Journal of Socio-Educational & Cultural Research
International Journal of Arts & Social Sciences
Peer Reviewed Refereed Journal
Published by Srijan Research Foundation, Varanasi India
Vol.12, N. 27, December 2026, **ISSN : 2394-2878**
DOI: https://doi.org/10.68868/14Js15aK30
www.jsecrjournal.in

AIR POLLUTION AND ITS EFFECTS: THE JUDICIAL ACTIVISM

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ABSTRACT:

The atmosphere, a vital gaseous envelope essential for life, maintains a delicate balance of nitrogen, oxygen, and trace gases. Sustainable economic progress can therefore be achieved only when development is balanced with the protection of atmospheric stability, ecological systems, human health, and the interests of future generations. Scientifically, the article highlights that air pollution is driven by the rapid pace of industrialization and urbanization. Key pollutants include **Carbon Monoxide (CO)**, which constitutes 50% of all pollutants and arises principally from the incomplete combustion of fossil fuels in automobiles, causing respiratory suffocation. **Carbon Dioxide (CO_2)**, while a natural resource for photosynthesis, has become a threat due to deforestation and fossil fuel burning. Its accumulation intensifies the "Greenhouse Effect" by allowing shortwave solar radiation to enter while trapping outgoing longwave terrestrial radiation, leading to global warming, reduced soil moisture, and increased oceanic acidity which alters marine albedo. Furthermore, it analyses **Chlorofluorocarbons (CFCs)**, stable industrial chemicals that deplete the stratospheric ozone layer, thereby increasing UV radiation exposure and skin cancer risks. **Sulphur Dioxide (SO_2)** and **Nitrogen Oxides (NO_2)** are identified as precursors to hazardous phenomena like "Acid Rain" (with pH values dropping between 5 and 2.5) and poisonous smog. These pollutants cause irreparable damage to agriculture, corrode buildings, and trigger severe human health issues ranging from gum inflammation to lung cancer. Legally, the text documents India's constitutional evolution via the **42nd Constitutional Amendment Act (1976)**, which introduced Articles 48-A and 51-A(g), imposing duties on the State and citizens to protect the environment. The Supreme Court's shift from the 19th-century English doctrine of "Strict Liability" (Rylands Vs. Fletcher) to the

tougher standard of **"Absolute Liability"** in the *M.C. Mehta Vs. Union of India* (Oleum Gas Leak Case)[1]. This new principle dictates that hazardous industries are absolutely liable for accidents, with compensation amounts correlated to the enterprise's magnitude to ensure a deterrent effect. The judicial handling of the *Union Carbide* (Bhopal Gas Tragedy)[2] mass disaster, where 2,660 lives were lost due to Methyl Iso-cyanate leakage, and the *Taj Trapezium* case[3] ,where the Court mandated 292 industries to switch from coal/coke to natural gas to preserve the Taj Mahal. Thus, the increasing deterioration of air quality represents an important environmental and public-health challenge that requires effective scientific understanding and appropriate preventive measures.

KEY WORDS:

Air Pollution, Trace Gases like Neon, Krypton, Helium, Ozone, Biosphere, Greenhouse Effect, Photosynthesis, Albedo, Ozone Depletion, Acid Rain, Smog, Carbon Monoxide, Carbon Dioxide, Chlorofluorocarbons, Sulphur Dioxide, Nitrogen Oxide, Methane, Methyl Iso-cyanate, Industrialisation, Urbanization, Judicial Activism, Absolute Liability, Strict Liability, Anthropogenic.

INTRODUCTION:

" Air pollution" means the presence in the atmosphere of any air pollutant[4]. "Air pollutant" means 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 beings or other living creatures or plants or property or environment[5].

Air is very important for all types of life in the biosphere. The atmosphere is a gaseous envelope which surrounds the earth from all sides and the air is a mechanical mixture of several gases,mainly, nitrogen (78.09%), oxygen (20.95%), argon (0.93%) and carbon dioxide (0.03%).Besides, other trace gases like neon, krypton, helium, hydrogen, xenon and ozone are also present.

The air becomes polluted when its natural composition is disturbed either by natural or manmade sources or by both. It may be pointed out that air is never pure because some gases such as sulphur dioxide, hydrogen sulphide, carbon monoxide, emissions from volcanoes and swamps, wind blown dusts pollens from plants etc. are continuously added to the air by the natural process.

Air pollution is generally accomplished through the pollutants of gases, solid and liquid particles of both organic and inorganic chemical. Major sources of air pollution are natural sources (volcanic eruptions, deflation of sands and dusts, wild fires of natural vegetation etc.) and man-made sources (industries, urban centres, automobiles, aircrafts, agriculture, power plants, etc.). Air pollution may be divided into two bases viz. (i) on the basis of type of pollutants and (ii) on the basis of sources of pollutants. Air pollution is primarily caused through rapid rate of industrialization and urbanization.

Carbon Monoxide And Air Pollution:

Carbon monoxide constitutes about 50% of the total air pollutants. The major source of the production of carbon monoxide (CO) is incomplete burning of fossil fuels like coal and petroleum and wood charcoal. The automobiles using diesel and petroleum are the major sources of carbon monoxide. Besides, carbon monoxides are also produced from oil refineries, metallurgical operations and numerous combustion engines. It is apparent that urban areas and

industrial centres are the most significant contributors of carbon monoxide because they account for the largest number of automobiles and industries. It may be noted that carbon monoxide is not toxic to plants but it causes respiratory problem and suffocation, when inhaled, in the human bodies.

Carbon Dioxide And Air Pollution:

Carbon dioxide gas is one of the natural gaseous components of the atmosphere and in itself it is not harmful to human health rather it is a resource because plants manufacture their food through the process of photosynthesis by using carbon dioxide (CO_2) in the presence of sunlight and it is the food manufactured by green plants upon which depends all organisms including man. The content of carbon dioxide in the atmosphere is increasing at an alarming rate because of two major factors viz. (i) release of carbon dioxide due to burning of fossil fuels (coal and petroleum) at ever increasing rate and (ii) gradual decrease in the consumption of carbon dioxide because of shrinking forest covers due to rapid rate of deforestation.

The higher concentration of carbon dioxide in the atmosphere increase the "Greenhouse Effect" of the atmosphere and thus increases the temperature of the earth's surface because carbon dioxide is more or less transparent to incoming shortwave solar radiation and thus allows the solar radiations to pass through the atmosphere and reach the earth's surface but stops the outgoing longwave terrestrial radiation from escaping to the space.

The increasing content of atmosphere carbon dioxide from anthropogenic sources is expected to have far reaching effects on global climate through gradual rise in temperature. Rise in temperature because of increased "Greenhouse Effect" is caused by increased content of atmospheric carbon dioxide would cause decrease in precipitation and soil moisture content in the most developed agricultural regions of the world. If the concentration of atmospheric carbon dioxide goes on increasing the oceans would be overburdened to absorb the additional carbon dioxide which would result in gradual increase in the oceanic acidity. Increased oceanic acidity would decrease biological productivity of the marine ecosystem and thus decreased plant covers in the oceanic areas would change the albedo of the ocean surface.

Chlorofluorocarbons And Ozone Depletion:

The chlorofluorocarbons, popularly known as CFCs, belonging to the category of chemicals synthesized by man for use in several kinds of industries including refrigeration, are relatively simple compounds of the elements Chlorine, Flourine and Carbon are initially stable compounds which do not have any toxic effect on life process in the biosphere at the ground level. It may be pointed out that the air is being increasingly polluted due to release of CFCs in the atmosphere. Thus, the depletion of the ozone due to increased concentration of the chlorofluorocarbons is one of the most dangerous forms of air pollution.

Thus, the ozone depletion caused by increased concentration of chlorofluorocarbon would adversely affect the global climate, biotic communities and human beings. The substantial increase in the surface temperature of the earth would cause climatic changes at regional and global levels. The increased surface temperature and exposure of human bodies to increased ultra-violet solar radiation would cause skin cancer. Increased exposure of human bodies to ultra-violet solar radiation would decrease immunity of human body against infectious diseases.

Methane (CH_4)

The major sources of the production of methane, which belongs to the category of greenhouse gases is anthropogenic activities, such as burning of biomass and fossil fuels (coal, petroleum and natural gas). Concentration of methane gas in the stratosphere increases water vapour there and thus increased water vapour together with other factors intensifies the greenhouse effect of the atmosphere which causes rise in the temperature of the earth's surface.

Sulphur Dioxide And Air Pollution:

Sulphur dioxide gas (SO_2) is produced by both natural and man-made sources. After carbon monoxide (CO), sulphur dioxide (SO_2) is the second most important contributor of air pollutants as it accounts for about 29% of the total weight of all air pollutants. It may be pointed out that sulphur is essential element for both plants and animals only in trace amount but when the concentration of sulphur increases in the atmosphere, it becomes, injurious to both plants and animals because increased concentration of sulphur increases the acidity of water and lowers the pH of water significantly. The major man-made sources of sulphur dioxide are thermal power plants (where huge amount of coal is burnt to generate power), crude oil refineries and automobiles which together account for 50% of total sulphur dioxide pollution from man originated sources.

Sulphur dioxide (SO_2) through the photochemical reactions with atmospheric oxygen (O_2) and with water films on suspended particulates produces sulphuric acid (H_2SO_4) which is highly corrosive and leading to culprit to human health and wealth. Sulphuric acid coming down with rainfall cause ACID RAIN having very low pH value ranging between 5 and 2.5.Acid rain is very dangerous hazard as it causes irreparable damage to agricultural crops, forests, aquatic life and human bodies. It corrodes buildings, pollutes drinking water ,storage sources and degrade soil biological processes. The sulphur content present in the coal and petroleum gets converted into sulphur dioxide on burning. This sulphur dioxide after combining with smoke over urban and industrial areas forms poisonous SMOG which causes respiratory diseases in human body and sometimes causes deaths.

Oxides Of Nitrogen And Air Pollution:

A few oxides of nitrogen such as nitric oxide (NO), nitrogen oxide (N_2O), nitrogen dioxide (NO_2), etc. are important air pollutants. Nitrogen oxides are formed through natural processes as well as through man induced processes. The main sources of man originated nitrogen oxides are thermal power station, factories, automobiles and aircrafts. In other words, nitrogen oxides are released to the atmosphere through the burning of coal and petroleum. According to an estimate each ton of coal after burning produces between 5 to 10 kilograms of nitrogen dioxide whereas 1 ton of diesel and petroleum consumed by transport vehicles releases 25 to 30 kilograms of nitrogen dioxide.

High concentration of nitric oxide causes several diseases in human bodies such as gum inflammation, internal bleeding, oxygen deficiency, pneumonia, lung cancer etc.

Constitutional Provisions :

For a better appreciation of the legal setting, it is necessary to first consider the basic relevant constitutional and legislative provisions. The Forty-Second Amendment Act of 1976 of the Constitution introduced Article 48-A and Article 51-A(g) into the Constitution. Article 48-A declares: 'The state shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country.' Article 51-A(g) imposes a duty on every

citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.

The Indian Courts have embraced judicial activism in developing environmental jurisprudence. The right to pollution free environment is treated as a fundamental right.

M.C. Mehta Vs Union of India[6]

There was escape of oleum gas from one of the units of Shriram on 4th and 6th December, 1985 and applications were filed by the Delhi Legal Aid and Advice Board and the Delhi Bar Association for award of compensation to the persons who had suffered harm on account of escape of oleum gas.

The Supreme Court held that where an enterprise is engaged in a hazardous or inherently dangerous activity and harm results to anyone on account of an accident in the operation of such hazardous or inherently dangerous activity resulting for example, in escape of toxic gas the enterprise is strictly an absolutely liable to compensate all those who are affected by the accident and such liability is not subject to any of the exceptions which operate vis-a-vis the tortious principle of strict liability. In such a case, the measure of compensation must be correlated to the magnitude and capacity of the enterprise because such compensation must have a deterrent effect.The larger and more prosperous the enterprise, the greater must be the amount of compensation payable by it for the harm caused on account of an accident in the carrying on off the hazardous or inherently dangerous activity by the enterprise.

The following statement of Bhagwati,C.J., which laid down the new principal may be noted:

"We are of the view that an enterprise which is engaged in hazardous or inherently dangerous industry which poses a potential threat to the health and safety of the persons working in the factory and residing in the surrounding areas owes an absolute and non delegable duty to the community to ensure that no harm results to anyone on account of hazardous or inherently dangerous activity which it has undertaken. The enterprise must be held to be under an obligation to provide that the hazardous or inherently dangerous activity in which it is engaged must be conducted with the highest standards of safety and if any harm results on account of such activity, the enterprise must be absolutely liable to compensate for such harm and it should be no answer to the enterprise to say that it had taken all reasonable care and that the harm occurred without any negligence on its part."

The Supreme Court took a bold decision holding that it was not bound to follow the 19th century rule of English Law, and it could evolve a rule suitable to the social and economic conditions prevailing in India at the present day . It evolved the rule of absolute liability as part of Indian Law in preference to the rule of strict liability laid down in Rylands Vs Fletcher. It expressly declared that the new rule was not subject to any of the exceptions under the rule in Rylands Vs Fletcher.

Union Carbide Corporation Vs Union Of India[7]

The Bhopal gas leak tragedy that occurred at midnight on 2nd December, 1984, by the escape of deadly chemical fumes. Methyl Iso-cyanate from the appellants pesticide factory was a horrendous industrial mass disaster, unparalleled in its magnitude and devastation and remains a ghastly monument to the dehumanising influence of inherently dangerous technologies. The

tragedy took an immediate toll of 2660 innocents human lives and left tens of thousands of innocent citizens of Bhopal physically impaired or affected in various degrees. What added grim poignance to the tragedy was that the industrial enterprise was using Methyl Iso-cyanate a lethal toxic poison, whose potentiality for destruction of life and biotic communities was apparently, matched only by the lack of a pre-package of relief procedures for management of any accident based on adequate scientific knowledge as to the ameliorative medical procedures for immediate neutralisation of its effects.

The matter concerns the interest of a large number of victims of a mass disaster .The Court directed the settlement with the earnest hope that it would do them good and bring them immediate relief.

M.C. Mehta Vs Union of India[8]

Taj Mahal degradation due to pollution, emission generated by coke/coal using industries in Taj trapezium found to be main polluters.The Supreme Court issued the direction to 292 industries located and operating in Agra to change-over within fixed time schedule to natural gas as industrial fuel or stop functioning with coal/coke and get relocated. Industries not applying for gas or relocation to stop functioning with coal/coke from 30.04.1997.

The incorporation of protection of environment as an obligation of the state and as a mandate to the citizens of India as part of the fundamental duties is notable indication to the importance of the protection of environment. The Indian courts have embraced judicial activism in developing environmental jurisprudence. The right to pollution free environment is treated as a fundamental right. In municipal council , Ratlam Vs. Vardichand the Supreme Court has recognised the importance of pollution free environment and gave it the status of a human right.

Chhetriya Pradushan Mukti Sangharsh Samiti Vs. State of U.P.[9]

The Supreme Court has again affirmed that every citizen has a fundamental right to have the enjoyment of quality of life as contemplated by Article 21 of the Constitution of India.

CONCLUSION:

The comprehensive study of atmospheric science and environmental law highlights that air pollution has emerged as a complex and systemic environmental challenge requiring coordinated scientific, legal, and regulatory responses. The increasing release of anthropogenic pollutants has exceeded the natural capacity of the atmosphere to absorb and regulate harmful substances, resulting in significant impacts on climate, ecosystems, natural resources, and human health. This situation emphasizes the need to understand both the scientific consequences of air pollution and the legal mechanisms available to prevent and control environmental degradation. The comprehensive analysis of atmospheric science and environmental jurisprudence leads to the conclusion that air pollution is a systemic crisis requiring a synchronized scientific and legal intervention. The data establishes that the atmosphere's capacity to absorb anthropogenic by-products is critically overextended. We are witnessing a transformation of essential resources into hazards: Carbon Dioxide, vital for plant life, is now the agent of global warming and oceanic acidity; chemically stable CFCs have become destroyers of the ozone shield. The text clarifies that the consequences are not merely aesthetic but existential, threatening the biological productivity of marine ecosystems, reducing agricultural soil moisture, and exposing humanity to increased UV radiation and respiratory ailments like pneumonia and internal bleeding caused by Nitrogen Oxides. From a legal

perspective, there's a paradigm shift in Indian law: the recognition that the "right to a pollution-free environment" is a fundamental right. The judiciary has successfully argued that modern industrial risks cannot be managed by archaic laws. The rejection of the "Strict Liability" doctrine (which allowed for exceptions) in favour of "Absolute Liability" signifies a judicial determination to hold "inherently dangerous" industries fully accountable. The Supreme Court's rulings in the Oleum Gas Leak Case and Bhopal Gas Tragedy Case established that the cost of human safety must be internalized by corporations, with compensation directly proportional to their prosperity. Furthermore, the Taj Mahal Trapezium verdict illustrates that environmental protection supersedes economic convenience, forcing industries to either adapt (switch to gas) or cease operations. Ultimately, the text concludes that while natural sources of pollution exist, the acceleration of environmental degradation is unmistakably anthropogenic. The remedy lies in the authoritarian enforcement of Constitutional Articles 48-A and 51-A(g), ensuring that the "deterrent effect" of the law keeps pace with the hazardous potential of modern technology. The intersection of these environmental warnings and legal mandates creates a clear directive that economic development cannot continue at the cost of the biosphere's stability. Sustainable economic progress can therefore be achieved only when development is balanced with the protection of atmospheric stability, ecological systems, human health, and the interests of future generations.

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