CHAPTER - 2
PROBLEMS OF ENVIRONMENTAL POLLUTION:
INDIAN SCENARIO

"You are a product of your environment. So choose the environment that will best develop you toward your objective. Analyze your life in terms of its environment. Are the things around you helping you toward success - or are they holding you back?"

- W. Clement Stone

1. **Meaning and Kinds of Pollution** :-

Environmental pollution is the build-up and concentration of toxic levels of chemicals in the air, water, and land, which reduces the ability of the affected area to support life. Pollutants may be gaseous- ozone and carbon monoxide, for example; liquid discharge from industrial plants and sewage systems; or solid-landfills and junkyards.

Environmental Pollution is the effect of undesirable changes in our surroundings that have harmful effects on plants, animals and human beings. This occurs when only short-term economic gains are made at the cost of long-term ecological benefits for humanity. No phenomenon has led to greater ecological changes than has been made by mankind. During the last few decades we have contaminated our air, water and land on which life itself depends with a variety of waste products.

Environmental Pollutants include solid, liquid or gaseous substances present in greater than natural abundance, produced due to human activity, which have a detrimental effect on our environmental. The nature and concentration of a pollutant determine the severity of its detrimental effects on
human health. An average human requires about 12 kgs. of air each day, which is nearly 12 to 15 times greater than the amount of food we eat. So, even a small concentration of pollutants in the air becomes more significant in comparison to similar levels present in food. Pollutants that enter water have the ability to spread to distant places, especially in the marine ecosystem. From ecological perspective, pollutants can be classified as follows:

Degradable or non-persistent pollutants: These can be rapidly broken down by natural processes; e.g. domestic sewage, discarded vegetables etc.

Slowly-degradable or persistent pollutants: These are pollutants that remain in the environment for many years in an unchanged condition and take decades or longer to degrade; e.g. DDT (pesticides) and most plastics.

Non-degradable pollutants: These cannot be degraded by natural processes. Once they are released into the environment they are difficult to eradicate and continue to accumulate; e.g. toxic elements like lead or mercury and nuclear wastes.

Section 2(a) of the Environment (Protection) Act, 1986 defines, “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-organisms and property.

Section 2(b) of the aforesaid Act defines, “Environmental Pollutant”, means any solid, liquid or gaseous substance present in such concentration as may be or tend to be, injurious to environment.
Section 2(c) of the aforesaid Act defines, "Environmental Pollution", means the presence in the environment of any environmental pollutant.

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 increasingly small world concerns all countries irrespective of their size, level of development or ideology. Notwithstanding political division of the world into national units, the oceanic world is interconnected whole; and winds that blow over the countries are also one. If the nuclear test is carried out in one part of the world, the fall out may be carried by winds to any other part of the world and such fall out of irresponsible disposal of radioactive waste from a remote energy plant in one country may turn out to have greater adverse effect on the neighbouring countries than the danger of full fledged war.¹

The problem of environmental pollution is not new in its origin. It is as old as the emergence of Homo Sapiens on the planet and it was realised in the times of Plato 2500 years ago.² 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 environment question has assumed proportions affecting all humanity. Industrialisation, urbanisation, 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 environmental deterioration the world over. While the scientific and technological progress of man invested him

¹ - Due to the agricultural chemicals, solvents and mercury, which flowed into the Rhine River during a warehouse fire in Switzerland, millions of fish were killed and the drinking water in the Federal Republic of Germany and the Netherlands was threatened.
with immense power over nature, it has also resulted in the unthinking use of the power, encroaching endlessly on nature.\textsuperscript{3}

It is a basic right of all to live in a healthy environment. The acute poverty in the countries requires developmental process to be accelerated, but we cannot do so at the cost of environment thereby endangering not only the present generation but also the future generation. The crying need of hour is the “sustainable development.” “Sustainable Development” is that development which meets the need of the present without compromising the ability of future generations to meet their own needs.\textsuperscript{4} At present human beings are indeed at the heart of the search for sustainable development as our very narrow range environmental conditions.

In India, as elsewhere in the world, uncontrolled growth and consequent environmental deterioration are fast assuming menacing proportions and all Indian cities and majority of the population are afflicted with the problem. Global warming, ozone depletion and toxic pollution are some of the negative effects of existing development strategy.

Today, most of our rivers are polluted. Deforestation of most of our forest is increasing day by day. Leakage of poisonous gases and other harmful gases, liquids and solid wastes from the industries has almost become a regular phenomenon of the present day. The problem of noise pollution, particularly, in big cities is at alarming stage. Land erosion through winds and water has become the common future.

However, the fundamental question before us today is whether we can allow the destruction of the environment leading to the destruction of all living creatures including human beings on

\textsuperscript{3} Shri Sachidanand Pandey v. State of West Bengal, A.I.R. 1987 S.C. 1109.
this planet. The answer is obviously — No. Despite our brutal exploitation of our forests, indiscriminate quarrying, pollution of rivers and other water resources, rapid increase of air and noise pollution, it is still possible to protect the deteriorating environment through proper policies and management.  

As far as in Indian Scenario concerned their are so many kind of Pollution. We can discuss as under:-

**a- Water Pollution**

"Our liquid planet glows like a soft blue sapphire in the hard-edged darkness of space. There is nothing else like it in the solar system. It is because of water."

Water is the essential element that makes life on Earth possible. Without water there would be no life. We usually take water for granted. It flows from our taps when they are turned on; most of us are able to bathe when we want to, swim when we choose and water our gardens. Like good health we ignore water when we have it.

Although 71% of the Earth's surface is covered by water, only a tiny fraction of this water is available to us as freshwater. About 97% of the total water available on Earth is found in the oceans and is too salty for drinking or irrigation. The remaining 3% is freshwater. Of this, 2.997% is locked in ice caps or glaciers. Thus, only 0.003% of the Earth's total volume of water is easily available to us as soil moisture, groundwater, water vapour and the water in lakes, streams, rivers and wetlands.

---

In short, if the world’s water supply were only 100 liters our usable supply of freshwater would be only about 0.003 liters (one-half teaspoon). This makes water a very precious resource. The future wars in our world may well be fought over water. By the middle of this century, almost twice as many people will be trying to share the same amount of freshwater the Earth has today. In the future, as freshwater becomes scarcer, the access to water resources will be an important factor in determining the economic growth of several countries around the world.

The present legislation on pollutions of water renders a system of control different from those in any other laws in the past. The Water Act was enacted for the purpose of prevention and control of pollution of water. It came into being at time when the country was already on the path of industrialisation and urbanisation. The need was keenly felt for treatment of domestic and industrial effluents, before they were discharged into rivers and streams. Pollution of streams, rivers and other watercourses reduced the availability of potable water. In addition, it caused deterioration in the quality of vegetation and other living creatures in water. The destruction of the fish population in as example. It has far-reaching consequences upon the economy. It was against this background that the Water Act was enacted.\(^6\) Water, being a state subject, the Parliament passed the law on the request of some of the states in the country.\(^7\)

The purpose of the legislation was not only the prevention and control of water pollution, but also the maintenance and

---

\(^6\) See statement of objects and reasons of the Water (Prevention and Control of Pollution) Bill 1974.

\(^7\) States of Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Rajasthan, Tripura and West-Bangal passed a resolution requesting a national legislation under art 252(1) of the Constitution. The attempt at such a legislation had its origin in 1962, when a committee was appointed. After circulating the comprehensive legislation in the year 1974 enable both the Central and state pollution control board to deal with the problem of water pollution in the country.
restoration of the wholesomeness of water. Under the Water Act, pollution is considered a nuisance or an evil harms public health. The Water Act defines the pollution of water as follows:

Pollution means such contamination of water of such alteration of the physical, chemical or biological properties of water of such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance of render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants of aquatic-organisms.\(^8\)

Water bodies and streams are useful for several purposes. They are habitat for many aquatic organisms. In **Mohan Vaniya Vinayog Private Ltd. v State of West Bengal\(^9\)** The Calcutta High Court held that filling up of water bodies and streams result in alteration of the physical properties of water. Hence, the term ‘pollution’ has to be construed in a wide sense, and not in a narrow manner. Definitions of ‘sewage effluent’, ‘trade effluent’ and ‘stream’ in the Water Act are also conspicuous.\(^10\) ‘Sewage effluent’ means effluent from any sewage system or sewage disposal works, and includes sullage from open drains. ‘Trade effluent’ finds and illustrative definition as including ‘any liquid, gaseous or solid substance which is discharged from any premises used for carrying on any industry, operation or process or treatment and disposal system other than domestic sewage.’ The definition of ‘stream’ is also an inclusive one. It includes river, flowing or dry watercourse,

---

\(^8\) Water (Prevention and Control of Pollution) Act 1974, s 2.

\(^9\) AIR 2007 Cal 190 (NOC). The court held by necessary implication, the East Calcutta Wetlands (conservation and Management) Act 2006 dealing with lands is a perfect instrument of law to fight water pollution.

\(^10\) Water (Prevention and Control of Pollution) Act 1974, 2 s (g), s 2 (k), prior to the amendment of the Water Act in 1988, only the expression 'trade and industry' was present in the definition in place of 'industry, operation of process or treatment and disposal system.'
natural or artificial inland water, subterranean waters or sea or tidal waters. However, when the stream relates to sea or tidal waters, it is defined to include only to such an extent, or as the case may be, to such a point as the state government may specify, by notification in the Official Gazette.

Prohibition of disposal of pollution matter to a stream or well or sewer or on land, is the key to the regulation under the Water Act. According to this system, no person shall knowingly cause or permit poisonous, noxious or polluting matter to enter into a stream or well or sewer or on land. The prohibition extends to a case, where the entry of any other matter impedes the proper flow of water in a manner leading, or likely to lead, to a substantial aggravation of pollution. Although, violation of these provisions is against the public interest and leads to penal consequences, this offence stands different from public welfare offences. In a modern welfare state, as the knowledge about the harm and mens rea are the most important elements to constitute an offence under the Water Act. Prohibition of discharge of polluting matter is not absolute. The law allows discharge of sewage or trade effluent after treatment. No person without obtaining the consent of the state pollution control board established under the Water Act can establish or take any steps to establish any industry, which is likely to discharge sewage or trade effluents. An application for consent has to be made by the person who intends to establish any industry or carry out an operation or process or treatment or disposal system. The consent can be given with or without conditions. Violation of condition may lead to withdrawal or consent and to prosecution.

11 Water (Prevention and Control of Pollution) Act 1974, s 2(j)
12 Ibid, s 24
13 The term refers to offences punishable without criminal intent that were witnessed at the beginning of the twentieth century as a result of a shift in emphasis from protection of individual interests to the protection of public and social interest. See Sayre, "Public Welfare Offences," Columbia Law Review, vol 33, 1933, p 55.
14 Water (Prevention and Control of Pollution) Act 1974, s 25
b- Air Pollution

Air Pollution occurs due to the presence of undesirable solid or gaseous particles in the air, in quantities that are harmful to human health and environment. The air may become polluted by natural causes such as volcanoes, which release ash, dust, sulphur and other gases, or by forest fires that are occasionally naturally caused by lightning. However, unlike pollutants from human activity, naturally-occurring pollutants tend to remain in the atmosphere for a short time and do not lead to permanent atmospheric change.

Pollutants that are emitted directly from identifiable sources are produced both by natural events (e.g., dust storms and volcanic eruptions) and human activities (emission from vehicles, industries, etc.). These are called primary pollutants. There are five primary pollutants that together contribute to about 90% of the global air pollution. These carbon oxides (CO and CO2), nitrogen oxides, sulphur oxides, volatile organic compounds (mostly hydrocarbons), and suspended, particulate matter.

The Pollutants that are produced in the atmosphere when certain chemical reactions take places among the primary pollutants are called secondary pollutants; e.g. sulphuric acid, nitric acid, carbonic acid etc.

The origin of air pollution on the Earth can be traced back to the times when man started using firewood as a means of cooking and heating. Hippocrates has mentioned air pollution in 400 BC. With the discovery and increased use of coal, air pollution became more pronounced especially in urban areas. It was recognized as a problem 700 years ago in London in the form of smoke pollution, which promoted King Edward I to make the first anti-pollution law to restrict people from using coal for domestic heating in the year
In the year 1300, another Act banning the use of coal was passed; defying the law led to imposition of capital punishment. In spite of this, air pollution became a serious problem in London during the Industrial Revolution due to the widespread use of coal in industries. The earliest recorded major disaster was the 'London Smog' that occurred in 1952, which resulted in more than 4000 deaths due to the accumulation of air pollutants over the city for five days.

In Europe, around the middle of the 19th Century, a black form of the Peppered moth began appearing in industrial areas. Usually, a normal-colored Peppered moth is well camouflaged when on a clean, lichen-covered tree. However, this peppered pattern was easily spotted and picked up by birds on the smoke-blackened in surviving in clean non-industrial areas, only black-colored moths were successfully camouflaged in industrial areas. Thus, with the spread of industrialization, an increased incidence of black forms has been observed not only in the Peppered moth, but also in many other moths. This is a classic case of pollution leading to adaptation.

Air Pollution began to increase in the beginning of the 20th Century with the development of transportation systems and large-scale from the combustion residues of diesel and petrol engines were felt for the first time in Los Angeles. Pollution due to auto-exhaust remains a serious environmental issue in many developed and developing countries, including India.

The Air Pollution Control Act in India was passed in 1981 and Motor Vehicle Act for controlling air pollution was passed very recently. These laws are intended to prevent the air from becoming over polluted.

The greatest industrial disaster leading to serious air pollution took place in Bhopal, where the extremely poisonous methyl
isocyanide gas was accidentally released from the Union Carbide's pesticide manufacturing plant, on the night of December 2nd, 1984. The effects of this disaster on human health and the soil are felt even today.

When a view to implementing the decisions taken in the United Nations Conference on the Human Environment held in Stockholm in the year 1972, the Parliament relied on the external affairs clause in the Constitution, and took steps towards and control of air pollution. The Air (Prevention and Control of Pollution) Act 1981 (Air Act) was enacted on lines with the provisions of the Water Act. The Central and state pollution control boards created under the Water Act carry out the functions of the boards envisaged under the Air Act. As far as functions of the barods are concerned, the two laws make identical provisions with regard to criminal and administrative sanctions, powers of the government vis-a-vis the actions of the board and the rule-making powers of the Central and state governments.

The distinguishing characteristics of the Air Act can be seen in the provision for declaration of air pollution control zones, inclusion of noise within the definition of air pollution and control on pollution caused by motor vehicles. On consultation within the state. 15 The state government can prohibit use of any fuel other than approved fuel in the area. No appliance other than the approved appliances can be used. If it causes or is likely to cause air pollution, burning any material, other than fuel, can be prohibited. Restrictions are imposed on the establishment and operation of any industrial plant within the area by the system of consent administration. As in the case of Water Act, the board considers applications for grant of consent before allowing any establishment to operate. In order to ensure that the standards of

15 Air (prevention and Control of Pollution) Act 1981, s 19.
emission of air pollution from automobiles are complied with the government will issue instructions to authorities under the Air Act. This is done after consultation with the state pollution control board. The control of vehicular pollution is not restricted to the air pollution, control area, but may extend to the whole area within a state. The Air Act makes an attempt to bring noise pollution within its ambit by including noise within the definition of air pollution. After the introduction of the EPA, the rules framed thereunder lay down not only the standards of emission of discharge of pollutants, but also ambient air quality standards.

c- Land Pollution

Pollution is a global problem. It has affected the lives of millions of people and caused several deaths and health problems. Land pollution is one of the types of pollution. Land pollution is pollution of our planet's land surface. The deposition of solid or liquid waste materials on land or underground in a manner that can contaminate the soil and groundwater, threaten public health, and cause unsightly conditions and nuisances. The waste materials that cause land pollution are broadly classified as municipal solid waste (MSW, also called municipal refuse), construction and demolition (C&D) waste or debris, and hazardous waste. MSW includes nonhazardous garbage, rubbish, and trash from homes, institutions (e.g., schools), commercial establishments, and industrial facilities. Garbage contains moist and decomposable (biodegradable) food wastes (e.g., meat and vegetable scraps); rubbish comprises mostly dry materials such as paper, glass, textiles, and plastic objects; and trash includes bulky waste materials and objects that are not collected routinely.

16 Air (Prevention and Control of Pollution) Act 1981, s 20.
17 Air (Prevention and Control of Pollution) Act 1981, s 2 (a), defines air pollutants as to mean 'any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human being or other living creatures or plants or property or environment.'
for disposal (e.g., discarded mattresses, appliances, pieces of furniture). C&D waste (or debris) includes wood and metal objects, wallboard, concrete rubble, asphalt, and other inert materials produced when structures are built, renovated, or demolished. Hazardous wastes include harmful and dangerous substances generated primarily as liquids but also as solids, sludges, or gases by various chemical manufacturing companies, petroleum refineries, paper mills, smelters, machine shops, dry cleaners, automobile repair shops, and many other industries or commercial facilities. In addition to improper disposal of MSW, C&D waste, and hazardous waste, contaminated effluent from subsurface sewage disposal (e.g., from septic tanks) can also be a cause of land pollution.

Soil consists of a mixture of unconsolidated mineral and rock fragments (gravel, sand, silt, and clay) formed from natural weathering processes. Gravel, sand, and silt are relatively coarse-grained bulky particles, while clay particles are very small and platelike in shape and have a strong affinity for water. Gravel and sand formations are porous and permeable, allowing the free flow of water through the pores or spaces between the particles. Silt is much less permeable than sand or gravel, because of its small particle and pore sizes, while clay is virtually impermeable to the flow of water, because of its plate-like shape and molecular forces. The permeability of soil formations underlying a waste disposal site is of great importance with regard to land pollution. The greater the permeability, the greater the risks from land pollution.

Until the mid-20th century, solid wastes were generally collected and placed on top of the ground in uncontrolled "open dumps," which often became breeding grounds for rats, mosquitoes, flies, and other disease carriers and were sources of unpleasant odours, windblown debris, and other nuisances.
Dumps can contaminate groundwater as well as pollute nearby streams and lakes. A highly contaminated liquid called leachate is generated from decomposition of garbage and precipitation that infiltrates and percolates downward through the volume of waste material. When leachate reaches and mixes with groundwater or seeps into nearby bodies of surface water, public health and environmental quality are jeopardized. Methane, a poisonous and explosive gas that easily flows through soil, is an eventual by-product of the anaerobic (in the absence of oxygen) decomposition of putrescible solid waste material. Open dumping of solid waste is no longer allowed in many countries. Nevertheless, leachate and methane from old dumps continue to cause land pollution problems in some areas.

A modern technique for land disposal of solid waste involves construction and daily operation and control of so-called sanitary landfills. Sanitary landfills are not dumps; they are carefully planned and engineered facilities designed to control leachate and methane and minimize the risk of land pollution from solid-waste disposal. Sanitary landfill sites are carefully selected and prepared with impermeable bottom liners to collect leachate and prevent contamination of groundwater. Bottom liners typically consist of flexible plastic membranes and a layer of compacted clay. The waste material—MSW and C&D debris—is spread out, compacted with heavy machinery, and covered each day with a layer of compacted soil. Leachate is collected in a network of perforated pipes at the bottom of the landfill and pumped to an on-site treatment plant or nearby public sewerage system. Methane is also collected in the landfill and safely vented to the atmosphere or recovered for use as a fuel. Groundwater-monitoring wells must be placed around the landfill and sampled periodically to assure proper landfill operation. Completed landfills are capped with a layer of clay or an impermeable membrane to prevent water from
entering. A layer of topsoil and various forms of vegetation are placed as a final cover. Completed landfills are often used as public parks or playgrounds.

Hazardous waste differs from MSW and C&D debris in both form and behaviour. Its disposal requires special attention because it can cause serious illnesses or injuries and can pose immediate and significant threats to environmental quality. The main characteristics of hazardous waste include toxicity, reactivity, ignitability, and corrosivity. In addition, waste products that may be infectious or are radioactive are also classified as hazardous waste. Although land disposal of hazardous waste is not always the best option, solid or containerized hazardous wastes can be disposed of by burial in "secure landfills," while liquid hazardous waste can be disposed of underground in deep-well injection systems if the geologic conditions are suitable. Some hazardous wastes such as dioxins, PCBs, cyanides, halogenated organics, and strong acids are banned from land disposal in the United States, unless they are first treated or stabilized or meet certain concentration limits. Secure landfills must have at least 3 metres (10 feet) of soil between the bottom of the landfill and underlying bedrock or groundwater table (twice that required for municipal solid-waste landfills), a final impermeable cover when completed, and a double impervious bottom liner for increased safety. Underground injection wells (into which liquid waste is pumped under high pressure) must deposit the liquid in a permeable layer of rock that is sandwiched between impervious layers of rock or clay. The wells must also be encased and sealed in three concentric pipes and be at least 400 metres (0.25 mile) from any drinking-water supplies for added safety.

Before modern techniques for disposing of hazardous wastes were legislated and put into practice, the wastes were generally disposed of or stored in surface piles, lagoons, ponds, or unlined
landfills. Thousands of those waste sites still exist, now old and abandoned. Also, the illegal but frequent practice of "midnight dumping" of hazardous wastes, as well as accidental spills, have contaminated thousands of industrial land parcels and continue to pose serious threats to public health and environmental quality. Efforts to remediate or clean up such sites will continue for years to come. In 1980 the United States Congress created the Superfund program and authorized billions of dollars toward site remediation; today there are still about 1,300 sites on the Superfund list requiring remediation. The first listed Superfund site—Love Canal, located in Niagara Falls, N.Y.—was not removed from the list until 2004.

Causes of land pollution:

- **Increase in urbanization**- Construction uses up forestland. More constructions means increase in demand for raw materials like timber. This leads to the exploitation and destruction of forests. There is more demand for water. Reservoirs are built leading to the loss of land.

- **Increase in agricultural land**- As the human population grew there was a greater demand for food. This caused more land allocated to agriculture. Forests were cut down for this purpose.

- **Domestic waste**- Every single day, tons and tons of domestic waste is dumped ranging from huge pieces of rubbish such as unused refrigerator to fish bones. If all these wastes are not disposed of properly, the damage they can do to the environment and humankind can be devastating. While waste collected from homes, offices and industries may be recycled or burnt in incinerators, a large amount of rubbish is neither burnt nor recycled but is left in certain areas marked as dumping grounds. We throw away more things today and
there is an increase in the quantity of solid waste. This has given rise to problems as new dumping grounds have to be found.

- **Agricultural activities** - Besides domestic waste, pesticides and herbicides used by farmers to increase crop yields also pollute the land when they are washed into the soil.

- **Industrial activities** - Industrial activities also are a contributing factor to land pollution. For example, in open cast mining, huge holes are dug in the ground and these form dangerously deep mining pools. Heaps of mining waste are left behind and these waste often contain several poisonous substances that will contaminate the soil.

Pollution sources include plastics factories, chemical plants, oil refineries, nuclear waste disposal activity, large animal farms, coal-fired power plants, metals production factories and other heavy industry.

**Reducing land Pollution**

We can take the following steps:-

- encourage organic farming
- proper garbage disposal
- recycle garbage
- reduce use of herbicides and pesticides
- Avoid overpackaged items
- efficient utilization of resources and reducing wastage

**Effects of land pollution**

- exterminates wild life
- acid rain kills trees and other plants.
- vegetation that provides food and shelter is destroyed.
it can seriously disrupt the balance of nature, and, in extreme cases, can cause human fatalities.

- pesticides can damage crops; kill vegetation; and poison birds, animals, and fish. Most pesticides kill or damage life forms other than those intended. For example, pesticides used in an effort to control or destroy undesirable vegetation and insects often destroy birds and small animals. Some life forms develop immunity to pesticides used to destroy them.

d- Noise Pollution

Noise may not seen as harmful as the contamination of air or water, but it is a pollution problem that affects human health and can contribute to a general deterioration of environmental quality.

Noise is undesirable and unwanted sound. Not all sound is noise. What may be considered as music to one person may be noise to another. It is not a substance that can accumulate in the environment like most other pollutants. Sound is measured in a unit called the ‘decibel’ (db).

There are several sources of noise pollution that contribute to both indoor and outdoor noise pollution. Noise emanating from factories, vehicles and playing of loudspeakers during various festivals can contribute to outdoor noise pollution, while loudly played radio or music systems, and other electronic gadgets can contribute to indoor noise pollution. A study conducted by researchers from the New Delhi-based National Physical Laboratory show that noise generated by firecrackers (presently available in the market) is much higher than the prescribed levels. The permitted noise level is 125 decibels, as per the Environment (Protection) (Second amendment) Rules, 1999.

The differences between sound and noise is often subjective and a matter of personal opinion. There are, however, some very
harmful effects caused by exposure to high sound levels. These effects can range in severity from being extremely annoying to being extremely painful and hazardous.

Noise Pollution is another growing problem in the city life today. Sound beyond permissible limit generate pollution which would endanger public health. A citizen or people cannot be made captive listener to bear the tremendous sounds caused by microphone, or fireworks. In India, there is no specific and elaborate law on noise pollution has been made so far. The traditional common law application under Tort law as wrong of nuisance was seldom applied in the courts in India. However, Calcutta High Court dealt with a cause of bursting out of fire works under Article 19(1)(g) read with Act. 21 of the Constitution. On the other hand, Kerala High Court dealt with problem of use of microphone in high volume under section 17 of the Air Act of 1981. Let us look into these two cases on the principles of law developed by the Court in matters of Noise Pollution.

The Noise Pollution (Regulation and Control) Rules 2000 (Noise Pollution Rules) framed under EPA demarcate the areas where noise is regulated and controlled. Even before this law came into being, course have seized of the impact of noise of health. Undesirable noise was considered as nuisance and as interference on one's right to freedom of speech, privacy and silence.

There is clash between freedoms of speech and expression and the freedom of privacy and silence when the loudspeakers are indiscriminately used in public places. In other words, such a use may invade the freedom of persons who are not willing to listen to the sound produced by the loudspeaker.


\[20\] Rajni Kant v State A I R 1958 All 36. For facts and discussion.
In Rajni Kant v State, 21 the Allahabad High Court recognised the powers of the local authority to regulate public nuisance created by the use of loudspeakers. In Om Birangana Religious Society v the State, 22 the Calcutta High Court said that a citizen should not be coerced to hear anything which he does not like or which he does not require. The amplifier and microphone create tremendous noise and sound. They injure people’s rights to leisure, to sleep and to enjoy their lives in the way they like, without violating any of the provision of the law. The people also have the right to read and speak with others, right not to hear, and right to remain silent. In a public meeting, microphones or amplifiers may be necessary but the sound has to be regulated in such a manner that it does not travel beyond the zone of the willing listeners. The Noise Pollution Rules lay down restrictions according to the time and decibel limits for noise in different places.

In Moulana Mufti Syed Md Noorur Rehman Barkati v State of West Bengal, 23 the Calcutta High Court followed its decision in Om Birangana and held that the restrictions on the use of loudspeakers for call of azan before 7 am as per the Noise Pollution Rules for the time and decibel limits for noise in different places do not violate the right to equality and freedom of religion. The use of loudspeakers and microphones before 7 am disturbs and take away a person’s right to sleep. In Sayeed Maqsood Ali v State of Madhya Pradesh 24 The Madhya Pradesh High Court directed the respondent not to let out their premises without authorisation from competent authorities who grant permission to use loudspeakers. In the case the court laid emphasis upon the

21 AIR 1958 All 35.
22 100 CWN 627.
23 AIR 1999 Cal 15.
24 AIR 2001 MP 220, pp 225, 226. The petitioner was a cardiac patient who had undergone a coronary artery by-pass surgery. From the community hall in the locality highly pitched music used to come out from the loudspeakers causing disturbance to the petitioner and other residents in the area.
duties of different agencies²⁶ with a warning that, 'Silence brings
bliss, noise invites chaos'. Diligent attempts are to be made to curb
noise starting from the street to stratosphere.²⁶

By an amendment to the Noise Pollution Rules the Central
Government introduced an exception. It permitted the use of
loudspeakers between 6 pm and 12 am midnight or during
ordinary festivals not exceeding fifteen days in a calendar year. In
forum, Prevention of Environment & Sound Pollution v Union of
India,²⁷ the apex court considered the diversity of culture and
religions in India and justified the exception with the conditions
that the power of exception be used only by the state government.
It should not be delegated and should be exercised by reference to
the state as a limit and not by specifying different dates for
different districts. There is no question of increasing the number of
days and duration beyond tow hours.

Support from the Noise Pollution Rules was sought for in
Salva and Associates v National Capital Territory of Delhi,²⁸ where
a firm of lawyers and solicitors was disturbing their work. The
mechanics had encroached upon the parking spaces in the vicinity,
and were causing nuisance. Perusing the pleadings, the Delhi High
Court found that the respondents had seized the vehicles and
registered cases against encroachment, and that there was no need
for monitoring.

The Supreme Court in Church of God (Full Gospel) in India
v KKRMC Welfare Association²⁹ held that directions of the high
court to bring down noise level were perfectly legal.³⁰ The court
went on to observe that in a civilised society ever person is entitled

²⁶ Ibid. For instance, state government, pollution control board and district magistrate.
²⁷ Ibid, p 225
²⁹ AIR 2003 Del 73.
³⁰ AIR 2000 SC 2773
³¹ Ibid. (The directions were in consonance with the Madras City Police Act 1888, Madras town
Nuisance Act 1889, and Noise Pollution (Regulation and Control) Rules 2000).
to enjoy his natural rights to quietness without being interfered by noise pollution. The evil effects of noise pollution are enormous.\textsuperscript{31} The Court gave illustrations such as interruption of sleep, loss of efficiency, hearing loss or deafness, high blood pressure, depression, irritability, fatigue, gastro-intestinal problem, allergy, distraction, mental stress and annoyance. The extent of damage depends upon the duration and the intensity of noise that sometimes leads to serious law and order problem. In an organised society, rights being related with duties towards others including neighbours, the court held that there is no ground for permitting noise pollution caused by voice amplifiers, loud speakers or musical instruments.\textsuperscript{32}

With the advent of industrialisation and urbanisation, noise pollution has become a disturbing phenomenon. Noise causes increase in cholesterol levels, makes one prone to heart attack and stroke, and leads to neurosis and nervous breakdown. The Orissa High Court went into these problems in detail in Bijayananda Patra v District Magistrate, Cuttack.\textsuperscript{33} When the noise from the machinery or instrument at defendants' premises materially affects the physical comfort of the occupant of the plaintiff's house, the person causing noise can be restrained by injunction. According to the court, pollution of air, water or atmosphere through noise continues to be part of the Common Law of nuisance. This is so despite the new laws enacted on environment to include the pollution control measures in the wider conspectus of social justice.\textsuperscript{34}

\textbf{e- Ocean Pollution}

\textsuperscript{31} Ibid, p 2774
\textsuperscript{32} Ibid.
\textsuperscript{33} AIR 2000 Ori 70. The Court and quoted Ramcharit Manas ‘Sunder Kanda’ 27/1 and observed that ‘the roar of Hanuman, while back from Lanka, brought abortion to many a demonesses in Lanka.’
\textsuperscript{34} Ibid, p 75
There are several definitions of pollution. For our purposes, ocean pollution is any substance or "energy" that humans put in the ocean which causes harm to living things. There are two key aspects of this definition. First, humans have caused the pollution, and, second, the pollution has to do harm to living organisms. Dead seaweed on the beach may be ugly, but it is not pollution, because humans did not put it there and, in general, it does not harm anything. Pollution is not necessarily a "substance" like oil. For example, human ships and navy SONAR can be very loud, and disrupt ocean animals' ability to communicate or navigate, or even deafen them. Thus, oceanographers sometimes talk about "sound pollution" in the ocean. Also notice that polluting "substances" are not necessarily unnatural (e.g., man-made). Mercury and oil are naturally occurring substances; we humans release them into the ocean in unnaturally large amounts which can harm the environment.

Pollution, Concentration, and the Ocean

In general, pollution is more dangerous when there is more if it, when it is more concentrated, because the pollution is more likely to encounter something (e.g., a body organ or tissue) where it can do harm. We are surrounded by a large number of different pollutants all the time in our daily lives (e.g., mercury, radioactive substances), but the concentrations are so low that our body is easily able to repair the damage or compensate. In a sense, there is a "natural level" of pollution that we are built to tolerate. Moreover, just about anything can be a pollutant in high enough concentrations. In other words, you definitely can have too much of a good thing.) For example, taking 2500 mg or more of calcium each day makes it harder for your body to absorb other nutrients and can damage your kidneys. Taking too much acetaminophen (a
pain reliever found in Tylenol and many other products) is the leading cause of acute liver failure in the United States. Determining how much of a pollutant is harmful is difficult, because it can take time for a pollutant to do its damage (it may happen a little bit at a time). Therefore, we usually set safety levels that are very far away from the levels that we know can cause harm. Just how far away they should be, though, is not always clear. For example, one of the first environmental acts of the George W. Bush Administration was to allow more arsenic in drinking water. It costs money to remove arsenic down to the current safety levels, and the administration argued that the "safety margin" was too large (that a "reasonably" safe amount was actually much higher), so the money could be better spent on other things (education, health care, tax cuts, the military, and so on). Pollution dangers can often be minimized if the pollution can be spread out, reducing the pollutant's concentration. This actually makes the ocean a great place to dump our wastes, because there are many mechanisms in the ocean which help break down and spread out pollutants naturally. Recall that water is the "universal solvent;" it naturally dissolved things (pulls pollutants' atoms or molecules away from one another). Waves and currents stir and mix the ocean water, helping to move pollutants away from the place where they were dumped. In doing so, they spread pollutants out, and thus reduce their concentration. Another reason that the ocean is a great place for our wastes is that it is really big. This means that there are lots of water molecules available to dissolve (pull apart and bond with) pollutant molecules and pollutants can spread over a larger area (they can get farther apart from one another), reducing their concentration. By spreading pollutants over a wide area, we say that ocean water "dilutes" the pollution, weakens it, in much the same way that you might add water (or ice, which melts into water) to an alcoholic beverage to "weaken" the
drink. The atoms or molecules of pollutants are strongly bonded together at first, but a group of water molecules is even more electrically attractive than the neighboring pollutant atoms/molecules. The water molecules pull the pollutant atoms/molecules away from one another (i.e., they are less concentrated if they "spread out").

The ocean's size is absolutely essential: no matter how well water dissolves pollutants or how strong waves and currents are, they can only do so much to reduce the concentration of pollutants. For example, suppose that you dumped a bunch dye in a swimming pool and had everyone swim in the same direction along the edge to create a "whirlpool." The current would help disperse the dye, and but at certain point the dye would spread as much as it could; no amount of stirring and mixing could dilute it any further.

f. Thermal Pollution

Thermal pollution is a temperature change in natural water bodies caused by human influence. The temperature change can be upwards or downwards. In the Northern Hemisphere, a common cause of thermal pollution is the use of water as a coolant, especially in power plants. Water used as a coolant is returned to the natural environment at a higher temperature. Increases in water temperature can impact on aquatic organisms by (a) decreasing oxygen supply, (b) killing fish juveniles which are vulnerable to small increases in temperature, and (c) affecting ecosystem composition. In the Southern Hemisphere, thermal pollution is commonly caused by the release of very cold water from the base of reservoirs, with severe affects on fish (particularly eggs and larvae), macro invertebrates and river productivity.

Increase in the normal temperatures of natural waters caused by intervention of human activities. The discharge of warm
water into a river is usually called thermal pollution. It occurs when an industry removes water from a source (e.g. a river), uses the water for cooling purposes, and then returns the heated water to its source. Power plants heat water to convert it into steam, to drive the turbines that generate electricity. For efficient functioning of the steam turbines, the steam is condensed into water after it leaves the turbines. This condensation is done by taking water from a water body to absorb the head. This heated water, which is at least 15°C higher than the normal, is later discharged back into the water body.

The warmer temperature decreases the solubility of oxygen and increases the metabolism of fish. This changes the ecological balance of the river. Within certain limits, thermal additions can promote the growth of certain fish and fish catch may be high in the vicinity of a power plant. However, sudden changes in temperature caused by periodic plant shutdowns, both planned and unintentional, can result in the death of these fish that are acclimatized to living in warmer waters.

Tropical marine animals are generally unable to withstand a temperature increase of 2-3°C and most sponges, molluscs and crustaceans are eliminated at temperatures above 37°C. This results in a change in the diversity of fauna, as only those species that can live in warmer water will survive and proliferate excessively.

g- Nuclear pollution

It is not only the use of fossil fuels that pollutes our surrounding but even the use of nuclear energy gives rise to pollutants and hence pollutes our environment. Also the pollution caused by the use of nuclear energy from fission process is much more damaging than pollution caused by burning fossil fuels. The fuels like U-235 are radioactive substances which keep on
emitting some nuclear radiations all the time. The dangerous
nuclear radiations can enter into the environment- by leakage from
nuclear reactors where fission of U-235 is going on. These nuclear
radiations can cause damage to cells and in some cases even lead
to death.

The waste materials produced during the various steps of the
nuclear energy production are collectively known as nuclear
wastes. If these radioactive wastes are dumped in garbage bins,
they will emit nuclear radiations and pose a threat to the life of
men and animals. If they are dumped in rivers or sea, they will
contaminate water and damage aquatic life. This has become an
issue of legitimate concern to the public after the Chernobyl
accident of Russia. More 99% of the total radioactivity in the entire
nuclear fuel cycle is generated from the fuel processing plants. To
ensure that this highly radioactive waste does not pose any
hazards to the environment. For this purpose, a three stage
approach has been adopted. First the waste will be incorporated in
stable and inert solid matrices. The conditioned waste will then be
placed in canisters and kept in a retrieval store under cooling and
constant surveillance. Ultimately, the canisters stored in suitable
place. A waste immobilization plant for incorporating the high level
radioactive wastes generated from the fuel processing plants is
being set up along with the solid storage surveillance facility of
Tarapur. Immobilization involves verification of radioactive waste
which is coded at underground disposal. The canisters in storage
are air cooked by natural convection and when the heat
radioactivity decay to desired level, they are transported to a
suitable geological formation for ultimate storage. A graveyard for
storage of nuclear wastes has been established in Trombay for
nuclear waste disposal.

When the whole nuclear fuel-cycle is considered, pollution
from mining the uranium is relevant. In the early days of uranium

56
mining in Ontario some of the local rivers were seriously polluted as a consequence of poor tailings management. The situation has been largely corrected but there have still been occurrences of tailings-pond failures. This is a continuing problem for all mining operations, requiring constant vigilance. Uranium tailings, when dry, contoured and landscaped for abandonment, release radioactive radon gas but in amounts that would not add significantly to the exposures of surrounding communities. Radon is constantly being released from all soil, especially when it is disturbed, e.g., by ploughing. The eruption of the Mount St. Helen's volcano in the U.S. in 1980 emitted as much radon in one day as would be released from a uranium tailings area in a hundred years.

Nuclear-electric generating stations release radioactive materials to air and water in amounts small enough not to harm the environment. The most obvious environmental effects that nuclear reactors do not cause are those resulting from combustion. Burning coal, oil, natural gas and even wood produces atmospheric pollutants to varying degrees. The best known pollutants are those resulting in acid rain, sulphur dioxide and nitrogen oxides. Less well known are particles, ozone, many organic compounds and heavy metals. These in combination as smog are of great concern to those with lung or heart weaknesses, the young and the old: polluted air is estimated to cause 1,800 premature deaths per year in Ontario alone. Furthermore, some of these pollutants are known to be carcinogenic, but for many of them the information is simply not available. By preventing the burning of coal, Canada's nuclear reactors are avoiding the release of more than a million tonnes of acid gases each year.

Many people are surprised to learn that the radioactive emissions from a coal-fired plant can be as high as, or even higher than, those from a nuclear plant, depending on the source of the coal and hence its impurities. Coal contains small amounts of
uranium and thorium together with their radioactive decay products, including radium and radon, and these are released through the stack or disposed of in the ash where they are subject to leaching into the ground water.

Much of the air-borne pollution from fossil-fuelled generating plants falls on our forests and ends up in our rivers and lakes. The acid rain that kills maple trees, among others, and the vegetation and fish in the lakes has been greatly reduced over recent decades. However, the carcinogens and heavy metals, both in the airborne fly-ash and leached from the ash piles, remain a concern. Mercury is a particularly worrisome pollutant. Three times since 1987 Canada and the U.S. have promised the virtual elimination of mercury, a nerve poison, from the Great Lakes. Despite this, mercury continues to build up in fish and fish-eaters such as loons. Atmospheric emissions from metal smelters and coal-burning electrical plants, mostly those in the U.S.'s midwestern states, are largely responsible. Mercury, along with other pollutants, is released into our water supplies from hydro-electric plants when large areas of land are flooded to produce a reservoir.

2- **Industrial Pollution**

Industrial pollution is pollution which can be directly linked with industry, in contrast to other pollution sources. This form of pollution is one of the leading causes of pollution worldwide; in the United States, for example, the Environmental Protective Agency estimates that up to 50% of the nation's pollution is caused by industry. Because of its size and scope, industrial pollution is a serious problem for the entire planet, especially in nations which are rapidly industrializing, like China. This form of pollution dates back to antiquity, but widespread industrial pollution accelerated rapidly in the 1800s, with the start of the Industrial Revolution. The Industrial Revolution mechanized means of production,
allowing for a much greater volume of production, and generating a corresponding increase in pollution. The problem was compounded by the use of fuels like coal, which is notoriously unclean, and a poor understanding of the causes and consequences of pollution. There are a number of forms of industrial pollution. One of the most common is water pollution, caused by dumping of industrial waste into waterways, or improper containment of waste, which causes leakage into groundwater and waterways. Industrial pollution can also impact air quality, and it can enter the soil, causing widespread environmental problems. Because of the nature of the global environment, industrial pollution is never limited to industrial nations. Samples of ice cores from Antarctica and the Arctic both show high levels of industrial pollutants, illustrating the immense distances which pollutants can travel, and traces of industrial pollutants have been identified in isolated human, animal, and plant populations as well. Industrial pollution hurts the environment in a range of ways, and it has a negative impact on human lives and health. Pollutants can kill animals and plants, imbalance ecosystems, degrade air quality radically, damage buildings, and generally degrade quality of life. Factory workers in areas with uncontrolled industrial pollution are especially vulnerable. A growing awareness of factory pollution and its consequences has led to tighter restrictions on pollution all over the world, with nations recognizing that they have an obligation to protect themselves and their neighbors from pollution. However, industrial pollution also highlights a growing issue: the desire of developing nations to achieve first world standards of living and production. Those countries that are already industrialized want to keep their place in the World Economy, and those that aren't want a better position in the world economy eg China. As these countries industrialize, they add to the global burden of industrial pollution, triggering serious discussions and arguments about environmental
responsibility and a desire to reach a global agreement on pollution issues. Industrial pollution is unwanted liquid or solid wastes dumped [intentionally or unintentionally] in the environment.

Industrial waste or trade effluent includes any liquid or solid substance. Which is discharged from any premises used for carrying on any industry, operation or process or treatment and disposal system other than the domestic sewage. It is a common practice that a large number of industries, which are located on the banks of rivers discharge their untreated effluent into the river and thus pollute the river water. Industrial effluents contain, inter alia, mercury, lead, cadmium and copper etc., which are harmful to the aquatic animals. For example, mercury results in large-scale killing of fish and other animals. It is also poisoned animals. The presence of lead in water also causes deformities and it is also responsible for causing anaemia and loss of appetite. Certain trade effluents change the pH value of the water and thus produce toxic effect on plants and animals.

Industrial pollution is pollution which can be directly linked with industry, in contrast to other pollution sources. This form of pollution is one of the leading causes of pollution worldwide; in the United States, for example, the Environmental Protective Agency estimates that up to 50% of the nation's pollution is caused by industry. Because of its size and scope, industrial pollution is a serious problem for the entire planet, especially in nations which are rapidly industrializing, like China. This form of pollution dates back to antiquity, but widespread industrial pollution accelerated rapidly in the 1800s, with the start of the Industrial Revolution. The Industrial Revolution mechanized means of production, allowing for a much greater volume of production, and generating a corresponding increase in pollution. The problem was compounded by the use of fuels like coal, which is notoriously unclean, and a poor understanding of the causes and consequences of pollution.
There are a number of forms of industrial pollution. One of the most common is water pollution, caused by dumping of industrial waste into waterways, or improper containment of waste, which causes leakage into groundwater and waterways. Industrial pollution can also impact air quality, and it can enter the soil, causing widespread environmental problems.

Because of the nature of the global environment, industrial pollution is never limited to industrial nations. Samples of ice cores from Antarctica and the Arctic both show high levels of industrial pollutants, illustrating the immense distances which pollutants can travel, and traces of industrial pollutants have been identified in isolated human, animal, and plant populations as well.

Industrial pollution hurts the environment in a range of ways, and it has a negative impact on human lives and health. Pollutants can kill animals and plants, imbalance ecosystems, degrade air quality radically, damage buildings, and generally degrade quality of life. Factory workers in areas with uncontrolled industrial pollution are especially vulnerable.

A growing awareness of factory pollution and its consequences has led to tighter restrictions on pollution all over the world, with nations recognizing that they have an obligation to protect themselves and their neighbors from pollution. However, industrial pollution also highlights a growing issue: the desire of developing nations to achieve first world standards of living and production. As these countries industrialize, they add to the global burden of industrial pollution, triggering serious discussions and arguments about environmental responsibility and a desire to reach a global agreement on pollution issues. Classification are as under:

a- Hazards and Solid Wastes
In ancient cities, food scraps and other wastes were simply thrown into the unpaved streets where they accumulated. Around 320 BC in Athens, the first known law forbidding this practice was established and a system of waste removal began to evolve in several eastern Mediterranean cities. The initial disposal methods were very crude and were often just open pits outside the city walls. As populations increased, efforts were made to transport the wastes out further away from cities, thus creating city dumps. Until recently, the disposal of municipal solid waste did not attract much public attention. The favoured means of disposal was to dump solid wastes outside the city or village limits, and occasionally burn or compact them.

Around most towns and cities in India, the approach roads are littered with multicoloured plastic bags and other garbage. Waste is also burnt to reduce its volume. Modern methods of disposal such as incineration and the development of sanitary landfills, etc., are now attempting to solve these problems. The lack of space for dumping solid waste has became a serious problem in several cities and towns all over the world. Dumping and burning wasters is not an acceptable practice today, from either an environmental or a health perspective. The disposal of solid waste should be part of an integrated waste management plan. The method of collection, processing, resource recovery and the final disposal should be synchronized to achieve a common objective.

Solid wastes are grouped or classified in several different ways. These different classifications are necessary to address the complex challenges of solid waste management in an effective manner. The term municipal solid waste (MSW) is generally used to describe most of the non-hazardous solid waste from a city, town or village that requires routine collection and transport to a processing or disposal site. Sources of MSW include private homes, commercial establishments and institutions, as well as and
demolition debris, sewage sludge, mining wasters or agricultural wastes.

Municipal solid waste contains a wide variety of materials. It can contain food waste (like vegetable and meat material, leftover food, eggshells, etc), which is classified as wet garbage as well as paper, plastic, tetrapacks, plastic cans, newspaper, glass bottles, cardboard boxes, aluminium foil, metal items, wood pieces, etc., which is classified as dry garbage.

Solid waste is anything a campus or other entity no longer needs or no longer wants, even if it is liquid or gaseous. Other terms for solid waste are “garbage,” “trash,” or “refuse.” Some recyclable materials, such as scrap metals, are exempt from the definition of solid waste, but others are not. The federal RCRA program encourages individual states to develop specific requirements for management of solid wastes. Examples of these include construction/demolition debris, tires, medical wastes, and petroleum wastes. Individual states may have more specific requirements than required by federal RCRA.

Hazardous wastes are a specific category of solid wastes. RCRA identified two general categories of hazardous waste: those that are specifically “listed” in the regulations, and those that exhibit a hazardous “characteristic” by being flammable, corrosive, reactive, or toxic (see nearby table). Most empty containers are not hazardous waste under federal RCRA rules. Although it may be dangerous, most waste that comes from residential settings is not hazardous under the federal RCRA rules. As with solid waste, states may have more specific requirements than required by federal RCRA. Certain hazardous wastes are subject to higher levels of regulation. These are acute hazardous or “P-listed” wastes. With the exception of a few pesticides, laboratories are usually the only activities on a campus that will generate these wastes.
Examples include arsenic compounds, azides, cyanides, and osmium tetroxide. A hazardous waste determination is the decision that something is a waste, followed by the decision that the regulations consider it hazardous waste or simply a solid waste. At this point, the waste becomes subject to regulation. Failure to make a waste determination is a serious and common breach of the RCRA regulations. Such a failure can also result in unknown wastes, which can be very expensive to manage.

**b- Electronic Wastes**

E-waste is a term used to cover almost all types of electrical and electronic equipment (EEE) that has or could enter the waste stream. Although e-waste is a general term, it can be considered to cover TVs, computers, mobile phones, white goods (e.g. fridges, washing machines, dryers etc.) home entertainment and stereo systems, toys, toasters, kettles—almost any household or business item with circuitry or electrical components with power or battery supply.

E-waste has been defined as “waste electrical and electronic equipment, whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded”. Whereas Electrical and electronic equipment has been defined as “equipment which is dependent on electrical currents or electromagnetic fields to be fully functional”. In the recent years, there has been increasing use and dependence on electrical and electronic gadgets like mobile phone, personal computers, laptops, server, data storage devices, photo copying machines, TV(CRT/LED/LCD), washing machine, refrigerators and air conditioners, etc. resulting into generation of large quantities of E-waste. The high rates of obsolescence of the above mentioned items coupled with steady rise in the demand have also resulted in substantial growth in e-waste generation. There is no
comprehensive and latest inventory of E-waste in the country however, as per preliminary estimates, the annual e-waste generation in India has been estimated to be 0.8 million tonne by 2012. An UN report estimates that the world wide generation of e-waste is around 30 to 50 Million tonne per annum. The electrical and electronic equipment (EEE) have valuable materials and hazardous/toxics substances in their components. The electronic products and electrical equipment after their useful life may not cause any harm if it is stored safely in households/stores. However, if the E-waste is opened-up and attempts are made for retrieval of useful components or material in an un-scientific manner or if the material is disposed in open, then it may cause health risks and damage to environment. E-waste can be considered as a resource that contains useful material of economic benefit for recovery of plastics, iron, glass, aluminum, copper and precious metals such as silver, gold, platinum, and palladium and lead, cadmium, mercury etc. However, at the same time presence of heavy metals (As, Cd, Hg, Pb etc.) and other toxic substances such as polychlorinated bi-phenyls (PCBs), etched chemicals, etc. may pose risk to health and environment during handling and recovery operations. E-waste is a problem of increasing proportions especially when crude methods are adopted for recovery of useful components from E-waste. There is a need to encourage recycling of all useful and valuable material from e-waste so as to conserve the ever depleting natural resources. Electronic component are increasingly made from recycled materials, for example for making new LCDs, more than 50% of indium is sourced by recycling used LCDs. The E-waste thus presents a scenario of urban mining for recovery of ferrous/non-ferrous/ rare earth metal and precious metal in addition to plastics and glass. However, presence of hazardous and toxic substances in the component of e-waste necessitates environmentally sound management of e-waste
including collection and recycling/treatment in an environmentally sound manner. The E-waste (Management & Handling) Rules, 2011 have been notified with primary objective to channelize the E-waste generated in the country for environmentally sound recycling which is largely controlled by the un-organized sector who are adopting crude practices that results into higher pollution and less recovery, thereby causing wastages of precious resources and damage to environment.

**Implementation of E-waste Rules, 2011: Objectives and scope of the guidelines:**

MoEF/CPCB after consulting various stake holders felt the need for preparing a guidance document for implementation of the provisions of the E-Waste (Management & Handling) Rules, 2011 that may help the Producers, Consumer & Bulk Consumer, Collection Center, Dismantler, Recycler and Regulatory agencies (SPCBs/PCCs) for effective compliance/implementation of these rules. This document also provides guidance on setting up collection mechanism, dismantling and recycling operations. As the E-waste Rules place main responsibility of e-waste management on the producers of the electrical and electronic equipment by introducing the concept of "extended producer responsibility"(EPR). The scope of implementing such EPRs is also discussed in these guidelines.

**E-Waste (Management & Handling) Rules, 2011:**

The e-waste (Management & Handling) Rules, 2011 have been notified in May 2011 and are effective from 01-05-2012. These rules were notified in advance to give the various stakeholders adequate time to prepare themselves and also to place the required infrastructure for the effective implementation of these rules.
Applicability

1. These rules shall apply to every producer, consumer or bulk consumer, collection centre, dismantler and recycler of e-waste involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components as specified in schedule – I the regulatory agencies involved are SPCBs/PCCs and CPCB.

2. The rule will not apply to lead acid batteries as covered under the Batteries (Management and Handling) Rules, 2001. The rules shall not apply to, Micro and Small enterprises as defined in the Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006) and radioactive wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and rules made there under. The Ministry of Micro Small and Medium Enterprises has awarded a study to ‘The Energy and Resources Institute’ (TERI) to examine the quantum of e-waste generated and the management of e-waste from the products manufactured by them at the end of life. The study is likely to be completed in three months time. Based upon the finding of the study, the matter regarding the inclusion of Micro and Small Enterprises would be reviewed.”

3. The e-waste Rules apply to all electrical and electronic equipment (EEE) listed in Schedule 1 (annexure-IV) and put on market in India, including their components and consumables which are part of the product at the time of discarding.

4. The rules also call for the reduction in the use of hazardous substances in electrical and electronic equipment. Every producer of equipment listed in Schedule 1 of the Rule shall ensure that the covered products do not contain lead,
mercury, cadmium, hexavalent chromium, poly-brominated biphenyls or poly-brominated di-phenyl ethers above a specified threshold. The threshold for cadmium is 0.01% by weight in homogeneous material, for all other substances, the threshold is 0.1% by weight in homogeneous material.

5. In case of any doubt regarding applicability of these rules the matter would be referred to an interministrial committee comprising of technical experts and industry representatives.

6. Equipment or system that is not listed in Schedule-I but has a part or component that is listed in Schedule-I as an integral part of that equipment or system is considered to be outside the scope of the rules. However, waste generated from such components or parts may be accepted for channelization to recycling facility as long as it is recyclable.

Major Stakeholders

1. **Producer** is any person who, irrespective of the selling technique used, “manufactures and offers to sell electrical and electronic equipment under his own brand; or offers to sell under his own brand, assembled electrical and electronic equipment produced by other manufacturers or suppliers; or offers to sell imported electrical and electronic equipment” and has to take authorization under these Rules for implementation of EPR.

2. **Bulk Consumers** are bulk users of electrical and electronic equipment such as central government or state government departments, public sector undertakings, banks, educational institutions, multinational organizations, international agencies and private companies that are registered under the Factories Act, 1948 and Companies Act, 1956; they have to maintain records on E-waste generated and channelized to registered/authorized collection centres/recycler/dismantler.
3. **Extended Producer Responsibility** is a responsibility of any producer of electrical or electronic equipment, for their products beyond manufacturing until environmentally sound management of their end of life products.

4. **Collection Centre** is a centre established individually or jointly or a registered society or a designated agency or a company or an association to collect e-waste which has to obtain authorization under E-Waste Rules, 2011.

5. **Dismantler** is any person or registered society or a designated agency or a company or an association engaged in dismantling of used electrical and electronic equipment into their components who has to obtain authorization and registration E-Waste Rules, 2011. The association may include a consortium as well.

6. **Recycler** is any person who is engaged in recycling or reprocessing of used electrical and electronic equipment or assemblies or their component. Recycling facility may be set up by an individual or a company or a joint venture or a consortium.

7. **SPCBs/PCCs** have been given the responsibility as regulatory agencies for ensuring implementation of the E-waste Rules in their respective States.

8. **CPCB** is responsible for evolving the guidelines for implementation, overseeing the progress made in implementing the Rules and ensuring RoHS compliance.

**Implementation of EPR**

Extended producer's responsibility (EPR) is the main feature of the E-waste (Management and Handling) Rules, 2011, wherein the producer of electrical and electronic equipment has the responsibility of managing such equipment after its 'end of life',

69
thus the producer is responsible for their products once the consumer discards them. Under this EPR, producer is also entrusted with the responsibility to finance and organize a system to meet the costs involved in complying with EPR. Most of the e-waste models around the world are based on these concepts which motivate the producers to reduce consumption of virgin materials, undertake product design changes to reduce waste generation and ensure closure of material loops to promote resource efficiency and sustainable development. The scope and requirements for compliance to EPR is outlined below;

1. Producers intending to sell their EEEs listed in Schedule-I are required to take authorization only in the place where their manufacturing facilities and corporate head offices are located. In case, of producers importing EEEs listed in Schedule-I, authorization may be taken from SPCB of the State where the port of landing is located. Since these products are sold across the country, SPCB/PCC concerned granting the authorization would inform the CPCB of the details of the authorization granted. CPCB would maintain a centralized database on their website, which will be available to all stakeholders. Producers will also place this information on their website and provide details of products sold to the SPCB from whom they have obtained authorization. SPCBs will provide consolidated information to CPCB on an annual basis which CPCB will maintain on the centralized database.

2. In the application for authorization, it should be clearly mentioned, how the producer would ensure channelization of the E-waste at the end of its life; details of his own collection centres or take-back systems or the collection centres authorized by him, shall be specified.
3. As per the EPR under the Rules, the producers are required to achieve 100% collection and channelization of the end of the life equipment. However, for the purpose of monitoring, targets need to be fixed. Such targets should be based on the life of the product, type of the product, usage and consumption patterns and other relevant factors. CPCB will, therefore, set up a Committee, which will examine the issue of fixing targets, based on the aforesaid factors and also taking into consideration the level of compliance achieved during the first two years.

4. Producer who has manufacturing facility shall comply with prevailing environmental regulations under Water (P&C) Act, 1974, Air (P&C) Act, 1981, Hazardous Waste (M,H&TM) Rules, 2008 and other relevant regulations. In the case of manufacturers, who has obtained authorisation under the Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 need not take separate authorization under the e-waste rules till the validity/expiry of that authorization. Subsequent authorisation has to be taken under the e-waste rules, 2011 to ensure that electronic scraps, rejects etc. generated during the manufacturing shall be sent or channelized to registered E-waste recycling facilities. Such producer shall obtain authorization only from SPCB/PCC of the State where the manufacturing facility is located.

5. The producer is required to maintain records in form 2 (Annexure-II) along with the details of the e-waste handled/generated and has to submit the annual returns in form 3 (Annexure-III) in accordance with Rule 4(9) of these Rules.
6. Producer shall finance the EPR system either by setting up individual collection system or by joining a common collection system by authorizing them.

7. **Scope of EPR for the Producer:**

1. Producer may assess their individual requirements and design a collection or product take back system as they deem appropriate as long as it facilitates channelization of E-waste for environmentally sound management.

2. Producer may arrange for collection from both, individual and bulk consumers and channelize the waste to collection centres or recyclers/dismantlers.

3. The producer may opt to implement EPR on his own individually or collectively. There can be two distinct models; (i) individual producer responsibility where producer implements EPR managed on his own by setting up his own authorized collection centres or (ii) collective producers responsibility, where producers may authorize common collection centres (CCC) independently or by joining a consortium as a member. Producers importing EEE listed in schedule – I, may take authorisation from the State where the landing port is located.

4. In the E-waste rules, the logo has been printed without a bar below the symbol, whereas the present practice commonly followed by the producer, the Logo has a bar below the symbol. Logo without the bar below the symbol and the logo with bar below the symbol as shown below are acceptable. Symbol may be placed on the products or printed in the accompanying product documentation.

5. As per Rule 4(6) of the E-waste Rules, 2011 the producer is responsible for creating awareness for the consumer about
the product that has been placed on the market. The information should essentially convey the message for the compliance under the rules and the responsibility undertaken by the producer on safe handling and disposal of the end-of-life product. Various modes for creation of awareness such as publications, advertisements, posters, information booklets, use of Television, radio, newspaper etc., could be adopted for communicating the information. The details of awareness programs under taken shall be provided to SPCBs/PCCs while submitting annual returns as per Form 3.

6. Under Rule 4(5) it is mandatory for the producer to publicize the contact details of the authorized collection centres and collection points or their collection mechanism to the consumers and such information should be periodically updated. The detailed information should comprise of the full address, telephone number, fax number e-mail etc for each State. The helpline number (like call centre) may also be publicized so that the consumer can reach the nearest collection centre from where he/she is located.

7. Awareness is essential regarding the hazardous constituents present in the equipment as well as the safe handling and disposal of the product after its use. In case of the products complying with the provisions of rule 13(1), the same should be indicated in the product information booklet.

8. Producer may manage a system directly or with a help of any professional agency on his behalf for collection and channelization system of E-waste by involving relevent stake holders such as consumer, bulk consumer, NGOs, informal sector, resident associations, retailers, dealers, etc.
c- Chemical Wastes

Chemical waste is a waste that is made from harmful chemicals (mostly produced by large factories). Chemical waste may fall under regulations such as COSHH in the United Kingdom, or the Clean Water Act and Resource Conservation and Recovery Act in the United States. In the U.S., the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA), as well as state and local regulations also regulate chemical use and disposal. Chemical waste may or may not be classed as hazardous waste. Chemical waste includes both the chemical byproducts of large manufacturing facilities and laboratories, as well as the smaller-scale solvents and other chemicals disposed of by households. It may fall under the classification of hazardous waste, depending on the nature of the chemicals — for example, chemicals such as ethanol and glycerol don't require special disposal procedures. Health and safety legislation varies internationally and dictates the manner in which this waste must be handled and disposed of. In the United States, it is regulated by the Resource Conservation and Recovery Act as well as the Clean Water Act; while the Control of Substances Hazardous to Health Regulations (COSHH) regulates chemical waste in the UK. If chemical waste is not handled or disposed of properly, both the environment and nearby individuals are put at risk by its potentially corrosive, toxic, flammable or explosive nature. Proper handling of this waste first requires the separation of chemicals that may react with one another, such as salts from acids, hypochlorites and hydroxides from ammonia, and oxidizing substances from combustible substances. After it is properly separated, it should be safely stored in tightly-sealed drums, bottles, tins or jars that will not be corroded or otherwise affected by the contents.

d- Bio-medical Wastes

Medical care is vital for our life, health and well being. But the waste generated from medical activities can be hazardous, toxic and even lethal because of their high potential for diseases
transmission. The hazardous and toxic parts of waste from health care establishments comprising infectious, bio-medical and radio-active material as well as sharps (hypodermic needles, knives, scalpels etc.) constitute a grave risk, if these are not properly treated/disposed or is allowed to get mixed with other municipal waste. Its propensity to encourage growth of various pathogen and vectors and its ability to contaminate other nonhazardous/ non-toxic municipal waste jeopardises the efforts undertaken for overall municipal waste management. The rag pickers and waste workers are often worst affected, because unknowingly or unwittingly, they rummage through all kinds of poisonous material while trying to salvage items which they can sell for reuse. At the same time, this kind of illegal and unethical reuse can be extremely dangerous and even fatal. Diseases like cholera, plague, tuberculosis, hepatitis (especially HBV), AIDS (HIV), diphtheria etc. in either epidemic or even endemic form, pose grave public health risks. Unfortunately, in the absence of reliable and extensive data, it is difficult to quantify the dimension of the problem or even the extent and variety of the risk involved. With a judicious planning and management, however, the risk can be considerably reduced. Studies have shown that about three fourth of the total waste generated in health care establishments is non-hazardous and non-toxic. Some estimates put the infectious waste at 15% and other hazardous waste at 5%. Therefore with a rigorous regime of segregation at source, the problem can be reduced proportionately. Similarly, with better planning and management, not only the waste generation is reduced, but overall expenditure on waste management can be controlled. Institutional/Organisational set up, training and motivation are given great importance these days. Proper training of health care establishment personnel at all levels coupled with sustained motivation can improve the situation considerably. The
rules framed by the Ministry of Environment and Forests (MoEF), Govt. of India, known as 'Bio-medical Waste (Management and Handling) Rules, 1998,' notified on 20th July 1998, provides uniform guidelines and code of practice for the whole nation. It is clearly mentioned in this rule that the 'occupier' (a person who has control over the concerned institution / premises) of an institution generating bio-medical waste (e.g., hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank etc.) shall be responsible for taking necessary steps to ensure that such waste is handled without any adverse effect to human health and the environment.

'Bio-medical waste' means any solid and/or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunisation of human beings or animals or in research pertaining thereto or in the production or testing thereof. The physico-chemical and biological nature of these components, their toxicity and potential hazard are different, necessitating different methods / options for their treatment / disposal. In Schedule I of the Bio-medical Waste (Management and Handling) Rules, 1998 (Annexure II), therefore, the waste originating from different kinds of such establishments, has been categorised into 10 different categories (as mentioned in the box below) and their treatment and disposal options have been indicated.

A Common Bio-medical Waste Treatment Facility (CBWTF) is a set up where bio-medical waste, generated from a number of healthcare units, is imparted necessary treatment to reduce adverse effects that this waste may pose. The treated waste may finally be sent for disposal in a landfill or for recycling purposes. Installation of individual treatment facilities by small healthcare units requires comparatively high capital investment. In addition, it
requires separate manpower and infrastructure development for proper operation and maintenance of treatment systems. The concept of CBWTF not only addresses such problems but also prevents proliferation of treatment equipment in a city. In turn it reduces the monitoring pressure on regulatory agencies. By running the treatment equipment at CBWTF to its full capacity, the cost of treatment of per kilogram gets significantly reduced. Its considerable advantages have made CBWTF popular and proven concept in many developed countries. CBWTF as an option has also been legally introduced in India. The Bio-medical Waste (Management & Handling) Rules, 1998, gives an option to the biomedical waste generator that such waste can also be treated at the common bio-medical waste treatment facility. The SecondAmendment of the Rules in June, 2000, further eased the bottleneck in upbring the CBWTF by making Local Authority responsible for providing suitable site within its jurisdiction. The concept of CBWTF is also being widely accepted in India among the healthcare units, medical associations and entrepreneurs. In order to set up a CBWTF to its maximum perfection, care shall be taken in choosing the right technology, development of CBWTF area, proper designing of transportation system to achieve optimum results etc. These key features of CBWTF have been addressed in the following sections and will form the guidelines for the establishment of CBWTFs throughout the country.

e- Plastic Wastes

The quantum of solid waste is ever increasing due to increase in population, developmental activities, changes in life style, and socio-economic conditions, Plastics waste is a significant portion of the total municipal solid waste (MSW). It is estimated that approximately 10 thousand tons per day (TPD) of plastics waste is generated i.e. 9% of 1.20 lacs TPD of MSW in the country. The plastics waste constitutes two major category of plastics; (i)
Thermoplastics and (ii) Thermoset plastics. Thermoplastics, constitutes 80% and thermoset constitutes approximately 20% of total post-consumer plastics waste generated in India. The Thermoplastics are recyclable plastics which include; Polyethylene Terephthalate (PET), Low Density Poly Ethylene (LDPE), Poly Vinyl Chloride (PVC), High Density Poly Ethylene (HDPE), Polypropylene (PP), Polystyrene (PS) etc. However, thermoset plastics contains alkyd, epoxy, ester, melamine formaldehyde, phenolic formaldehyde, silicon, urea formaldehyde, polyurethane, metalised and multilayer plastics etc. The environmental hazards due to mismanagement of plastics waste include the following aspects: Littered plastics spoils beauty of the city and choke drains and make important public places filthy; Garbage containing plastics, when burnt may cause air pollution by emitting polluting gases; Garbage mixed with plastics interferes in waste processing facilities and may also cause problems in landfill operations; Recycling industries operating in non-conforming areas are posing unhygienic problems to the environment.

Main Features of the Plastics Manufacture and Usage (Amendment) Rules, 2003

Regulation of plastics waste, particularly manufacture and use of recycled plastics carry bags and containers is being regulated in the country as per "Recycled Plastics Manufacture and Usage Rules, 1999 and as amended in 2003. According to these Rules. No person shall manufacture, stock, distribute or sell carry bags made of virgin or recycled plastic bags which are less than 8 x 12 inches in. No vendor shall use carry bags/containers made of recycled plastics for storing, carrying, dispensing or packaging of food stuffs; Carry bags and containers made of recycled plastic and used for purposes other than storing and packaging food stuffs shall be manufactured using pigments and colorants as per IS 9833:1981 entitled "List of pigments and colorants for use in
plastics in contact with food stuffs, pharmaceuticals and drinking water" Recycling of plastics shall be undertaken strictly in accordance with the Bureau of Indian Standard specification: IS 14534:1998 entitled "The Guidelines for Recycling of Plastics" Manufacturers of recycled plastic carry bags having printing facilities shall code/mark carry bags and containers as per Bureau of Indian Standard specification: IS 14534:1998 (The Guidelines for Recycling of Plastics). No person shall manufacture carry bags or containers irrespective of its size or weight unless the occupier of the unit has registered the unit with respective SPCB/PCC prior to the commencement of production. The prescribed authority for enforcement of the provisions of these rules related to manufacturing and recycling is SPCB in respect of States and the PCC in Union Territories and for relating to use, collection, segregation, transportation and disposal shall be the District Collector/ Deputy Commissioner of the concerned district.

f- Radioactive Waste

Waste generated from atomic reactors contain different kind of radioactive isotopes, are very harmful for the plants and animals living in water. The IAEA definition of radioactive waste:

"Any material that contains or is contaminated by radionuclides at concentrations or radioactivity levels greater than the exempted quantities established by the competent authorities and for which no use is foreseen".

It is recognised that different countries may have different interpretations, however, the important part of the definition is "for which no use is foreseen". This immediately raises the question as to the status, for example, of spent nuclear fuel. Some countries, such as the UK and France would deem spent fuel as a resource whereas Finland, USA, Sweden would regard it as a waste. The interpretation therefore can be dependent as much on National Government Policy as much as any scientific or technical
description. We must also be clear what we mean by disposal. Again, we adopt the IAEA definition:

"The emplacement of waste in an approved, specified facility without the intention of retrieval..."

But again the reality of the definition depends as much on Government policy. In this case it is the role of retrievability in the disposal concept. Some countries require retrievability to be an option post disposal, for example even if spent fuel were regarded as a waste in this generation, future ones may regard it as a resource. The foreclosure of future options therefore becomes a consideration. Moreover, there is a public acceptability angle here in that disposal is regarded as too final, there is the question of "What if it goes wrong and we need to get it back". The scientists have the answers but sometimes these are not to the questions uppermost in peoples minds. In addition we have to address the ethical and political questions as well in finding acceptable disposal solutions. Radioactive waste management is therefore about addressing both the technical questions and the less technical questions. Successful implementation requires us not only to address the regulatory requirements, based on scientific arguments, but also recognise that there are issues and concerns which need us to take a more holistic approach. The purpose of this paper is to look at radioactive waste management from an international perspective. At the same time consider how different countries are applying top level principles of radwaste management in providing an environmental solution to a technological problem. We are concentrating here on the disposal of solid radioactive waste but many of the same principles apply to discharges of liquid and gaseous radioactive effluents as well. We also realise that discharges from repositories may take place over many thousands and tens of thousands of years. Radioactivity does not implicitly recognise national boundaries, witness the Chernobyl accident for
example, nor on the timescales we are talking about for geological repositories, do national borders themselves remain a constant. It is therefore important that to ensure we follow the main objective of radioactive waste management that common principles and practices are applied around the world. The main objective is described in IAEA documentation as follows:

"The main objective of radioactive waste management is to deal with radioactive waste in a manner that protects human health and the environment now and in the future without imposing undue burdens on future generations."

But this does not mean to say that radwaste disposal solutions have to be found at any cost. We have a responsibility also to the present generation which has to pay for disposal to provide an environmental solution that is economical but is consistent with providing adequate safety - an optimised solution. Radwaste management and disposal policies must also be consistent with higher level policies aimed at enhancing the environment. In particular policies such as sustainable development, a widely quoted definition being:

"Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs".

**g. Space Waste**

"Space waste" by Robin des Bois is the first report to cover this new subject fully as an environmental Non Governmental Organization. Space waste, the use of radioactive sources and the mechanical and environmental risks of reentries in the Earth's atmosphere have been a major concern for Robin des Bois since 1987.

The Space race has managed a significant achievement. In 50 years, humanity has sent tons of waste from Earth to space. "The ocean above" as Victor Hugo called it is a victim of industrial
pollution of a new genre, striking, proliferating and long lasting it is of the same nature as the pollution of our worldly ocean riddled with plastic polystyrene and hydrocarbon waste however space waste is much harder to recuperate. The life of a satellite is not much longer than that of a car, about twelve years. On earth, managing out-of-use cars and their accessories is a real headache. In space, managing Out of Use Satellites is a case of “each state for itself” and involves a certain amount of inconsideration. Waste management in all its forms is a science as well as a mirror of collective behavior. Space waste is no exception to the rule however no-one, especially operators, saw it coming. In the 1970s, traces of titanium and alumina were detected for the first time on Guinea pig satellites. This was blamed on solar flares or the chemical composition of asteroids but was actually from paint and combustion residues on the spacecraft. Space experts did not anticipate geometric expansion or the multiplication of waste from orbital collisions and explosions. In 50 years, human activities in space has created more waste in the Earth’s low and high orbits than meteorites injected by the solar system in billions of years. Today, no manned space flight and satellite or interplanetary mission is safe from collision with destructive waste. On Earth, no one is immune to waste falling from the sky above or uncontrolled re-entry on the Blue Planet, not even a whale. Space waste contributes to light pollution in space and disturbs astronomers’ observations. Nuclear reactors on board the satellite mask the natural radioactive background noise in the cosmos, emitting gamma-rays even when the satellites are no longer in use. All this for internet, GPS, satellite telephone and radio as well as many business activities, media and entertainment that make a lot of money and produce tons of waste without having to pay a space TGAP - General Tax on Polluting Activities. In the near future polluters should pay, in order to manage and recover space waste.
Space law is also broken. The steps that may put an international agreement on prevention and space waste management in orbit are far from the launch pad. The only glimmer of hope: space logistics managers now understand the urgent need to act to clean this spatial dump and prevent waste at the source.

The United Nations (UN) and the space community use the French and English word debris to describe abandoned objects in space. The debris comes from demolitions, disasters or calamities or geological or fossil remains or traces. The UN defines debris "debris as all objects created by man, including fragments or parts of these objects, whether their owners can be identified or not, in the Earth's orbit or that return to the dense layers of the atmosphere, which are not functional and which cannot reasonably be expected to be used or reused for the purpose for which they were designed or any other function for which they were or may be authorized." In European legislation, "any substance or object which the bearer discards or intends to or is required to discard" is considered debris." On this basis, the UN and EU definitions are the same. In essence, the word debris is much "lighter" if you will and does not require the origin to be known. For this report, which aims to provide public or private operators with more information, we have preferred to use the legal term, waste. There are several types of space waste: Launchers, Combustion residue, Operational Waste, Out of Use Satellites, Fragmentation Waste, Space Erosion.

3- Various Problems and there Implications

a. Various Problems

An environmental problem arises whenever there is a change in the quality or quantity of any environmental factor which directly or indirectly affects the health and well-being of man in an adverse manner. Environmental problems can be studied from two different viewpoints. One is simply to look for adverse effects
without regard to their origin in order to detect trends that call for further investigation; the other is to try to understand the cause and effect relationships, which make better prediction and proper management possible. Some of the environmental problems which are critical at the present time are fairly widely known because of the growing awareness of all levels of society, including governments, general public and the scientific community. However, our present information on the structure and function of the biosphere is not sufficient to allow an accurate evaluation of the total situation, expect to indicate some broad problem areas. There may be serious potential problems of which we are as yet unaware; other known problems may be less serious than we think. The Commission has made an extensive survey and analysis of those problems which are currently regarded as being of critical importance. The following criteria were used in an attempt to assess the critical nature of the problems to be solved in the near future:

a) Number of people and nations involved
b) Geographical distribution of the problem
c) Temporal distribution of the problem (temporary or long-term effects)
d) Degree of irreversibility of the effects
e) Degree of impact on health, standard of living, social structure and economy
f) Degree of international significance of the problem. Although these criteria overlap and may not be exhaustive, they found a useful basis for judgement. The consensus of the Commission's survey was that a fairly restricted number of problems were found to recur time and again. The major critical problem may be summarized as, "the adverse effects
of a changed environment on human health and well-being; i.e., the possibility that a changing environment may lead to increased mortality, increased frequency of diseases, lowered nutritional status via decreased agricultural productivity, or lowered psychological value of the environment. Concern has been widely expressed that these possible effects on man may be caused by direct input of toxic substances into the environment or improper land use. Climatic changes as a result of human activity may also adversely affect the standard of living through, for example reduced crop productivity, and increased energy consumption, etc. Those problems considered most relevant for early implementation by a global environmental monitoring system are:

1. Potentially adverse climatic change resulting from human activities

2. Potentially adverse changes in biota and man from contamination by toxic substances including radionuclides

3. Potentially adverse changes in biological productivity caused by improper land use (reduced soil fertility, soil erosion, extension of arid zones etc.) A second category includes problems that, although of great importance, are not suitable for early global monitoring either because of their nature or because further study is necessary to determine whether they should be included in a global environmental monitoring system. These problems are:

4. Potentially adverse changes in the growth, structure and distribution of the human population

5. Changes in the subjective human perception of the environment

6. Eutrophication of waters
7. Decreasing fresh water resources

8. Natural disasters

Environmental problems stem from two main categories of human activities:

1) Use of resources at unsustainable levels, and

2) Contamination of the environment through pollution and waste at levels beyond the capacity of the environment to absorb them or render them harmless.

Resulting ecological damage seen around the world includes:

• Biodiversity loss

• Pollution of water and consequent public health problems

• Air pollution and resulting increase in respiratory diseases, deterioration of buildings and monuments

• Loss of soil fertility, desertification and famine

• Depletion of fishing resources

• Increase in skin cancers and eye diseases in certain areas due to ozone depletion

• New diseases and more widespread disease vectors

• Damage to future generations

**DISCUSSION OF CRITICAL ENVIRONMENTAL PROBLEMS**

Potentially Adverse Climatic Change Resulting from Human Activity, Large-scale climatic changes could be caused by alterations in the earth-atmosphere system through changes in: the atmospheric content of carbon dioxide; atmospheric turbidity (aerosol content); mean global cloudiness; the earth's surface; the composition of the stratosphere; and the amount of heat generated by man's activities. The concentration of atmospheric carbon dioxide is increasing at an average annual rate of nearly 0.3
percent. This increase, which is due to the burning of fossil fuels, is expected to accelerate in the future accompanying global economic development. Atmospheric carbon dioxide can influence climate through the "green-house effect", i.e. it is transparent to incoming solar radiation but partially absorbs the outgoing longer wavelength energy emitted by the earth. The best current estimates suggest that by 2000 A.D. the effect of increased CO2 alone will be an average warming of the global surface temperature by roughly 0.5°C. Atmospheric aerosols attenuate solar radiation by absorbing and scattering (re-directing) it and are thereby potentially capable of affecting local and global climate. The nature of the climate change (warming or cooling) depends on the relative importance of these two radiative processes as well as the character of the earth's surface. In addition, atmospheric particles can affect the physical processes of precipitation and cloud formation through their role as condensation nuclei. Recent estimates have indicated that on a global basis, man's production of atmospheric particles is now roughly 10 to 50 percent of the natural rate. Locally, of course, the man-made contribution may far exceed that occurring naturally. Changes in the earth's reflectivity (albedo) are dominated by variations in cloudiness. Thus, any activity of man that affects large-scale cloudiness is likely to have an impact on climate. Potential examples of such activity include subsonic and supersonic aircraft flights that add moisture to the atmosphere at high altitude, atmospheric particles that serve as condensation nuclei, and attempts at weather modification. Man-made changes in the earth's surface can affect the albedo and the availability of solar energy. Examples of such changes include deforestation, erosion, extension of arid or desert land, irrigation, urbanization, and the creation of artificial lakes. Although large local climatic effects result from these activities, the global consequences are not well understood and may be insignificant. The combustion of fuels
and the use of energy result in the liberation of heat. In large, temperate-latitude cities during winter this man-made-energy can often equal or exceed that naturally available from solar radiation. Man-made energy is, however, not yet significant on a global scale but within 30 to 40 years it will equal several percent of the available solar energy over large, highly industrialized regions. The specific regional climatic consequences are unknown but are likely to be significant. Plans to build commercial fleets of supersonic aircraft that cruise in the lower stratosphere have caused some scientists, but certainly not all, to become concerned about possible stratospheric contamination. The exhaust products from these aircraft—soot particles, water vapour, nitric oxide, etc.—could attenuate solar radiation, increase cloudiness or decrease ozone concentrations. Since these substances would have a much longer average lifetime than those emitted near the earth's surface, a relatively small stratospheric emission rate could lead to significant ambient concentrations. Thus an early programme is needed to obtain baseline measurements of substances in the stratosphere and to determine whether they have a natural or man-made origin.

Potentially Adverse Changes on Biota and Man from Contamination by Toxic Substances including Radionuclides, This is one of the most complex and widespread of the environmental problems because many potential contaminants are involved, with the list growing each year, and immense number of species that could be affected. Many cases of local catastrophes or widespread poisoning in man and wildlife have already occurred. The more hazardous toxic substances include heavy metals (lead, mercury and cadmium), organic Worine compounds (DDT, its degradation products and metabolites, polyc Worinated biphenyls) and possibly petroleum products. Contamination occurs in all media: air, land, water and biota. Of particular importance, however, are those parts of the biosphere where the substances show long residence times,
namely in soils and sea water. The sea is the ultimate repository of almost every kind of pollutant material created by man. Industrial effluents and biocides are discharged directly into coastal waters or carried to the sea by rivers. Toxic materials are often dumped in quantity on the seabed or into the open waters of the oceans. Hazardous cargoes, transported by ships as freight or fuel, are released either by accident or design into the sea. Pollutants transported by the atmosphere are continuously transferred by precipitation or direct diffusion onto the surface waters. The use of the biosphere as a recipient for toxic and other waste products will inevitably affect animal and plant species, their growth and reproduction. Every kind of pollutant in some measure affects the character of an ecosystem structure by decreasing the species diversity. Toxic substances may endanger man's health directly or by passage and accumulation through food chains. The effects of contaminants on biota can be studied by considering various biological effects, such as changes in the numbers and distribution ranges of organisms, changes in the structure of plant and animal communities, replacements of whole ecosystems and changes in productivity. Thus, by assessing selected parameters which describe changes in single species or biological systems of higher order, both specific and general effects on biota can be determined. Important changes in many species populations, including extinctions, are well known. Inadvertent or deliberate simplifications of ecosystems with a resulting decrease in stability and tolerance of environmental stress have occurred many times. The transfer of natural ecosystems to monocultural agricultural systems constitute the best examples of ecosystem simplification which now need continuous management to preserve the desired state. In some cases whole ecosystems have been completely replaced by new ones because of intensive pollution or grazing by domestic animals. Possible adverse effects on agricultural
productivity are of special concern because any factor that tends to decrease the production of food and fibre must receive a high priority in the monitoring system. To arrive at the optimal combination of exploitation and management of natural resources, programmes must be developed that provide continuous information on the use of these resources and permit evaluation of the consequences of predicted future developments. In contrast to the above problems, monitoring of radioactive contaminants is currently being efficiently provided by UNSCEAR, IAEA and other agencies. Thus, it is not anticipated that any new programmes, other than support of the current effort, will be necessary for this very important problem. In the future, however, the predicted growth of nuclear-powered electrical generating plants will necessitate greater awareness of the potential hazards from storage of radioactive wastes.

Potentially Adverse Changes in Biological Productivity Caused by Improper Land-use, The land surface in extensive parts of the world is changing because of the intense agricultural methods necessary to provide for a growing population with an increasing per capita consumption. In many parts of the world, improper land use has resulted in irreversible degradation of soils and vegetation. Soil erosion by wind and water, leaching of nutrients, salinization and extension of arid zones have been caused by such improper land-uses as overgrazing in arid zones, deforestation in areas with unstable soils and over-use of both surface and ground-water resources. Usually, these problems are local or regional in nature and are the responsibility of individual governments. However, because similar changes in soil fertility have occurred throughout the world in many nations, a global, multi governmental approach to the problem is appropriate. Moreover, because the local effects of decreased soil fertility may be very significant, the economy of adjacent regions may also be
affected. Extension of arid zones can also induce large-scale climatic changes by allowing considerable amounts of windblown dust to become airborne.

Potentially Adverse Changes in the Growth, Structure and Distribution of the Human Population, The fast growth of the human population in combination with changes in its distribution pattern, particularly the strong and increasing tendency towards urbanization, constitutes one of two major factors responsible for the creation of environmental problems; the other being technological developments. Among the variety of environmental problems that are affected by population growth and urbanization are: over-utilization of land; deterioration of natural areas; ecological changes; depletion of natural resources; dietary deterioration; increase of urban pathology; increased wastes; and the consequences of national policies to reduce or increase fertility. We are satisfied that the United Nations will continue to improve its already valuable collection and evaluation of information on population size, vital statistics and demographic data which will provide supporting information both to the environmental monitoring system and to other international and national activities, particularly those related to human health monitoring.

Changes in the Subjective Human Perception of the Environment, Changes of the environment mayor may not be harmful to man. However, both kinds of change may be perceived by people as annoying, dangerous or even irrelevant. This not only applies to laymen, but also to environmental scientists, planners and decision makers. Consequently the subjective perception of environmental problems constitutes an important factor in relation to environmental monitoring activities. It may serve as a kind of qualitative evaluation of the results of control management. Thus, although the Commission recognizes this environmental problem, it is not included as an operative part of the system.
Eutrophication of Waters, Both natural and man-made lakes have suffered from eutrophication and its secondary effects. In lakes receiving nitrogen and phosphorus compounds and other agricultural fertilizers, unprecedented blooms of algae have occurred. The algae themselves can spoil water quality and recreational conditions. When they die and decay, the oxygen demand may exceed the supply with resultant fish kills. The average oxygen content of some fresh water bodies has decreased very markedly in historic times. The effects of added nutrients on marine life are not well known but there may be particularly important synergistic effects, for example, if the oxidation of oil in the sea is biologically controlled. Fertilization of the seas may enhance the production of directly economically valuable species. Because eutrophication is primarily a local problem, it has not been included in the global environmental monitoring system.

Decreasing Freshwater Resources, The availability to man of freshwater of high quality is becoming an acute problem in many countries. Water requirements continue to increase with the growth of populations and living standards and the expansion of agriculture and industry. Water is needed for power generation, irrigation, navigation and community water supply. Often it is drawn from international rivers or lakes and in many instances international co-operation is needed in the allocation of water and the financing and technical aspects of water resource development projects. The availability of ground water is most often a local problem but it has international implications in relation to the general effects which a depletion of ground water may have within a larger region.

Natural Disasters, Although natural disasters constitute a very important environmental problem, it is not pertinent to include a programme directly related to natural disaster monitoring or warning within the global environmental monitoring system. It is
appropriate, however, that the system should provide assistance in reporting phenomena that relate to natural disasters.

b. **Data**

The following information is based on the case reported in the All Indian Reporter, January 1992 August 2002. During this period the Supreme Court and the high courts handed down seventy eight and one hundred and thirty cases judgments/orders respectively. In the apex court’s case law, there were sixty two percent judgments/orders of two judges Bench and three judges Bench set in thirty two per cent cases. However, there was one Constitutional Bench Judgment as well. The years 1992-95 saw negligible cases. It is from the year 1996 that the curve starts rising and it reaches to the highest peak of thirteen judgments in 1999 and 2000 as well.

In case of the high courts’ case law, the slack session of judgments/orders was the year 1994 and 1996 when there were five and six cases respectively. It is from the year 1997 when the number starts with fourteen and it reaches to the highest point of twenty decisions in 1999. At the lowest frequency of 1-5 were the high courts of Calcutta, Gauhati, Haryana, Jammu and Kashmir, Madhya Pradesh and Patna etc. 10-15 judgments/orders were in the account of Allahabad, Andhra Pradesh, Bombay, Orissa Karnataka, etc. The Kerala high court handed down the largest number of decisions, numbering sixteen, followed by Andhra Pradesh, Karnataka and Allahabad high courts, each contributing fifteen, twelve and eleven decisions respectively. There were large number of Division Bench’s judgments pointing towards giving more time generally to the ecociders to continue with their ant-environmental activites.

The increasing frequency in the case law can be attributed to the craze for unsustainable development resulting increasing in the
level of pollution, wider ramifications of anti-environmental activities; peoples’ enviro-awareness, emerging fundamental right to environment and other related fundamental rights; increase in the number of enviro NGOs, green Benches, green judges and green lawyers; politicisation of enviro-issues; press and media exposing pollution and its ill effects; errors in the decisions or in actions of the environmental authorities; orders after orders in the same matter; and last but not the least, increasing judicial concern against the environmental degradation and judicial dynamism in the protection of environment. (See Annexure-I)

C- Its Effects on Health and Ecology

Our respiratory system has a number of mechanism that help in protecting us from air pollution. The hair in our nose filters out large particles. The sticky mucus in the lining of the upper respiratory tract captures smaller particles and dissolves some gaseous pollutants. When the upper respiratory system is irritated by pollutants, sneezing and coughing expel the contaminated air and mucus. Prolonged smoking or exposure to air pollutants can overload or breakdown these natural defences causing or contributing to diseases such as lung cancer, asthmases, chonic bronchitis and emphysema, Elderly people, infants, pregnant women and people with heart disease, asthma or other respiratory diseases are especially vulnerable to air pollution.

Cigarette smoking is responsible for the greatest exposure to carbon monoxide. Exposure to air containing even 0.001% of carbon monoxide for several hours can cause collapse, coma and even death. As carbon monoxide remains attached to the haemoglobin in the blood for a long time, it accumulates and reduces the oxygen-carrying capacity of blood. This impairs perception and thinking, slows reflexes and causes headaches, drowsiness, dizziness and nausea. Carbon monoxide in heavy
traffic causes headaches, drowsiness and blurred vision; in large doses, it can even cause death by carbon monoxide poisoning.

Sulfur dioxide irritates the respiratory tissues; chronic exposure to it causes a condition similar to bronchitis. It also reacts with water, oxygen and other material in the air to form sulphur-containing acids. The acids can become attached to practices which, when inhaled, are very corrosive to the lungs.

Nitrogen oxides, especially NO₂, can irritate the lungs, aggravate asthma or chronic bronchitis and also increase our susceptibility to respiratory infections, like influenza or common colds.

Suspended particles in the air aggravate our respiratory tract, leading to bronchitis and asthma. Prolonged exposure to these particles damages lung tissue and contributes to the development of chronic respiratory disease and cancer.

Many volatile organic compounds (e.g., benzene and formaldehyde) and toxic particulates (e.g., lead and cadmium) can cause mutations, reproductive problems or cancer. The repeated inhalation of ozone, a component of photochemical smog, causes coughing, chest pain, breathlessness and irritation of the eye, nose and the throat.

Effect on plants: When some gaseous pollutants enter the leaf pores they damage the leaves of crop plants. Chronic exposure of the leaves to air pollutants can break down the waxy coating that helps prevent excessive water loss and leads to damage form diseases, pets, drought and frost. Such exposure interferes with photosynthesis and plant growth, reduces nutrient uptake and causes the leaves to turn yellow, brown of drop off altogether. At higher concentrations of sulphur dioxide, most of the flower buds become stiff and herd. They eventually fall off from the plants, as they are unable to flower.
Prolonged exposure to high levels of several air pollutants from iron smelters, coal-burning power plants and industrial units, as well as from vehicles, can damage trees and other plants.

Effect of air pollution on materials: Every year, air pollutants cause damage worth billions of rupees. Air pollutants break down the exterior paint on cars and houses. All over the world, air pollutants have discoloured irreplaceable monuments, historic buildings, marble statues, and other heritage and natural beauty sites.

Effect of air pollution on the stratosphere: The upper stratosphere consists of considerable amounts of ozone, which works as an effective screen for UV light. This region, called the ‘ozone layer’, extends up to 60 km above the surface of the Earth. Although the ozone is present up to 60 km, it is densest in the region between 20-25 Km. From the Earth’s surface. The ozone layer does not consist solely of ozone, but also has a mixture of other common atmospheric gases. In the densest ozone layer there is only 1 ozone molecule in 100,000 gas molecules. Therefore even small changes in the ozone concentration can produce dramatic effects on the life on Earth.

Effects or noise pollution on physical health: The most direct harmful effect of excessive noise is physical damage to the ear and the temporary or permanent hearing loss often called a ‘temporary threshold shift’ (TTS). People suffering from this condition are unable to detect weak sounds. However, hearing ability is usually recovered within a month of exposure. In Maharashtra, people living in close vicinity of Ganesh mandals that play blaring music for ten days of the Ganesh festival are usually known to suffer from this phenomenon. Permanent loss, usually called ‘noise-induced permanent threshold shift’ (NIPTS) represents a loss of hearing ability from which there is no recovery.
Below a sound level of 80 dB hearing loss does not occur at all. However, temporary effects are noticed at sound levels between 80 and 130 dB. About 50% of the people exposed to 95 dB sound levels at work will develop NIPTS and most people exposed to more than 105dB will experience permanent hearing loss to some degree. A sound level of 150 dB or more can physically rupture the human eardrum.

The degree of hearing loss depends on the duration as well as the intensity of the noise. For example, 1 hour of exposure to a 100 dB sound level can produce a TTS that may last for about one day. However, in factories with noisy machinery, workers are subjected to high sound levels for several hours a day. Exposure to 95 dB for 8 hours every day for over a period of 10 years may cause about 15 dB of NIPTS. In addition to hearing losses, excessive sound levels can cause harmful effects on the circulatory system by raising blood pressure pulse rates.

Effects of noise pollution on mental health: Noise can also cause emotional or psychological effects such as irritability, anxiety and stress. Lack of concentration and mental fatigue are significant health effects of noise. It has been observed that the performance of school children is poor in comprehension tasks when schools are situated in busy areas of a city and suffer from noise pollution.

As noise interferes with normal auditory communication, it may mask auditory warning signals and hence increases the rate of accidents especially in industries. It can also lead to lowered worker efficiency and productivity and higher accident rates on the job.

Thermal pollution: - The discharge of warm water into a river is usually called pollution. It occurs when an industry removes water from a source (e.g. a river) uses the water for cooling purposes, and then return the heated water to its source. Power
plants heat water to convert it into steam, to drive the turbines that generate electricity. For efficient functioning of the steam turbines, the system is condensed into water after it leaves the turbines. This condensation is done by taking water from a water body to absorb the heat. This heated water, which is at least 15°C higher than the normal, is later discharged back into the water body. The warmer temperature decreases the solubility of oxygen and increases the metabolism of fish. This changes the ecological balance of the river. Within certain limits, thermal additions can promote the growth of certain fish and the fish catch may be high in the vicinity of a power plant. However, sudden changes in temperature caused by periodic plant shutdowns, both planned and unintentional, can result in the death of these fish that are acclimatized to living in warmer waters.

Tropical marine animals are generally unable to withstand a temperature increase of 2-3°C and most sponges, molluscs and crustaceans are eliminated at temperatures above 37°C. This results in a change in the diversity of fauna, as only those species that can live in warmer water will survive and proliferate excessively.

4. History of environmental laws and policies in India

Modern man’s unethical behavior towards ecology and environment through his arms of science and technology and legs of industry and enterprises with egoistic tendency to dominate the nature, has resulted spontaneously into inexpressible damage to the wholesomeness of the natures environment. If this unethical behavior of man is not timely transformed into eco-friendly attitude, things are bound to go soon beyond human control. World leaders and environmentalists are not aware of this fact and have expressed their serious concern and made efforts to protect the environment through various international and national conferences, committees and organizations. Important among such
conferences are Stockholm Conference of 1972 on Human Environment, Rio-de Janeiro Conference of 1992 on Environment and Development. India is also one of the signatories to these conferences and, in recognition of the decisions taken at such conferences, has enacted many Acts and formulated necessary policies to integrate environmental concerns into its developmental activities so that the environment is not degraded and ecology is not disturbed beyond their tolerance limits.

But any attempt in the direction of the preservation of environment and ecology cannot succeed unless we truly understand the man-nature relationship and have a viable policy to maintain it. In order to understand India’s viewpoint in this context, a brief account of the environment policies as adopted in different ages is desired. To make it comprehensible, such periods may be divided into ancient, medieval, British and post constitutional.

a. Ancient period

In India, people have been conscious about environment problems ever since the Vedic times. It is clearly mentioned in almost all ancient Hindu scriptures that nature and mankind form an inseparable part of life support system. The earth as the source of all life — human as well as non-humans-has been considered to be an object of awe, and reverence and is worshipped as Mother Goddess.

The Vedas, oldest among the available writings are considered as foundation of the Hindu culture and civilization, which is also one of the oldest in the world. Vedas contain a plenty of verses about environment protection. The prime constitution of nature, viz, the earth, the water, the air, the fire and the space are prayed as divine embodiments in Vedas and thus lay down a religions check on environment pollution.
Vedic culture is significant for having love and respect for natural world. This includes the flora and fauna on the earth, in the sky and under the sea.

The Hindu belief that all that exists has been created by the Supreme Being, comes from the Supreme Being, and will return to the Supreme Being, is adequate basis for the veneration of the natural world in which man finds himself.35

1. **Important of plants and their protection**

- As regards the protection of flora, Hindus were well aware of the protective power and medicinal value of trees. They also knew that indiscriminate destruction of trees would cause pollution. Therefore, Rgvedic deers provided for the workshop of trees so as to protect them from unnecessary destruction. The following Rgvedic hymns the important of trees during that period.

- May plants, the waters and the sky preserve us, and woods and mountains with their trees for tresses. May the swift wanderer, Lord of refreshments, list our songs, who speeds through cloudy heaven. And may the waters bright like castles, hear us, as they blow onward from the cloven mountain. In Rgveda a prayer is also offered for the growth of the flora (Vanaspati).

- Vanaspati mount up with hundred branches, that we may mount with a thousand thou whom the sharpened hatchet has brought for great auspiciousness. Athisanveda also provided for the protection of trees through their worship. In addition to it, in Athisanveda a series of verses is also found denoting the bond between the earth and human beings and exemplify the true relationship between the earth and all living beings and the relationship of humans to other forms

---

of life. Mother earth is seen as an abode of a large and extended family of all beings.

- Hindu concept as enshrined in Vedas was further expanded during the period of Epics and Puranas. Trees, during this period were believed to feel happiness and sorrow and therefore, they were required to be given better treatment than before.

- Although trees are solid, they have the virtues of sky. It has no doubt, because of their life they bear fruits and flowers. Trees feel warmness. Their fruits and flowers are affected by heat and after being dry they fall down. It appears that they have the sense of touch. Flowers of trees fall down with effect of air, fire, voice and thunder. Only ears catch the sound. It shows that trees have the hearing power. Creepers encircles the trees and it rises from the bottom to the upper part of the trees. No one can go ahead without seeing the path. It shows that trees have the sight. The incense and foul smell affects the growth of the trees. Incense helps the trees to flower and fruit and foul smell makes them suffer. It shows that trees have the power of smell as well.

- Trees take water from the roots. If they have any disease it is cured by sprinkling of medicines. It shows they have Rasendriya. Trees are alive and they have life like others because on cutting they feel sorrow. Similarly they have the feelings of happiness. After cutting, a new branch comes out. The Manu Smriti, which is considered to be the first law book of any civilized society, has comprehensively included provisions, against abuse and misuse of vegetation and forest in order to protect the environments by declaring it to be unreligious activity.
ii- Importance of pure air

- ‘Air’ in Rgveda is called vata which according to it pure air has rare quality to prolog life of living organisms on earth. The air is life force for existence. It is vigour and cause of carnalsation of body. This visible world is also air is Almighty God. It is meant that this whole world is dependent on air.

iii- Effects of Shortage of plants on environment

- Charak Samhita also considers the destruction of forest as most dangerous for human and national welfare by stating. The destruction of forest is most dangerous for the nation and human beings. Vanaspati has direct relationship with the well being of the society. Due to the pollution of natural environment and the destruction of the forests many diseases crop up to ruin the nation. Only then vanaspati with medicinal qualities may enhance the nature and cure diseases of human beings. Thus Vedic culture and Hindu scriptures reveal a clear conception of eco system. Vedic seers were also aware of the pollutional effects of human activities, therefore, while laying down other norms of life, they tried to make the society aware of hazards of various pollutions. According to them only a few create pollution but the whole society suffers the consequences. From pollution two types of diseases occur in human beings. The first, which is related with body and the other with the mind and both are interrelated. One follows the other and none exists without another. Sometimes physical disease creates the mental disease and vice-versa another. Sometimes physical diseases creates the mental disease and vice-versa. Cool warm and air-these are three virtues of the body. They are called cough, pitta and vata. When they are balanced in body it is free diseases. Similarly when Charaka wrote about
vikriti (pollution) and diseases he cautioned the people about the side effect of seasons and foul air and water etc. According to him air seems to be main cause of pollution as it creates so many diseases. Air of this type should be known as polluted as causing illness such as not in accordance with the season, excessively moist, speedy, harsh, cold, hot rough blocking, terribly sounding, excessively clashing with each other whistling and affected with unsuitable smell vapour, gravels dust and smoke.

iv- **Importance of animals and their protection**

- As regards the protection of animal life, killing of animals for food was prevented in Rgveda. Any person committing such act was called ‘Yatudhan’. The Yatudhana who fills himself with the flesh of man and he who fills himself with the flesh of horses or of other animals and he who steals the milk to the cow-cut off their heads with thy flame. Animal killing was also prevented in Yajurveda, which states as well that service to animals is a heavenly activity. No person should kill animals helpful to all and by serving them should obtain happiness. In Yajurveda, not only have admonishments about killings animals been mentioned, but the kind is advised to punish those who kill animals. Thus Hindu culture has a deep faith in the doctrine on non-violence. Almost all the Hindu scriptures place strong emphasis on the nation that God’s pleasure can neither be enhanced by killing His creatures nor harming his creation. In contrast the feeding of animals, specially cows, is considered a sacred act by which real piety can be achieved. The Hindu science of medicine, Ayurveda, regards the presence of animals, birds and other creatures as necessary for a healing and balanced environment for example, animals give a prior warning of danger by changed behavior or sounds. Many stories tell how
horse, cows, dogs, crows and parrots have warned human beings of impending disasters. From the above, it is evident that Hindu culture is considerate enough towards the animals as necessary component of ecosphere.

v. **Environmental Policy during Gupta Period.**

- As regards the historical account of the environmental policy, we find a detailed and perspective law provisions in the Kautilaya’s Arthashastra written between 321 B.C. and 300 B.C. Chanankya, the Prime Minister of Chandra Gupta Maurya, realized the importance of forest administration and made a comprehensive policy for its conservation.\(^{36}\)

Under Arthashastra, various punishments have been prescribed for cutting trees, damaging forests and for killing animals, fish and deer, it also provides punishment for causing pollution and uncivic sanitation.\(^{37}\)

The environment conservation, as it existed during the Mauryan period continued more or less unaltered in subsequent reigns until the end of Gupta Empire in 673 A.D. Destruction of forests and killings of animals were prohibited by Hindu Kings. For example kings Ashoka favoured this policy during the regime. He made the animal killings punishable.\(^{38}\)

With the end of the Gupta Empire, the environment conversation movement as started with Mauryan Empire received a set back, as political instability due to division of the country into small states and foreign invasion dominated the entire scene for centuries together.

---

\(^{36}\) See V.K. Gupta, Kautilyan Jurisprudence, Delhi (1987) at 155-156

\(^{37}\) Ibid.

\(^{38}\) See. R. Thapar, Ashoka and the Decline of the Mauryas (2nd Ed. 1973) at 264.
b. Medieval period

With the downfall of Gupta dynasty in 673 A.D. political instability began in India which continued up to the close of 16th century when Moghul Emperor Akbar consolidated his Moghul Empire. During this period of political instability India witnessed a considerable ecological loss due to destruction of forests. During the Moghul period also there was no policy for environmental conservation and no policy was ever made to conserve forests. There was no restriction on cutting of trees. However a few species of trees were specified as royal trees and enjoyed patronage and could be cut only upon the payment of a prescribed fees.\(^{39}\)

The only but significant contribution of the Moghul period, from the viewpoint of environmental conservation, has been establishment of magnificent gardens, fruits orchards and green parks around their palaces, central and provincial head quarters, public places, on the banks of the rivers and in the valleys and dales which the Moghul Emperor used as their holidays resorts or places of retreat or temporary head quarters during the summer season.

These gardens significantly contribute towards the cultural heritage of India. Besides it, the religious policy of Akbar based on the principle of complete tolerance shows concern for the protections on of beast and birds also and consequent upon it necessary measures were taken to protect these birds from unnecessary killing. The religion of Akbar was followed by his successors with minor changes.\(^{40}\)

Despite political ups and downs, Hindu culture, in accident times, provided a system of moral guidelines towards environmental preservation and conservation. Environmental ethics, as propounded by ancient Indian scriptures and the seers,

\(^{39}\) See J.B. Lal. India’s Forests Myths and Realty (1989) at 18
\(^{40}\) Ibid.
continued to exist in society and were practised by not only common man but even by rulers and kings. They observed these fundamentals sometimes as religions obligations, often as rules of administration or obligation for law and order but, either way these principles were properly knitted with the Hindu way of life. It is noteworthy that ancient Hindu culture believes in the partnership-cum-stewardship ethic, which stands for holding of the land including its trees, rivers, mountains and minerals in trust for God and for the general benefit of mankind. Man is the trustee of the universe. As a trustee man is authorized to use natural resources, but has no divine power of control over and its elements. Hence, from the perspective of Hindu Culture abuse and exploitation of nature for immediate gain is unjust and irreligious. Hindu have been very careful to observe such bindings and morals for the welfare of the society as a whole. Not only common man but also even rules and kings followed these conditions and tried to create an example for others.\footnote{Ramayana, Canto 90. Verse 1}

c. Modern period

As far as the modern period of protection of environmental pollution is concerned that Section 2 of Environmental Protection Act, 1986 deals with the evolution of environmental laws and policies. We consider four policy periods: (i) pre-independence period to 1947, (ii) from independence to the Stockholm Conference, 1947 – 1972, (iii) from the Stockholm Conference to Bhopal disaster, 1972-1984, and (iv) Bhopal Tragedy to 1998. In the first two periods, there were no major legislations relating to environmental protection. The Stockholm Conference on Environment and Development exerted great influence on environmental policymaking leading to an amendment of the Constitution, passage of important legislations such as the Water (Prevention and Control of Pollution) Act, 1974 and the Air
(Prevention and Control of Pollution) Act, 1981 and creation of institutions such as Central and State Pollution Control Boards for implementing the provisions of the Acts. The Bhopal gas tragedy in 1984 triggered the passage of comprehensive environment legislation in 1986 and Public Liability Insurance Act in 1991. The new economic policy initiated in 1991 favours decentralisation, debureaucratisation and globalisation. Constitutional amendments were made in 1994 to facilitate devolution of powers and resources to local bodies. The Policy Statement on Pollution Abatement issued in 1992 advocates the need for combining regulatory instruments with market-based instruments and various supportive measures to deal with environmental protection.

1. **Pre-Independence period**

The ancient Indian religious literature, for example, Vedas, Upanishads, Smiritis and Dharmas preached a worshipful attitude towards earth, sky, air, water, plants, trees, and animals and enshrined a respect for nature and environmental harmony and conservation. It regarded sun, air, fire, water, earth and forest as God and Goddesses. Many animals, birds, trees and plants were associated with the names of God and Goddesses.

The Indian Penal Code 1860, enacted during the British rule, contains one chapter (Chapter XIV) on offences affecting public health, safety, convenience, decency and morals. Section 268 covers public nuisance. Sections 269 and 272 deal with adulteration of food or drink for sale and adulteration of drugs respectively. Section 277 lays down that, whoever, voluntarily corrupts or fouls the water of any public spring or reservoir, so as to render it less fit for the purpose for which it is ordinarily used shall be punished with imprisonment for a term which may extend to 3 months, or with a fine which may extend to Rs.500, or with both. Section 278 lays down that whoever voluntarily vitiates the atmosphere so as to make it noxious to the health of persons in
dwelling or carrying on business in the neighbourhood or passing along a public way shall be punished with fine which may extent to Rs.500. Sections 284, 285 and 286 deal with negligent conduct with respect to poisonous substances, combustible matter and explosive substances. Sections 428 and 429 cover mischief to animals.

The Shore Nuisance (Bombay-Kalova) Act, 1893 was enacted to check wastes and marine water pollution. The Oriental Gas Company Act, 1857 and the Bengal Smoke Nuisance Act, 1905 were enacted to prevent or reduce atmospheric pollution in and around Calcutta. The Bombay Smoke Nuisance Act, 1912 was passed to check smoke nuisance in Bombay area. For preservation of forests, the Cattle Tresspas Act 1871 and Indian Forest Act 1927 were passed. The Indian Easement Act of 1882 guaranteed property rights of riparian owners against “unreasonable” pollution by upstream users. Municipal and Public Health Acts on the pattern of Local Authorities Act of United Kingdom conferred powers on the local bodies for controlling water pollution caused by industrial effluents and for necessary action against the erring industries. These Acts prohibit the discharge of any pollutant or trade effluent from factories into municipal drains, except in accordance with the relevant byelaws. These Acts prohibit the discharge of sewage into any watercourse until it had been treated so as not to contaminate the water. These laws are applicable to large industrial cities and municipal towns. Until 1947, the environmental problem was not serious because of the low rate of population growth and lack of industrialisation, except in and around a few big cities.
2. Post-independence period
   A. Period of 1950-1972

   **The Indian Constitution**

   The Indian Constitution provides for a federal structure within the framework of parliamentary form of government. Part XI of the Constitution governs the division of legislative and administrative authority between the centre and states. Article 246 divides the subject areas for legislation into three lists, viz, Union List, State List and Concurrent List. The subject areas related to environmental protection are:

   **Union List**

   6. **Atomic energy and mineral resources necessary for its production**

   14. **Entering agreements with foreign countries and implementing treaties, agreements and conventions with foreign countries**

   24. **Shipping and navigation on inland waterways**

   25. Maritime shipping and navigation, including shipping and navigation on tidal waters

   29. Airways, regulation and organisations of air traffic and of aerodromes

   52. Industries, the control of which by the Union is declared by Parliament by law to be expedient in the public interest

   53. Regulation and development of oil fields and mineral oil resources

   54. Regulation of mines and mineral development to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest
56 Regulation and development of inter-state rivers and river valleys

57 Fishing and fisheries beyond territorial waters

**State List**

6 *Public health and sanitation, hospitals and dispensaries*

10 Burials and burial grounds, cremations and cremation grounds

14 Agriculture

15 Preservation, protection and improvement of stock and prevention of animal diseases

17 Water, that is to stay, water supplies, irrigation and canals, drainage and embankment, water storage and water power subject to the provisions of Entry 56 of Union List

18 Land

21 Fisheries

**Concurrent List**

17 Prevention of cruelty to animals

18 Adulteration of food stuffs and other goods

19 Drugs and poisons

20 Economic and social planning

20 A Population control and family planning

29 Prevention of the extension from one state to another of infecting or contagious diseases or pests affecting, men, animals or plants

32 Shipping and navigation on inland waterways as regards mechanically propelled vessels

36 Factories
37 Boilers

38 Archaeological sites and remains other than those declared by or under law made by Parliament to be of national importance.

Under the Concurrent List, both Parliament and state legislatures can enact laws. Article 248 gives the centre the residual power to legislate on any subject not covered in the three lists. Articles 251 and 254 state that a central law on any subject in the Concurrent List generally prevails over a state law on the same subject. Article 249 states that the centre can legislate in the national interest on any subject in the State List provided it can obtain a two-thirds majority in the Rajya Sabha, the upper house of Parliament. Article 252 states that the centre can also pass laws on state subjects if two or more state legislatures consent to such legislation. Article 253 empowers the Parliament 'to make any law for the whole or any part of the territory of India for implementing any treaty, agreement or convention with any other country or countries or any decision made at any international conference, association or other body'. These provisions of the Constitution of India give a dominant role for the central government on matters relating to environmental protection.

Even though many entries in the three lists deal with location-specific subjects which generally come under the jurisdiction of local bodies viz, municipalities and panchayats, until 1992, they were not given the necessary powers to deal with these subjects. Part IV (Directive Principles of State Policy), Article 40 provides that 'the State shall take steps to organize village panchayats and endow them with such power and authority as may be necessary to enable them to function as units of self government'. These are only guidelines for policy formulation. Until the 73rd and 74th amendments to the Constitution in 1992, the
Constitution did not assign powers to the local bodies; local government was simply treated as a subject in the State List.

**Legislations**

Some important legislations relating to environmental protection enacted by the Parliament during this period were:

The Factories Act, 1948

The Prevention of Food Adulteration Act, 1954

The River Boards Act, 1956

The Mines and Minerals (Regulation and Development) Act, 1957

The Ancient Monuments and Archaeological Sites and Remains Act, 1958

The Atomic Energy Act, 1962

The Insecticides Act, 1968

The Factories Act, 1948 provides that the liquid effluents, gases and fumes generated during a manufacturing process should be treated before their final disposal to minimise the adverse effects. During this period the focus of economic policy was on planned economic development in a mixed economy framework. The dominant policy objectives were economic growth, employment generation, balanced regional development and equity. Environmental considerations did not play major role in policy making.

**B. Period of 1972-1992**

The UN Conference on Human Environment held at Stockholm in 1972 exerted major influence on environmental legislations in India. A National Committee on Environmental Planning and Coordination (NCEPC) was set up in the Department of Science and Technology in 1972 to make necessary preparations for the Conference. The Government of India took a number of
steps to implement the decisions taken at the Conference by means of amendments to the Constitution, new legislations relating to environmental protection and creation of institutions for implementing the legislations. Many Supreme Court judgements in the late eighties and the nineties refer to the decisions made at the Stockholm Conference. The Bhopal gas tragedy claiming more than 3000 lives triggered the passage of environmental legislations and formulation of rules relating to the use of hazardous substances.

**Constitutional Amendments**

The 42\textsuperscript{nd} Constitution Amendment Act, 1976, inserted specific provisions for environmental protection in the form of Directive Principles of State Policy and Fundamental Duties. Article 48A (Directive Principles) enunciates that 'the state shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country'. Article 51A(g) (Fundamental Duties): 'To protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures'. Two entries 17A – Forests and 17B – Protection to wild animals and birds were added in the Concurrent List.

> **The Wild Life (Protection) Act, 1972**

This Act was enacted under the provisions of Article 252 to prevent the decline of wild animals and birds. It prohibits the poaching of certain animals except for the purpose of education or scientific research. In respect of certain wild animals, license is made a prerequisite for their hunting. It provides that a state government may declare any area to be a sanctuary or as a national park if it considers that such area is of adequate ecological, faunal, floral, geomorphological, natural or zoological significance for protecting, propogating or developing wild life or its environment.
The Water (Prevention and Control of Pollution) Act, 1974

The first important environmental law enacted by Parliament is the Water (Prevention and Control of Pollution) Act, 1974. As water is a state subject and as 12 states had passed the enabling resolutions, the Government of India, in pursuance of clause 19 of Article 252, passed this legislation. It defines pollution 'such contamination of water or such alteration of the physical, chemical or biological properties of water of such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or it is likely to create a nuisance or rend such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or of aquatic organisms'.

Forest (Conservation) Act, 1980

This Act was passed to prevent deforestation, which results in ecological imbalance and environmental deterioration. It prevents even the state governments and any other authority dereserve a forest which is already reserved. It prohibits forestland to be used for non-forest purposes, except with the prior approval of the central government.

The Air (Prevention and Control of Pollution) Act, 1981

The preamble to the Act states that 'whereas decisions were taken at the United Nations Conference on the Human Environment held in Stockholm in June 1972, in which India participated, to take appropriate steps for the preservation of the natural resources of the earth which, among other things, include the preservation of the quality of air and control of air pollution; And, whereas it is considered necessary to implement the decisions aforesaid in so far as they relate to the preservation of the quality
of air and control of air pollution'. The central government used Article 253 to enact this law and made it applicable throughout India.

> **Forest (Conservation) Act, 1980**

This Act was passed to prevent deforestation, which results in ecological imbalance and environmental deterioration. It prevents even the state governments and any other authority from reserving a forest which is already reserved. It prohibits forestland to be used for non-forest purposes, except with the prior approval of the central government.

The government had constituted the Department of Environment in 1980, which was transferred to the newly created Ministry of Environment & Forests (MoEF) in 1985. It had also set up the Land Commission. Fiscal incentives such as rebates on excise/customs duties for pollution control equipments, accelerated depreciation allowance on selected pollution control equipments, financial and technical assistance to small scale units in industrial clusters to set up common effluent treatment plants are now available. EIA has become mandatory for highly polluting industries since 1994.

**Bhopal Tragedy to the 1998, 1984 to 1998**

Constitutional amendments, legislations and policies relating to environmental protection during this period were influenced by domestic events, shift in economic policy and international events. The Bhopal gas tragedy and the difficulties faced in claiming compensation from the company and disbursing compensations to the victims necessitated the need for a comprehensive

---

environmental legislation, rules relating to storing, handling and use of hazardous wastes and a law to provide immediate compensations to the victims of industrial accidents.

Since June 1991, the Government of India announced a series of reform measures to liberalise and globalise the Indian economy. An urgent need was felt for decentralisation and debureaucratisation. The amendments to the Constitution in 1994 recognized the three-tier structure of the government and facilitated the transfer of powers and resources to the local governments. The Supreme Court and High Courts have been very active in the enforcement of legislations relating to environmental protection.

The decisions reached at the UN Conference on Environment and Development held at Rio de Janerio in 1992 as well as the shift in economic policy led the Government of India to reexamine the command and control (CAC) type of regulatory regime for environmental protection and to explore the feasibility of combining regulatory instruments along with economic instruments for controlling environmental pollution.

Constitutional Amendments and Public Interest Litigation

The 73rd and 74th Constitutional amendments of 1992 recognized the three-tier structure of the government by devolution of power to the local bodies viz. panchayats in rural areas and municipalities in urban areas. With the passage of bills by the state legislatures and devolving powers and allocating revenue sources, these local bodies can become institutions of self-government. The eleventh schedule contains environmental activities such as soil conservation, water management, social forestry and non-conventional energy, that panchayats can undertake. The twelfth schedule lists activities such as water supply, public health and sanitation, solid waste management and environmental protection which the municipalities can undertake. These grass root level
institutions can facilitate greater participation by the people in local affairs, promote better planning and implementation of developmental and environmental programmes and be more responsive to the needs of the people.

The Supreme Court and the High Courts have played an active role in the enforcement of constitutional provisions and legislations relating to environmental protection. The fundamental right to life and personal liberty enshrined in Article 21 has been held to include the right to enjoy pollution free air and water. In R.R. Delavoi v. The Indian Overseas Bank case, 1991, the Madras High Court pointed out: ‘Being aware of the limitations of legalism, the Supreme Court in the main and the High Courts to some extent for the last decade and a half did their best to bring law into the service of the poor and downtrodden under the banner of Public Interest Litigation. The range is wide enough to cover from bonded labour to prison conditions and from early trial to environmental protection’. This is a new remedy available to public spirited individuals or societies to go to the court under Article 32 for the enforcement of the fundamental right to life (including clean air and water) contained in Article 21.

➤ The Environment (Protection) Act 1986

This Act was enacted in the aftermath of the Bhopal gas tragedy in 1984 claiming more than 3000 lives. The Statement of Objects and Reasons of this Act refers to the decisions taken at the Stockholm Conference in June 1972 and expresses concern about the decline in environmental quality, increasing pollution, loss of vegetal cover and biological diversity, excessive concentrations of harmful chemicals in the ambient atmosphere, growing risks of environmental accidents and threats of life system.

c. Period of 1993-till date
In our country like India for protecting the environmental pollution by our Indian Parliament lots of enactments has been passed. Some of them are as under:

- The Plastics Manufacture, Sale and Usage Rules, 2000
- The Ozone Depleting Substances (Regulation and Control) Rules, 2000
- The Noise Pollution (Regulation and Control) Rules, 2000
- The Municipal Solid Wastes (Management and Handling) Rules, 2000
- The Batteries (Management and Handling) Rules, 2001
- The Forest (Conservation) Rules, 2003
- The Wild Life (Protection) Rules, 1995
- The Wild Life (Specified Plants – Conditions for Possession by Licensee) Rules, 1995
- National Zoo Policy, 1998
- The Declaration of wild Life Stock Rules, 2003
- The National Board for Wild Life Rules, 2003
- The National Tiger Conservation Authority ( Salaries, Allowances and Other Conditions of Appointment ) Rules, 2006
- The National Tiger Conservation Authority (Qualifications and Experience of Experts or Professional Members) Rules, 2006

5. Environmental Policies

India adopted the socialist pattern of society in 1954 as a framework for social and economic policies. This framework articulates that public policy decisions must enable the society to
maximise social gain and not private profit. This framework also envisages a catalytic role for the State in the social and economic transformation of the country. The Constitution of India provides a number of Directive Principles of State Policy. Indian Five year Plans have also stressed goals such as rapid economic growth, employment generation, poverty alleviation and balanced regional development. Since June 1991 there has been a tilt in economic policy towards economic liberalisation and globalisation. The importance of sustainable development is also being stressed as an objective of public policy.

Judicial activism in the Indian Supreme Court has created major reforms in the protection of human rights and has put the Court in a unique position to intervene when it sees violations of these fundamental rights. But the Court's eagerness to right societal wrongs can lead it to take decisions that are within the province of executive agencies. By usurping the role of agencies and directing policies through its orders, the Court risks making decisions that may ultimately harm the nation. In 1998, the Indian Supreme Court, embracing its activist role, made a controversial order mandating the conversion of the entire Delhi fleet of diesel-powered buses to compressed natural gas (CNG). Steadfast resistance from the agencies responsible for enforcing the court order has raised serious questions about the wisdom of this decision. Many opponents have disputed the reliability and practicality of CNG, arguing that the technology is still in development, making the conversion both risky and costly. Others, especially civil society groups, argue that CNG is an optimum low polluting fuel, and a shift to CNG should take place at once. By disregarding the pleas of the Delhi government and insisting on the implementation of its orders, the Court seems to be usurping the authority of the existing pollution control structures and their capacity to fulfil their duties. This raises both institutional and
constitutional questions, as the Court wrestles with the question of which branch of government is best suited to handle pollution control matters. An examination of the environmental legislation and bureaucracy in India makes clear that the infrastructure is already in place for effective environmental management. While the Court evidently intended to protect the health of the citizens of Delhi, it may in fact be impeding the development of more effective environmental controls in the country.

The Supreme Court's involvement in Delhi's air pollution problem originated over concerns that the city's polluted air was slowly poisoning its citizens. A widely cited study conducted in Delhi estimated that 10,000 people die every year due to complications from air pollution, a staggering total of one person every hour. Alarmed by this unchecked pollution and its health impacts on the Delhi population, Supreme Court environmental advocate M.C. Mehta filed a Public Interest Litigation (PIL) suit in the Supreme Court against the Union of India in 1985, charging that existing environmental laws obligated the government to take steps to reduce air pollution in Delhi in the interests of public health. For several years following the initial appeal, the Court did little more than set up fact-finding commissions to determine the status of air in Delhi. In 1990, based on the opinion of the Ministry of Environment and Forests (MoEF), the Court acknowledged that heavy vehicles including trucks, buses and defence vehicles were the main contributors to the air pollution problem. In 1996, the Court ruled that all government vehicles in the city be converted to compressed natural gas (CNG). The case took on its current significance in 1998 when the Court mandated that all buses in the city must be converted from diesel fuel to CNG by 31 March 2001. Subsequently, autorickshaws were brought under the same rule. Since there is no adequate infrastructure to deliver CNG to
vehicles, some rickshaw drivers have had to wait up to five hours to fill their gas tanks at the handful of CNG stations in Delhi.

**Resistance from Governmental Agencies**

While the conversion to CNG requires the determined cooperation of all branches of government, the history of the case reveals that executive branch officials have consistently tried to prevent the conversion to CNG. In 1998, in an attempt to quell public concern for the air pollution problem, the Delhi health minister, Dr Harsh Vardhan, was quoted as saying that air pollution does not increase the risk of heart and lung disease. Parvez Hashmi, the Delhi transport minister, recently tried to attack the reliability of CNG as a fuel source, claiming that the government will be “blindly spending public money on an unproven technology. We don’t want CNG…”

**Bhure Lal Committee**

The Environmental (Protection) Act of 1986 gave the federal government the authority to act in the interests of “protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution.” Exercising this authority regarding air pollution in Delhi, the MoEF in 1998 established the Environment Pollution (Prevention and Control) Authority (commonly referred to as the Bhure Lal Committee). This five-member committee was originally composed of a representative from the Central Pollution Control Board, the Automobile Manufacturers Association of India, the Centre for Science and Environment (an environmental NGO), the Transport Department, and the “Central Vigilance Commission”. Because of its legal authority and equal representation, the Supreme Court has consistently looked to this committee as its fact-finding commission and has relied almost exclusively on its findings when making its decisions in the Delhi air pollution case.
Supreme Court’s Order of 5 April 2002

In its order of 5 April 2002, the Supreme Court reaffirmed its commitment to CNG conversion and voiced its frustration with the implementing agencies. It scolded the Delhi government for its defiance of the Court’s orders to implement the CNG conversion and discredited claims that CNG was not technically or economically feasible. It pointed out that India does not currently import any CNG and its domestic supply is more than adequate for both the country’s and Delhi’s transport needs. After consulting bus manufacturers, the Court concluded that diesel bus replacement was proceeding at an unacceptably slow rate due to an “imaginary shortage in the availability of (CNG)”. The Court sought to further establish itself as a protector of public health, standing up against corporate greed to ensure the rights of citizens and especially children, whose “sound is not heard” by the government otherwise. The Court’s orders reflected its frustration with the implementing agencies and attempted to discredit any existing concerns with the CNG implementation. To prevent the government from blaming the lack of implementation on a shortage of CNG buses, the Court, after consulting officials from Ashok Leyland and Tata Engineering Locomotive Company, the two main manufacturers of CNG-equipped buses, ordered the immediate installation of 1500 CNG buses and the replacement of 800 diesel buses each month beginning on 1 May, 2002, until the entire fleet is converted.

Economic Analysis of the Decision

The conversion of the entire Delhi bus fleet from diesel to CNG will require a complete overhaul of the fuel supply structures within the city. In addition to the fact that all current diesel buses will either need to be replaced or upgraded to CNG, the Delhi government will need to figure out how to supply the city through
existing or new pipelines, and will have to develop a distribution plan to allow fast and easy access to this fuel. Such reforms in the distribution infrastructure will require a considerable financial investment, one that many opponents to the conversion say is too large to justify. However, the Court has maintained that public health interests must supersede the financial interests of a private company and continues to reject economic concerns in opposition to its orders. Furthermore, based on the findings of the Bhure Lal Committee, the Court has scolded the Delhi government for exaggerating the economic hardships associated with the conversion, strengthening its resolve to stand up for the health of the citizens of Delhi.

**The Decision's Legal and Constitutional Antecedents**

The Supreme Court's decision to control air pollution in Delhi was consistent with precedent. Although many parties have challenged the Court's position in this case, the history of environmental regulation in India has established the Court as a responsible and often effective instrument of environmental improvement. The Supreme Court's determination to use its power to manage Delhi's vehicular pollution may, however, have been a mistake in judgment. Despite the fact that the Court's ruling is environmentally friendly and has a realistic chance of successfully controlling air pollution in Delhi, it may be detrimental to the future of environmental management in India. While many environmental NGOs are delighted by the strong stance of the Supreme Court in the Delhi Pollution Case, this rise in judicial power might come at the expense of other environmental improvements, including much needed funding for the Pollution Control Boards (PCBs) and the MoEF, and the strengthening of inspection, monitoring and enforcement structures.

**The Need for Strengthening of Pollution Control Boards**
One of the most serious problems with the Supreme Court's decision to mandate a conversion of the Delhi bus fleet to CNG is that its effects will be limited to the city of Delhi. The Court's decision will have no impact on vehicle regulations or emissions in other cities, and will do nothing to mitigate air and water pollution in other industries. The Water and Air Acts created Pollution Control Boards in each state as autonomous bodies under the MoEF to design and enforce effluent and emissions standards for polluting industries. Accordingly, it is the responsibility of these PCBs, and not the Supreme Court, to devise solutions to Delhi's pollution problem. Environmental advocate Shyam Divan has argued that "judicial activism has restricted the growth of a responsible and independent bureaucracy." Strengthening these monitoring and enforcement structures would seem to be the best way toward effective, long-term solutions. Despite their apparent power, the PCBs have not yet fulfilled their potential as enforcement agencies. They have no power to impose fines, cannot threaten imprisonment for non-compliance, and are reliant on the courts to enforce their orders. Their power to shut down polluting factories is often compromised by their reluctance to bring about unemployment and economic dislocation. Despite whatever limited successes the PCBs may have had, air and water quality continue to be a serious issue in India. The Indian government has already recognized the need to increase funding for agencies that enforce environmental regulations. In the "National Conservation Strategy and Policy Statement on Environment and Development", developed in 1992, the Ministry of Environment and Forests recognized that in order to effectively implement any environmental laws, it must strengthen the requisite enforcement machinery. Therefore, for any environmental regulations to be effective in India, Parliament must appropriate money to the MoEF to strengthen the enforcement capabilities of the Pollution Control
Boards. In addition to Parliamentary funding, the Boards must be given power to impose and collect fines from polluting industries in amounts proportional to their emissions levels. If appropriately levied, these taxes would establish pollution as an economic liability and could encourage corporate investment in environmentally-friendly technology and research.

The current air pollution problem in India provides environmental advocates with a unique opportunity to force the government to enact large-scale reforms in the regulation of air pollution. For environmentalists, the extreme situation in Delhi represents more than just a violation of human rights; it is an opportunity to effect lasting change. The pollution problem in Delhi is political capital that could be used to enact nationwide environmental reforms. These reforms could provide regulations and funding to address concerns beyond vehicular pollution. If such reforms aren't enacted in response to the air pollution problems in Delhi, it will be much more difficult to motivate the country to develop nationwide management reforms in response to the air pollution levels in another city whose air pollution problems are less egregious than those in Delhi.

**The Supreme Court as Environmental Manager**

It seems imperative for the Prime Minister to act boldly to prevent the Indian Supreme Court from usurping the executive branch's constitutional obligation to protect the environment. By issuing its own orders in this case instead of mandating the government to act, the Supreme Court is establishing itself as the protector of the environment, enabling the executive to shed this unwelcome responsibility. Moreover, not wishing to alienate their corporate support in the diesel industry, many legislators may fail to demand rules implementing controversial environmental legislation, letting the Supreme Court justices handle these matters
instead. By attacking vehicular pollution in Delhi, environmentalists are focusing their case on motor vehicles in the country's most polluted city. Even if the Court is successful in reforming the bus system in Delhi, the ruling will affect only this case. It will not affect other industries or cities, which will argue that their emissions, or total pollution load, are not as severe as the pollution levels in Delhi. The Supreme Court's ruling could also backfire for environmentalists if the Court can't get its orders enforced. If the enforcement agencies are successful in generating public opposition to the ruling and obstructing its implementation, it may appear that pollution controls are excessive.

If the Court is unsuccessful in regulating one of the worst polluters in the country, it is unlikely to have the legitimacy to attack less serious polluters. Environmentalists have little to gain and everything to lose – if they win, their decision applies to few, if any, other industries; if they lose, they threaten to inhibit any further environmental litigation by setting the precedent that even the worst polluter in the country – the Delhi bus management – is free from regulation. Alexander Hamilton described the judiciary as the weakest branch of government because it lacks control over the purse or the sword. Instead, it must derive its power from being the protector of the people. In the Delhi pollution case, there is a good chance that public opinion may fail to support the Supreme Court's CNG policy. To many Delhi residents living below the poverty line, environmental regulations are less important than people's access to basic necessities such as transportation. Should the Court's decision prove unpopular with the general public due to long queues and inefficient service, the Court risks losing some of the respect and credibility it needs in order to remain an effective instrument of change.

a. British Policies
With the establishment of British Rule, an era of plunder of natural resources began in India. In its early days, the British administration not only showed a total indifference towards the need of forest conservation but it proved predators, causing a fierce onslaught on India’s forest. 43 The main reason behind this onslaught was military and other related purposes. In British reason the forest management in an organised way started during the second half of the nineteenth century, by taking certain measures to conserve forests. After this the objective of management of forest changed from cutting forest for various purposes to protecting and improving forests and treating them as a biological growing entity. 44 Thereafter the state monopoly on forests were asserted by passing the forest Act, 1865 and the Forest Policy statement of 1894 cleared the way for the state to take over all the forests forcibly. 45 To provide teeth to the forest policy of 1984, the Forest Act of 1927 was enacted. Through this Act, people were denied their rights over forest produce. This Act also provided for land use policy by which British government was empowered to acquire all forestland, village forest and other common property resources through simple notification, without any compensation or equity.

b. Policies Between 1950-1972

India willingly joined the world community and equally shared the global concerns for the protection of environment from growing environmental pollution mainly caused by industrialisation, urbanisation, population explosion, and growth and use of science and technology in every walk of life. Environmental protection became one of the national goals for

43 Forestry in British and Post-British India: A Historical Analysis, Economic and political Weekly, October 29, 1988 at 1882
44 J.B. Lal Supra Note 23 at 18
45 See Ramchandra Guha. The Unquiet Woods-Ecological Change and Peasant Resistance in the Himalaya (Delhi: Oxford Univ. Press, 1989) at 87
India. But however high or good a goal may be, its attainment shall remain a mere dream as long as a comprehensive and viable policy for that purpose is not laid down by the policy makers. Hence formulation of a policy is indispensable as it acts as an instrument to transform a given environment into the desired or preferred one. The same holds true in the context of the protection of environment, which presents a most fundamental challenge to the nation’s desire to industrialise faster, to be self-sufficient in food and to be capable of fulfilling certain basic needs of the growing population.46

Determined to realise the goal of environment and development, India made serious and to a large extent successful efforts to formulate a comprehensive environmental policy, which reflects through the five years plans, administrative actions and legislative measures.

**d- Policies Between 1973-1992**

The concern for environmental planning recognised by the Fourth Five Year Plan was turned into concrete actions during the Fifth Five Year Plan (1974-79) by launching several programmes for enhancing the quality of life and incorporating environmental concerns while assessing economic and technical feasibility of a project.

On the aspect of industrial development and environment the plan states as follows :-

"It has to be ensured that the pursuit of development goals does not cause a reduction in the quality of life through deterioration in environmental conditions if a link and balance between development planning and environmental management are maintained. It is, therefore necessary that in the environmental management are maintained. It is, therefore necessary that in the

---

national development of industrial activity and in the utilisation of natural resources, due weight is to be given to the impact of such activity on the environment.47

Under this plan several programmes such as elementary education, rural health and sanitation, nutrition, drinking water provision for housing sites, slum improvement and rural education were implemented on the priority basis with the expectation that quality of life will improve, poverty level will be reduced and environmental pollution in the countryside will be minimised.

Policy Statement for Abatement of Pollution, 1992

The Policy Statement for Abatement of Pollution issued by the Ministry of Environment and Forests (MOEF) in February 1992 identifies the environment problems and admits that ‘the state of the environment continues to deteriorate’. It favours a mix of instruments in the form of legislation and regulation, fiscal incentives, voluntary agreements, educational programmes and information campaigns. It recommends the polluter pays principle, involvement of the public in decision making and new approaches for considering market choices ‘to give industries and consumers clear signals about the cost of using environmental and natural resources’.

d. Policies Between 1993-till date

India’s environmental concerns very well reflect from the fact that to institutionalise the mechanism of environmental management various committees to review that State of India’s environment and environmental planning and to suggest viable measures for the improvement and protection of environment were set up from time to time.

- Pitamber Pant Committee

---

47 See Chapter on Environment Planning and Co-ordination in the Draft Fifth Five Year plan (1974-79)
Objective thinking about environmental management based on ground realities of the environmental all over the globe began with the beginning of the seventies of the preceding century. It is evident from the determination of the 24th U.N. General Assembly to organise a conference of the member states on the Human Environment at Stockholm in 1972. In this regard these member states were requested to submit a report on the state of their country's environment. As a consequences of this request, India also set up a Committee on Human Environment under the Chairmanship of Pitamber pant a member of the Planning Commission of India, to prepare the required reports. This committee found that so far environmental concerns such as sewage disposal, sanitation and public health were dealt with by different ministers of India and each pursued these objectives in its own way due to the lack of any established system for proper co-ordination among them both at the federal and the intergovernmental level as well and therefore, stressed the need for establishing greater co-ordination and integration in environmental policies and programmes at all levels. This report ultimately formed the basis on which India's policy concern on environment was presented at the Stockholom Conference of 197248.

- **National Committee on Environmental Planning and Co-ordination**

In pursuance of the recommendation of Pitamber Committee, National Committee on Environmental Planning and Co-ordination (NCEPC) was set up in the Department of Science and Technology to plan and co-ordinate various environmental programmes and policies and to advise various ministries in all matters relating to environmental protection and improvement. Initially this committee consisted on 14 members drawn from various disciplines

---

concerned with environmental management and undertook various activities relating to environmental management and undertook various activities relating to environmental management including environmental appraisal to develop projects, human settlement planning, formulation of environmental guidelines creation of environmental awareness at all levels and co-ordination or research programmes on environmental problems. The first NCEPC, by virtue of having a considerable number of non-official members most of them politically influential.

But in the subsequent committees the proportion of non-official members decreased as more and more bureaucrats were added to them. Due to this significant change in the composition of the NCEPC greater bureaucratization took place and the committee gradually lost its political vigour and consequently failed to receive desired cooperation of other departments as they started viewing this committee as a competitor rather than a planner and coordinator.49

To assist this committee an office of Environmental Planning and Co-ordination (OEPC) was set up which functioned under the direction and supervision of the chairman of the Committee.

The OEPC originally consisted of experts in different disciplines and provided secretarial and technical support to the committee under the direction and supervision of its chairman. Since all these officials were recruited and employed by the Department of Science and Technology, and as NCEPC chairman had no administrative authority on these officials they were inclined to look to the Department of Science and Technology for control and accountability. The OEPC was subsequently dissolved to become an Environment division of the Department of science and Technology. This further weakened the position purposes

49 ibid
worked under the direction of the department. This dual authority pattern further eroded the expected performance of the environmental office.\textsuperscript{50}

The draft Fifth Plan (1974-79) also laid emphasis on having close association of the NCEPC with all important industrial decisions so that environmental goal could be achieved. The plan also provided that NCEPC will co-ordinate efforts to develop standards for the emission of pollutants and other facilities to monitor them.\textsuperscript{51}

- **The N.D. Tiwari Committee**

In tune with the recommendation of NCEPC the Government of India on February 29, 1980 appointed a High Power Committee for Recommending Legislative Measures and Administrative Machinery to ensure environmental protection under the Chairmanship of the Deputy Chairman of the Planning Commission, Mr. Narain Dutt Tiwari. The terms of reference of the Committee\textsuperscript{52} were as follows:

- "To review the existing laws on the subject of environmental protection at the Central and State levels and recommend legislative measures required for ensuring environmental quality.
- To review the existing administrative arrangements for the protection of the environment and to recommend improved administrative machinery for ensuring environmental protection.
- To recommend appropriate and adequate machinery in Government both at the Central and the State levels for

\textsuperscript{50} See Shekhar Singh (2 edited), Environmental Policy in India (1984), at 53
\textsuperscript{51} See Draft Fifth five Year Plan (1974-79)
\textsuperscript{52} See Report of the Committee for Recommending Legislative Measures and Administrative Machinery for Ensuring Environmental Protection : (The Tiwari Committee's Report) Department of Science and Technology Government of India, 15\textsuperscript{th} September 1980.
improving environmental quality and to maintain the ecological balance.

- **Recommendations on Administrative Measures**

  This committee submitted its report on September 15, 1980 to the Prime Minister of India and made far-reaching recommendations on administrative and legislative measures for the protection and improvement of the environment. The administrative measures\(^{53}\) recommended by this committee are as follows:

- The committee expressed the need for creating a Department of Environment (DOE) at the Centre that could explicitly recognize the pivotal role of the environmental conservation in sustainable national development.

- In order to conserve the nation's ecological base it recommended that a Central Land Commission should be set up.

- For effective and scientific management of reserve, other than Biosphere Reserve, a sub-cadre of scientific personnel should be created within the Forest Departments of States and Union Territories. Personnel of this sub-cadre should be given intensive training and a research institution to be established for the purpose. These personal should not be interchangeable with those in the forest services.

- A sound and well informed interest in nature among our people needs to be cultivated. Nature education at all levels of education and public communication must be efficiently organised especially in our schools and other educational institutions.

- **Fuel and forest supply should be included in the Minimum Need Programmes of the Central Government; and**

---

\(^{53}\) Ibid
- Diversion of forest land to non-forestry used would need prior approval of the Central Authority Constituted for the propose.

- **National Committee on Environmental Planning (NCEP)**

  On the recommendation of the Tiwari Committee, the NCEPC was replaced by National Committee on Environmental Planning (NCEP) in April 1981 with the functions almost similar to its predecessor. The major objective of the NCEP is to promote research in environmental problems and provide facilities for such research wherever necessary. NCEP implements its research programmes through the Indian National Man and Biosphere Committee (MAB) and the Environmental Research Committee (ERC). The man and the Biosphere Programme is a part of an international effort initiated by UNESCO. Its primary objective is to study the impact of human interference on national ecosystems. ERC covers the general areas of environmental pollution and its impact, environmental aspects of human settlements, rural environment and other areas related to general environment.

  Besides it the NCEP was also authorised to prepare and annual "State of environment" to arrange public hearing or conferences on significant environmental issues; and to establish a nation wide Environmental information and communication System to propagate environmental awareness through mass media. In addition to these functions NCEP also renders necessary assistance and advice to DOE in matter relating to environmental management and planning.\(^{54}\)

- **Policy Statement of 1992**

---

\(^{54}\) Supra Note 46, at 62.
In the year 1992 two policy statement came into being to supplement the existing polices relating to forest and environment. These policy statements are :-

➢ the Policy Statement for Abatement of Pollution, 1992 and
➢ the National Conservation Strategy and Policy Statement on Environment and Development, 1992. They were released by the Ministry of Environment and Forest in February and June, 1992 respectively. A brief account thereof is given below :-

• **Policy Statement for Abatement of Pollution 1992**

The Preamble to the Policy Statement envisages the Government's commitment on abatement of pollution in order to prevent degradation of the environment. The prime objective of this Policy Statement is to integrate environmental consideration into decision making at all levels.\(^{55}\) To achieve this end the policy statement suggests following measures\(^{56}\).

➢ Prevention of pollution at source;
➢ To encourage, develop and apply the best available practicable technical solutions;
➢ To ensure that the polluter pays for the pollution and control arrangements;
➢ To focus protection on heavily polluted areas and river stretches; and
➢ To involve the public in decision-making.


The Government of India and extensive consultations with Central and State Governments, academic institutions, non-

---


\(^{56}\) Ibid.
governmental organisations and informed individuals prepared and adopted the National Conservation Strategy and Policy Statement on Environment and Development in June 1992\textsuperscript{57} with a view to achieve the goal of sustainable development. Which is the key phrase of the Policy statement. Policy of Environment without development or development without environment can neither save the environment for long nor can bring true development. Therefore balanced view about environment and development is the best view.

To achieve this objective the policy itself lays down an agenda for action\textsuperscript{58} which includes the follows :-

- To ensure sustainable and equitable use of resources for meeting the basic needs of the present and future generations without causing damage to the environment.
- To prevent and control future deterioration of our life support system
- To take steps for restoration of ecologically degraded areas and for environmental improvement in our rural and urban settlement;
- To ensure that development projects are correctly cited with least-adverse environmental consequences.
- Conservation and protection of coastal areas and marine ecosystems;
- To protect the scenic landscapes, areas of geomorphologic significance, unique and representatives biomass and ecosystem and wildlife habitats, heritage site/structures and areas of cultural heritage importance.

**National Environment Policy, 2006** - This is the comprehensive policy statement intended to mainstream environmental concerns


\textsuperscript{58} Ibid
in all developmental activities. It outlines the strategies for addressing key environmental challenges facing in the country. The major principles of the policy include the right to development and equity along with environmental standard setting and a precautionary approach.

**The Planning Commission: Approach to the 12th Plan**

Managing the Environment and Ecology: Introduction

The Planning Commission has identified twelve Strategy Challenges for the 12th Plan Approach Paper. "Managing the Environment and Ecology" with the following five components is one of the Challenges:

- Land, mining, and Forest Rights
- Mitigation and Adaptation Strategy for Climate Change
- Waste management and Pollution Abatement
- Degradation of forests and loss of biodiversity
- Issues of Environment Sustainability

**Expectations**

The general expectations of the citizens with respect to environment are: Access to clean air, water, and soil; Right to Natural resources; Sustainable Livelihoods and healthy surroundings.

**Suggestions**

Detailed below are some suggestions in respect of, Policy, legislation, both national and international, institutional mechanisms, infrastructure, and Science and technology in the management of Environment and Ecology and specific suggestions with respect to the five components.
a) Institutionalize a holistic, integrated approach for the management of environment and natural resources, converging national regulations and international protocols in relevant sectoral and cross-sectoral policies, through review and consultation.

b) Evolve schemes to encourage trading in air and water pollutants in industrial complexes. Establish on-line continuous monitoring systems to enable trading of pollutants and encourage public and private sector participation in GHG emission trading.

c) Identify emerging areas for new legislation, including our obligations under multilateral environmental regimes and review the body of existing legislation.

d) Ensure accountability of the concerned levels of Government (Centre, State, Local) in implementing existing legislation and introducing necessary legislation, wherever required in a defined time-frame, ensuring the livelihoods and well-being of the poor and improved access to the necessary environmental resources.

e) Promote research and the use of information technology based tools, together with necessary capacity-building. Bring about transparency through public web-portal for national resource accounting for Non Wood Forest Produce (NWFP), common property resources, usufruct rights etc on GIS platform.

f) Encourage Industrial Associations to shoulder greater responsibility of environmental management, implementation of regulation, including drafting strategy on issues on environment and trade that affect industry.
g) Develop multiple models, for rapid and effective restoration, of open and degraded forests, wastelands and urban areas through PPP and community participation.

h) Introduce Performance monitoring and development of Environment performance linked financial devolution mechanisms to states.

i) Setup regional databases on natural resources to support the information requirements of planning and prepare inventory through land cover mapping (Remote Sensing, 1:4000 scale).

j) Review the list of International Conventions to which India is a signatory and party to fix a timeframe to ratify and fulfill obligations under these Conventions.

k) Put in place rules and guidelines in the Area of Access and Benefit sharing, trade especially exports in LMO’s and GMO’s in respect of Biological Resources.

l) 12th plan should focus on leadership role for India in SAARC, ASEAN, and SACEP, including serving as repository of information and help train in early warning systems for disasters. A Strategy and action plan should be drawn up to forge partnership among countries in the region.

m) TIFAC be commissioned to list 10 cutting edge technologies for possible exhaustive studies and field trials in environment sector.

n) Strengthen Scientific Research, Technology Development and Human Resource in areas of environment and ecology which are critical for Sustainable Development.

Specific Suggestions
1. Land, Mining and Forests Rights

1.1 The key suggestions identified for effective land management include the following:

a) Land development/diversion for various uses, be based on a national policy.

b) A national strategy based on scientific understanding of the natural resources both above and below ground, resettlement and livelihood requirements is necessary,

c) Existing policy, in respect of Energy, Raw materials etc., to indicate the various source options taking into consideration availability, cost and environmental impact, be modified.

d) Conduct Cumulative Environmental Impact Assessments (EIAs) for vulnerable regions and Carrying capacity studies in selected river-basins, and

e) Adapt remediation techniques developed elsewhere for decontamination of contaminated sites.

1.2 The key issues identified in respect of mining include the following:-

a) Effective land management to restore degraded lands.

b) promote, more efficient metals recycling industry by adopting modern technology,

c) formulate, a sustainable Development Framework which addresses issues related to economic viability, environmental impact and social concerns, and

d) Take action to check illegal mining activities

1.3 Forests Rights
The livelihood rights of forest-based communities need to be respected in conservation efforts, even as new livelihood and revenue options are explored. Following are some key issues:

a) Current schemes of compensation needs to be reviewed, and
b) Payments for Environmental Services (PES) schemes needs to be introduced and proposals developed to prevent poaching of flagship species like tiger, rhino, elephants, etc; to check fragmentation and degradation of wildlife habitats and corridors; to reduce instances of human-wildlife conflict; to control illegal trade in wildlife products; Creation of inviolate areas for tiger and other flagship species, and; Voluntary relocation of people from core areas. In PES schemes, locals be paid to conserve and manage resources.

2. Mitigation and Adaption Strategy for Climate change

1. The two key challenges that have to be addressed by various stakeholders in the short term on Climate Change are:
   a) Ensuring, involvement of various stakeholders, including the State Governments, in implementing the National Action Plan for Climate Change (NAPCC), and
   b) Achieve a low-emission sustainable development growth model using a voluntary approach.

2. The strategy/ guidelines of NDMA be modified to draw up regional disaster preparedness and mitigation plans, which should also address pre and post disasters migrations.

3. States need to prepare the State Level Action Plan for Climate Change (SAPCC) within a time frame, which can be dovetailed with the NAPCC.

4. The eight National Missions documents needs to be finalized, adopted, and actions initiated.
3. **Waste Management and Pollution Abatement**

   **Waste Management**

1. Encourage 4 R's (Recycle, Reuse, Reduce and Remanufacture) and co-processing of HW for recovery of energy

2. Incentivize public-private partnership for creating the required infrastructure for Setting up of Treatment Storage and Disposal Facilities (TSDF) for hazardous waste management across the country.

3. Ensure Segregation of Bio-medical wastes as per existing rules and the infectious and hazardous wastes treated in dedicated facilities. Common facilities be setup.

4. Enhance recycling facilities for E-wastes in the country.

5. Ensure Municipal Solid Waste segregation, collection and setting up of facilities for complete disposal. Where ever possible recycling and processing has to be ensured during the 12th Plan to protect our people and the environment

6. Green belt for dust and Noise abatement and odour mitigation is considered essential.

**Water environment**

The key challenges for maintaining acceptable water quality and quantity across the country are: - Water Pollution and overuse; Indiscriminate use of Wetland/lakes, Agricultural run-offs as residual fertilizer, pesticides and feedlot wastes. Following are suggested:

1. Improve coverage and efficiency of sewage treatment systems, encourage use of low-cost decentralized measures for treatment of wastewater e.g use of microbes for sewage treatment in open drains.
2. Clean critical rivers state wise and all polluted rivers in the country by 2020.

3. No Net loss (NNL) of wetlands acres be set as the goal and a system of permits be introduced to provide replacement wetlands.

4. A National Action Plan to remediate contaminated sites be drawn up.

5. Massive Plantation drives, including other methods for recharging ground water levels be propagated.


**Forests**

1. The target should be to increase Forest and Tree cover (FTC) by 5%.

2. Encourage efficient use of forest products and alternative sources of fuel, fodder, and timber.

3. Provide Legal backing for JFMCs.

4. Evolve a comprehensive national policy for non-destructive extraction and marketing of both timber and MFP.

5. Organize markets, Build infrastructure, Capacity and upgrade skill for carrying out trade in MFP.

6. Prepare Master greening plans/Roadmaps for all cities with over 1 million populations.

**Biodiversity and wildlife**

1. The major challenges of the sectors include: 1. Preventing poaching of flagship species like tiger, rhino, elephants, etc.; 2. check fragmentation and degradation of wildlife habitats and corridors; 3. reduce instances of human–wildlife conflict; 4. control illegal trade in wildlife products; 5. Creation of
inviolate areas for tiger and other flagship species, and; 6. Voluntary relocation of people from core areas.

2. Draft a national action plan on the management of biological invasion., and

3. Create proper institutional mechanisms for involving local stakeholders, including local communities, in coastal and mangrove restoration and conservation programs.

5. Monitorable targets for the 12th Plan

1. To increase forest and tree cover by 5 percentage points.

2. To reclaim wetlands/inland lakes /ponds (of ------ Ha) by 2017.

3. To identify, assess and remediate contaminated sites (hazardous chemicals and wastes) with potential for groundwater contamination.

4. To improve forest production and maintain biodiversity.

5. To establish continuous on-line monitoring systems using GIS & GPS for air and water pollution.

6. To create Common Infrastructure for Environment Protection viz; CETP, TSDF etc.

7. To clean all critically polluted rivers by 2020.

8. To reduce 20-25 percent energy use per unit of GDP by 2020.

9. Epidemiological studies to assess improvement in health status due to better management of Environment and ecology.