Evaluation of Noise Pollution Status In Metropolitan Aurangabad City, Maharashtra (India)

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Abstract- *Noise pollution is a major problem in cities around the world. Environmental noise consists of all the unwanted sounds in our communities. A detailed evaluation and analysis of the fast growing metropolitan Aurangabad city has been carried out to know the noise pollution status with respect to existing number of two wheeler and four wheeler vehicles. Present analysis was categorised into the three timings of day in which fifteen most crowded areas were selected. For the measurement of Noise levels for which advanced scientific and sensitive dB meters were used. It is found that highly concentrated and dense areas of the city are mostly polluted whereas the educational zones including university areas having low concentrations of Noise. The noise level measurement at morning ranged in between a 21.7 to 75.5 dB.The average noise level concentration was 56 dB. Average numbers of two wheelers were 254 and numbers of two wheelers were 122. The noise level measurement at afternoon time range in between minimum 26.8 to 88.2 dB. The average noise dB level of afternoon time was 69.51. Average numbers of two wheelers were 316 and number of two wheelers were 161.The noise level measurement at evening time i.e. at 6 to 8 pm were ranged in between minimum 34.7 and maximum up to 86.6 dB. The average noise level concentration was 69.20 dB. Average numbers of two wheelers were 347 and numbers of two wheelers were 253. It is also found that, the most of the areas of the city are above the standards given by WHO Guidelines. On the basis of the interpretation given in the present research paper it is recommended that Noise pollution should be avoided so as to protect the human life from detrimental effects.*

Keywords- noise, pollution, concentration, dB meter, measurement.

I. INTRODUCTION

Noise pollution, a form of detrimental pollution and a major threat to health and well-being. It is more severe and cocentratrated in crowded areas and widespread than ever before, and it will continue to develop in the magnitude and severity in terms of effects and concentration because of over population, urbanization and the associated growth in the use of powerful appliances , varied and mostly various mobile sources of noise (Garg *et al.,* 2017). It will also continue to increase because of long-term growth of infrastructure, domestic constructions, Rail and air traffic congestions, which remain basic sources of environmental noise. In industrial sectors workers are basically exposed to high noise due to operations of machinery in routine. The common health impacts of noise pollution are mostly critical, pervasive, persistent, medically and socially potent. Noise produces direct and cumulative negative effects which impair health status and that disturb residential, social and working environment with corresponding to economic and health issues. Motor vehicles are the major sources of noise emission in the cities contributing approximately 55% to the total noise (Banerjee *et al.,* 2008; Pandya *et al.,* 2002; Sinha *et al.,* 2003) (Garg *et al.,* 2017). The potential to assess and predict noise exposure precisely is an increasingly a crucial factor in the design and implementation of any sources development. The number and intensity of noise sources may vary with type of basic sources and in particular, with the type of mechanism of source incorporated. Relationship between the acoustic properties of the main noise sources and the various modes of parameters must be known for the best assessment of noise levels under the source path of any type. Noise is a prominent feature of the ecological system; it includes noise from transport, industry and neighbors. It has directly and indirectly affected on the people which may lead to the health issues. Some of the major health impacts cause by the noise which is may be permanent hearing loss and numerous psychological disorders (Garg *et al.,* 2017). Other some of the health issues include high blood pressure, headache, migraine, irritability and insomnia. In the countries like India there were limited researchers studies on noise pollution are being carried out. Even such research studies conducted in the past observed that the noise level in urban areas is generally more than the prescribed limit given by CPCB guidelines. The WHO (World Health Organization) estimates that 10% of the population at the global level is exposed to noise levels that could significantly causes noise induced loss of hearing potential (Oishi *et al.,* 2011; *Basner et al.,* 2014). (Garg *et al*., 2017). Environmental noise causes various psychological effects like annoyance (Ohrstr¨om et al., 2004; Pathak *et al.,* 2008; Ouis,

2001;), anxiety, depression and serious health issues like cardiovascular disease (Babisch, 2008; Babisch *et al.,* 2005; Davies *et al.,* 2012; Jamir *et al.,* 2014; Selander *et al.,* 2009). Most environmental noises can be approximately described by one of several simple measures. They are all derived from overall sound pressure levels, the variation of these levels with time and the frequency of the sounds. Noise has been found to have potential negative impact on blood pressure and mental health of children's. Few studies show that people who are generally exposed to high road traffic noise levels have greatly higher prevalence of blood pressure (Chang *et al.,* 2011). In the India, the pilot project of NANMN (National Ambient Noise Monitoring Network) established by Central Pollution Control Board (CPCB) in the 2011 year, covering 35 locations in the seven metro cities, those are Delhi, Lucknow, Bangalore, Hyderabad, Kolkata, Mumbai and Chennai, is one of the great step for monitoring and analyzing the ambient noise levels and disseminating the noise related data to the public. The sound pressure levels of most noises vary with time. Consequently, in calculating some measures of noise, the instantaneous pressure fluctuations must be integrated over some time interval. To approximate the integration time of our hearing system, sound pressure meters have a standard set mechanism (Garg *et al.,* 2017).

II. METHODOLOGY

Noise is one of the chief externalities of transportation especially in ambient air and road transportation and it goes underestimated on the large scale. Noise can be defined as sound which is not required. The noise pollution generated by various sources during operations around like Bus stands and heavily crowded places represents serious ecological, technical and socio-economic problem. Noise levels are measured by the numerous methods. They are all derived from overall sound pressure levels, the variation of these levels with time and the frequency of the sounds. Aurangabad city is one of the well-known industrial and fastest growing cities and it is well known for its auto sector (Jogdand *et al.,* 2021). Some of the cities like Aurangabad which is surrounded by the hills of Vindhya ranges (Potadar and Patil, 2016a) and these ranges have significant effect on the control of noise pollution. It is observed that the areas like MIDC Waluj area located nearby Aurangabad city which is approximately 12-14 kms away from Central Bus Stand as well as 11-13 kms from Railway Station of Aurangabad city record most of the noise compared to the main city areas (Potadar *et al.,* 2021). Some of the cities like Aurangabad which is surrounded by the hills (Potadar and Patil, 2016a) and such hilly zones have significant effect on the control of noise pollution and there is no global agreement on the main reasons where there is a growing awareness about pollution (Potadar and Patil, 2016b).

Fig.1. Study area selected for noise measurement

For the detail analysis and measurement of noise status in the study area advanced, most reliable and widely accepted decibel meters were used.

Fig. 2. Measurement of noise intensity by using Decibel (dB) meter.

These meters have the significant potential to measure the intensity levels of the study area. For the measurement of noise intensity levels from the study area, three different times of the day i.e. morning 6 am to 8 am, afternoon 1 pm to 3 pm and evening 6 pm to 8 pm. The noise pollution intensity was analysed and considered in present research study.

III. RESULTS AND DISCUSSION

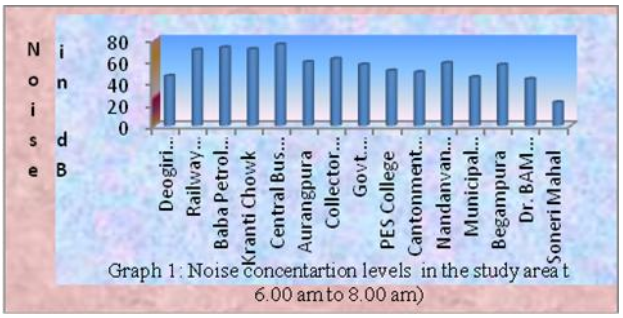
Noise exposure per individual is not believed to produce detrimental effects. However, in combination with provocation, pre-existing anger or hostility and other psychoactive agents, noise may results into the negative consequences.Genrally Noise pollution interferes with the potential to comprehend normal speech and may lead to a

numerous personal disabilities, handicaps, and behavioural alterations (Basner et al., 2014).

Table 1: Noise level measurement at Morning time (6-8 am)

Sr. No.	Location	Time	Noise level (dB)	Two wheelers	Four wheelers
1	Deogiri college	6.2	46.2	14	2
2	Railway station	6.8	70.5	465	112
3	Baba Petrol Pump	6.19	72.7	356	152
4	Kranti Chowk	6.26	71.2	456	165
5	Central Bus Stand	6.32	75.5	438	156
6	Aurangpura	6.39	59.2	368	175
7	Collector Office	6.46	62.1	267	135
8	Govt. Hospital (GHATI)	6.55	56.8	460	156
9	PES College	6.59	51.1	11	124
10	Cantonment Board	7.8	49.7	269	156
11	Nandanvan colony	7.15	58.3	256	123
12	Municipal Corporation	7.29	45.1	235	175
13	Begampura	7.44	56.6	156	198
14	Dr. BAM University Gate	7.52	43.3	65	11
15	Soneri Mahal	7.57	21.7	5	1
Average	Abad	6-8 am	56	254.73	122.73
Max.	Abad	6-8 am	75.5	465	198
Min.	Abad	6-8 am	21.7	5	1

These include issues with fatigue, uncertainty, lack of self-confidence, concentration, irritation, disturbed interpersonal relationships, misunderstandings, decreased working capacity and stress reactions. Some of these major effects may lead to increased incidences like disruption of communication in the classroom, and disturbed academic performance especially vulnerable groups may involve children, the elderly, and individuals having the disabilities (Passchier and Passchier, 2000).



Graph 1: Noise concentartion levels in the study area t 6.00 am to 8.00 am)

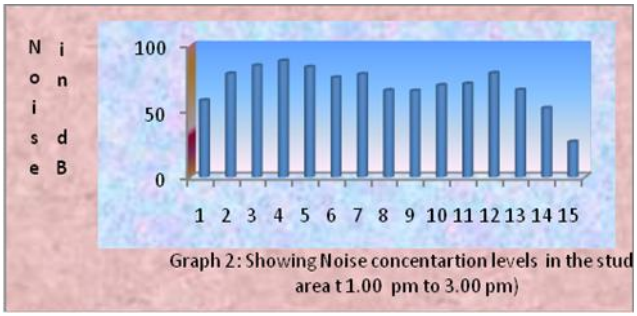
The measured results of the noise produced at different localities in Aurangabad city have been tabulated in the table no.1 by categorizing number of two wheeler and four wheelers and the graphical presentation for the same has been given in graph no.1.Noise measurement was carried out continuously for eight days (only average values have been given).

Table 2: Noise level measurement at Afternoon time (1- 3 pm)

Sr. No.	Location	Time (pm)	Noise level (dB)	Two wheelers	Four wheelers
1	Deogiri college	1.4	58.2	268	115
2	Railway station	1.11	78.5	526	145
3	Baba Petrol Pump	1.19	84.6	456	148
4	Kranti Chowk	1.22	88.2	545	171
5	Central Bus Stand	1.30	83.5	398	236
6	Aurangpura	1.37	75.5	389	249
7	Collector Office	1.46	78.1	258	257
8	Govt. Hospital (GHATI)	1.58	65.8	471	237
9	PES College	2.12	65.5	102	178
10	Cantonmnet Board	2.23	69.7	254	139
11	Nandanvan colony	2.34	70.8	327	150
12	Municipal Corporation	2.45	78.9	341	128
13	Begampura	2.49	66.2	234	145
14	Dr. BAM University Gate	2.54	52.4	156	78
15	Soneri Mahal	2.59	26.8	26	43
Average	Abad	1-3 pm	69.51	316.73	161.26
Max.	Abad	1-3 pm	88.2	545	257
Min.	Abad	1-3 pm	26.8	26	43

Obtained values of the noise intensity was compared with morning, afternoon and evening timings. At the morning time noise intensity values have been recorded 6 am to 8 am. It is observed that minimum noise level (dB) was 21.7 nearby Soneri Mahal in the university campus area, it is might be due to lesser human inhabitation. Highest noise intensity values 75.5 dB were recorded nearby central bus stand area of Aurangabad city, it is might be due to the intense and dense habitation in the area where most of the human crowd generally seen. The average noise level of Aurangabad city was 56 dB. It is also observed the some of the areas like Railway station and Kranti Chowk where maximum number of two wheelers was recorded and the lower numbers of two wheelers have been recorded in the Soneri Mahal and PES College area. These numbers were in between minimum 5 to 465 maximum. It is recorded that the some of the areas like Begampura and Municipal corporation office area, where maximum number of four wheelers were recorded and the lower numbers of four wheelers seen in the Soneri Mahal and Deogiri College campus. These numbers were in between

minimum 1 to 198 maximum. The recorded values with the help of advanced decibel meters. At the afternoon time noise intensity values have been recorded 1 pm to 3 pm. It is observed that minimum noise level (dB) was 26.8 nearby Soneri Mahal in the university campus area, it is might be due to lesser human inhabitation. Highest noise intensity values 88.2 dB were recorded nearby Kranti Chowk area, it is might be due to heavy traffic load and transportation. The average noise level of Aurangabad city was 69.51 dB at afternoon time.



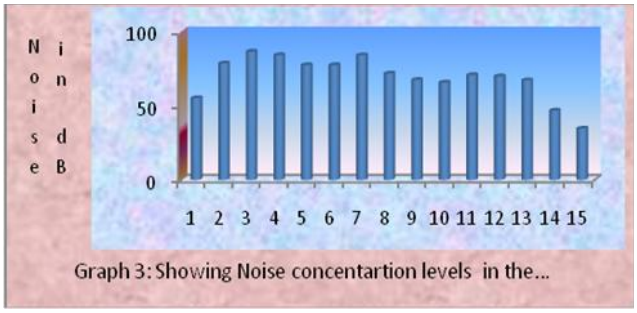
Graph 2: Showing Noise concentartion levels in the stud area t 1.00 pm to 3.00 pm)

It is observed that the areas like Kranti Chowk and Railway station where maximum numbers of two wheelers were recorded and the lower numbers of two wheelers have been recorded in the Soneri Mahal.

Table 3: Noise level measurement at Morning time (6-8 pm)

Sr. No.	Location	Time (pm)	Noise level (dB)	Two wheelers	Four wheelers
1	Deogiri college	6.5	55.2	24	16
2	Railway station	6.12	78.6	468	112
3	Baba Petrol Pump	6.25	86.6	399	389
4	Kranti Chowk	6.35	84.2	456	451
5	Central Bus Stand	6.42	77.5	502	429
6	Aurangpura	6.48	77.5	598	436
7	Collector Office	6.55	84.1	480	459
8	Govt. Hospital (GHATI)	6.59	71.8	561	178
9	PES College	7.6	67.5	526	176
10	Cantonment Board	7.14	65.7	358	218
11	Nandanvan colony	7.26	70.8	208	257
12	Municipal Corporation	7.36	69.9	236	251
13	Begampura	7.45	67.2	257	265
14	Dr. BAM University Gate	7.52	46.8	102	156
15	Soneri Mahal	7.58	34.7	36	12
Average	Abad	4-6 pm	69.20	347.4	253.66
Max.	Abad	4-6 pm	86.6	598	459
Min.	Abad	4-6 pm	34.7	24	12

These numbers were in between minimum 26 to 545 maximum. The average number of two wheelers were 316.The maximum four wheelers were observed nearby Collector office and Aurangpura, it is may be due to the presence superior market and government offices. The average numbers of four wheelers were 161 at the afternoon time. At the evening time noise intensity values have been recorded in between 6 pm to 8 pm. It is found that the minimum noise level (dB) was 34.7 nearby Soneri Mahal in the university campus area, it is might be due to lesser human interference and the educational zone. Approximate highest noise intensity values 86.6 dB were recorded nearby Baba Petrol Pump, Kranti Chowk and nearby Collector office, it is might be due to heavy traffic load and transportation. The average noise concentration level was 69.20 dB at evening time i.e. 6 pm to 8 pm. It is observed that the areas like Aurangpura and Central bus stand have most of the two wheelers.



Graph 3: Showing Noise concentartion levels in the...

The two wheeler numbers were in the range of minimum 24 and maximum 598. The average numbers of two wheelers were 347. Minimum four wheeler numbers were 12 i.e. from Soneri Mahal area. The areas like Collector office and Kranti Chowk have maximum number of four wheelers. The numbers of four wheelers were in between 12 to 459 and the average numbers of four wheelers were 253 at the evening time. On an average basis noise level measurements were very high at afternoon time compared to morning and evening timings at the selected sites of Aurangabad city, it is may be due to heavy traffic congestions, office working hours and due to trading in the markets. It is the evident fact that Aurangabad city is one of the fastest growing; metropolitan city not only in the India but also it has good economic and industrial development in the Asia.

IV. CONCLUSION

Noise is one of the most affecting and common form of pollution load globally. It is the propagation of noise through numerous medium having great potential to affect on physio-psychological attributes of human. The ultimate goal of the present research analysis was to find out the ways to identify and measure the noisiest zones of city having the

significant impacts on the health of human being. The comprehensive analysis was carried out to know the present status of noise with respect to various sources and associated impacts. For the measurement of noise generated in the city high quality, advanced, sensitive dB meter was used. Maximum noise generation was reported in the afternoon session compared to the morning and evening sessions. The noise level measurement at morning ranged in between a 21.7 to 75.5 dB. The average noise level concentration was 56 dB. Average numbers of two wheelers were 254 and numbers of two wheelers were 122.The noise level measurement at afternoon time range in between minimum 26.8 to 88.2 dB. The average noise dB level of afternoon time was 69.51. Average numbers of two wheelers were 316 and number of two wheelers were 161.The noise level measurement at evening time i.e. at 6 to 8 pm were ranged in between minimum 34.7 an maximum up to 86.6 dB. The average noise level concentration was 69.20 dB. Average numbers of two wheelers were 347 and numbers of two wheelers were 253.Various sources like road traffic, railway station and main market places have the major contribution in the noise generation. On the basis of present study it is suggested that, the areas with high noise pollution load need to be recognised, evaluated and planned so as to protect the individuals from negative impacts of noise and associated effects.

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