

Vol 6 Issue 11 August 2017

ISSN No : 2249-894X

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*Monthly Multidisciplinary  
Research Journal*

*Review Of  
Research Journal*

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## Review Of Research



### ASSESSMENT OF NOISE POLLUTION IN SILENCE AND INDUSTRIAL ZONES OF VISAKHAPATNAM CITY



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#### ABSTRACT :

The noise is termed as "unwanted sound". With the development all around, sources of unwanted sound are increasing day by day knowingly or unknowingly. Hence the noise monitoring at two silence and two industrial zones in the Visakhapatnam city was carried out. The locations for Silence zone were open area in 'Sri Shanthi Ashram' and 'Biodiversity Park' and for Industrial zones were at the Main entrance gate of 'Visakhapatnam Steel Plant' and 'BHEL Heavy Plate & Vessel Plant and Visakha Dairy'. The results show that the equivalent noise levels are higher in the both industrial zones than the both silence zones. The Noise levels are least at Biodiversity Park and highest at 'BHEL Heavy Plate & Vessel Plant and Visakha Dairy'. However, the noise levels at all the places are exceeding over the set limits described by the Central Pollution Control Board during day time except at Visakhapatnam Steel Plant most of the time in the year. The increase in traffic movement around the silence zones is raising the noise levels. The trend of tempering with horn & silencers of vehicles specially two wheelers is increasing peak as well as ambient noise levels. The large difference in the noise levels of two industrial zones under the study is not due their industrial activity but due to traffic transiting around them.

**KEYWORDS :** Noise Pollution, Silence Zone, Industrial Zone.

#### INTRODUCTION:

The noise is termed as "unwanted sound". It is caused by human activities that are detrimental to quality of life. Noise can also be considered an environmental pollutant; a waste product generated in conjunction with various anthropogenic activities (Pathaka *et al*, 2015). With the development all around, sources of unwanted sound are increasing day by day knowingly or unknowingly. The rapid increase in the urbanisation, industrialization and individual transport for the sake of being smart has silently raised the level of ambient noise in our environment. The present environmental pollution problems are universal both in the developed as well as developing countries. All these problems are resulting as a consequence of rapid growth of population, excessive exploitation of natural resources, urbanization and industrialization. The current trend of rapid development and increase of the industries, transportations and community activities provides major source of noise pollution, which is well-known environmental hazard throughout the globe (Singh & Dev, 2010). Establishment of Small and Medium scale industries in and around cities, increasing population of Automobiles and Deforestation and clearing of Urban Greenland in the name of human development has degraded environment (Rampal & Duggal, 2013).

Evidence of the non-auditory effects of environmental noise exposure on public health is growing. Observational and experimental studies have shown that noise exposure leads to annoyance, disturbs sleep & causes daytime sleepiness, affects patient outcomes & staff performance in hospitals, increases the occurrence

of hypertension & cardiovascular disease, and impairs cognitive performance in schoolchildren (Basner et.al, 2014). According to World Health Organisation, at least one million healthy life years (Disability Adjusted Life Years) are lost every year from traffic related noise in the western part of Europe. The main burden of environmental noise comprises of road traffic noise causing annoyance & Sleep disturbance (WHO, 2011).

In the present study, four locations were selected to carry out ambient noise survey in Visakhapatnam City. Visakhapatnam is a coastal, port city situated in the of Andhra Pradesh, located on the eastern shore of India, nestled among the hills of the Eastern Ghats and facing the Bay of Bengal to the east. It is the largest city in Andhra Pradesh and it is primarily an industrial city, apart from being a port city. Visakhapatnam is district headquarter in Andhra Pradesh State. It is a coastal city with all types of connectivity from land, sea and air.

## MATERIAL AND METHOD

The noise monitoring was carried out in two zones viz. Silence and Industrial zones taking two locations each for respective zones in different parts of the city of Visakhapatnam. The locations for Silence zone were 'Sri Shanthi Ashram' and 'Biodiversity Park'. Sri shanthi ashram is the place with where a school for deaf & dumb children, an ashram & a primary school is situated. Bio-diversity park is the nature's park with a large number of plant species from different parts of India & home to lot of birds & butterflies in the middle of the city.

The locations for Industrial zones were 'Visakhapatnam Steel Plant' and 'BHEL Heavy Plate & Vessel Plant and Visakha Dairy'. Visakhapatnam Steel Plant, popularly known as Vizag Steel, is an integrated steel producer in public sector based in Visakhapatnam founded in 1971. Heavy Plate Vessel Plant (HPVP) is one of the main manufacturing units of Bharat Heavy Electrical Limited (BHEL). Sri Vijaya Visakha Milk Producers Company Limited popularly known as Visakha Dairy was established in the year 1973 is milk processing plant at Akkireddipalem, Visakhapatnam. The dairy is situated in front of Heavy Plate Vessel Plant (HPVP) on the other side of National Highway 16 (previously known as NH 5).

Noise levels were recorded in 'A' weighed network using Sound Level Meter (HTC SL-1350). The meter was held 1.3 to 1.5 m above the ground surface and away from reflecting surface. The noise data was recorded over a period of twelve months from March 16 to February 17. Readings were tabulated taking one week for each zone i.e. in first week for Silence zone and in fourth week for Industrial zone every month. The Leq value was recorded for five minutes every half an hour. A total of 30 readings were recorded on the days of monitoring commencing 0730H to 2200H. The data recorded from all the locations was statistically analysed.

## NOISE POLLUTION INDICES

The average equivalent values (Leq) for the months were calculated for each location. Also the percentile values like  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  for noise levels were calculated using statistical formulas.

$L_{eq}$  – Time Weighed Average or Equivalent Continuous Noise Level

$L_{10}$  – Level of Sound exceeding 10% of the time of measurement or Peak Noise

$L_{50}$  – Level of Sound exceeding 50% of the time of measurement or Mean Noise

$L_{90}$  – Level of Sound exceeding 90% of the time of measurement or Background Noise

The noise limit decided by Central Pollution Control Board is 50 dB (A) & 75 dB (A) for Silence Zone and Industrial Zone respectively during the day time.

## RESULT

The final data obtained from noise monitoring from two Silence and two Industrial Zones is tabulated. Table 1, 2, 3 & 4 shows the noise pollution data of Sri Shanthi Ashram, Biodiversity Park, Visakhapatnam Steel Plant and 'BHEL Heavy Plate & Vessel Plant and Visakha Dairy' respectively. All the values are in dB (A) scale calculated for a period of 12 months.

Table 1: Noise Pollution data of Silence Zone 1 (S1) Sri Shanthi Ashram

dB(A)	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12
<b>L<sub>eq</sub></b>	59.08	59.30	54.73	59.72	59.08	58.82	58.90	59.18	59.10	59.64	59.23	59.88
<b>L<sub>10</sub></b>	62.54	63.55	56.06	63.94	62.20	60.66	60.56	60.33	60.40	60.84	60.58	60.62
<b>L<sub>50</sub></b>	55.41	56.04	54.72	55.61	55.92	55.80	55.62	55.61	55.80	56.04	55.65	55.71
<b>L<sub>90</sub></b>	50.41	51.59	50.26	52.13	50.21	50.25	50.49	50.34	50.06	50.11	51.16	50.28

Table 2: Noise Pollution data of Silence Zone 2 (S2) Biodiversity Park

dB(A)	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12
<b>L<sub>eq</sub></b>	49.34	51.07	51.83	51.29	51.86	54.02	54.11	54.05	54.12	53.53	53.83	53.70
<b>L<sub>10</sub></b>	50.94	52.59	53.58	53.23	53.65	55.35	55.69	55.82	56.65	55.44	55.63	55.26
<b>L<sub>50</sub></b>	48.98	51.23	51.68	51.31	52.25	54.36	54.35	54.35	54.37	53.67	53.98	53.92
<b>L<sub>90</sub></b>	46.05	48.11	48.26	47.84	46.98	49.84	49.91	50.24	49.99	49.40	49.23	49.57

Table 3: Noise Pollution data of Industrial Zone 1 (I-1) Visakhapatnam Steel Plant

dB(A)	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12
<b>L<sub>eq</sub></b>	62.50	62.98	62.63	62.15	63.32	63.88	64.52	64.23	64.40	64.57	64.47	64.24
<b>L<sub>10</sub></b>	65.34	66.04	65.77	65.36	66.00	66.52	67.13	66.80	66.94	66.95	66.96	66.87
<b>L<sub>50</sub></b>	56.91	56.90	57.07	56.87	57.34	57.24	57.40	57.41	57.24	57.50	57.49	57.42
<b>L<sub>90</sub></b>	55.76	55.28	54.95	54.76	55.76	55.24	55.31	55.04	54.47	54.49	54.60	55.09

Table 4: Noise Pollution data of Industrial Zone 2 (I-2) BHEL Heavy Plate &amp; Vessels Plant and Visakha Dairy

dB(A)	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12
<b>L<sub>eq</sub></b>	75.30	75.20	75.37	75.36	75.65	75.70	75.78	75.89	75.63	75.64	75.75	75.74
<b>L<sub>10</sub></b>	76.19	76.13	76.21	76.42	76.44	76.76	76.85	77.21	77.15	76.73	76.86	76.82
<b>L<sub>50</sub></b>	75.34	75.30	75.27	75.27	75.45	75.52	75.59	75.56	75.35	75.49	75.64	75.56
<b>L<sub>90</sub></b>	73.80	73.79	74.35	74.20	74.77	74.70	74.72	74.57	74.57	74.40	74.62	74.66

## DISCUSSION

The data from above tables was then compared and the Figure 1, 2, 3 and 4 were drawn for the values of  $L_{eq}$ ,  $L_{10}$ ,  $L_{50}$  and  $L_{90}$  respectively for all locations. All the tables show that the equivalent noise levels are higher in the both industrial zones than the both silence zones with clear differences.

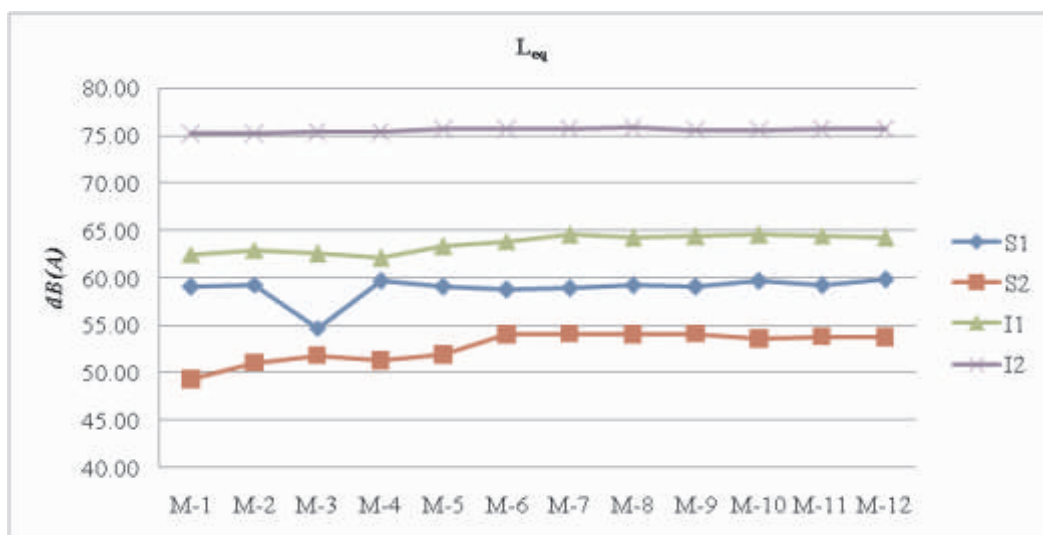
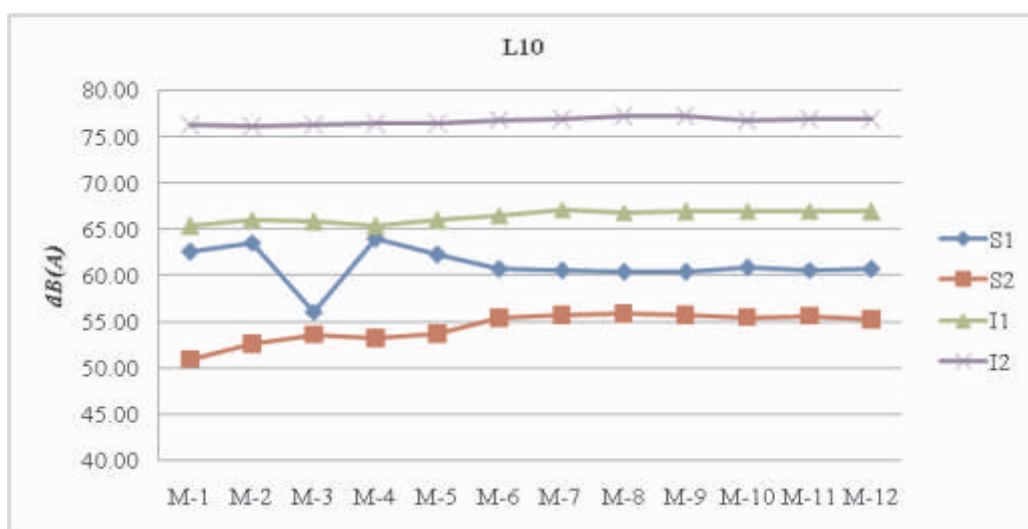
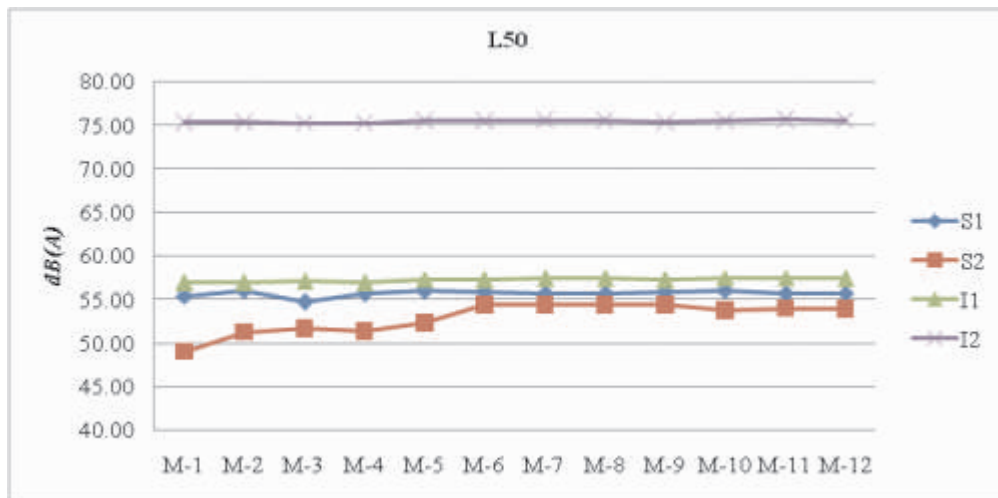
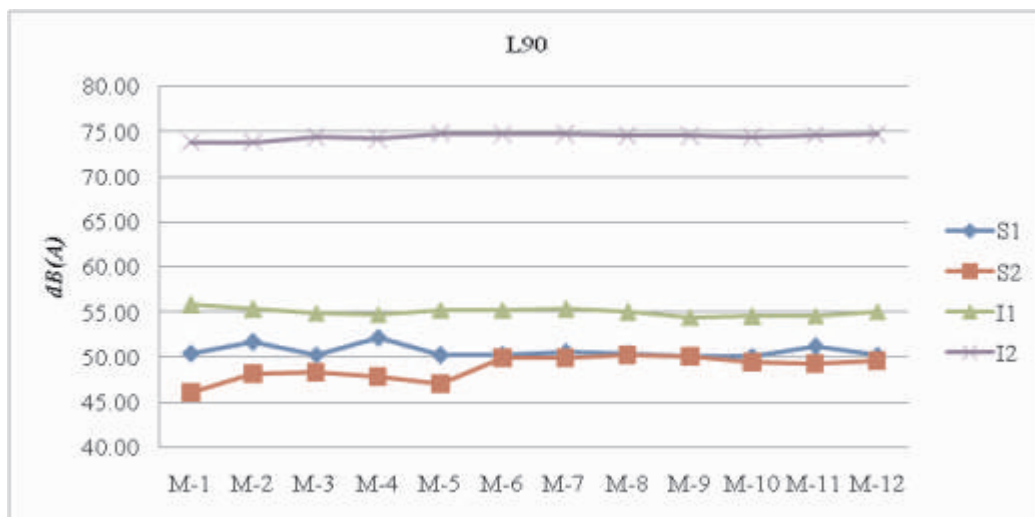


Figure 1: Leq at various locations in dB (A)

Figure 2: L<sub>10</sub> at various locations in dB (A)

The Noise levels are least at Biodiversity Park and highest at 'BHEL Heavy Plate & Vessel Plant and Visakha Dairy'. However, the noise levels at all the places are exceeding over the set limits described by the Central Pollution Control Board during day time except at Visakhapatnam Steel Plant most of the time in the year. The observed equivalent noise levels ranges from 54.73 – 59.90 dB (A), 49.34 – 54.12 dB (A), 62.15 – 64.57 dB (A) and 75.20 – 75.89 dB (A) at Sri Shanthi Ashram, Biodiversity Park, Visakhapatnam Steel Plant and 'BHEL Heavy Plate & Vessel Plant and Visakha Dairy' respectively.



Figure 3: L<sub>50</sub> at various locations in dB (A)Figure 4: L<sub>90</sub> at various locations in dB (A)

The noise indices are lower in the Shanthi Ashram area due to the summer vacations in school during month 3. The noise indices are rising in the biodiversity park area over the year due to increase in vehicular traffic near boundary wall.

The noise indices at Visakhapatnam Steel Plant is comparatively lower than the CPCB limit of 75 dB (A) and is even below the CPCB limit of 65 dB (A) for commercial area. The reason being the location of the plant in deep corner of the city and was well planned with wide roads & green belts of trees. The area is also not a transit route to other places. The shift change siren slightly raises the ambient noise levels because the ambient noise level is much lower during whole day. The noise indices at 'BHEL Heavy Plate & Vessel Plant and Visakha Dairy' are just above the CPCB limit of 75 dB (A) due to the location being on either side of National Highway 16. Here, the elevated level of noise on most of the time is due to fast moving vehicles & honking. The shift change sirens have very little effect on raising the ambient noise levels compared to traffic noise during the whole day.

The increase in traffic movement around the silence zones is raising the noise levels. The access / lane roads for apartment, building & offices etc. are used for parking of vehicles, making the roads further narrow are also a cause of traffic noise. These roads are used for avoiding wait time at traffic lights in the main roads. The trend of tempering with horn & silencers of vehicles specially two wheelers is increasing peak as well as ambient

noise levels. The tempered horn & silencer noise is clearly audible from half a kilometre. These causes are raising the noise levels in the silence zones under the study.

The large difference in the noise levels of two industrial zones is not due to their industrial activity but due to traffic transiting around them. The traffic on National Highway 16 transiting between BHEL-HPVP & Visakha Dairy is the main cause of raised ambient noise in the area.

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