COMPARATIVE STUDY OF NOISE LEVEL IN SURAT CITY

Niket Shastri [1], Sweta Shah [2], Juned Miyajan[3],

Bijaylakshmi Borpuzari[4], Sonal Verma[5]

[1]*Physics Dept. Sarvajanik College of Engineering & Technology,*

MTB College Campus, Athwalines, Surat-395001, (India)

[2,3,4,5] *Environment Science Dept. TIFAC CORE (SCET), Athwalines, Surat-395001. (India)*

ABSTRACT

Disturbing environmental noise affects man's psychological and nervous health leading to annoyance and restlessness. This is considered a violation to the human right to rest and quietness. High noise levels in major cities and governorate capitals are due to population growth and associated activities as well as the lack of sound urban planning. Surat is a historical city dating its existence long back from the Moghal period. Due to explosion of population and rapid industrialization the transportation in the city increased to unimaginary heights but due to the want of efficient Mass Transit system, individual vehicular growth also touched the heights. As on 31-12-2009 the vehicles registered at R.T.O. is around 19.00 lakhs. Thus the explosion of population, rapid industrialization and highest growth rate in vehicle population made the traffic problems complicated which cause the problem of noise pollution. Day by day the noise levels are increasingly causing noise pollution at public places due to industrial activities, various types of construction activities, generators, public meetings, vehicular traffic, various types of horns and other mechanical devices. It is necessary to control the noise level within the prescribed limit. Taking into consideration this fact the study of noise level of Surat city was done. This paper presents the results obtained in a study of environmental noise pollution in Surat city. These data are very useful to be used as reference and guideline for future regulations on noise limit to be implemented for areas in Surat.

Keywords: Environment, Noise, Traffic, Zones, Surat city, Gujarat.

I INTRODUCTION

Environmental pollution is a major problem facing all nations of the world. Rapid urban and industrial growth has resulted in vast quantities of potentially harmful waste products being released into the environment. Environmental

IJARSE

pollution and its consequent influence over the life quality of human beings may be considered as a "hot topic" in scientific research. The increasing number of living people and vehicles has led to major concern about "noise pollution". Noise is defined as unwanted sound. Sound is a form of energy which is emitted by a vibrating body and on reaching the ear causes the sensation of hearing through nerves. Sounds produced by all vibrating bodies are not audible. The frequency limits of audibility are from 20 Hz to 20,000 Hz. The discrimination and differentiation between sound and noise also depends upon the habit and interest of the person/species receiving it, the ambient conditions and impact of the sound generated during that particular duration of time. Every exposure to loud noise destroys some cells, but prolonged exposure damages a larger amount of cells, and ultimately collapses the Organ of Corti, which causes deafness. Noise pollution is a major problem for the quality of life in urban areas [1]. Traffic noise is considered as one of the important sources of noise pollution that adversely affects human health in residential urban areas [2-4]. Permanent hearing loss by long-term exposure to noise has been reported by Nelson [5]. It is considered one of the most widespread environmental issues all over the world. It is considered a serious issue because of its harmful impacts on citizens and public health. Noise adversely impacts development as a result of its direct and indirect effects on life activities. Exposure to high noise levels is among the key causes of human mistakes leading to increased accident rate [6]. These levels have reached unacceptable limits locally and internationally. Pathak *et al.* [7] carried out a study on traffic noise pollution at four areas categories (industrial, commercial, residential and silence zone) in the city of Varanasi, India. They found that 85% of the people were disturbed by traffic noise; about 90% of the people reported that traffic noise is the main cause of headache, high blood pressure problem, dizziness and fatigues. To prevent and control the sources of the noise, the Govt. of India has already published the rules known as Noise Pollution (Prevention & Control) Rules, 2000 which is applicable to entire country. To implement these Rules under Section 2 (c) Authority is prescribed, accordingly the Police Commissioner or District Superintendent of Police are declared as Authority. According to this act the environmental quality standards are prescribed which is as under

Four zones are categorized in which various standards are prescribed, which are mentioned below:-

Sr. No.	Description	Standards	
		Day	Night
1	Industrial Zone	75	70
2	Commercial Zone	65	60
3	Residential Zone	55	45
4	Silence Zone	50	40

1. Day time is reckoned in between 6 a.m. and 9 p.m.
2. Night time is reckoned in between 9 p.m. and 6 a.m.

IJARSE

3 Silence zone is referred as areas up to 100 meters around such premises as hospitals, educational institutions and courts. The Silence zones are to be declared by the Competent Authority.

II MATERIALS AND METHOD

2.1 Study Area

Surat city has experienced a rapid rate of building capacity, economic and technological development over the last few years along with the economical growth in Surat. Significant structural changes in the city have been observed. Some examples has be cited: people migration for search of more jobs, the expansion of the road network, the industrialization, the urbanization and the realization of great infrastructures and increasing activities in civil construction in order to build new homes for the new inhabitants. This development combined with rapid population growth, has led to an increase in the pollutants released into the environment. One of the environmental problems in Surat city is noise pollution. Traffic noise is considered as one of the important sources of noise pollution that adversely affects human health.

Noise level measurement were carried out during 4 consecutive weeks for 22 sampling sites at under four different zones namely Residential, commercial, Silent, Industrial Zone. Six sites were under Residential zone, nine sites were under Commercial zone, five sites were under Silent zone and two were under Industrial zone. The timing selected for survey for morning hours were 5am to 6am and 9am to 10am to get the clear picture of silent as well as peak hour noise level in morning. While for night hours the timing selected was 6pm to 7pm and 11pm to 12:00 to get the picture of noise level of peak hours and silent hours. As 9am-10am and 6pm-7pm are considered to be peak hour as it is job going and returning hours respectively.[Table 2]

The noise assessment was done by minimum, maximum and mean values of all sites [Table 1].

2.2 Noise measurements

All measurements were carried out under suitable meteorological conditions. The noise levels were measured by sound level meter.[Lutron SL-4010]

III RESULT AND DISCUSSION

From the data obtain after 4 week survey of 22 different sites at different timing were analyzed and the minimum, maximum and average mean of all selected were obtained are as in table 1. The sampling sites classified into 4 categories according to their location were

IJARSE

3.1 Residential Zone

The minimum average noise level was 83.5dB at Hari champa site while the maximum average noise level was 110.8 dB at Bharimata site. The high value was recorded at Bharimata site was due to two factors, the first one was the high traffic density with necessary or unnecessary blowing of horns by drivers, high speed. The second factor was high density from visitor people during 24hours of day. The minimum value was recorded at Hari champa because of low traffic density as well little plantation around with open space and garden in the vicinity of the 1km of the sampling site.

According to Indian standards the noise level during day time and night time for this zone should be 55dB and 45dB but the noise level during day time and night time was found to be in the range of 56.9-99.8dB and 74.1-107.6dB respectively.

3.2 Commercial Zone

The minimum average noise level was 82.2dB at Parle point site while the maximum average noise level was 100.4 dB at Athwa gate circle site. The highest value was recorded at Athwa gate circle site due to its location as it is the connecting route to most academic, commercial and industrial areas due to which the traffic density remains high. The other reveling and observable point during data analysis was, though the Athwa gate circle being in Commercial zone the maximum average noise level was found to be lower than the max. noise level of the residential zone at Bharimata which was a controversial result on analyzing in detail it was found that the existence of garden near the sampling site as well few plantation done by the Surat Municipal Corporation along the road side bring about the decrease in noise level.

According to Indian standards the noise level during day time and night time for this zone should be 65dB and 60dB but the noise level during day time and night time was found to be in range of 75.9-93.4dB and 69.8-94.6dB respectively.

3.3 Silent Zone

The minimum average noise level was 68.4dB at Ryan internation school (Adajan) site while the maximum average noise level was 100.1dB at Civil hospital (Majura gate). The reason behind such high noise level is the poor town management planning as the hospital is located near the over bridge as well various markets and commercial building are to its nearby places which increase the traffic density and vehicular junction as well during study it was observed an uncivilized behavior of citizens by blowing horns within hospital compound area.

According to Indian standards the noise level during day time and night time for this zone should be 50dB and 40dB but the noise level during day time and night time was found to be in range of 60.8-75.2dB and 59.8-84.6dB respectively.

IJARSE

3.4 Industrial Zone

The most astonishing results were obtain during analysis of noise level near industrial zone as the minimum average noise level was 89.9dB near Hazira (KRIBCO) while maximum average noise level was 93.3dB at ONGC circle which was lower than all the average maximum values.

This showed the awareness of the industrial authority towards environment preservation. Moreover the plantation in this area was found to be dense.

According to Indian standards the noise level during day time and night time for this zone should be 75dB and 70dB but the noise level during day time and night time was found to be in range of 72.8-77.2dB and 79.3-91.8dB respectively.

TABLE 1: DATA'S OF DAILY AVERAGE FOR DIFFERENT STATION POINTS.

Sr, No.	Name of the area	Max.value			
		Week 1	Week 2	Week 3	Week 4
1	Ramnagar intersection point	96.9	87.3	95.6	95.2
2	Rayan International school	68.4	66.9	64.5	64.5
3	Lp sawani	89.2	84	84.6	83.5
4	Gujrat gas circle	96.9	95	94.6	94.6
5	Hari Champa	83.5	83.1	82.1	82
6	Athwa gate	100.4	95.6	92.1	92.1
7	TIFAC, SCET	80.4	79.9	79.1	79.1
8	Parlepoint	79.3	79.2	82.2	81.3
9	SVNIT	83.4	79.5	91.4	91.4
10	ONGC circle	90.6	90.6	93.3	91.8
11	Hazira Nr KRIBHCO	88.9	85.2	89.9	88.9
12	Majura gate Civil	100.1	100.1	89.8	85.3
13	Sahara darwaja	96.8	95.5	90.1	91.1
14	Belgium tower	89.8	87.6	89.1	90.1
15	Bhagal traffic point	96.2	94.5	82.6	82.1
16	Chawk traffic point	92.8	89.9	92.1	91.9

IJARSE

17	Bharimata	109.2	109	110.8	108.6
18	Delhi gate	93.5	91.5	96.2	92.1
19	Station Garnala	97.8	95.3	93.4	88.2
20	Mini bazaar	92.8	92.8	94.6	92.3
21	Baroda pristage	92.4	92.6	96.3	96.3
22	Hera bag circle	98.2	98.2	94.2	94.2

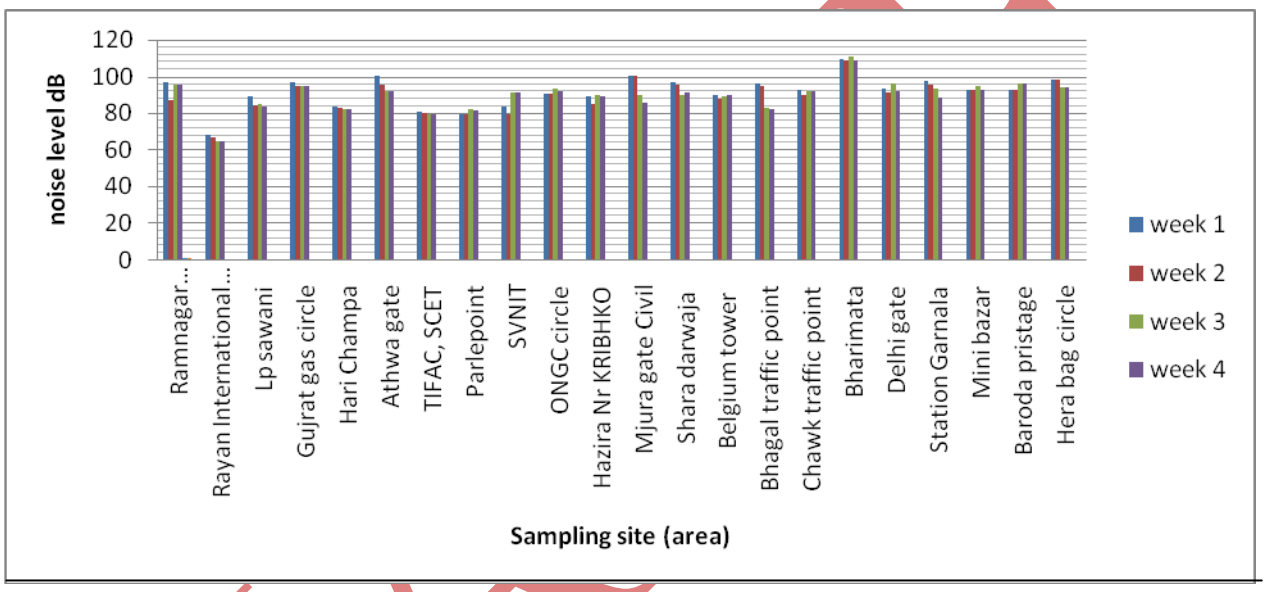
TABLE 2: AVERAGE MAXIMUM VALUES OF ALL ZONES

AREAS	Max.value				weeklymax. value
	week-1	week-2	week-3	week-4	
RESIDENTIAL ZONE :					
Ramnagar intersection point	96.9	87.3	95.6	95.2	96.9
Hari champa	83.5	83.1	82.1	82	83.5
Bhagal	96.2	94.5	82.6	82.1	96.2
Chowk	92.8	89.9	92.1	91.9	92.8
Bharimata	109.2	109	110.8	108.6	110.8
Hira bagh circle	98.2	98.2	94.2	94.2	98.2
COMMERCIAL ZONE					
Gujarat gas circle	96.9	95	94.6	94.6	96.9
Athwa gate circle	100.4	95.6	92.1	92.1	100.4
Parle point circle	79.3	79.2	82.2	81.3	82.2
Sahara darwaja	96.8	95.5	90.1	91.1	96.8
Belgium tower	89.8	87.6	89.1	90.1	90.1
Delhi gate	93.5	91.5	96.2	92.1	96.2
Station garnala	97.8	95.3	93.4	88.2	97.8
Mini bazaar	92.8	92.8	94.6	92.3	94.6
Baroda prestage	92.4	92.6	96.3	96.3	96.3
SILENT ZONE:					
Ryan international school	68.4	66.9	64.5	64.5	68.4
L.P Savani	89.2	84	84.6	83.5	89.2
SVNIT College	83.4	79.5	91.4	91.4	91.4

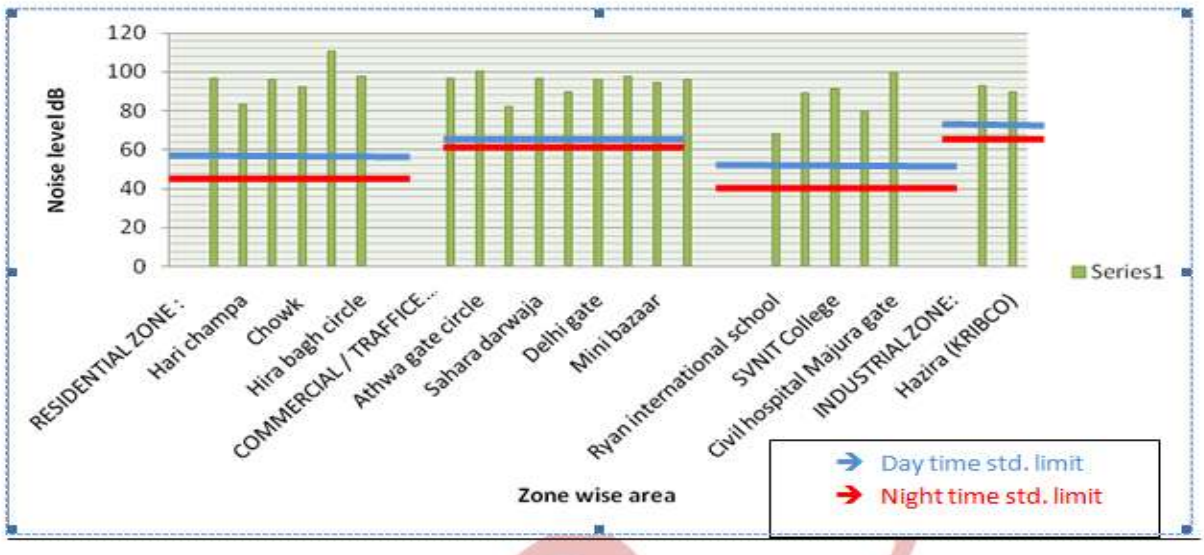
IJARSE

SCET College	80.4	79.9	79.1	79.1	80.4
Civil hospital Majura gate	100.1	100.1	89.8	85.3	100.1
INDUSTRIAL ZONE:					
ONGC	90.6	90.6	93.3	91.8	93.3
Hazira (KRIBCO)	88.9	85.2	89.9	88.9	89.9

DAILY AVERAGE VALUE GRAPH



COMPARISON GRAPH



IV CONCLUSION

From the above results it can be concluded that noise level of most of the area of the Surat city in all four zone are above standard limits and that is majorly due to high traffic density, illegal behavior of drivers for horn use and high speed, increased population, changing life style of generation and less plantation. As well it can be concluded to control noise level best remedy can be the maximum plantation around the residential areas and along road sides. More green belt planning should be done by the town planning committee. Environmental noise analyses at selected locations were presented to represent typical equivalent noise level at several selected sites in Surat city. This paper gives a preliminary data for the locations and it's believed all this area will be develop in the coming future. In the next five to ten years, the noise level will also increase proportionally with the development happen to the country. Analysis of equivalent noise level at selected locations in Surat being presented in this paper will benefit the researchers and policy makers in this field, especially for those who are directly involve with the study of noise pollution for environmental impact assessment (EIA) with the Department of Environment (DOE) Surat, India.

REFERENCES

[1]. Cabrera, I.N. and M.H.M. Lee, 2000. Review: reducing noise pollution in the hospital setting by Establishing a Department of Sound: A survey of recent research on the effects of noise and music in health care. Preven. Medic., 30: 339-345.

[2]. Aparicio, A. and M.M. Surez, 1993. Subjective annoyance caused by environmental noise. J. Environ. Pathol. Toxicol. Oncol., 12: 237-243.

[3]. Lercher, P., 1995. Environmental noise and health: An integrated research perspective. Environ. Intern., 22: 117-129.

[4]. Williams, I.D. and I.S. Mc Creae, 1995. Road traffic nuisance in residential and commercial areas. Sci. Tot. Environ., 169: 75-82.

[5]. Nelson, P.M., 1987. Transportation Noise Reference Book, Netherlands Health Council (NHC); 1987: Committee on a Uniform Environmental Noise Exposure. Butterworth and Co., London.

[6]. *Zekry F. Ghatass*, World Applied Sciences Journal 6 (3): 433-441, 2009. Assessment and Analysis of Traffic Noise Pollution in Alexandria City, Egypt. ISSN 1818-4952.

[7]. Pathak, V., B.D. Tripathi and V.K. Virendra, 2008. Evaluation of traffic noise pollution and attitudes of exposed individuals in working place. Atmos Environ., 42: 3892-3898.

IJARSE