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*Full Length Research Paper*

# Ambient air quality monitoring and assessment of air pollution status at different locations in Kolhapur city

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**ABSTRACT**

Growing urbanization has emerged as a major issue contributing to the air pollution. The high disease burden due to air pollution has started to impact the economy of the urban centers. Kolhapur city is a district place in the Western Maharashtra (India) and important centre for agriculture, industries and education. Increased vehicular traffic is foremost to deterioration of air quality in Kolhapur city in recent years. In present work air quality is monitored with view to assess current levels of pollutants. Three representative sites were selected namely Shivaji University (SU), Dabholkar Corner (DC) and Mahadwar road (MR) on basis of localities and traffic pattern in the Kolhapur City. These pollutants are associated with vehicular emission and road dust due to pedestrians both. Air pollutant level on three locations monitored for three seasons and is summarized in this paper.

**Keywords:** Air pollution, Kolhapur, SPM, Monitoring, Air quality

## INTRODUCTION

Air is the most important component of environment without which living being can not survive. Clean air is becoming scarce due to ever increasing population and settlements are getting flourished in outskirts of the cities giving rise to new townships. Quality of the ambient air is determinant of physical and mental health of people in any area. Relationship between status of air and health condition is studied by Pavelescu et al., 2005. Epidemiology aspects of air pollution are gaining importance due to increase in respiratory disorders among city dwellers. Kim et al., 2004 have reported associations between respiratory symptoms and residential proximity to traffic. Numbers of cities today are influenced by deteriorating air quality due to wrong setting of industries and increasing traffic load. Cutting of trees for developmental activities which are inseparable part of human life is another reason of rising pollution of air. Research has been carried out since long back in many developed countries in order to detect the polluting sources of the city and to measure their contribution (Cherniack et al., 1965).

Kolhapur city is one of the growing cities in the state of Maharashtra with considerable rise in population and city is not exception for changing environmental conditions and lifestyle as like many other cities. Pollution of water and air are on rise since last few years with problem of noise pollution during festive period in the Kolhapur city (Lad et al. 2012). Traffic is the main source of pollution besides industrial units located in the heart of the city. The industrial establishments are mostly engaged in engineering i.e. foundries, workshops, automobile, repair shops, smithy, fabrication etc. Though, the area concerned is small the output given by this industrial area is quite good and has added to name and economy of Kolhapur city (ESR, 2008). Different commercial areas clustered along main roads are adding to clogging of traffic resulting in rise in level of pollutants. Roads which are important means of transportation were constructed during last two years took toll of number of well grown huge trees which is supposed to be reason for risen average temperature of the city (Cherniack et al., 2013). Emission from an individual car, bike or heavy motor vehicle is generally low, but addition of 2,37,492 new vehicles every year increases the intensity of vehicular pollution day by day. Cars, trucks and buses emit significant quantities of carbon monoxide, hydrocarbons, nitrogen oxides, fine particles. Even though the PUC centers are giving certificates after testing the vehicle, it is necessary to calibrate the PUC analyzers periodically. Kolhapur city has a network of 86.59 km roads of different width and there

are 18 traffic signals (Mangelakar et al., 2012). It is observed that engines of vehicles are kept on during 'stop signal' which adds to partial combustion resulting in more emission of obnoxious gases. Monitoring of air pollution and strategies to minimize it to extent possible is of immense importance for growing city like Kolhapur. Considerable rise in number of vehicles in the city during last two decades gives scope to clear the picture of air status by observation for relatively longer periods. Sampling methods provide reliable, cost-effective air quality analysis, which gives a good indication of average pollution concentrations over a period of weeks or months (Popescu et al., 2009). In this view to determine average air quality of the Kolhapur city, monitoring of certain major pollutants was carried throughout the year.

## MATERIAL AND METHODS

For monitoring of air three locations in the Kolhapur city viz. Shivaji University, Dabholkar Corner (DC) and Mahadwar Road were selected in which Dabholkar Corner was representative of higher traffic while Mahadwar Road (MR) and Shivaji University (SUK) were Commercial and Control site respectively. These sites were selected as representative of all three locations viz. Residential, commercial and control. Air quality pollutants were monitored as per the guidelines provided by CPCB. Air quality monitoring was accomplished by carrying out for 6 days of week and each site monitored for the 2 times in a week, for 24 hours a day. Sampling of air was carried out with Respirable Dust Sampler (RDS) (NEERI designed and Envirotech made). Air Quality Monitoring was done continuously in each season viz. summer, monsoon and winter of year 2011. Monitoring of $SO_2$ and NOx was carried out after every four hours and suspended particulate matter (SPM) were monitored with the interval of eight hours in a day. Analysis of $SO_2$ and NOx was performed with Modified Waste Gaeke and Na Arsenite method respectively. Cup and filter paper method was used to monitor SPM from NRSPM and RSPM in the air. Data obtained was analysed statistically on Excel programme prepared by Microsoft (Dasibi Ozone Monitor, Model 1003 AH).

## RESULTS AND DISCUSSIONS

Results of the present study are summarized in following tables. All parameters are described in ug/m$^3$. Values in bracket indicate standard norms (Tables 1-3).

| | $SO_2$ (80) | NOx (80) | SPM (100) |
|---|---|---|---|
| **SUK** | 12.33 | 15.88 | 205.08 |
| **DC** | 23.24 | 32.09 | 379.10 |
| **MR** | 19.57 | 25.15 | 101.50 |

**Table 1.** Avg. pollutant level in summer at different locations (ug/m$^3$).

| | $SO_2$ (80) | NOx (80) | SPM (100) |
|---|---|---|---|
| **SUK** | 9.43 | 12.59 | 127.84 |
| **DC** | 24.02 | 32.72 | 404.21 |
| **MR** | 20.395 | 25.33 | 336.32 |

**Table 2.** Avg. pollutants level in winter at different locations (ug/m$^3$).

| | $SO_2$ (80) | NOx (80) | SPM (100) |
|---|---|---|---|
| **SUK** | 7.37 | 8.79 | 102.27 |
| **DC** | 18.05 | 25.23 | 253.27 |
| **MR** | 14.06 | 18.39 | 197.34 |

**Table 3.** Avg. pollutants level in rainy season at different locations (ug/m$^3$).

In present study it is observed that there is maximum level of pollutants at Dabholkar Corner site during all the seasons. Average level of SPM at Shivaji University site has remained always below permissible limit given by different agencies. Being residential and commercial area Mahadwar Road (MR) location has median pollutant as compared to other sites. Settling is the main reason of lower pollutant level during rainy season while drifting pollutants in summer rise in per unit area of the concentration (Figures 1-3).

## CONCLUSION

Higher level of pollutants at Dabholkar corner site than two other locations asks for control of vehicular pollution in the city. Shivaji University site has remained with lowest pollutants at all the seasons which is attributed to minimum traffic in the area. Present study discerns that there is need


**Figure 1.** Avg. gaseous pollutant level in summer at different locations (ug/m$^3$).

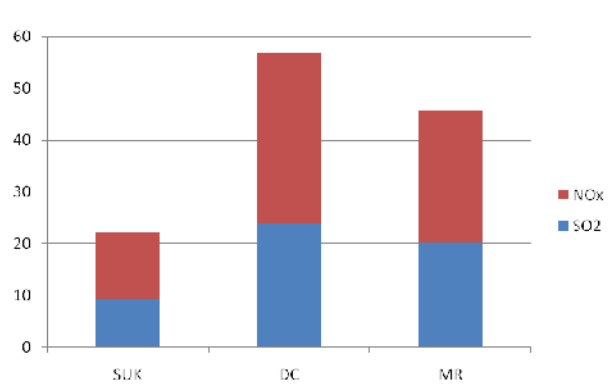


**Figure 2.** Avg. gaseous pollutants level in winter at different locations (ug/m$^3$).

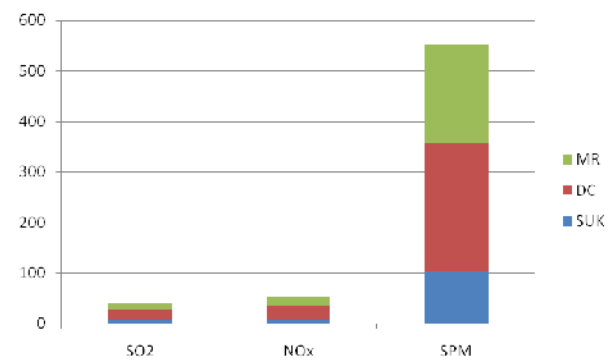


**Figure 3.** Avg. gaseous pollutants level in rainy season at different locations (ug/m$^3$).

to implement better transport management with well planed traffic roads and awareness for minimum use of vehicles. Ambient Air Quality Monitoring sets out the basic framework for the measurement of air quality in Kolhapur city. Dabholkar Corner (DC) area has showed maximum pollution due to heavy traffic especially at morning and evening hours. Mahadwar Road (MR) shows the medium level of the pollution and the Shivaji University (SUK) site showed the low pollution level as compared to other sites. In summer the strong sunlight leads to a buildup of ozone through the oxidation of volatile organic compounds (VOCs) such as benzene, in the presence of nitrogen oxides. Citizens moreover students as well as educational institutions should show their increasing interest and concern to minimize the pollution in possible way they can. The problem of pollution has also given coverage by local mass media in order to tackle the same through awareness.

Present work is significant in long term planning and strategy formation to cater growing air pollution problem in Kolhapur city. Seasonal variation will helpful to assess current trend and focus on sources of air pollution to minimize by implementing traffic control through city out skirts and awareness in citizens. Scientifically monitored data will helpful to compare past and predict future scenario within span of decades and to implement accordingly.

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## REFERNCES

Cherniack I, Bryan RJ (1965). A comparison Study of Various Types of Ozone and Oxidant Detectors which are Used for Atmospheric Air Sampling. JAPCA. 15(8): 351-354.

Environmental Status Report (ESR) (2008). Kolhapur city prepared by Kolhapur Municipal Corporation, Kolhapur Maharashtra, India.

Kim JJ, Smorodinsky S, Lipsett M, Singer BC, Hodgson AT, Ostro B (2004). Traffic-related air pollution near busy roads: the East Bay Children's Respiratory Health Study. Am. J. Respir. Crit. Care. Med. 170(5): 520-526.

Kumar A, Kim H, Hancke GP (2013). Environmental monitoring systems: A review. IEEE.13(4): 1329-1339.

Lad RJ, Patil VN, Raut PD (2012). Study of Noise pollution during Deepawali festival in Kolhapur city of Maharashtra, India. 1(5): 1-4.

Manual of Air Monitoring prepared by CPCB.

Mangalekar SB, Jadhav AS, Raut PD (2012). Study of Noise Pollution in Kolhapur City, Maharashtra, India. Univers. J. Environ. Res. Technol. 2(1): 65-69.

Operating and Instruction Manual, Dasibi Ozone Monitor, Model 1003 AH, Dasibi Environmental Corp., Glendale, CA.

Pavelescu M, Pavelescu A, Sandulescu A (2005). Nuclear power and the environment, Rom. J. Phys. 50(5-6): 473-491.

Popescu F, Ionel I, Lontis N, Calin L, Dungan I (2009). Air quality in an urban agglomeration Rom. J. Phys. 56(3-4): 495-506.