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The Study of Air Quality Status in Marathwada Region of Latur City.

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ABSTRACT

Nowadays, it is observed that urban activities are responsible for increasing levels of pollution. This study presents the status of ambient air quality in the urban area of Latur city. Three monitoring sites were selected in the study region representing residential, commercial, and industrial areas. These sites were chosen according to the guidelines of the Maharashtra Pollution Control Board (MPCB) and the Central Pollution Control Board (CPCB), New Delhi, to ensure proper coverage of the area. Air quality was evaluated by measuring four major air pollutants: SO_2 (oxides of sulfur), NO_x (oxides of nitrogen), RSPM (repairable suspended particulate matter), and SPM (suspended particulate matter). The assessment was carried out over a period of one year, from January 2025 to December 2025. Monitoring was conducted continuously for two days (48 hours) per week using a Repairable Dust Sampler (RDS) machine. After one year of investigation, the results showed that the concentrations of RSPM and SPM value close to the standards prescribed by the CPCB in residential and commercial, industrial site areas. The levels of NO_x and SO_2 at all three locations were within the CPCB standards, though comparison among the sites indicated that their concentrations were slightly higher in the Industrial area.

Keywords: RSPM, SPM, SO_2, NO_x, Ambient Air Quality

INTRODUCTION

Air pollution has harmful effects on human health. Pollution mainly occurs due to the combustion of coal and gas oil, burning of fossil fuels such as coal, wood, and dry grass, and emissions from various manufacturing processes that release dust and gases. Sulfur- and nitrogen-containing compounds also contribute to increased pollution levels. Vehicular movement, high traffic density, and other organic and inorganic pollutants further increase the concentration of air pollutants like RSPM, SPM, NO_x, and SO_2. In Latur city, transportation is one of the major sources of air pollution. Additional contributing sources include waste material shops, industrial operation**s,** waste burning, juice shops, construction activities, and natural contaminants.

MATERIALS AND METHOD

Total area of the city is 32.56 Km^2 and situated 636 meters above the mean sea level it is 16th large population city in Maharashtra annual temperature range from 13 to 41^0C the highest temperature is recorded 45.8^0C and lowest is 6.9^0C the monsoon occurs in month of June to September. Three monitoring sites of steady area located at Dayanand Science college, Residential area (category number 642). Ganjgolai, Commercial area (category number 643). Water supplyproject, Industrial area (category number 641). Assessment carried out during the month of **January 2025 to December 2025**. Under the National Ambient Air Quality Monitoring Project, sponsored by MPCB Mumbai and CPCB New Delhi, and Run by Dayanand Education Society Latur, and funded by Maharashtra pollution control board From Measurement for SO_2 and NO_xSample monitoring through Thermo electrically cooled gaseous sampling attachment to RDS machine which is commercially available through Envirotec Dheli. Frequency of Sample collection is of Four hours duration, machine works for two days at each site in week .Tetra chloro mercurate and Sodium arsenate are used as absorbing reagent for SO_2 and NO_x respectively. Collected samples are analyzed by spectrophotometrically Labman Scientific instrument ,and method used West &Geake for SO_2 and Jacob & Hochheiser method for NO_x.Measurement, RSPM and SPM Monitored by RDS-Envirotech APM 460 DXNL model.Usually the air was drawn at a flow rate of 1.1 to1.2 m^3per minute. The air inside the sampler passed through a combination of cyclone separator and filter in two stages. At the first stage, the cyclone separator was used to collect the particles (particles in the size range above than of 10 **$\mu g/m^3$**).The rest of the particulates in the size range of 2.5 to 10 **$\mu g/m^3$** were collected over a previously dried and weighed glass micro fiber filters (Minipore GF/1,8”x10”inches). RDS is operated continuously for two days.

Table 1. Monthly and yearly average concentration of RSPM (PM_{10}), SPM ,SO_2, NO_X in $\mu g/m^3$Residentialsite

Table2. Monthly and yearly average concentration of RSPM (PM_{10}), SPM, SO_2, NO_X in $\mu g/m^3$ Comercial site

Month	Total Samplesanalized	SO2			Nox			Total Samplesanalized	RSPM				SPM	
		Min	Max	24 hr Avg.	Min	Max	24 hr Max. Ave.		Min	Max	24 hr Max.Ave	Min	Max	24 hrMax.
January	48	6.0	12.0	8.7	16.0	28.0	21.4	24.0	54.0	65.0	59.0	82.0	94.0	88.6
February	48	4.0	12	8.7	11.0	26.0	20.9	24.0	53.0	64.0	59.0	71.0	93.0	86.3
March	54	6.0	16	9.2	15.0	30.0	23.0	27.0	52.0	65.0	60.0	81.0	93.0	86.0
April	54	6.0	17	11.1	22.0	30.0	25.8	27.0	52.0	66.0	59.0	76.0	90.0	81.7
May	48	6.0	12	8.8	21.0	29.0	24.8	24.0	57.0	63.0	60.0	87.0	93.0	89.9
June	54	3.0	13	7.6	17.0	28.0	22.2	27.0	53.0	64.0	59.0	82.0	93.0	88.704
July	54	2.0	7	4.5	11.0	22.0	16.2	27.0	54	60	57	82.0	91.0	87.778
August	48	2.0	7	3.7	12.0	19.0	15.1	24.0	53.0	61.0	57.0	79.0	90.0	85.3
September	30	2.0	6	3.5	10.0	16.0	13.2	15.0	54	61	57.0	83.0	89	85.46
October	30	3.0	7	4.1	14.1	18.1	15.0	15.0	56	61	58	84	89	86
November	12	5.0	8	6.3	16.0	21.0	18.3	6.0	57.0	61.0	59.7	85.0	89.0	87.7
December	60	4.0	8.2	6.9	16.0	24.0	21.4	30.0	57.0	62.0	60.0	85.0	93.0	89.2
	Total samples in year			24 hr Max. Ave			24 hr Max. Ave	Total samples in year			24 hr Max. Ave			24 hr Max. Ave
				SO2			NOx				RSPM			SPM
	540			7.18			20.2	270.0			58.8			86.1

Month (Year-2025)	Total Samples analized	*SO2*			*Nox*			Total Samplesanalized	RSPM				SPM	
		Min	Max	24 hr Max. Ave.	Min	Max	24 hr Max.Ave.		Min	Max	24 hr Max. Ave.	Min	Max	24 hr Max. Ave.
January	60	5.0	11.0	9.0	16.0	32.0	23.0	30.0	53.0	64.0	59.0	77.0	93.0	86.8
February	48	7.0	12.0	9.0	15.0	27.0	21.0	24.0	53.0	61.0	59.0	80.0	93.0	86.8
March	48	6.0	11.0	8.0	16.0	29.0	23.0	24.0	57.0	65.0	60.0	80.0	92.0	87.4
April	54	8.0	18.0	11.0	20.0	31.0	26.0	27.0	55.0	65.0	60.0	80.0	94.0	87.3
May	54	6.0	12.0	9.0	20.0	29.0	25.0	27	55.0	65.0	61.0	82.0	93.0	90.2
June	48	3.0	15.0	8.0	16.0	28.0	22.0	24.0	53.0	65.0	60.0	83.0	93.0	89.1
July	60	2.0	9.0	4.6	11.0	21.0	16.1	30	53	61	57	81.0	91.0	86.933
August	36	2.0	7.0	3.9	12.0	18.0	15.0	18	52.0	61.0	58.0	80.0	89.0	84.6
September	48	1.0	6.0	3.7	10.0	18.0	13.4	24	51.0	61.0	57.0	80.0	90.0	84.5

October	60	3.0	7.0	4.9	9.0	19.0	13.9	30.0	52.0	59.0	55.8	80.0	86.0	83.3
November	48	4.0	8.0	5.7	10.0	20.0	14.8	24	51.0	65.0	57.2	75.0	91.0	82.8
December	54	4.0	11.0	7.6	16.0	26.0	21.1	27.0	58.0	63.0	60.1	87.0	93.0	89.2
	Total No. of samples in year			**24 hr Max. Ave**			**24 hr Max. Ave**	**Total No. of samples**			**24 hr Max. Ave**			**24 hr Max. Ave**
				SO2			**NOx**				**RSPM**			**SPM**
	618			**7.0**			**19.5**	**309.0**			**58.7**			**86.6**

Table3. Monthly and yearly average concentration of RSPM (PM_{10}), SPM, SO_2, NO_X in $\mu g/m^3$ Industrial site

Month (Year-2025)	Total Sampl esanal ize	SO2			Nox			Total Sample sanalize	RSPM				SPM	
		Min	Max	24 hr Max. Ave.	Min	Max	24 hr Max. Ave.		Min	Max	24 hr Max. Ave.	Min	Max	24 hr Max Ave.
January	**54**	**3.0**	**11.0**	**7.1**	**13.0**	**29.0**	**23.6**	**27.0**	**51.0**	**71.0**	**61.0**	**70.0**	**93.0**	**81.9**
February	**48**	**4.0**	**11.0**	**7.9**	**14.0**	**29.0**	**21.7**	**24.0**	**50.0**	**71.0**	**57.3**	**70.0**	**92.0**	**77.8**
March	**54**	**5.0**	**13.0**	**8.5**	**16.0**	**28.0**	**22.8**	**27.0**	**58.0**	**65.0**	**60.6**	**82.0**	**92.0**	**88.6**
April	**48**	**8.0**	**14.0**	**11.0**	**20.0**	**32.0**	**26.0**	**24.0**	**60.0**	**69.0**	**63.0**	**88.0**	**101.0**	**93.0**
May	**60**	**6.0**	**13.0**	**9.1**	**21.0**	**29.0**	**24.6**	**30.0**	**57.0**	**66.0**	**61.2**	**87.0**	**94.0**	**90.7**
June	**48**	**2.0**	**13.0**	**8.0**	**16.0**	**29.0**	**22.3**	**24.0**	**55.0**	**64.0**	**60.0**	**84.0**	**94.0**	**89.5**
July	**48**	**2.0**	**8.0**	**4.9**	**12.0**	**21.0**	**17.1**	**24.0**	**53.0**	**61.0**	**57.0**	**83.0**	**91.0**	**87.7**
August	**54**	**2.0**	**6.0**	**3.9**	**11.0**	**19.0**	**15.2**	**27.0**	**51.0**	**61.0**	**58.0**	**84.0**	**90.0**	**87.3**
September	**36**	**2.0**	**5.0**	**3.5**	**9.0**	**18.0**	**13.3**	**18.0**	**52.0**	**62.0**	**58.0**	**81.0**	**90.0**	**85.1**
October	**54**	**3.0**	**7.0**	**4.8**	**11.0**	**19.0**	**14.3**	**27.0**	**52.0**	**58.0**	**55.0**	**81.0**	**84.0**	**84.1**
November	**54**	**3.0**	**8.0**	**5.6**	**10.0**	**22.0**	**16.0**	**27.0**	**52**	**61**	**56.7**	**82.0**	**90.0**	**86.2**
	48	**5.0**	**10.0**	**7.5**	**16.0**	**25.0**	**21.4**	**24**	**57**	**63**	**60.0**	**87.0**	**92.0**	**89.8**
	Total No. of sampl es in year			**24 hr Max. Ave**			**24 hr Max. Ave**	**Total No. of samples in year**			**24hr Max. Ave**			**24 hr Max .Ave**
				SO2			**NOx**				**RSP M**			**SP M**
	606			**6.8**			**19.9**	**303**			**59.0**			**86.8**

Table 4. National ambient air quality standards (Annual) for different parameters in ($\mu g/m^3$)

Sampling sites	RSPM	SPM	SO_2	NO_x
Residential	60	140	60	60
Commercial	60	140	60	60
Industrial	120	360	80	80

Fig.1 – Showing monthly average concentration of RSPM ($\mu g/m^3$) at Residential, Commercial, and Industrial

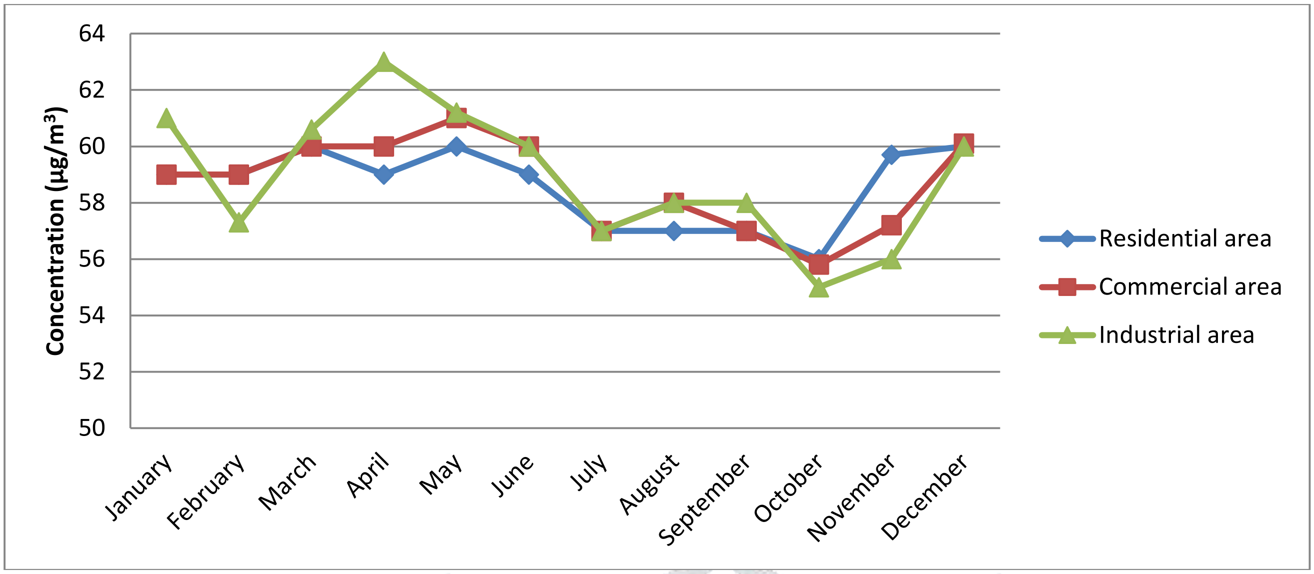


Fig.2 – Showing monthly average concentration of SPM (µg/m^3) at Residential, Commercial, and Industrial area.

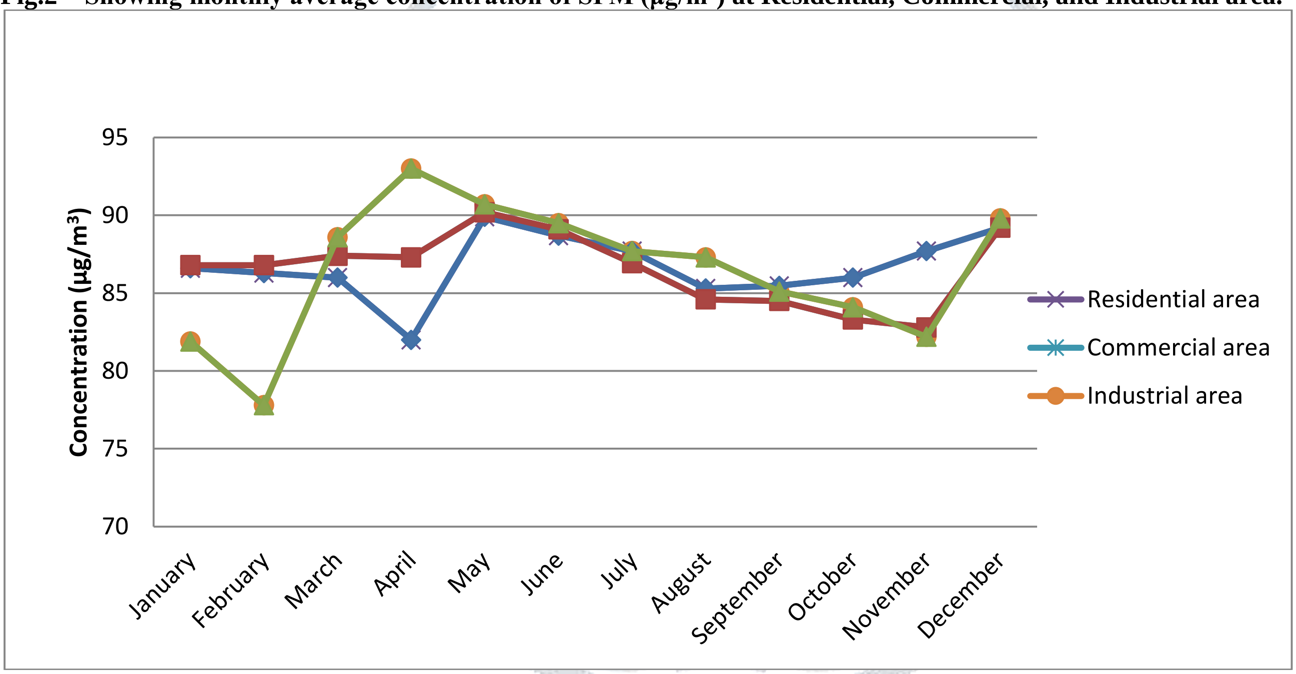


Fig.3 – Showing monthly average concentration of So2 (µg/m^3) at Residential, Commercial, and Industrial area.

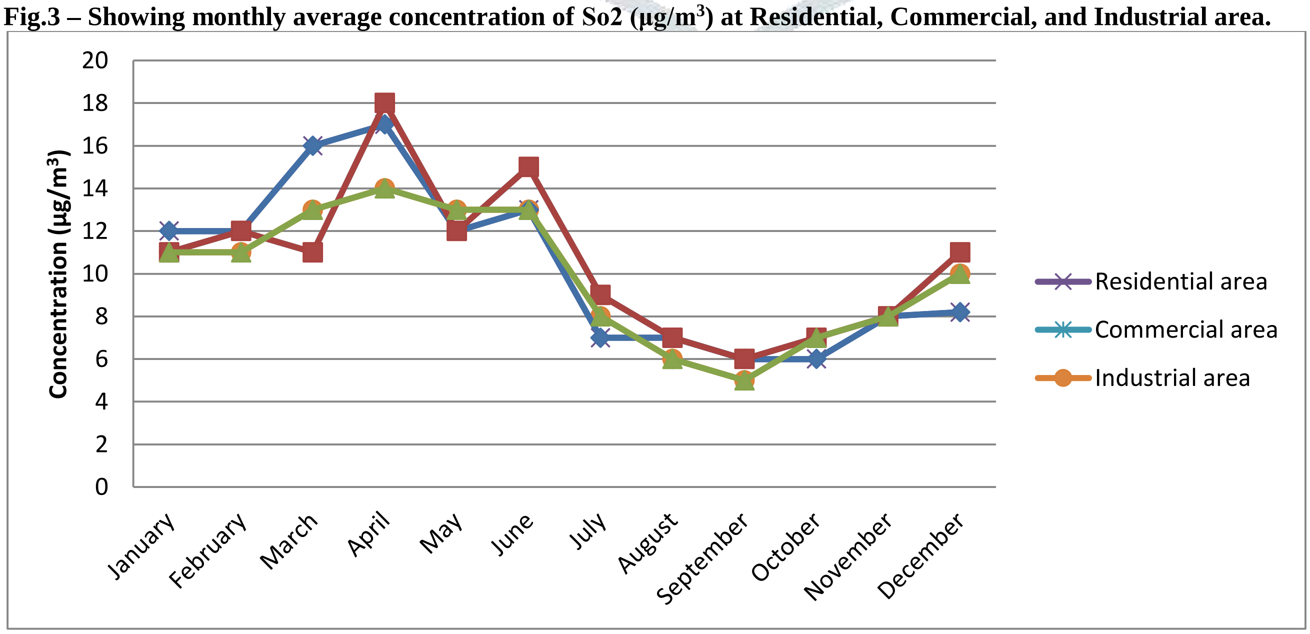
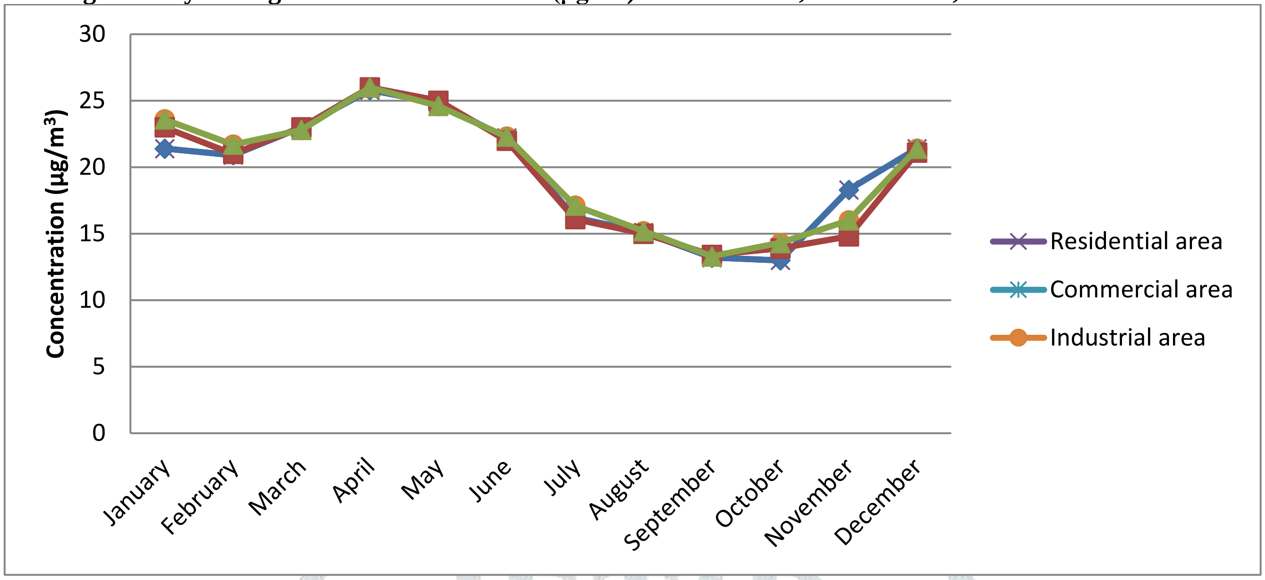


Fig.4 – Showing monthly average concentration of Nox (µg/m^3) at Residential, Commercial, and Industrial area.



RESULTS AND DISCUTION

The statistical results of RSPM in the year **January 2025 to December 2025** for different sites have been presented in table 1,2,3.The observed minimum RSPM concentration was 57 µg/m^{3}and maximum was 60 µg/m^3 at residential area. Minimum RSPM concentration was 59 µg/m^{3}and maximum was 65 µg/m^{3}at commercial area. Minimum RSPM concentration was 58 µg/m^{3}and maximum was 64 µg/m^{3}at industrial area. Average RSPM concentration was 58.8 µg/m^3, 58.7 µg/m^3,59 µg/m^{3}at residential, commercial and Industrial areas respectively..Minimum SPM concentration was 81.7 µg/m^3 and maximum was 88 µg/m^3 at residential area. Minimum SPM concentration was 82.8 µg/m^3 and maximum was 86.9 µg/m^3 at commercial area. Minimum SPM concentration was 77.8.8µg/m^3 and maximum was 93 µg/m^3 at industrial area. Averages concentration SPM was 86.1 µg/m^3,86.6 µg/m^3 and 86.8 µg/m^3 at residential, commercial and Industrial areas respectively. It was noticed that annual average concentration of RSPM and SPM at Residential as well as Commercial areas found crosses the National ambient air quality standards, During the month of January to June all the parameters SPM, RSPM ,SO_2 and NO_x and month of July to October it is found lower as compares to January to June and in the month of November to December it is again slightly increases in all three sites of Residential and Commercial, industrial area The reason may be increased festival activity and seasonal change occurred.

CONCLUSION

This research explores the initial findings regarding the levels of RSPM, SPM, SO_2 and NO_x concentrations. While average concentration of SO_2 and NO_x remained safely within the limits set by the National Ambient Air Quality Standards (NAAQS) across all three monitored locations, particulate matter levels RSPM and SPM fluctuated and were notably higher in residential and commercial sectors. The study identifies several primary contributors to this particulate pollution, including: High vehicular activity and the mechanical wear of automobile components. The increased burning of traditional fuels like wood and coal. Emissions from various small-scale industries within the city. Dust generated from poorly maintained roads and ongoing civil construction.

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