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Noise and ambient air pollution and its effect on local communities in Anand City, Gujarat, India

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ABSTRACT

Air and noise pollution survey was carried out different sites in Anand city. From 1 hour 24 hour average for few days. This also included meteorological measurements. The monitoring sites were included the blend of industrial, commercial, residential and heavy traffic roads with thick population trend.

Major pollutant analysed were Carbon monoxide (CO), Sulphur dioxide (SO_2), Nitrogen dioxide (NO_2), Total suspended particulates (TSP), and Particulate matter (PM_{10}) and noise level. Carbon monoxide level in the ambient air was found to reach 0.8-10.0 ppm in 1 hour monitoring and for 24 hour average was 7 ppm. To manage and improve ambient air quality within the city, the basic strategic are: establishment of ambient air quality objectives and criteria for assessment of air quality, and promote increased level of co-operation among the population of this city in reducing pollution load.

INTRODUCTION

Gujarat is facing population boom during last two decades .As per provisional report of census India. Population of Anand city in 2011 is 198282.Anand city known as a milk city .NDDB, IRMA and Agriculture university also in Anand city. So here urbanisation, transportation and industrialisation increased. There are 6 pollutants that account for the large majority of air pollution worldwide and for which standards are usually specified include Carbon monoxide (CO).Ozone(O_3),Oxide of Nitrogen(NO_X) Sulphur dioxide(So_2) ,Suspended particulates matter (TSP).These pollutant showed the highest levels in summer and spring ,while the lowest were observed in winter and monsoon. Transportation system has contributed significantly to the development of human civilization; on the other hand it has an enormous impact on the ambient air quality in several ways. Air pollution is a significant risk to the environment, quality of life and health of the population. Ambient air quality monitoring in long term on regular basis is still not systematic in India. All the available information is based on random and short term sampling conducted to assess the concentration of various pollutants. In this survey, the concentration of ambient air pollutants and noise pollution only give a general idea about the prevailing situation .A true picture of ambient air quality can only be obtained through well-defined long term monitoring programmes and establishment of standards and guidelines. The criteria used to establish air quality guidelines should be the production of technical document, and the establishment of regional collaboration centres and codes of best practice. The pollution is one of the major problems of this city, which requires special attention .The release of different pollutants into environment has increase noticeably as a result of indrustralization. The ambient air may contain a high number of pollutants depending upon natural and anthropogenic activities. The most widely implemented ambient air quality guidelines are those recommended by World Health Organisation(WHO) and these are used by many developing countries as guidelines for ambient air pollution.

MATERIALS AND METHODS

The most commonly used methods for automatically monitoring air pollutants.

- ✓ **Sulphur dioxide (SO_2):** Measured by the fluorescent signal generated by exciting SO_2 with UV light.
- ✓ **Nitrogen oxide (NO_X):** Measured by the chemiluscent reaction between NO_X and O_3.
- ✓ **Ozone (O_3):** Measured by an ultraviolet absorption analyser which determines the ozone concentration by the attenuation of 254 nm UV light along a single path cell.
- ✓ **Particulate Matter (PM_{10},$PM_{2.5}$ and STP):** Measured by gravimetric methods including true micro weighing technology, For automatic monitoring an instrument named " Tapered Element Oscillation Microbalance (TEOM)" has been most frequently used.
- ✓ **Carbon monoxide (CO):** In urban air pollution studies ,a non dispersive infrared photomerter utilising gas filter correlation technology is used to measure low concentration of CO accurately are reliably.
- ✓ **Total Suspended Particulate (TSP):** Total suspended particulate (TSP) measured by total suspended particulate monitor mass- flow controlled model no. TE-5170.

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RESULTS AND DISCUSSION

Table-1
National Ambient Air Quality Standards

Pollutant	Time weighted average	Concentration in ambient air			
		Industrial, rural residential and other areas		Ecologically sensitive area(notified central government)	
Sulphar dioxide(SO_2).ᵘg/m^3	Annual * 24 hours**	50	80	20	80
Nitrogen dioxide(NO_2).ᵘg/m^3	Annual * 24 hours**	40	80	30	80
Paticulate matters(PM_{10})).ᵘg/m^3	Annual * 24 hours**	60	100	60	100
Particulate matters ($PM_{2.5}$)).ᵘg/m^3	Annual * 24 hours**	40	60	40	60
Ozone(O_3)).ᵘg/m^3	8 hours*1 hours**	100	180	100	180
Carbon monoxide(CO) mg/m^3	8 hours*1 hours**	02	04	02	04

**Annul arithmetic mean of minimum 104 measurement in a year at a particular sight Taken twice a week 24 hourly at uniform intervals.*
*** 24 hours or 8 hourly monitored value.*

Location No. -1: Railway station. Anand

Sample No.	Time	CO(PPM)	NO_2(PPB)	SO_2(PPB)
1	8:00 TO 9:00	2.1	32.4	23.1
2	14:00 TO 15:00	1.1	30.6	15.4
3	20:00 TO 21:00	3.9	31.5	17.9
	24 hours average	2.36	31.5	18.8

Location No. -2: Borasad chokdi. Anand

Sample No.	Time	CO(PPM)	NO_2(PPB)	SO_2(PPB)
1	10:00 TO 11:00	4.1	34.5	19.7
2	16:00 TO 17:00	3.2	36.1	25.3
3	22:00 TO 23:00	2.0	25.3	15.4
	24 hours average	3.1	31.9	20.1

Location No.-3: Ganesh chokdi. Anand

Sample No.	Time	TSP(ᵘg/m^3)	PM_{10}((ᵘg/m^3)
1	8:00 TO 9:00	401	201
2	14:00 TO 15:00	299	215
3	20:00 TO 21:00	315	199
	24 h Average	338.3	205

Location No.-4: Zydus hospital. Anand

Sample No.	Time	TSP(ᵘg/m^3)	PM_{10}(ᵘg/m^3)
1	10:00 TO 11:00	430	210
2	16:00 TO 17:00	304	185
3	22:00 TO 23:00	299	206
	24 hours average	344.3	200.3

Carbon Monoxide (CO)

According to the data presented in above different table .It is clear that 24 hours average value of CO concentration in Anand city ranges between 1.1 to 4.1 ppm. It can be observed that CO levels in traffic areas are comparatively higher as compared to those monitored in like Borasad chokdi in Anand city.

Nitrogen Dioxide (NO_2)

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According to the data presented in above different tables .It is clear that 24 hours average value of NO2 concentration in Anand city ranges between 25.3 to 36.1 ppb. The value of NO2 measured in traffic area, In Borasad chokdi is very much traffic area in Anand city. so concentration of NO2 is high than other area.

Sulphur Dioxide (SO_2)

According to the data presented in above different table, it is clear that 24 hours average value of SO2 concentration in Anand city ranges between 15.4 to 25.3.It can also be observed that SO2 concentration level in traffic area are comparatively higher as compare to those monitored in like Borasad chokdi in Anand city.

Total Suspended Particulates (TSP)

The monitored data regarding Total Suspended Particulates (TSP) for 1 hour averages between 299 to 430(ɥg/m3.The TSP value indicates that concentration of particulate matters, area of Zydus hospital, Anand city is greater than Ganesh chokdi, Anand city.

Particulate Matters (PM_{10})

The monitored data regarding Particulate Matters (PM10) for 1 hour averages between 185 to 215ɥg/m3.The PM10 value indicates that concentration particulate matter (PM10) area of Ganesh chokdi, Anand city higher than zydus hospital, Anand city.

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