called congress grass. Wherever it begins growing, its roots turn that soil non-congenial for other plants. So all other naturally growing plants including the herbal medicines stop growing there. In the farm land also it poses threat to the crops.

Although, the above account does not enlist all the acts leading to pollution it is sufficient to arouse consciousness enough to restrain every enlightened citizen from acts which pollute the environment and which can be avoided.

(Second part of this article would cover ways to curb pollution. It would be published in the March-April 2014 issue)