GEO-EYE

RESEARCH ARTICLE

Assessment and management of ambient air quality of Bengaluru urban Karnataka, India

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OPEN ACCESS

Received: 08.03.2019
Accepted: 12.05.2019
Published: 25.05.2019

Citation: Rannorey RS, Nandini N, Shilpashree K. (2019). Assessment and management of ambient air quality of Bengaluru urban Karnataka, India. Geo-Eye. 8(1): 12-14. https://doi.org/10.53989/bu.ge.v8i1.4

Funding: None

Competing Interests: None

Published By Bangalore University, Bengaluru, Karnataka

ISSN
Print: 2347-4246
Electronic: XXXX-XXXX

Introduction

Air pollution is rapidly increasing in metropolitan cities in India. Maintaining good Air quality is becomes the biggest challenge in present era. The presence or absence of various substance and their concentrations are the main determining factors of air quality. Air quality is expressed as a concentration or intensity of contaminants. Pollutants like dust particulate, sulphur dioxide, oxides of carbon, nitrogen etc. are the key indicators of urban air pollution these pollutants when present in large quantities in the atmosphere it diorites the quality of air and pose health problems in human beings. The central and state pollution control boards are constantly monitoring air quality in many identified areas of major cities of India, Air quality monitoring data clearly showed comparatively lower concentration of gaseous pollutants (SO_2, NO□) and higher concentration of SPM and RPM in the ambient air in the (Chauhan P., 2015). India need to generate regular information on the ambient concentration levels of small particulates of diameter less than 10 micron and/or 2.5 micron and take urgent steps to control emissions of these particles (Hosamane S. N. and Dr. Desai G. P., 2018) present research work is to constantly monitor ambient air quality in eco sensitive zone of Bangalore which is located Jananabarathi campus, Bangalore University. The ambient air quality is continuously monitored from 2010. The objective is creating decade data base of ambient air quality and monitor the changes in the ambient air quality.

Methodology

The study area is Department Environmental Science Jnana Bharthi Campus of Bangalore University, Bangalore. is located at the latitude of 12.946259 N and longitude of 77.510770 E. Located. It is an isolated serene place with an area of 486 ha and has a diverse habitats consisting of mixed deciduous and non-deciduous trees, shrubs, clumps of bamboos, marshes, check dams mini parks and Bio park that has developed in the campus in the year 2000 and about two lakh saplings of different plants species were planted. The air quality monitoring is carried out by standard method prescribed by CPCB. Yearly 104 days sampling is carried out for Suspended particulate matter, Repairable particulate matter, oxides of Sulphur and oxides of nitrogen in air. To determine concentration of particulate matter gravimetric method is followed and to determine oxide of Sulphur Modified West and Geake Method Sodium-Arsenite method (National ambient air quality monitoring Series: naaqms/ ... /2003-04)

Abbreviations and Acronyms

CPCB-Central Pollution control board, SPM-Suspended particulate matter, RSPM- Repairable particulate matter

Equations

Calculation of SPM, RSPM SO_2,NO_2 in Ambient Air

$$SPM = \frac{(Wf - Wi)x\,10^6}{V} \quad (1)$$

Where :

SPM = Mass concentration of suspended particles in $\mu g/m^3$

W**i** =Initial weight of filter in g.

W**f** = Final weight of filter in g.

V = Volume of air sampled in m^3

10^6 = Conversion of g to μg

$$RSPM = \frac{(Wf - Wi)x\,10^6}{V} \quad (2)$$

Where :

PM10 = Mass concentration of particulate matter less than 10 microndiameter in $\mu g/m^3$

W**i**= Initial weight of filter in g.

W**f** = Final weight of filter in g.

V = Volume of air sampled in m^3

10^6= Conversion of g to μg

Concentration of SO_2 in $\mu g/m^3$ in the sample is calculated as follows:

$$C(SO_2\ \mu g/m^3) = \frac{(A - Ao)x\,10^6\,x\,B}{V} \quad (3)$$

Where :

A - Sample absorbance

Ao - Reagent blank absorbance

10^3- Conversion litres to cubic meters

B - Calibration factor, μg/absorbance

V - Volume of air sampled in liters

$$\mu g\frac{NO_2}{m^3} = \frac{\mu g/NO2\,x\,V_s}{Va\,x\,0.82\,x\,V_t}x\,D \quad (4)$$

Where :

$\mu g/NO^-$

2 = NO^- **2** concentration in analyzed sample

Va = Volume of air sample, m^3

0.82 = Sampling efficiency

D = Dilution factor (D = 1 for no dilution; D = 2 for 1:1 dilution).

V_s = Final volume of sampling solution

V_t = Aliquot taken for analysis

Results and Discussion

The results indicate that air quality at J. B Campus, Bangalore University is well within permissible limit but decadal statistical analysis has shown gradual increase in pollutant concentration. Significant increase is observed 2014.

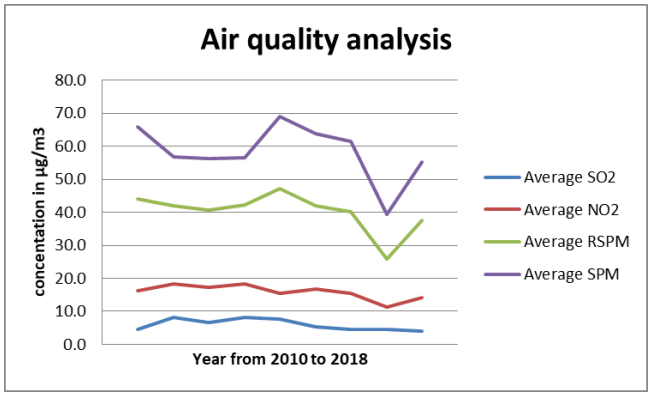

Fig. 1. Air quality analysis

Table 1. Pollutants concentration

Year	Average $SO_{2\ \mu g/m^3}$	Average $NO_{2\mu g/m^3}$	Average RSPM$\mu g/m^3$	Average $SPM_{\mu g/m^3}$
2010	4.6	16.2	44.1	65.9
2011	8.1	18.3	41.9	56.8
2012	6.6	17.2	40.6	56.1
2013	8.2	18.4	42.2	56.5
2014	7.7	15.4	47.1	69.0
2015	5.3	16.8	42.1	63.9
2016	4.4	15.3	40.2	61.3
2017	4.6	11.2	25.9	39.5
2018	4.1	14.2	37.7	55.2

Conclusions

The statistical analysis clearly indicates the gradual Increase in air pollutant concentration in eco-sensitive area which is surrounded by luxuriant growth of different tree species. Results show annual continual increase from 2010 to 2018. This study will help in understanding assimilative capacity of green cover by proxy values. The level of pollution in city due to point and nonpoint sources is increasing in exponentially, as a result having impact on the Bangalore university bio park an eco-sensitive zone. The result has shown an average increase of $2\mu g/m^3$ of oxides of sulfur, $4\mu g/m^3$ of $10\mu g/\ m^3$ of suspended particulate matter respectively. The seasonal levels of particulate matter and oxides of sulfur have shown slight increase in levels during summer and Oxides of Nitrogen levels are high during monsoon season.

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