Original Research Paper

Volume - 7 | Issue - 8 | August - 2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Zoology

AIR QUALITY STATUS AND TRENDS IN UTTAR PRADESH: A REVIEW

T.S. Naqvi

Department of Zoology, Shia P.G. College, Lucknow, U.P., India -Corresponding author

ABSTRACT

20.000 liters of air is what we breathe on a daily basis. But every time we inhale we risk inhaling dangerous chemicals which found their way in our air. Air pollution is the presence of dangerous chemicals in the air that we breathe. It is a change in the air which influences humans health and organism on the planet. Many think that `gases' pollute the air, those gases go under the names of CFCs, carbon monoxide, and sulfur dioxide. Emissions of carbon monoxide are especially dangerous. In periods of heavily air pollution there will be no rainfall. The sky will not produce it and the heat will therefore won't go away. Transport and large industries are always seen as the causes of those pollutants. It is not only bad for humans, plants and animals, it is also said to be harmful for buildings. Buildings become discolored when being disposed for a long time to pollutants. But air pollution is not only outdoor problem, it occurs indoor as well. Like earlier said is air pollution not only a problem for people's health but also for earth's ecosystems. Almost every large city in the world has a poor air quality.

KEYWORDS :

INTRODUCTION

Air pollution has been aggravated by developments that typically occur as countries become industrialized: growing cities, increasing traffic, rapid economic development and industrialization, and higher levels of energy consumption. The high influx of population to urban areas, increase in consumption patterns and unplanned urban and industrial development has led to the problem of air pollution. Currently, in India, air pollution is wide spread in urban areas where vehicles are the major contributors and in a few other areas with a high concentration of industries and thermal power plants. Vehicular emissions are of particular concern since these are ground level sources and thus have the maximum impact on the general population. Also, vehicles contribute significantly to the total air pollution load in many urban areas.

Causes

Increase in urban population

In 2011 the total population of Uttar Pradesh was 200 millions and in 2001 the rural population was 76.61% and urban population was 23.39%. In 2011 the percentage of rural population was decreased and become 75.11% and percentage of urban population was increased and become 24.89%. So the percentage of urban population was increased by 1.5%. The population of class I cities is also increasing with time.

This rapid increase in urban population has resulted in unplanned urban development, Increase in consumption patterns and higher demands for transport, energy, other infrastructure, thereby leading to pollution problems.

Increase in number of vehicles

The number of motor vehicles has increased from 3.03 millions in 1990 to 14.9 million in 2011. The percentage of two-wheeled vehicles in the total number of motor vehicles increased from 64.3% in 1990 to 73.7 % in 2011, and the share of buses declined from 2.1 % to 0.9% during the same period. This clearly points to a tremendous increase in the share of personal transport vehicles. In 1990, personal transport vehicles (two-wheeled vehicles and cars only) constituted 69.2 % of the total number of registered vehicles, and in 2011 this percentage is increased to 78.1%. Road-based passenger transport has recorded very high growth in recent years. The slow growth of road infrastructure and high growth of transport performance and number of vehicles all imply that roads of Uttar Pradesh are reaching a saturation point in utilizing the existing capacities.

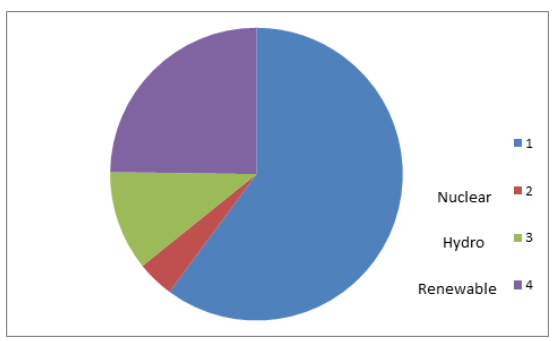
Increase in industrial activity

India has made rapid strides in industrialization, and it is one of the ten most industrialized nations of the world. But this status, has brought with it unwanted an dun anticipated consequences such as unplanned urbanization, pollution and the risk of accidents. The CPCB (Central Pollution Control Board) has identified seventeen categories of industries (large and medium scale) as significantly polluting and the list includes highly air polluting industries such as integrated iron and steel, thermal power plants, copper/zinc/ aluminium smelters, cement, oil refineries, petrochemicals, pesticides and fertilizer units. Uttar Pradesh started experiencing industrial development between 1950 and 1960. Large and small scale industries started springing up in Uttar Pradesh. The main industries of Uttar Pradesh include textile, woolen goods, vegetable oil and dyes. Heavy industries consist of copper and zinc smelting and the manufacture of railway rolling stock. The other industries related to Private Sector include steel, cement, ceramics and glass wares, electronic, leather and footwear, stone and other chemical industries.

Altogether the industrial sector accounts for about 32.5 per cent of the total share of the state's economy. During 1995- 96 and 2001-02, the industrial sector of Uttar Pradesh experienced growth at the rate of 6.9% per annum.

Increase in power generation

The generating capacity in Uttar Pradesh comprises a mix of hydro, thermal, and nuclear plants. Thermal power constitutes about 60.13 % of the total installed power generation capacity. However, increasing reliance on this source of energy leads to many environmental problems. India's coal has a very high in ash content (24%–45%). 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.



Domestic Pollution

One-third of the world's population burn organic material such as wood, dung or charcoal (biomass fuel) for cooking, heating and lighting. This form of energy usage is associated with high levels of indoor air pollution and an increase in the incidence of respiratory infections, including pneumonia, tuberculosis and chronic obstructive pulmonary disease, low birth weight, cataracts, cardiovascular events and all-cause mortality both in adults and children. When attention is focused on the problem of indoor air pollution resulting from the use of 'biomass fuels' (BMF), an enormous health burden is uncovered. There is now evidence linking an increased risk of respiratory tract infections, exacerbations of inflammatory lung conditions, cardiac

events, stroke, eye disease, tuberculosis (TB), cancer and hospital admissions with air pollution levels.

Inefficient burning of BMF on an open fire or traditional stove generates large amounts of particulate matter as well as carbon monoxide, hydrocarbons, oxygenated organics, free radicals and chlorinated organics (Naeher et al., 2007). The particulate matter component of this smoke is classified according to its size, with inhalable material <10 μm in aerodynamic diameter referred to as Pm_{10}.

Other Sources

The problem of air pollution in urban areas is also aggravated due to inadequate power supply for industrial, commercial and residential activities due to, which consumers have to use diesel-based captive power generation units emitting high levels NOX and SOX. In addition, non-point sources such as waste burning, construction activities, and roadside air borne dust due to vehicular movement also contribute to the total emission load.

Ambient air quality of Uttar Pradesh

Under the National Ambient Air Quality Monitoring (NAAQM) network, three criteria air pollutants, namely, SPM, SO2, and NO2 have been identified for regular monitoring at all the 290 stations spread across the country.

The air quality of different cities/towns has been compared with the respective NAAQS.

The air quality has been categorized into four broad categories based on an Exceedence Factor (the ratio of annual mean concentration of a pollutant with that of a respective standard). The Exceedence Factor (EF) is calculated as follows:

$$\text{Exceedence Factor} = \frac{\text{Observed annual mean concentration of criteria pollutant}}{\text{Annual standard for the respective pollutant and area class}}$$

The four air quality categories are:

Critical pollution (C) : when EF is more than 1.5;
High pollution (H) : when the EF is between 1.0 - 1.5;
Moderate pollution (M) : when the EF between 0.5 - 1.0; and
Low pollution (L): when the EF is less than 0.5.

It is obvious from the above categorization, that the locations in either of the first two categories are actually violating the standards, although, with varying magnitude. Those, falling in the third category are meeting the standards as of now but likely to violate the standards in future if pollution continues to increase and is not controlled. However, the locations in Low pollution category have a rather pristine air quality and such areas are to be maintained at low pollution level by way of adopting preventive and control measures of air pollution.

Table 1: Pollution Level Classification.

Pollution Level	Annual Mean Concentration Range (μg/m3)				
	Industrial (I)	Residential (R)			
	SO2 & NO2	RSPM	SPM	SO2, NO2, & RSPM	SPM
Low (L)	0-40	0-60	0-180	0-30	0-70
Moderate (M)	41-80	61-120	181-360	31-60	71-140
High (H)	81-120	121-180	361-540	61-90	141-210
Critical (C)	>120	>180	>540	>90	>210

Table 2: City wise Ambient air quality of Uttar Pradesh.

	So_2		No_2		RSPM		SPM	
Area	I	R	I	R	I	R	I	R
Kanpur	L	L	L	M	H	C	H	C
Lucknow	L	L	L	M	H	C	M	C
Allahabad	L	L	L	L	H	C	M	C
Ghaziabad	L	L	L	L	H	C	H	C

Table shows that all the industrial areas of big cities of Uttar Pradesh shows high pollution level of RSPM and residential areas show critical pollution level of RSPM. The SPM pollution level is critical in residential areas and it is of high or medium level in industrial areas.

Air pollution and health impact

Health impact of specific air pollutants

Some of these gases can seriously and adversely affect the health of the population and should be given due attention by the concerned authority. The gases mentioned below are mainly outdoor air pollutants but some of them can and do occur indoor depending on the source and the circumstances.

Tobacco smoke. Tobacco smoke generates a wide range of harmful chemicals and is a major cause of ill health, as it is known to cause cancer, not only to the smoker but affecting passive smokers too. It is well-known that smoking affects the passive smoker (the person who is in the vicinity of a smoker and is not himself/herself a smoker) ranging from burning sensation in the eyes or nose, and throat irritation, to cancer, bronchitis, severe asthma, and a decrease in lung function.

Biological pollutants. These are mostly allergens that can cause asthma, hay fever, and other allergic diseases.

Volatile organic compounds. Volatile compounds can cause irritation of the eye, nose and throat. In severe cases there may be headaches, nausea, and loss of coordination. In the longer run, some of them are suspected to cause damage to the liver and other parts of the body.

Formaldehyde. Exposure causes irritation to the eyes, nose and may cause allergies in some people.

Lead. Prolonged exposure can cause damage to the nervous system, digestive problems, and in some cases cause cancer. It is especially hazardous to small children.

Radon. A radioactive gas that can accumulate inside the house, it originates from the rocks and soil under the house and its level is dominated by the outdoor air and also to some extent the other gases being emitted indoors. Exposure to this gas increases the risk of lung cancer.

Ozone. Exposure to this gas makes our eyes itch, burn, and water and it has also been associated with increase in respiratory disorders such as asthma. It lowers our resistance to colds and pneumonia.

Oxides of nitrogen. This gas can make children susceptible to respiratory diseases in the winters.

Carbon monoxide. CO (carbon monoxide) combines with haemoglobin to lessen the amount of oxygen that enters our blood through our lungs. The binding with other haeme proteins causes changes in the function of the affected organs such as the brain and the cardiovascular system, and also the developing foetus. It can impair our concentration, slow our reflexes, and make us confused and sleepy.

Sulphur dioxide. SO2 (sulphur dioxide) in the air is caused due to the rise in combustion of fossil fuels. It can oxidize and form sulphuric acid mist. SO2 in the air leads to diseases of the lung and other lung disorders such as wheezing and shortness of breath. Long-term effects are more difficult to ascertain as SO2 exposure is often combined with that of SPM.

SPM (suspended particulate matter). Suspended matter consists of dust, fumes, mist and smoke. The main chemical component of SPM that is of major concern is lead, others being nickel, arsenic, and those present in diesel exhaust. These particles when breathed in, lodge in our lung tissues and cause lung damage and respiratory problems. The importance of SPM as a major pollutant needs special emphasis as a) it affects more people globally than any other pollutant on a continuing basis; b) there is more monitoring data available on this than any other pollutant; and c) more epidemiological evidence has been collected on the exposure to this than to any other pollutant.

Air pollution control

Air is considered to be polluted when it contains certain substances in concentrations high enough and for durations long enough to cause harm or undesirable effects. These include adverse effects on human health, property, and atmospheric visibility. Most air contaminants originate from combustion processes. The advent of mobile sources of air pollution—i.e., gasoline-powered highway vehicles—had a tremendous impact on air quality problems in cities. It was not until the

middle of the 20th century, however, that meaningful and lasting attempts were made to regulate or limit emissions of air pollutants from stationary and mobile sources and to control air quality on both regional and local scales.

The primary focus of air pollution regulation in industrialized coun tries has been on protecting ambient, or outdoor, air quality. This involves the control of a small number of specific "criteria" pollutants known to contribute to urban smog and chronic public health problems. The criteria pollutants include fine particulates, carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, and lead., hydrogen, and other atoms. Specific emission regulations have been implemented against those pollutants. In addition, the long-term and far-reaching effects of the "greenhouse gases" on atmospheric chemistry and climate have been observed, and cooperative international efforts have been undertaken to control those pollutants. The greenhouse gases include carbon dioxide, chlorofluorocarbons (CFCs), methane, nitrous oxide, and ozone. In 2009 the U.S. Environmental Protection Agency ruled that greenhouse gases posed a threat to human health and could be subject to regulation as air pollutants.

The best way to protect air quality is to reduce the emission of pollutants by changing to cleaner fuels and processes. Pollutants not eliminated in this way must be collected or trapped by appropriate air-cleaning devices as they are generated and before they can escape into the atmosphere.

ACKNOWLEDGEMENTS

Author is grateful to all workers of Environmental Sciences; on the basis of their work this manuscript was possible.

REFERENCES

1. BIS (1997a). Gasoline fuels-specification. New Delhi: Bureau of Indian Standards.
2. BIS (1997b). Diesel fuel-specification. New Delhi: Bureau of Indian Standards.
3. Brandon, C., Hommann, K. and Kishor, N.M. (1995). 'The cost of inaction: valuing the economy-wide cost of environmental degradation in India'. 46 pp.
4. CMIE (2000). Energy. Mumbai: Centre for Monitoring Indian Economy Pvt. Ltd.
5. CII; SII. (1996). India: an emerging environmental market- a handbook for trade and business opportunities.
6. CPCB (2000b). 'Clean coal initiatives'. Parivesh Newsletter, June 2000, Delhi: Central Pollution Control Board.
7. CPCB (2000c). Air Quality status and trends in India.
8. National Ambient Air Quality Monitoring Series: NAAQMS/14/1999-2000. Delhi: Central Pollution Control Board.
9. MoEF (1997). White paper on pollution in Delhi with an action plan. New Delhi: Ministry of Environment and Forests. 67pp.
10. MoEF (1998). India - Sustaining Development. New Delhi: Ministry of Environment and Forests.
11. MoEF (1999). Annual report (1998-99). New Delhi.
12. Ministry of Environment and Forests MoEF (2000a). Annual report (1999-2000), http://envfor.nic.in/report, June 2000. New Delhi.
13. Ministry of Environment and Forests MoEF (2000b). Personal communication from Dr G K Pandey, Director.
14. SIAM (1999). Fuel and Vehicular Technology. New Delhi: Society of Indian Automobile Manufacturers.