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Assessment of traffic noise at Kachi Chawni, Jammu(J&K)

KEYWORDS: traffic noise , main crossing , Leq

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ABSTRACT *The present study has been carried out to assess the status of traffic noise in three main crossing at Kachi Chawni, Jammu. From the study, it can be concluded that all the three main crossing of study area exhibited values of Leq above the permissible limits of 65 dB as prescribed by CPCB.*

Introduction

Development is the need of the hour for any nation in the world. In the name of development, the nature and natural resources have been degrading since the beginning of industrialization era. It leads to the introduction of many industries and industrial activities that has adversely affected the components of our environment and it is still growing by leaps and bound. But on the other hand degrading environment has raised concern among people of the world in protecting the components of the environment from pollution and degradation. The industries which have become back bone of development of the nation are the main source of pollution and degradation of nature and natural resources.

Noise is an acoustic, electric or electronic signal consisting of a random mixture of wavelength, which is unpleasant and arouses disturbing feeling or as the totality of unwanted, undesirable and unpleasant sound. It is also defined as wrong sound at the wrong place and at the wrong time. (Dhaliwal et al. 1996). The sources of noise can be broadly classified into two classes' viz. industrial and non-industrial (Grahland, 1987). Noise itself is a pollutant that is undesirable for human well-being and for aesthetic life. We have to admit that it is not possible to live the modern life without some sort of noise or other. Urban noise is a factor that is increasingly becoming a nuisance and a health hazard and is thus an environmental pollutant.

Wilson (1963) conducted a survey in London on noise pollution and found road traffic to be the most frequent disturbing factor for people residing in the home as well as moving outside. Mukhopadhyay and Ramanathan (1967) studied vehicular noise in a "No horn" zone in Calcutta and observed that the background noise levels were abnormal during day and night but the vehicular noise shown peak value in the morning and evening hours causing disturbances to the students, patients and residents in the area, though the density of vehicular traffic along the street was observed to vary from low to medium during the day and low at night. Fog and Jonsson (1968) investigated traffic noise in residential areas and found that the highest annoyance class included the greatest proportion of those individual with headache, insomnia and nervousness. Acute irritability showing a clear relationship with noise and annoyance was observed. Longdon and Buller (1977) found that the traffic noise interferes with various activities such as conversation, watching TV, taking rest and relaxation. Neema and Dubey (1988) measured the noise pollution by vehicles in the new city areas of Bhopal and found that the open areas and leafy trees reduced noise levels where as motorcycles and three wheelers produced disproportionally higher noise levels. Yagnanarayan and Rao (1994) reported that environmental noise due to motor vehicles traffic depends on various factors, such as the condition and the width of the road, presence or absence of the building or other absorbing agents like trees on the sides of the roads, the volume and structure of the traffic, the regulation of traffic flow and the age of vehicles. Pandya and Verma (1997) reported the existing noise pollution status of Nagpur urban environment with emphasis on objective measurement and subjective relation of people and showed that road traffic noise had been a major contributor to the annoyance which was substantiated by the results of continuous monitoring of noise equivalent level (Leq).

Singh and Rao (2001) observed that the noise generated from the traffic is a major source of environmental pollution. Raina and Agarwal (2003) estimated that the noise levels at 17 sites in Jammu city like residential, commercial, silence zone and traffic crossing and observed noise level at all the sites of these zones during day hours which exceeded the prescribed limit. Patel et al. (2006) studied noise level in different residential areas of Jharsuguda town in western Orissa (INDIA) and observed that vehicular traffic with air horns of loud noise was found to be the main reason for high noise levels. Thakur (2006) while studying the noise levels at major traffic junctions and community area near an educational institution of an urban city (Nagpur) observed that the major contribution towards noise was from the traffic activities. Rajakumara and Gowda (2006) investigated that the noise generated from road vehicles has become a major concern for community living in the vicinity of major highways corridors. Rampal and Sharma (2008) concluded that the value of Leq was directly related with increase in commercial activities. However no co-relation was observed between the value of Leq and traffic flow rates. Tiwari et al. (2013) monitored the noise pollution due to railway and vehicular traffic at one of the major intersection Rajapeth using digital sound meter along with the collection of traffic volume data and train frequency.

In present study, attempt has been made to assess the status of traffic noise in three main crossing at Kachi Chawni, Jammu.

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Material and Methods

The study area was divided into three sites- Site I: CPO chowk which leads to the Amphalla, Parade and Panjtirthi. Site II: Kachi Chawni chowk which lies between the CPO and Distt. Lib. and is connected with a link road to Pacca Danga. Site III: Distt. Lib chowk. This crossing again leads to Parade, Shalamar, CPO, Kachi Chawni and Rehari Chungi thus making it one of the busy crossings.

Noise levels were recorded with the help of Digital Sound Level meter (model 8928) in A-weighted scale. Noise level were recorded three times a day during 9-10 hrs 13-14hrs and 17-18 hrs for three weeks at various sites. At each site three days sampling was done from Monday to Sunday per week for period of 21 days and finally average noise indices for each day were calculated. During each sampling of noise level, 20 readings of Sound Pressure Level (SPL) were recorded at an interval of 30 seconds in a period of 10 minutes. At the end of 10 minutes minimum and maximum SPL levels were recorded with the help of Sound Level Meter.

From the 20 readings of the SPL, following noise levels were calculated.

(i)Leq (equivalent noise level) = 10 log ∑ fi (10Li/10) dB (A).

Where,

fi= fraction of time for which the constant SPL persists

Li= noise levels recorded after every 30 sec.

(ii) Traffic flow rate:

Count of number of vehicles per 10 minutes at each site.

Observation and Discussion Table I and II

Overall analysis of data revealed that Site I exhibited minimum values of 52.3 dB (A) during 17-18 hrs and maximum value of 92.5 dB (A) during 13-14 hrs. The Site II exhibited minimum value of 53.9 dB (A) during 17-18hrs and maximum value of 96.1 dB (A) during 9-10 hrs.The Site III shows minimum value of 62.8 dB (A) during 9-10 hrs and highest value of 94.6 dB (A) during 13-14 hrs.

Site I exhibited lowest Leq values of 74.1dB (A) during 9-10 hrs and highest Leq values of 77.4 dB (A) during 17-18 hrs. Site II exhibited lowest Leq value of 79.2 dB (A) during 17-18 hrs and highest Leq value of 80.4 dB (A) during 9-10 hrs as well as 13-14 hrs. Site III exhibited lowest Leq value of 77.9 dB (A) during 9-10 hrs and highest Leq value of 79 dB (A) during 13-14 hrs (Table I).

From the above study, it can be concluded that all the three sites of study area exhibited value above the permissible limits of 65 dB as prescribed by CPCB.

The statistical analysis of data revealed that traffic flow rate and Leq exhibited significant ($p < 0.05$) positive co-relation on Monday (r=0.9), Tuesday (r=0.9), Wednesday (r=0.8) and Friday (r=0.5), insignificant ($p>0.05$) negative co-relation on Thursday (r= -0.5), significant ($p< 0.05$) negative co-relation on Saturday (r= -0.3) and Sunday (r= -0.4) which are non-working days (Table II).

The main reason for such a high noise levels is the condition of the road i.e. narrow road, lack of passenger shed, footpath for pedestrians, proper road divider, noise barriers and improper traffic regulations. As a result the pedestrians are seen walking on the main road making it narrower for the vehicles and they tend to blow horns frequently polluting the environment. The reasons stated above strongly support the observation made by Neema and Dubey (1988), Singh and Rao (2001), Raina and Agarwal (2003), Patel et al. (2006).

The coefficient correlation of the Leq vs traffic flow rate is positive and significant for most of the working day as more number of vehicles were seen plying on the roads especially in the peak hours. But for non-working days the coefficient correlation of Leq vs traffic flow rate was negative due to decrease in number of vehicles and consequently no major traffic jam occured. Rampal and Sharma (2008) also reported that the value of Leq was directly related with increase in commercial activities but no co-relation was observed between the value of Leq and traffic flow rates.

Environmental noise due to motor vehicles traffic depends on various factors, such as the condition and the width of the road, presence and absence of building or other absorbing agents like trees on the sides of the roads, the volume and structure of the traffic, regulation of traffic flow and the age of vehicles (Yagnanarayan and Rao, 1994).

Table I: Average outdoor noise indices (dB (A)) at study area.

Site	Time (Hrs)	Minimum dB(A)	Maximum dB(A)	Leq dB(A)	Traffic flow rate/10 minutes
Site I CPO chowk	9-10	60.5	86.8	74.1	348
	13-14	61.7	92.5	77.1	390
	17-18	52.3	91	77.4	389
Site II Kachi Chawni chowk	9-10	65.3	96.1	80.4	353
	13-14	65.8	94.9	80.4	377
	17-18	53.9	93.7	79.2	377
Site III Distt. Lib chowk	9-10	62.8	93.3	77.9	338
	13-14	62.9	94.6	79	357
	17-18	63.3	90	78.4	358

Table II: Pearson's correlation co-efficient (r) traffic flow rate versus Leq

Day		Timing (hrs)			Pearson's co-efficient (r) T Test (p)
		9-10	13-14	17-18	
Monday	Leq dB(A)	74	78.5	75.4	r= 0.9 p= 0.005
	Traffic flow rate	330	409	376	

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Tuesday	Leq dB(A)	78.3	77.2	81.3	r= 0.9 p= 0.001
	Traffic flow rate	378	359	408	
Wednesday	Leq dB(A)	80	88.2	84.4	r= 0.8 p= 0.01
	Traffic flow rate	277	359	358	
Thursday	Leq dB(A)	78.2	80.1	80.9	r= -0.5 p= 3.08
	Traffic flow rate	399	400	396	
Friday	Leq dB(A)	74.8	75.5	75	r= 0.5 p= 0.0005
	Traffic flow rate	351	368	373	
Saturday	Leq dB(A)	78.9	75.7	75.6	r= -0.3 p=0.0002
	Traffic flow rate	389	401	386	
Sunday	Leq dB(A)	77.9	76.6	75.9	r= -0.9 p= 0.001
	Traffic flow rate	298	325	324	

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