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Study on Noise Level and Its Effects in the Commercial Area of Bengaluru City

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Abstract

Most of the Indian cities suffer from noise pollution with very meagre information about the actual level of noise and its effects. Bengaluru is one such metropolitan city which is expanding rapidly and experience pronounced vehicular emission.Even though W.H.O has declared noise as third most hazardous pollutant many are ignorant about this. The CPCB - Central Pollution Control Board has stipulated standard admissible noise levels at day time and night time for different locations such as silent zone, residential zone, industrial zone and commercial zone. Industrialization, improvement in infrastructure, commercial activities, use of vehicles etc. have become indispensable part of our life. This study carried out to determine the influence of noise level on human life in B.V.K Iyangar road – a prominent commercial area of Bengaluru city Noise measurements were taken in the above areas during peak hours of morning traffic (9am to 11am) and night (10pm to 12pm) on alternative days over a period of one year from July 2017 to May 2018. The equivalent or average noise level (L_{eq}dB) have been measured at four points in the above area using noise measuring instruments SL 4001 and HT-80A. It is observed that in all places in this area there is an increase in L_{eq}above the set limits (L_{limit}= 65dB during day time and 55dB during night time) and it varies in the range of 6.2% to 19.8%. This paper aims at finding the reasons for increase in the noise pollution level in this area and also gives preventive measures.

Keywords: Commercial zone, Noise levels, permissible limit, Sound level measure.

1.0. INTRODUCTION

The sound energy travelling in a medium once received by the auditory system will create the sensation of hearing. If this energy is above the range of permissible limit then it is termed of noise. The term Noise is derived from the Latin word *Nausea* – meaning sound signals generated on account of random fluctuations which causes discomfort. Continuous exposure to such discomfort has many physiological and psychological repercussions on the life [1-3].

People who are prone to noise unknowingly develop mental disorders, annoyance, stress, hypertension, loss of concentration, sleeplessness etc [4-9]. which will have severe impact on their day to day activities. Also exposure to noise can cause cardiac related problems, temporary or permanent hearing loss, headache etc[10-12]. Due to these impacts there will be significant change in the behavior of a person. The challenge faced today is to regulate noise generated due to various causes. Citizens have a right to choose the ambient environment to live as it is the basic necessity. Different approaches have been experimented to measure the noise levels and its effects in a broader perspective. But here is an attempt made to study the impact of noise pollutant through continuous assessment of noise levels at discrete time intervals during day and night and there by suggest the possible solutions. B.V.K Iyangar road – a prominent commercial area of Bengaluru city has been selected for the purpose of study.Table:1 gives the comparison of admissible noise levels by CPCB in India with the standards fixed by other countries along with W.H.O standard for different zones [13]

From the above table:1 it is evident that the permissible noise level in India exceeds the same w.r.t W.H.O standard and also from the standards stipulated by other countries mentioned. However the objective of such control limits by the government boards such as CPCB- Central pollution control board, SPCB – State Pollution Control Board, MoEF – Ministry of Environment and Forest, Government of India etc, is to protect the citizens of the state from the adverse effects of noise pollutant. The magnitude of noise is increasing due to increase in population, improvement in infrastructure, commercial activities, use of vehicles etc. Thus definitely people are affected by such noise knowingly or unknowingly. It is the demand of the time to educate and create awareness about this major pollutant which has become the part of life. B.V.K Iyangar road is a major commercial area in Bengaluru which is a focus point of this study.

2.0. ABOUT THE LOCATION

Bengaluru is known as major IT hub, a cosmopolitan city etc. Due to employment opportunities many are migrating to Bengaluru from all parts of India. Population thus is increasing there by demand is created for their needs and wants. Due to this there is a huge demand pull market created for goods. BVK Iyangar road is once such street which is known for Sunday bazaar has many shopping malls which are busy with commercial activities. This street is surrounded by Basettypet, Huriopet,Cottonpet Chickpet, Mamulpet etc which are also busy in commercial activities. Thus during business hours population density of this area is quite dense there by become major source of sound and noise. Google map of location is shown fig 1.The vehicle density during business hours is very high in this area and is as shown in fig 2.

3.0 MATERIALS AND METHODOLOGY

3.1 Measurement

As per the definition of CPCB, Noise pollution (regulation and control) rules – day time shall mean 6:00 am to 10:00 pm and night time shall mean from 10:00 pm to 6:00 am.In order to have a better analysis on noise induced pollution in this area, measurement of noise between 9:00 am to 11:00 am during day time and between 10:00pm to 12:00pm during night time with the discrete time lap of 5minutes is done.Odd ntage (%) of noise level is calculated using the formula dates are chosen for day time and even dates for night time measurements. **SL 4001 and HT-80A** (fig 3 and fig 4 respectively) microprocessor based digital noise measuring devices are used for the purpose of measurement. These devices were kept at the height of 1.2- 1.5m to measure the noise level. The data thus measured in dB (A) – decibel unit of measurement was recorded for further calculations and analysis.'A' in dB(A) - weighting is applied to instrument-measured sound levels in an effort to account for the relative loudness perceived by the human ear, as the ear is less sensitive to low audio frequencies. Sound pressure level (SPL) is represented in a logarithmic manner and it is measured on a logarithmic decibel scale (dB), which corresponds fairly well to the human hearing response**.** Further Leq is calculated. Equivalent noise Level (Leq)- is the average or constant SPL over the period of interest. For example Leq(2) is the average for an 2 hr. period

$$Leq=10*Log10\Sigma ni=110Li/10*ti$$

Where, Li = the noise level of any i_{th} sample , n = Total number of sound samples,ti = Time duration of i_{th} sample, expressed as fraction of total sample time,L_{limit} = Allowed noise level in specific area prescribed by CPCB, L_{min} = Minimum noise level in the prescribed duration,L_{max} = Maximum noise level in the prescribed duration.Increase in perce

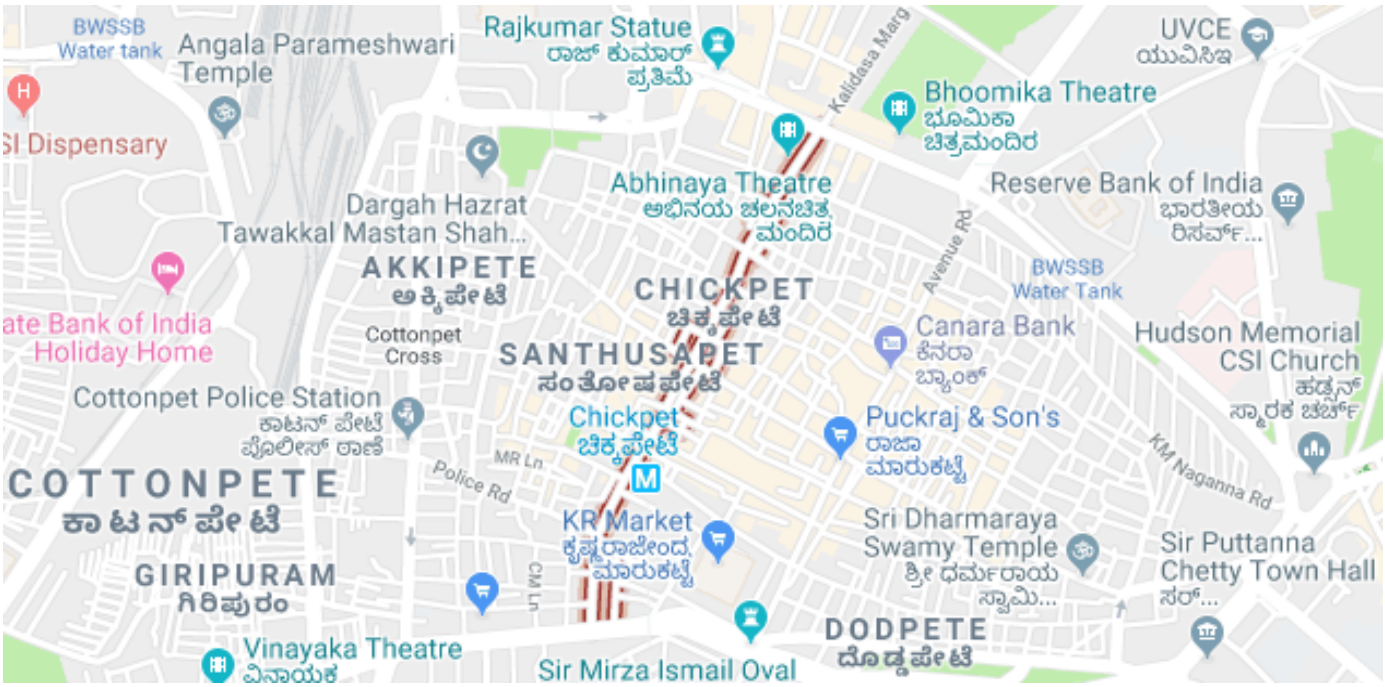

Fig:1 google map of BVK Iyangar road (latitude 12.9702784^0 N

Longitude: 77.5759349^0 E)

Fig: 2 Vehicle traffic in BVK Iyangar Road.

Table 1: The comparison of admissible noise levels by CPCB in India

L_{limit} - SOUND LEVELS IN dB									
Sl. No	Country	Industrial Zone		Residential Zone		Silent Zone		Commercial Zone	
		Day	Night	Day	Night	Day	Night	Day	Night
1	Australia	65	55	55	45	45	35	55	45
2	Japan	60	50	50	40	45	35	60	50
3	US	70	60	55	45	45	35	60	50
4	India	75	70	55	45	50	40	65	55
5	W.H.O	65	65	55	45	45	35	55	55

Fig. 3: SL 4001 and fig:4 HT-80A (micro processor controlled)

4.0 RESULTS AND DISCUSSION

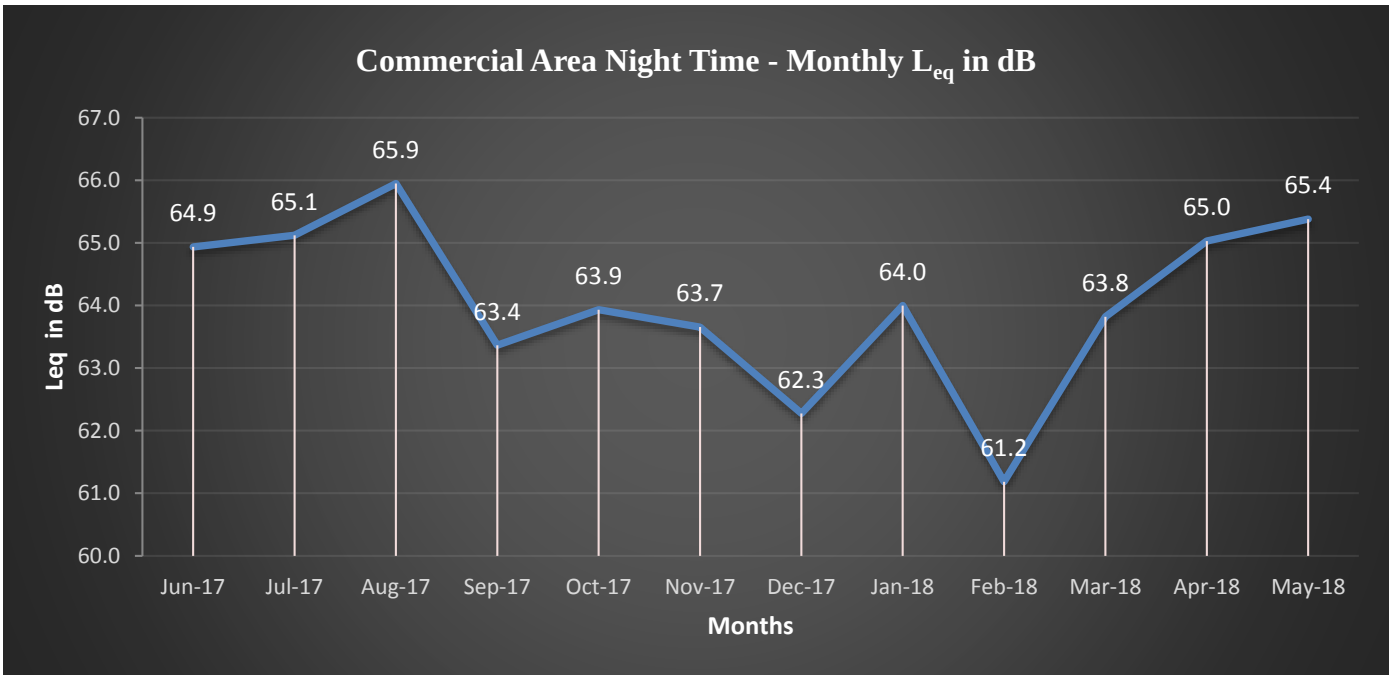

Fig:5 night time month wise variation of L_{eq} at BVK Iyangar road in Bangalore city

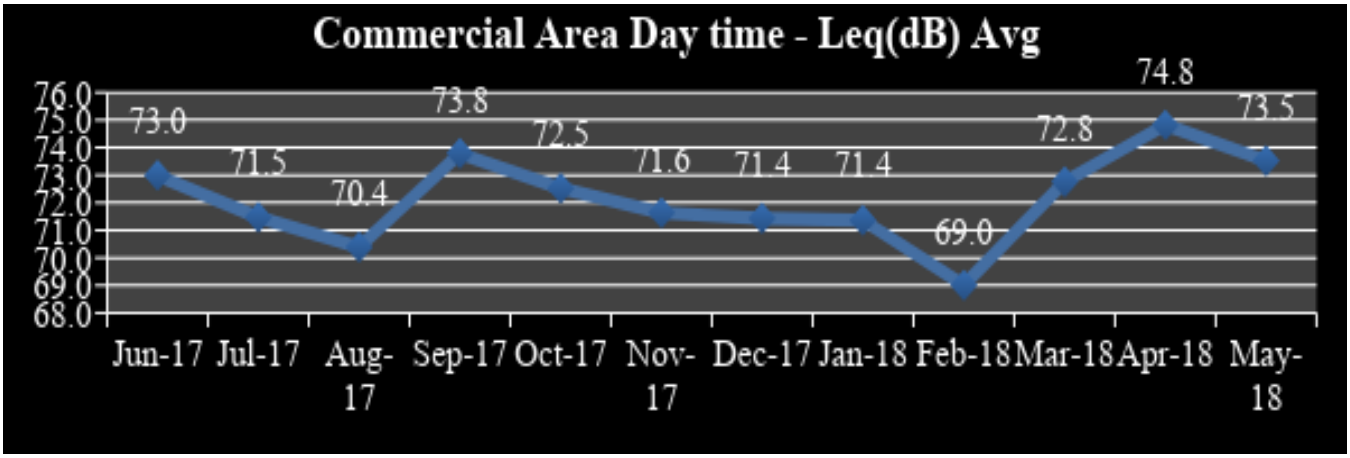

Fig: 6 day time month wise variation of L_{eq} at BVK Iyangar road in Bangalore city

Figure 5 shows the month wise variation of Leq at BVK Iyangar road in Bangalore city from July 17 to May 18 during night time. From this figure it is observed that Leq attains maximum of 65.9dB in August 17 and it attains minimum of 61.2dB in February 18.Leq set standards for commercial area during night time in India is 55dB.The rise of Leq above the set standards is only 6.2 dB in February 18 to 10.9 dB in August 17.The variation in Leq observed above set limits from July 17 to May 18 during night time is 11.2% to 19.8%/ Figure 6 shows the month wise variation of Leq at BVK Iyangar road in Bangalore city from July 17 to May 18 during day time. From this figure it is observed that Leq attains maximum of 74.8dB in April 17 and it attains minimum of 69dB in February 18.Leq set standards for commercial area during day time in India is 65dB.The rise of Leq above the set standards is only 4 dB in February 18 to 9.8 dB in April 18.The variation in Leq observed above set limits from July 17 to May 18 during day time is 6.15 % to 15.07 %. From the analysis of complete data during day and night for one year in the zone under study, it is very much evident that traffic attributed noise level is around 4dB and remaining is due to other sources of noise. To control noise level during day time can be done by controlling the vehicle traffic and during night time by controlling anthropogical activities in the area. If noise level exceeds 31% above the set limits of commercial zone for more than eight hous daily can cause hearing loss, deafness, mental disorder, heart problem, high BP, dizziness for the people who are living in this residential area. The area under study is exempted completely from the above mentioned potential threats of noise pollution.

5.0 CONCLUSIONS

The observed noise levels over a period of one year in the commercial zone under study clearly reveal that there is a high level rise in noise pollution during peak hours of traffic in BVK Iyangar Road, The only way to reduce traffic congestion in peak hours is the movement of heavy vehicles should be banned. The complete zone under study can be made horn free zone.Strict rule should implement such that all vehicles are required to maintain stringent noise emission standard. Educate the people to use public transport facility as much as possible. Need to bring awareness among people about noise pollution and its hazardous effects. Noise can be controlled to the maximum extent by providing Metro train facility in these zones.

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