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Research paper

Evaluation of Atmosphere Air Quality in Hyderabad Urban, India

Sanjoli Mobar and Pradeep Bhatnagar
The IIS deemed to be University, Jaipur Address for correspondence: IIS University, SFS Mansarovar, Gurukul Marg, Jaipur

A R T I C I E I N F O

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**Corresponding Author:*
Sanjoli Mobar
sanjolimobar23@gmail.com

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A B S T R A C T

Environmental contamination is an ever-raising issue in industrialized and high-populated locations. Nowadays the severity and volume of air contaminant concentration have increased quickly in the troposphere. Hyderabad, the Andhra Pradesh capital, is the southern part center for both industrial and commercial actions. The urban has locations by about a 6.8million population and over 73,000 small, medium and main industrial facilities transferring to the bigger city. Air contamination is mostly related to autos and industrial resources of which motorcars are of significant trouble. The general data on the atmosphere gaseous contaminants levels in low areas especially Asian nations have been light and holding in the health effects view and economical responsibility related with the high levels of air contaminants, this investigation has been essayed with a purpose for assessing the Hyderabad atmosphere air quality that is experiencing rapid urban and industrial growth. The air models have been selected at the 1.5-3 m height from the ground level for monitoring the PM, SPM, oxides of nitrogen, and sulfur concentrations for ascertaining the association of among gaseous air contaminants and meteorological factors. The whole outcome shows that the quality of the air is decaying quickly according to gaseous contaminants. According to this study, numerous method is required for combating air contamination with autos by general understanding movements, media intermediation packages, efficient state activity programs judicious distribution of quality-oriented fuels.

Introduction

Environment contamination is a growing issue in industrialized and high-populated regions. Lately, the severity and volume of air contamination concentration have increased quickly in the troposphere. Manmade movements like fossil fuels explosion and the utilization of nitrogen fertilizers because of the product of hydrocarbons, CO, and NOx that eventually penetrate the environment. The grown concentration of air contaminants adversely influences the live organisms and the heat funding of the lower atmosphere. Investigations performed in the past have been confined to rural or to urban locations, mainly limited to 30° to 60° latitude. Some investigations have been performed by considering the air quality in various regions of the country (Joshi & Mishra 1998, Mudri et al. 1986). The general details on the levels of atmosphere gaseous contaminant in tropical regions, especially in Asian nations are meager. Maintaining in view the health outcomes and financial burden related to the high ranks of air contaminants, an endeavor has been created in this investigation for monitoring the concentration of the gaseous air contaminants in the urban surroundings of Hyderabad by estimating the ground level concentration of the contaminants.

Methodology

Case Study

Hyderabad, India is one of the most populated urban regions with a people of about 6.8 million residents, by a space of about 260 km^2. The land utilization includes 93 percent urban, 1.7 percent farming, and 5.3 percent water space (GVAQI 1997). It is placed among 17°10', 17°50' N latitude, 78°10', and 78°50' E longitude on the River Moosi banks by a 580 m elevation above the mean sea level. It lies within the subtropical belt and experiences an average highest temperature of 40°C in summer (April and May) and a lowest of 13°C in winter (November to January). It includes monsoon weather with an annual mean rain of 95.04 mm that is 80 percent obtained from June to September. The wind is from northwest to east by a mean speed of about 5 to 13 km/h. The sunlight duration has been discovered to be highest in the months of April and May with a mean amount of 7.0 hours as can be seen in Table 1.

Table 1. Meteorological situation in Hyderabad (2009 to 2010).

Month	Average amount						
	Max temperature	Min temperature	Whole rain	relative moisture 8:30 h	relative moisture 17:30 h	Mean wind rate	Sun duration
August	30.1	21.9	121	85	71	12	4.1
September	30.2	21.7	124	84	59	11	4.8
October	31.1	20.3	032	76	40	8	7.5
November	30.9	16.6	0	60	39	7	8.9
December	29	14.2	0	67	34	5	9.1
January	30.4	15.6	0	70	47	5	9.3
February	31.4	19.2	80	79	23	7	7.9
March	34.7	22.1	0	50	31	6	5.6
April	40.8	25.2	12	52	45	7	9.4
May	38.6	26.7	64	65	70	10	9.3
June	31.6	22.9	215	84	68	12	4.2
July	30	22.3	129	83	76	13	4.7

It is one of the main centers of the southern region of India, for industrial and commerce operations. This has almost 73,000 small, medium and extensive-scale industries and more than twelve lakhs automobiles. Air contamination is significantly related to motorcars and industrial resources. Specifically, an addition in the motorcar number from 6.9 lakhs to nearly twelve lakhs creates the main supporter for air contamination, which causes erosion of the urban surroundings of Hyderabad. Industrial and neighbor biomass burn, gases effect, and aerosols are the main factors of urban air contamination.

Measures have been performed for one year beginning from January 2009 to January 2010. Air samplings have been absorbed at 1.5-3 m from ground level from 6 samples positions called Basheer bagh, Punjagutta, RTC X roads, Begumpet, Narayanguda, and a management region, Hyderabad A. P. for obtaining the ground level SPM, NOx and $SO_2$21 concentrations for ascertaining the relation among gaseous air contaminants and meteorological factors. The PM10 has been estimated by the gravimetric approach utilizing the HVS-filtration method on a pre-weighed glass microfiber filter paper (GFA/EPM2000-Whatman). The SPMwas sampled using GF/A Whatman filter paper by gravimetric approach. The gathered samplings have been weighed by considering the BSI method (Bureau of Indian Standard Specification: BIS-5182) and measures have been constructed for obtaining the ultimate SPM concentrations. Air sample has been accomplished at eight a.m., 4 h distance at the speed of 1.5 L/min about SO_2 and NOx by the support of KIMOTO handy sampler (model HS-6). The air has been pulled to borosilicate glass impinges including 1percent KI solution in 0.1 M phosphate buffer (pH 7.0), 0.04 M TCM (potassium tetrachloride mercuries solution) and 0.1percent NEDA (n-1-naphthyl ethylene diamine dichloride) in 5percent sulfanilic acid for SO_2 and NOx orderly. The gases contained in the appropriate adsorbent have been analyzed spectrophotometrically by the systemic UV VIS aid (Visible Spectrophotometer 108) in the lab. The revised West&Gaeke (1956) approach has been utilized for determining SO_2, and Jacob & Hoccheiser (1958) revised approach for NOx samplings amount.

Discussion and Results

The summarized information on the mean concentration of suspended particulate material, SO_2, and Nox for the analysis period is demonstrated in Table 2.

Table 2. Contaminants concentration in individual sampling positions.

Sampling position	PM_{10} in $\mu g/m^3$			PM_{10} in $\mu g/m^3$			PM_{10} in $\mu g/m^3$			PM_{10} in $\mu g/m^3$		
	Rainy	Winter	Summer	Rainy	Winter	Summer	Rainy	Winter	Summer	Rainy	Winter	Summer
Punjagutta	120	141	134	560	793	928	60	43	13	18	52	16
R.T.C X roads	126	122	114	867	379	304	98	69	43	19	55	37
Basheerbagh	113	124	130	485	523	582	55	39	24	27	57	36
Begumpet	110	125	120	228	567	433	68	41	30	25	55	39
Narayanaguda	106	121	125	158	304	476	64	57	17	27	57	36
Control area	104	120	98	42	40	43	18	18	9	17	25	28

The NAAQS standards are demonstrated in Table 3. The whole outcomes obviously indicate that the NOx and SO_2 concentrations have been maximized between eight a.m and eleven, a.m and in the evening. It has been seen that the maximum SPM levels have been demonstrated at Punjagutta sample station. This is according to bad and unfixed roads, vehicular density, and the vehicles' kind ply on the roads regardless of the season. The releases from diesel vehicle possess more suspended particulate material than a petrol vehicle. The SPM expansion could be absolutely related to the traffic, especially with the diesel vehicles like lorries, trucks, and buses that are high on roads (Dayal & Nandini 2000).

Table 3: standards of air quality in Central Pollution Control Board for prohibition and controlling pollution (NAAQS).

Contaminants	Concentration in Ambient air		
	Industrial region	Residential region	Sensitive region
PM_{10}	150	100	75
SPM	500	200	100
NOx	120	80	30
SO_2	120	80	30
Remarks	Inferior	Moderate	Good

The NOx mean concentrations are good at 80 mg/m_3 (CPCB), whereas it was crossed 60 mg/m_3 of WHO limitations. Among the seasons, NOx concentrations have been discovered to be lower in the summer at whole places. The NOx concentration is so during the rainy season, due to high traffic concerning 4-stroke ignition motors (Agarwal et al. 1996).

The SO2 mean concentrations have been discovered to be 80 mg/m_3 and 60 mg/m_3 (WHOlimits) in whole places. SO_2 concentrations mean in winter have been high in comparison with the rainy season and summer season. According to highly traffic density and reversal controlling the contaminants' distribution. It is clear according to the seeing that the two-wheelers density is high in whole the sample positions could be regarded as the premium causative agent in entering the contaminants to the atmosphere.

NOx growth in concentrations is seen while the combustion temperature of the fuel is so high. The SO_2 release is proportionate to the sulfur amount in the fuel. The sulfur amount in diesel is 3 percent that is high in comparison with petrol. SO_2 releases are high from the diesel autos. The lower mean rate of autos generates high CO release (Gopinathan & Muthusubramanian 1998). Hemavathi & Jagganath's findings (2004), Jonathan& Ojha (2004) and Gupta & Shukla (2004) on air quality of the atmosphere also support the current results.

Conclusion

According to quick mechanization, grown urbanization, and high rail and road transport, the urban surroundings are worsened with the contaminants. The contaminated atmosphere air might generate immobilization, eye, and recessional irritation, interposition by the view, and sun obstacle. The main causative agents for the gas contaminants are the two-wheelers, making the air contamination in the city. Most of the auto-rickshaws run on degraded fuel that is accountable for the air contamination. In addition, awareness lack between the drivers, control strategy, awareness in the public of air contamination, the vehicles idling at traffic crossings are the causes to rise contamination load. procedure is required for combating air contamination with vehicles by general awareness campaign, media intervention

package, country performance and plans, and quality oriented fuel judicious distribution via the vendors.

Conflict of interest

The authors declare that they have no conflict of interest.

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