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ENVIRONMENTAL NOISE POLLUTION IN SALEM, TAMILNADU, INDIA

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ABSTRACT

Rapid urbanization and industrialization eventhough facilitate our lives, leads to various forms of environmental pollution. This paper presents the results obtained in a study on environmental noise pollution in the city of Salem. Road traffic noise has been a major contributor to the annoyance, which is substantiated by the result of continuous monitoring of noise equivalent levels (L_{eq}) at a number of silence, residential, commercial, industrial zones and road intersections. In conclusion, the noise pollution of the city is wide spread throughout most of its area, where measured noise levels are similar to those commonly observed in cities that do not have mitigation programmes. Public participation, education, traffic management, structural designing play a major role in noise management.

INTRODUCTION

Noise has become an alarming issue due to ever growing population and inevitable developmental activities throughout the globe, which poses cumulative stress to all biotic entities. The increase in population and the number of circulating vehicles have led to an increase in the urban noise levels (Calixto *et al.,* 2003). The need for study regarding the urban noise pollution and its consequences for the environment have motivated various researchers on the problem in several countries (Burgess, 1977; Zheng, 1996; Yoshida and Osada,

1997; Ravichandran *et al,* 1997, 1998; Arana and Garcia, 1998; Suksaard *et al,* 1999; Abdel-Raziq *et al,* 2000; Zeid *et al,* 2000; Kanakasabai *et al,* 2002 Jorge *et al,* 2004) .The continuous exposure of the workers to high noise levels can cause Noise Induced Permanent Threshold Shift (NIPTS) in their hearing (Sharma *et al* .,1998), damages the ear drum and ossicles causing deafness (Kudesia and Tiwari, 1993). The objective of the present research was to show the noise level measurements in different zones of the city and to bring in focus how far the people are unaware and expose to it.

STUDY AREA

Salem district is geographically situated at about 11°39′ N Latitude and 78°12′E Longitude and is about 241m above the mean sea level except Yercaud hills. It has an area of about 7905.38 Km^2 with 38,96,388 inhabitants. Entire district comprises of a hard rock terrain of Archean age with the principal rock type of granite and a semi-arid weather. It is assessable by National Highways 7 and 47, that connects major part of the state and the country. It has major industrial units like Steel Authority of India Limited (SAIL), Tamil Nadu Magnesite Limited (TANMAG) and many Sago units. Because of such importance, population rapidly increases and flooded with vehicular traffic throughout the day. As a result, noise has become a part of the city.

METHODOLOGY ADOPTED

The ambient noise levels were monitored in selected silence, residential, commercial, Industrial zones and road intersections of the city and compared with the ambient noise standards promulgated by Central Pollution Control Board (CPCB). The noise level measurements were recorded using a precision sound level meter-TES 1350 with a measuring range between 35-130dB. The instrument was calibrated before the measurements were recorded. A distance of 2m from the source has been maintained during measurements (Prabhakara Murty and Sudharshan Reddy, 1996). In each location, adequate number of samples was made with one-minute time interval between two subsequent readings (Edison *et al.,* 1999). The noise levels are recorded both during peak (0800 to 1000 and 1700 to 1900 hours) and non-peak (1000 to 1700 hours) timings of the day (Vishwanath and Anantha murthy, 2003) in road intersections and commercial areas.

From these measurements, the minimum sound pressure level L_{min}, the maximum sound pressure level L_{max} was observed. However, to quantify the variability of noise during each measurement, the percentiles L_{90} and L_{eq} were also calculated (Michael, 1991).

RESULTS AND DISCUSSIONS

The city of Salem is divided into four zones, each of them with a particular noise emission limit. The allowable limit for each zone in particular can be observed in **Table 1** .The locations covering silence, residential, commercial, industrial zones and road intersections and the results are summarized in the Tables 2 to 6.The noise in these areas is usually composite in nature and generated from many sources near and far with no particular sound predominant.

Noise levels measured at some of the silence zone locations consists of collectorate, hospital, park and educational institutions varied between 61.8 to 72.78 dB(A), exceeding the standard level of 50dB (A) as shown in **Fig. 1.** In K.N.Rao hospital and govt. Arts College the L_{eq} of 69.77 and 61.8 dB(A) is observed. For silence zone locations, proper designing and acoustic planning of the building is essential. One is to orient the building axis perpendicular to the direction of the roadway and then to locate the noise sensitive rooms at the end of the building. In case of hospitals, operation theatres and intensive care units could be located at the farthest end. Use of horns, loud speakers and bursting of crackers must be banned in these places (Shasthri *et al.,* 1996)

The Lgq in residential areas ranged between 66.6 to 70.83dB(A)The noise environment is alarming due to higher noise levels than the established standards as shown in **Fig.2.** All the five locations had L_{eq} values greater

Table - 1
Central Pollution Control Board standards for Noise

Sl.No.	Area	Noise levels in dB (A)	
		Day (0600 to 2000 hours)	Night (2000 to 0600 hours)
1.	Silence zone	50	40
2.	Residential zone	55	45
3.	Commercial zone	65	55
4.	Industrial zone	75	70

Table - 2
Noise levels at silence zones

Sl. No.	Location	Noise levels in dB(A)			
		L_{min}	L_{90}	L_{eq}	L_{max}
1.	Collectorate	68.7	69.8	72.78	78.0
2.	K.N Rao hospital	60.9	64.88	69.77	76.8
3.	Ramakrishna park	63.2	68.69	72.02	78.7
4.	Govt. arts College	43.7	45.5	61.8	74.1
5.	A.R Matric. school	49.6	54.7	63.6	71.1

Table - 3
Nosie levels at residential zones

Sl.No.	Location	Noise levels in dB (A)			
		L_{min}	L_{90}	L_{eq}	L_{max}
1	.Alagapuram	57.6	64.3	69.29	81.4
2.	Fairlands	53.3	64.25	70.83	84.6
3.	Narayana nagar	55.8	63.85	68.77	84.6
4.	Swarnapuri Annexe	53.2	63.75	66.6	76.5
5.	Police colony	54.3	63.2	68.54	83.1

Table - 4
Noise levels at commercial zones during peak and non-peak hours

Sl. No.	Location		Noise levels in dB (A)			
			L_{min}	L_{90}	L_{eq}	L_{max}
1.	V.O.C Market	Peak	67.9	70.67	83.9	98.6
		Non Peak	60.4	63.58	75.58	92.1
2.	Lee bazaar	Peak	68.4	73.58	86.3	102.6
		Non Peak	65.7	71.29	79.35	92.6
3.	Agraharam-I	Peak	78.5	81.4	90.53	94.8
		Non Peak	70.2	71.79	81.74	98.1
4.	SAGOSERVE	Peak	58.9	63.5	80.26	90.2
		Non Peak	51.9	60.5	69.93	87.6
5.	Gughai	Peak	78.5	81.4	92.3	98.3
		Non Peak	67.2	72.5	81.85	96.2

Table - 5
Noise levels at industrial zones

Sl. No.	Location	Noise levels in dB (A)			
		Lmin	L_{90}	L_{eq}	L_{max}
1.	TANMAG	79.3	83.1	91.0	99.4
2.	R.K Sago unit	62.1	67.2	84.95	95.8
3.	MRF retreads	87.21	78.14	88.32	74.5
4.	Arasu press	67.9	75.9	87.21	97.4
5.	SIDCO	73.4	77.52	94.32	105.6

Table - 6
Noise levels at road intersections during peak and non-peak hours

Sl. No.	Location		Noise levels in dB (A)			
			L_{min}	L_{90}	L_{eq}	L_{max}
1.	New Bus stand	Peak	80.1	84.16	93.5	107.6
		Non Peak	64.2	70.67	78.78	90
2.	Four roads	Peak	80	83.1	91.38	105.1
		Non Peak	65.6	75.57	87.04	103.7
3.	Hasthampatti	Peak	76.4	80.79	91.53	102.4
		Non Peak	70.1	75.06	87.57	99.6
4.	Valluvar statue	Peak	78.5	83.2	90.03	99.7
		Non Peak	63.2	71.88	81.28	94.69
5.	Arts College	Peak	81.2	84.36	89.98	99.7
		Non Peak	64.9	72.19	80.6	92.6

than 65dB(A). It is observed that the residential location (Fairlands) near the central bus stand is exposed to comparatively higher noise levels. In contrast, the Swarnapuri Annexe shows low levels. This is due to its location away from the main road and the attenuation due to houses shielding the location. Developing green belt in these zones will bring down the noise levels within the limits (Siddique and Shamin, 1998).

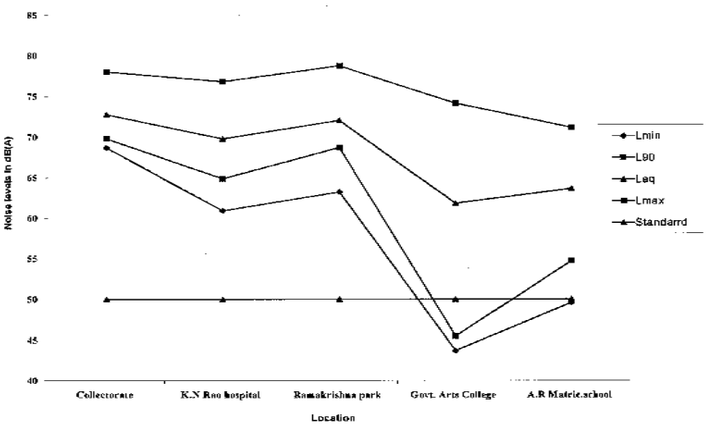

Fig. 1- Noise levels at silence zone compared with standards.

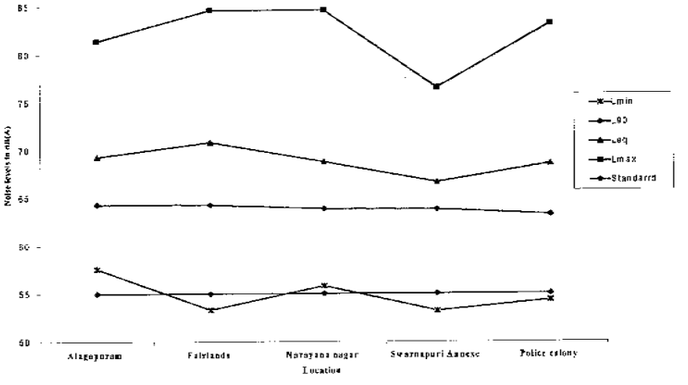

Fig. 2- Noise levels at residential zone compared with standards.

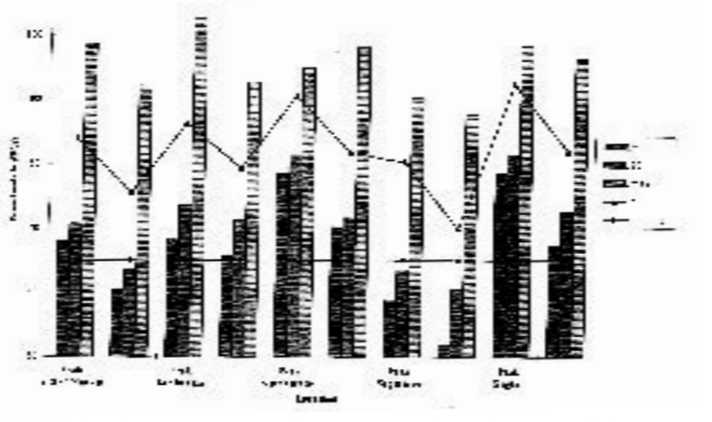

Fig. 3- Noise levels at commercial zone in peak and non-peak hours.

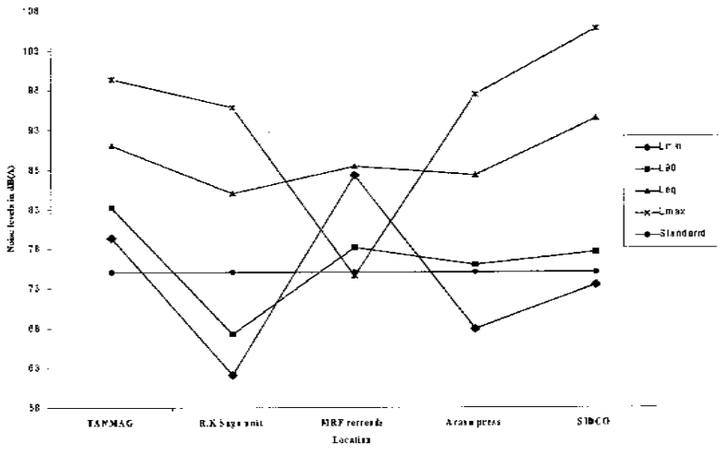

Fig. 4- Noise level status at industrial zone.

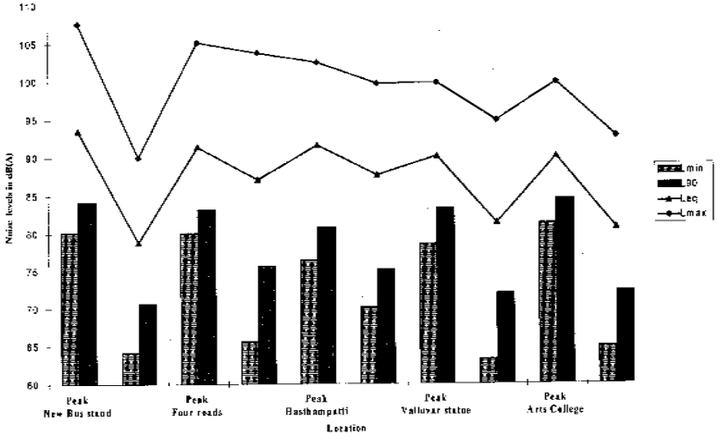

Fig. 5- Noise levels at road intersections in peak and non-peak hours.

Measurement in commercial centers was also carried out to assess the impact on community. The L_{eq} was in the range of 80.26 to 92.3dB(A) in peak hours and 69.93 to 81.85dB (A) in non-peak hours. The L_{90} values are greater than 60dB(A) throughout the day. The encroachments of the vendors and small businessmen causes traffic congestion with frequent hooting. Consequently, people are exposed to high noise levels. It is observed that all the areas exceed the CPCB standards as found in **Fig. 3.**

The L_{eq} noise levels in the industrial zones vary from 84.95 to 94.32dB (A). The observed noise levels were more than the standard permissible limit of 75dB(A) and these are illustrated in the **Fig. 4**. The L_{90} of 83.1dB(A) is observed in TANMAG, which clearly indicate the high levels of occupational noise exposure. Noise reduction is imperative to protect workers from permanent hearing loss. This can be effected through insulation of the source, better maintenance of machinery and exhaust mufflers. The hearing conservation programme, by undertaking periodic hearing tests, can identify workers who have high susceptibility to noise induced hearing loses.

The noise generated through traffic activities was also assessed at main road intersections of the city. The participation of vehicles in traffic flows leads to a steady state urban noise that causes sleep disturbances, annoyance and interference to communication. The L_{eq} values ranges from 89.98 to 93.5 dB(A) in peak hours and 78.78 to 87.57dB(A) in non-peak hours. In practice (Mitani and Ohta, 1986), the L_{eq} is very widely used since it allows a simple quantification of noises that may often vary in a highly non-stationary manner. The observed noise levels are very high and illustrated in the Fig.5. Since the vehicles flowing through different directions wait in signal with running engines, road intersections are always encountered with high noise levels. So the traffic policemen are highly affected.

For obtaining the reaction of the public in different localities of the city, a survey was conducted by questionnaire method. In all 200 respondents selected at random, the following results were obtained.

38% of the public felt that heavy trucks were the main source of noise pollution.
90% of the public conveyed that the level of noise is increasing day-by-day.
96% felt that unplanned urbanization and lack of awareness have resulted in increased noise pollution.
34% have ringing effect in their ear and 16% consulted ENT specialist.
70% felt that they live in a noisy environment.

CONCLUSION

This research looks at the possibilities for real time control of noise pollution. It is concluded that the environmental noise pollution problem caused by the traffic vehicles is the main cause of urban noise levels. The inhabitants living in these areas are bound to suffer from health problems and low life quality. From the technical point of view, it is necessary to take several measures in order to reduce the noise levels. In order to do so, measures should be considered as follows:

* Reduction of speed limits, mainly near residential areas, schools and hospitals.
* Incentives may be given to the vehicle manufactures to develop new systems in order to reduce sound power emissions. Removal of encroachments and banning the use of air horns within the city limits.

Among all things that can be done to relieve the environmental noise pollution problem in the city of Salem, the most effective one is to promote awareness of the population about the risks of daily exposure to high noise levels. Noise abatement is less of a scientific problem but primarily a policy problem, and this is not yet understood in Salem as well as in Tamilnadu.

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