

Air Quality Monitoring in Jaipur as Smart City

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Abstract—Environment is nothing but our surrounding and for healthy life healthy environment is necessary. But now- a-days this environment is badly affected by increase in industrialization and civilization. Presence of smoke, smell, dusts, gases, oxygen deficits, noise and vibration, when such substance or action hazardously affect our environment, is known as environmental pollution. In developing countries the development of civilization and rapid industrialization by man has caused a great damage to the ecosystem and environment and cause air pollution at large extent but for smart city quality of air must be good or excellent. This paper highlights monitoring of air quality in different zones of Jaipur as smart city. It also includes adverse effects of air pollution on surrounding environment and on living of study area.

Keywords: Environment, Industrialization, Civilization, Hazardously affect, Air quality.

1. INTRODUCTION

All human being required fresh air for life; human being required about 12 kg of each day. But not a day's increasing pollutants due to commercialization, industrialization and use of fuels in vehicles. Increasing of gases, liquid or solid substance in such concentrations that affect human life as animal's life & surroundings environment [1].

A limit quantity or volume of gases is good for environment, but when the increasing of harmful gases directly effected on environment. Now a day we use fuel for energy production or in developing country like India. We promote industries and other energy production work which is responsible for air pollution [2]. Only human is not responsible for air pollution some time nature is also responsible for air pollution like volcano dust & gases, and forest fire due to lighting, but human is more responsible for air pollution.

The main cause of air pollution is smoke which emitted by factories, coke oven, furnace and steam generated by engine, exhaust fumes from automobile, thermal power plant and other power plants. injurious chemical fumes from oil refineries, chemical industries, metallurgical plants iron and steel plants incineration plot etc. and other cause is evolution of radioactive gases and suspended radioactive dust from atomic explosions [3]. The cause for air pollution is primary and secondary pollutant. Primary pollutant is directly produce

by combustion or any other cause. Primary pollutants are oxides of sulphur (SO_x), oxides of carbon (CO_x), oxides of nitrogen (NO_x), volatile organic compounds and suspended particular matter. These primary pollutants often react with water vapor and abetted by sunlight, to form a new set of pollutant, that is secondary pollution. Important secondary pollutants are H₂SO₄, HNO₃, O₃, formaldehydes and pan etc. [4].

But now a day's technology developed and human is more responsible for matter earth. Now human try to use solar source and natural gases for reducing of air pollution and we have to adopt the electrical vehicles for transportations.

2. OBJECTIVE

The objective of present study to access the ambient air quality with respect to pm₁₀, pm_{2.5}, SO₂ and NO_x. The study trends of pollution over a period of time and space and to create public awareness about environment pollution.

3. STUDY AREA

Jaipur, the heritage city is located in northern India, in the western Rajasthan State; 149 km away from Agra and around 240km away from Delhi, at 26°55'19.4520"N, 75°46'43.9860"E The city is spread in 484.64 km² area with a population of 3,046,189 persons. Climatically, Jaipur city falls under hot semi-arid climate, about 90 percent of the rainfall takes place from June to September. Air quality of the city is the result of industries and the increasing vehicular traffic of the city itself as well as the heavy traffic load. These entire combine factors expels out lots of air pollutants into the cities atmosphere posing sever problems on the health of the people as well as deteriorating the fragile ecosystem.

4. METHODOLOGY AND DATABASE

The origin of air pollution is started the ancient time when human using firewood for cooking and energy purpose We are using the data of air pollution in Jaipur city, in Jaipur city we take particular different area's for observations of air pollution. The air pollution in Jaipur increase the development of

transportation systems, and large scale use of petrol and diesel in automobiles. The use of coal and diesel for running trains, due to auto vehicles, and use of aviation fuel for running aero planes

We choose the particular area in Jaipur Sindhi camp and Rambagh for air pollution measurement. We observe the different time pollution report and conclude the report as shown in table 1, table 2 and table 3.

Table 1 Pollution Data at Jaipur Sindhi Camp Rambagh

pollutants	8.00am	9.00am	10.00am	11.00am
CO	1123.97ppb	574.42ppb	465.77ppb	473.2ppb
NO ₂	33.15ppb	30.9ppb	42.51ppb	38.31ppb
O ₃	31.21ppb	30.13ppb	29.66ppb	33.4ppb
PM ₁₀	109.36ug/m ³	99.95ug/m ³	117.37ug/m ³	134.13ug/m ³
PM _{2.5}	59.88ug/m ³	54.05ug/m ³	58.82ug/m ³	66.13ug/m ³
SO ₂	1.65ppb	2.03ppb	3.37ppb	3.33ppb

At rambagh circle main cause of air pollution is traffic pollution and pollution due to auto mobiles as shown in table 2.

Table 2 Pollution Data at Rambagh

pollutants	8.00am	9.00am	10.00am	11.00am
Co(ppb)	899.39ppb	635.68ppb	620. ppb	648.6ppb
NO ₂ (ppb)	31.08	33.39	46.57	49.03ppb
O ₃ (ppb)	29.62	28.04	27.46	31.05ppb
PM ₁₀ (ug/m ³)	114.35	103.62	119.1	135.18ug/m ³
PM _{2.5} (ug/m ³)	61.95	50.93	62.55	65.33ug/m ³
SO ₂ (ppb)	1.36	1.76	9.67	3.13ppb

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Table 3 Pollution Data at Sitapura

pollutants	8.00am	9.00am	10.00am	11.00am
Co(ppb)	775.6	484.12	502.77	654.08
NO ₂ (ppb)	11.24	11.34	13.73	20.47
O ₃ (ppb)	35.4	38.04	35.33	31.31
PM ₁₀ (ug/m ³)	100.25	89.19	91.9	109.03
PM _{2.5} (ug/m ³)	51.66	40.4	48.06	54.39
SO ₂ (ppb)	1.93	2.56	3.55	6.29

At all the places pollution is gradually increased hour by hour due increase of traffic and use of industry.

5. ADVERSE EFFECT

Effects of air pollution on human health, animals, aquatic life, materials and global environment adversely are as follow-

- Air pollution is reduction in visibility. Smoke and soot is usually quit apparent in highly industrialized and transportation. Reduce in visibility slow down air traffic [4-5].

- The pollutants are generating the adverse health effect and it quickly spoiling the fabric and lather dress worn by human being. It is also cause skin damage, several monument and all buildings have been badly spoiled and damaged by the acidic fume.
- It will affect the breathing and respiratory system, damage to lungs issue and elderly people and children are most sensitive.it also affects the mental ability of human and cause of headaches.
- NO₂ cause asthmatics are most susceptible, and increases susceptibility to viral attack.
- Lead up take may be a factor high blood pressure and heart disease.
- Arsenic from dusts and insecticide sprays falling on the plants can similarly be accumulated by the plants, and when such contaminated vegetation is eaten by cattle, they may suffer from arsenic poisoning, and it is also cause the acid rain which is increase the acidity of fresh water which is affecting aquatic life, especially the fishes [3-6].
- Air pollutants cause deteriorating affects on metallic surface, building stone and damaging the paper and fabric.
- Air pollution increase ozone depletions and global warming, thereby adversely affecting the environment at global level.

6. CONCLUSION

In the present study analysis of air pollutants such as PM₁₀, PM_{2.5}, SO₂, NO_x have been done for-

Assessment of ambient air quality of Jaipur City and data analysis showed the following-The RSPM (PM₁₀) level at all the monitoring locations of residential, commercial and industrial;

Areas were higher than the NAAQS. Fine Particles (PM_{2.5}) level at all the monitoring locations of residential, commercial and industrial areas were much higher the NAAQS (40 ug/m³). The concentration of gaseous pollutants, SO₂ was below the prescribed NAAQS (20 ug/m³) at all the locations while NO_x was found to be above the permissible limits (30 ug/m³) and showed increasing trend. Increasing trend for PM₁₀ was found at all the three locations when compared to the previous

Overall results indicate that RSPM and SPM along with the gaseous pollutants are one of the major causes for deterioration of ambient air quality of the city. Unlimited growth of number of vehicles, their technological development and release of invisible tailpipe pollutants emission are serious debatable issues even for the policy makers. Use of different types of fuels namely petrol, diesel,

LPG and CNG make the environment more complex regarding the air quality and their synergistic effects on the human health. Overall, continuous accumulation of different types of pollutants and their exposure to human beings needs emergency attention of the policy maker, researchers and regulatory agencies. The present study suggests that it is necessary to monitor the air quality as well as the health effects at regular intervals at strategic locations which will help the planners for sustainable development of the city.

7. RECOMMENDATIONS

Subsidized public mass transport must be introduced and strengthened to minimize use of personal vehicles. Improvement in the traffic management is needed. Encroachment should be removed for the smooth flow of traffic. Public awareness programme for reduction of automobile pollution. Pressure horns to be removed from all vehicles and avoid use of horn. Government should increase the parking charges on hourly basis to discourage the use of personal vehicles. Restore foot path for pedestrian.

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