National Journal of Advanced Research
Online ISSN: 2455-216X; Impact Factor: RJIF 5.12
www.allnationaljournal.com
Volume 2; Issue 6; November 2016; Page No. 49-52

A sociological reflection of impact of air pollution in human society

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Abstract
Environment contamination is a wide-reaching problem and it is possible to effect the health of human populations is great. Clean air is one of the basic requirements of human wellbeing However, during the process of economic progress, air contamination has been and continues to be a major health threatglobal. Environmental sociology is typically defined as the sociological study of societal-environmental interactions and the problem of integrating human cultures with the rest of the environment. Keeping this view in mind, present paper provides an insight about a sociological Impact of Air pollution in Human society. The main issue here to be discussed is the increasing of the air pollution, the problems that it has caused, affected and the actions that have been put in place as possible and hopefully successful solutions.

Keywords: Environment pollution, Air pollution, Health hazard, Sustainable

1. Introduction
Environment pollution is a wide-reaching problem and it is likely to influence the health of human populations is great. As developing country with a population of over one billion India faces many problems, many of which are environmental issues. India's rapidly growing population, along with a move towards urbanization and industrialization, has placed significant pressure on India's infrastructure and its natural resources. Deforestation, soil erosion, water pollution and land degradation continue to worsen and are hindering economic development in rural India, while the rapid industrialization and urbanization in India's growing metropolises are straining the limits of municipal services and causing serious air pollution problems.

Air pollution is one of India's most severe environmental problems. Sources of air pollution come in a number of forms, including vehicle emissions and untreated industrial smoke. Industrialization and urbanization have resulted in a huge deterioration of India's air quality. Continued urbanization has exacerbated the problem of rapid industrialization, as more and more people are affected and cities are unable to implement adequate pollution control mechanisms. India's urban air quality ranks among the world are worst. One of the most affected cities is New Delhi, where airborne particulate matter has been registered at levels more than 10 times India's legal limit of the 3 million premature deaths in the world that occur each year due to out-door and in-door air pollution, the highest number are assessed to occur in India.

Millions of people breathe air with a high concentration of pollutants. The air is highly polluted in terms of suspended particulate matter in most cities. This has led to a greater incidence of associated health effects on the population in the form of sub-clinical effects, impaired pulmonary functions, use of medication, reduced physical performance, frequent medical consultations and hospital admissions with complicated morbidity and even death in the exposed population. (CPCB, 2000) [6]. According to a World Bank study (1993), respiratory infections contribute to 10.9% of the total burden of diseases, which may be both due to the presence of communicable diseases and well as high air pollution levels.

1.1 Significant of the study
Air pollution is a key concern in a developing economy like India. Despite several efforts by the Government of India, more than 80% of Indian cities violate the prescribed standards of air quality. More than 0.6 million people die prematurely in India just due to deteriorated quality of air. More than 30% of wheat is lost in the agricultural fields due to high ground level ozone concentrations in India. Delhi being the capital has remained in limelight due to its alarmingly polluted air in the last few years, while there are several other regions which are equally or polluted in the country. Economic estimates point to a degradation cost of Rs. 1.1 trillion by the outdoor and of Rs. 0.9 trillion by the indoor air pollution in India, which is about 3% of the total GDP of the country. Many of these air pollutants like black carbon (which is a constituent of combustion based particulate matter emissions), and ozone (formed at ground level by reactions of precursor pollutants gases like NOx and VOCS) also have warming potential, and hence, are known as short lived climate pollutants (SLCPs). World - wide, SLCPs have emerged as a powerful strategy for reducing the projected warming trends from now to mid - century by as much as 50%. While doing so, 4 million annual deaths and billions of dollars of crop damages can be saved globally, while climate benefits remain additional to these. There is multiplicity of sources which contribute to pool of emissions which eventually deteriorate the quality of air in India.

While on one hand, the poverty driven issues of energy access lead to the use of biomass based fuels for cooking purpose, on the other hand, growing aspirations enhanced by limitations in public transport have led to unprecedented growth in number of vehicles in the cities. Growing power demands and dependence on coal also contribute significantly to emissions along with industrial pollution. Improper management of waste - municipal and agricultural is also a key issue which eventually leads to emissions of pollutants, as significant

quantities of these wastes are combusted for volume reduction and heating purposes. Other than the emission sources, meteorology plays its role in defining the air pollutant concentrations. In India, the Indo - Gangetic Plain show the highest pollutant concentrations due to the presence of high intensity emission sources and adverse meteorological conditions, specifically in winters. It is in this scenario, it becomes very important to understand the chemistry and transport of pollutants to identify measures for effective and optimal control of pollution.

1.2 Meaning of air pollution

Air is the symptom of life. It governs the mechanism of Earth. Pollution of air is a dangerous threat to the earthly existence. Protection of air from pollution is as essential as the protection of life. "Air Pollution means the presence in the atmosphere of any air pollutant" and the latter denotes "any solid, liquid or gaseous substance, 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. In other word, Air pollution means the presence on the outdoor atmosphere one or more air contaminates or combination thereof in such quantities of such duration as are or may tend to be injurious to human, plants, animal life or property or the conduct or business. Air pollution may be described as imbalance, inequality of air which causes ill effect in the nature. Air pollution may be defined in many ways. In simple terms air pollution can be defined as any ambient condition in which substances are present at concentrations high enough above their normal levels to produce measurable effect.

1.3 Causes of air pollution

The causes of air pollution are divided into natural and man-made. Natural sources include volcanic eruptions, dust, storms-- etc., the principal man made sources of air pollution are transportations, fueled combustion from stationary sources, industrial processes and solid wastes disposal, domestic burning, includes the pollution from ships, planes, train and automobiles but the automobile is the worst contributor to air pollution particularly two wheelers.

India's ongoing population explosion has placed great strain on the country's environment. Between 1951 and 1991, the urban population has tripled, from 62.4 million to 217.6 million. India has more than 20 cities with populations of at least 1 million, and some of them -including New Delhi, Mumbai, Chennai, and Kolkata- are among the world's most polluted. The rapid increase in urban population has resulted in unplanned urban development, increase in consumption patterns and higher demands for transport, energy, and other infrastructure, therefore leading to pollution problems (India: State of the Environment, 2001).

Vehicles are the major source of this pollution, with more than three million cars, trucks, buses, taxis, and rickshaws already on the roads. The number of motor vehicles in India has increased from 0.3 million in 1951 to 37.2 million in 1997 with 23% being concentrated in the metropolitan cities (MoST, 2000). With vehicle ownership rising along with population and income, India's efforts to improve urban air quality have focused in this area.

Another key factor contributing to the poor air quality has been the increase in industrial activity. India has made rapid strides in industrialization, and is one of the top ten most industrialized nations of the world. This status has brought about unplanned and unwanted consequences to the environment. According to the Central Pollution Control Board they have identified seventeen categories of industries in India that significantly pollute the air. Small-scale industries play a role in the air pollution as well. They have over three million small-scale units that account for 40% of the total industrial output in the country (Kuntz, Garner, 2007) [1].

Since 1950 India's electricity generation capacity has increased rapidly. The generation capacity comprises a mix of hydro, thermal, and nuclear plants. Thermal power makes up about 74% of the total installed power generation capacity. However, increasing reliance on this source of energy has led to the environmental problems. The increased dependence of the power sector on an inferior quality coal has been associated with emissions from power plants in the form of particulate matter, toxic elements, fly ash, oxides of nitrogen, sulphur and carbon besides ash, which required vast stretches of land for disposal. During 1998-99, the power stations consumed 208 million tons of ash posing a major disposal problem (CPCB, 2000) [6].

1.4 Effects of air pollution

The primary concern of the human kind is to consider the relationship that air pollution has to human health. Air pollution effects the human health, animals, plant materials and on atmosphere. Though the direct causes and effect relationship of air pollution is not our concern but it may be said that it effects the human health particularly respiratory system, lung cancer bronchitis, emphysema and asthma which are some of the chronic diseases caused due to exposure to polluted air. The effects of air pollution on domestic animals are similar to those observing man. The effects on plant primarily concern to agriculture.

The effects of the sulphur Dioxide (SO2) are proved clearly that the gas is set to be absorbed through the stomach into the mesophel of the leaves; fluorides seem to interface with the photosynthesis and respiration plants. Air pollutants also caused and damaged the property and materials to increase the combustion of fossil fuel and oil increase the carbon dioxide (CO2) concentration of the atmosphere in recent years. Carbon Dioxide absorbs great strongly and the radioactive cooling effect of the earth is thus decreased. Calculation and prediction shows that present amount of carbon dioxide will be double in the future, resulting in an increasing in the temperature of the earth surface.

Since polluted air reaches not only industrial and residential areas but also agriculture regions in addition to man its impact on plants and animals are also beginning to manifest them. In present day environmental control the conservation of forests has gained in importance for two reasons. Firstly the forests need increased protection, secondly on the future can be at greater help against environmental contamination. Industrial air pollution caused greater damages to forests.

Air pollution harms human health and particularly is harmful for those who are already vulnerable because of their age as children and older people or existing health problems. The epidemiological evidence suggests that adverse health effects are dependent on both exposure concentrations and length of exposure, and that long-term exposures have larger, more persistent cumulative effects than short-term exposures.

1.5 Prevention and control of air pollution

(i) Indoor air pollution

Poor ventilation due to faulty design of buildings leads to pollution of the confined space. Paints, carpets, furniture, etc. in rooms may give out volatile organic compounds (VOCs). Use of disinfectants, fumigants, etc. may release hazardous gases. In hospitals, pathogens present in waste remain in the air in the form of spores. This can result in hospital acquired infections and is an occupational health hazard. In congested areas, slums and rural areas burning of firewood and biomass results in lot of smoke. Children and ladies exposed to smoke may suffer from acute respiratory problems which include running nose, cough, sore throat, lung infection, asthma, difficulty in breathing, noisy respiration and wheezing.

(ii) Prevention and control of indoor air pollution

Use of wood and dung cakes should be replaced by cleaner fuels such as biogas, kerosene or electricity. But supply of electricity is limited. Similarly kerosene is also limited. Improved stoves for looking like smokeless chullahs have high thermal efficiency and reduced emission of pollutants including smoke. The house designs should incorporate a well-ventilated kitchen. Use of biogas and CNG (Compressed Natural Gas) need to be encouraged. Those species of trees such as baval (*Acacia Nilotica*) which are least smoky should be planted and used. Charcoal is a comparatively cleaner fuel. Indoor pollution due to decayof exposed kitchen waste can be reduced by covering the waste properly. Segregation of waste, pretreatment at source, sterilization of rooms will help in checking indoor air pollution.

(iii) Prevention and control of industrial pollution

Industrial pollution can be greatly reduced by:

a. Use of cleaner fuels such as liquefied natural gas (LNG) in power plants, fertilizer plants etc. which is cheaper in addition to being environmentally friendly.
b. Employing environment friendly industrial processes so that emission of pollutants and hazardous waste is minimized.
c. Installing devices which reduce release of pollutants.

Devices like filters, electrostatic precipitators, inertial collectors, scrubbers, gravel bed filters or dry scrubbers are described below:

a) Filters - Filters remove particulate matter from the gas stream. The medium of a filter may be made of fibrous materials like cloth, granular material like sand, a rigid material like screen, or any mat like felt pad. Bag house filtration system is the most commonone and is made of cotton or synthetic fibres (for low temperatures) or glass clothfabrics (for higher temperature up to 290oC).
b) Electrostatic precipitators (ESP) - The emanating dust is charged with ions and theionized particulate matter is collected on an oppositely charged surface. The particare removed from the collection surface by occasional shaking or by rapping thesurface. ESPs are used in boilers, furnaces, and many other units of thermal powerplants, cement factories, steel plants, etc.
c) Inertial collectors -It works on the principle that inertia of SPM in a gas is higherthan its solvent and as inertia is a function of the mass of the particulate matter this device collects heavier particles more efficiently. 'Cyclone' is a common inertial collector used in gas cleaning plants.
d) Scrubbers - Scrubbers are wet collectors. They remove aerosols from a stream of gas either by collecting wet particles on a surface followed by their removal, or else the particles are wetted by a scrubbing liquid. The particles get trapped as they travel from supporting gaseous medium across the interface to the liquid scrubbing medium. Gaseous pollutants can be removed by absorption in a liquid using a wet scrubber and depends on the type of the gas to be removed e.g. for removal of sulphur dioxide alkaline solution is needed as it dissolves sulphur dioxide. Gaseous pollutants may be absorbed on an activated solid surface like silica gel, alumina, carbon, etc. Silica gel can remove water vapour. Condensation allows the recovery of many products in coal and petroleum processing industries from their liquid effluents. Apart from the use of above mentioned devices, other control measures are-

- Increasing the height of chimneys.
- Closing industries which pollute the environment.
- Shifting of polluting industries away from cities and heavily populated areas.
- Development and maintenance of green belt of adequate width.

(iv) Control of vehicular pollution

- The emission standards for automobiles have been set which if followed will reduce the pollution. Standards have been set for the durability of catalytic converters which reduce vehicular emission.
- In cities like Delhi, motor vehicles need to obtain Pollution under Control (PUC) certificate at regular intervals. This ensures that levels of pollutants emitted from vehicle exhaust are not beyond the prescribed legal limits.
- The price of diesel is much cheaper than petrol which promotes use of diesel. To reduce emission of sulphur dioxide, sulphur content in diesel has been reduced to 0.05%.
- Earlier lead in the form of tetraethyl lead was added in the petrol to raise octane level for smooth running of engines. Addition of lead in petrol has been banned to prevent emission of lead particles with the vehicular emission.

1.6 Steps taken by the government

India has made significant efforts in the area of environmental protection, developing environmental standards for both products and processes, requiring environmental impact statements in certain areas, and introducing environmental audits. Following the 1984 Bhopal disaster (a toxic leak from the city's Union Carbide chemical plant that resulted in the deaths of more than 3,000 people) environmental awareness increased significantly. The Environment Protection Act was passed in 1986, creating the Ministry of Environment and Forests, which strengthened India's commitment to the environment. The MoEF is tasked with the overall responsibility for administering and enforcing environmental laws and policies. The MoEF established the importance of integrating environmental strategies into any development plan for the country.

In New Delhi, emissions limits for gasoline and diesel powered vehicles came into effect in 1991 and 1992, and the

city has prohibited the use of vehicles more than 15 years old. Emissions standards for passenger cars and commercial vehicles were tightened in 2000 at levels equivalent to the Euro-1 standards of the European Union, while the even more stringent Euro-2 standards have been in place for the metropolitan areas of Delhi, Mumbai, Chennai, and Kolkata since 2001. Also the sulfur content of motor fuels sold in the four cities has been restricted to 500 parts per million since 2001 in order to be compatible with tighter vehicle emissions standards. Motor fuel sulfur content in all other regions of India has been limited to 2,500 PPM since January 2000.

2. Conclusion

India still faces significant challenges in balancing its increased demand for energy with the need to protect its environment from further damage. Sheer population growth and urbanization make the task all the more difficult for the Indian government, as increased vehicle ownership is contributing to the existing air pollution problems while urbanization raises the health risks from that pollution. India's strong support of air quality and alternative fuel initiatives has brought progress as well as growing pains to the country. However, in the absence of coordinated government efforts, including stricter enforcement, air pollution is likely to continue to worsen in the coming years as urbanization picks up pace and vehicle ownership increases. The Indian government's ability to safeguard the country's environment will depend on its success in promoting policies that keep the economy growing while providing adequate energy needs to satisfy the populace's growing energy consumption requirements in a sustainable manner. Air pollution is a health hazard. It is a global challenge, as evidence shows that adverse effects still exist even at relatively low air pollutant concentrations. It is more important in Asian developing countries due to the severe pollution levels and high population densities associated with them. Improving air quality has substantial, measurable and important public health benefits. Efforts should be made and goals set in order to control air pollution in every country.

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