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A Study of Noise Pollution in Greater Noida City – U.P., India

Faheem Khan[1], Avneet Kr. Singh, Shobha Ram

[1]Student of Environmental engineering (M.Tech), fahkhan093@gmail.com, contact no- +917836099237

Abstract— Sound in the environment is caused by the quivering of particles present in the air that reaches the human ears and stimulates a feeling of hearing. When sound becomes loud, or disagreeable, or unwanted, or annoying, it becomes noise. This production of noise causes some undesirable effects on the human being as well as on animals, therefore this noise is also termed as environmental pollutant such as air pollution, water pollution etc. Noise can cause annoyance, diseases, sleeplessness, communication interference, hearing loss etc. due to which it should be controlled in the surroundings. The Air Act 1981 also includes noise as one of the air pollutant. In this paper, the noise pollution level and its impacts on the environment of Greater Noida a small city of Uttar Pradesh, India is discussed. In this area the major sources of noise pollution are vehicle horns, commercial areas and industrial areas. The sound pressure level is measured at morning, noon and evening during the peak hours. It is found that in the most areas of the city the prevailing noise level is more than the ambient noise level. In Greater Noida the average prevailing noise level through the vehicle is 83dB which is far more than the desired level of noise. The city is developing rapidly due to which the number of vehicle are increasing day by day and hence traffic noise is also increasing that has to be analyzed and controlled for the sake of human health. At the end of the paper some fruitful suggestion for noise abatement and control has been discussed.

Keywords— Noise; Pollution; Environment; Traffic; Vehicle; industrial; commercial; residential; Noise level; Limits; dB.

INTRODUCTION

The simple expression of term noise is an unnecessary sound and important form of energy, which is emitted by a vibrating body and on reaching the ear causes sensation of hearing through nervous system [8]. Noise pollution has been recognized as new threat to the human being after the air and water pollution. It is mainly due to the increasing urbanization and population due to which the vehicle is increasing day by day. . It is an underrated environmental problem because of the fact that we can't see, smell, or taste it [6]. Not only vehicles but due to urbanization and increasing population the increase in infrastructure and industries is also taking place which is also a healthy reason for noise pollution. Now days the main task for the urban planners and environmental engineers is to administer the mounting noise level [1]. The city dwellers may undergo a serious stress on auditory and non-auditory and nervous system due to continuous high level of noise [2]. The poor condition of engine in cars, motorcycles or the poor condition of exhausts in the houses, industries etc. may lead to a cause of great annoyance to the population [3]. Physical and psychological, irritation, human performance and actions, hypertension, heart problems, tiredness, headache and sore throat are some of the severe health problem due to the noise pollution which has been seen in numerous studies of road traffic noise pollution [4]. Noise pollution is not a continuing or persisting phenomenon and hence it is transient in nature which differ this pollutant from other pollutants (air, water etc.) [5]. Unlike the other pollutant like gases and particulate matter, which continue to linger on, once they enter in the environment , the noise pollution stops and the environment becomes free from this pollutant [5]. The noise may induce annoyance, diseases, hearing loss, sleeplessness, communication interference and may cause some ill effects on the wild life as well. The noise may cause disease such as anxiety, tenseness, nervousness, headache, fatigue, nausea, insomnia, high blood pressure, high pulse rate, greater perspiration, gastric secretions, etc. [5]. The hypothesis is that long-time exposure to noise could result in lasting cardiovascular changes such as atherosclerosis, and increase cardiovascular risk as well as hypertension [7]. The noise level has not exceeded to such an extent, as to cause drastic adverse effects on human being due to which the noise has so far not been regarded as a killer pollutant. Noise pollution is not prominent except in industrial areas and big cities, and hence has generally remained ignored from being treated as an environmental pollutant. The consequential increase in noise producing automobiles and with increasing industrialization and commercialization of our society noise is becoming a slow poison. At present, noise pollution is considered as one of the key problems of urban communities that has numerous hazardous effects on the urban environment and may result in a great deal of costs on the society [9], [10].

SOURCES OF NOISE POLLUTION

In our society the noise is mainly produced by traffic (air, road and sea shore and inland water traffic) and industries. The increasing number of vehicles, musical instruments, small scale industries, and urbanization and human activities are the main sources of noise pollution [11]. Increasing density of traffic related with the traffic composition, the road slope, width, and surface structure distance to crossroad increases the traffic noise [12]. Traffic can be considered as the major source of noise pollution in large cities [13], [14], [15]. In big cities like Delhi a lot of noise is produced by traffic and which is causes a lot of nuisance to the society. The amount and type of noise produced by traffic is largely dependent upon the type of traffic. The noise level produced by different types of traffic is given in Table 1.

Table 1: Noise level from different sources of traffic.

S.No.	Sources of Noise	Noise Level in dB
1.	Air Traffic a) Jet aircraft at take off stage at about 300m b) Propeller type of aircraft at take of stage at about 300m	 100-110 90-100
2.	Rail traffic (at about 30m)	90-110
3.	Heavy road traffic (highway)	80-90
4.	Medium road traffic (main streets)	70-80
5.	Light road traffic (side streets)	60-70

Source: Sewage disposal and air pollution engineering, Environmental engineering volume 2 – Santosh Kumar Garg.

In Greater Noida the main sources of noise pollution is heavy moving traffic. Greater Noida is an emerging city of Uttar Pradesh as well as it is nearly connected to the highways due to which movement of heavy vehicle takes place now and then which creates lots of noise and air pollution. Use of horns by the drivers of the vehicle un-purposely is also a main cause of increasing noise level. Presently, Greater Noida is a developing city and hence plenty of constriction work is taking place which is also enhancing the level of noise. In many of industrial areas of the city level of noise is under control due to the proper planning of industries to resist the pollution created by noise.

ACCEPTABLE LIMITS OF NOISE ACCORDING TO GOVERNMENT OF INDIA AND INDIAN STANDARD CODES

The union Environment ministry has prescribed noise standards for different types of vehicle, as given in Table 2.

Table2: GoI noise standards for different types of vehicles.

S.No.	Type of Vehicles	Noise level in dB
1.	Two wheelers	80
2.	Cars	82
3.	Passenger or commercial vehicle a) Up to 4 MT (Metric tons) b) Between 4 MT to 12 MT c) More than 12 MT	 85 89 91

Source: Sewage disposal and air pollution engineering, Environmental engineering volume 2 – Santosh Kumar Garg.

The desirable outdoor noise levels in different types of residential areas, as well as the acceptable indoor noise levels for various types of buildings, as recommended by Indian standard code IS : 4954-1968 are given in Table 3 and Table 4 respectively.

Table 3: **Acceptable outdoor noise level in residential areas.**

S.No.	Location	Noise level in dB
1.	Rural areas	25-35
2.	Suburban areas	30-40
3.	Urban residential areas	35-45
4.	Residential and business urban areas	40-50
5.	City areas	45-55
6.	Industrial areas	50-60

Source: Sewage disposal and air pollution engineering, Environmental engineering volume 2 – Santosh Kumar Garg.

Table 4: Acceptable indoor noise level in various types of buildings in residential areas.

S.No.	location	Noise level in dB
1.	Radio and T.V. studios	25-35
2.	Music rooms	30-35
3.	Hospitals, class rooms, auditoria	35-40
4.	Apartments, hotels, homes, conference rooms, small offices	35-40
5.	Court rooms, private offices, libraries	40-45
6.	Large public offices, banks, stores, etc.	45-50
7.	Restaurants	50-55

Source: Sewage disposal and air pollution engineering, Environmental engineering volume 2 – Santosh Kumar Garg.

To control the noise levels, the Government of India has created the Noise Pollution Rules 2000, under the Environment Protection Act 1986. In these rules GoI has specified the limits of noise levels in Industrial, Residential, Commercial area and Silence zone which has been given Table 5.

Table 5: Limits if noise in different type of areas according to GoI.

S.No.	Category of area/zone	Limits in dB (A) Leq at day time	Limits in dB (A) Leq at night time
1.	Industrial area	75	70
2.	Commercial area	65	55
3.	Residential area	55	45
4.	Silence zone	50	40

Source: Sewage disposal and air pollution engineering, Environmental engineering volume 2 – Santosh Kumar Garg.

MATERIALS AND METHOD

In the present study the Noise level of different areas of Greater Noida city have been analyzed to identify whether the level is under the standard limits or not. The areas which are covered in the study are Kasna market, Kasna chowk near Bus stand, Pari chowk, Tugalpur, Alpha commercial and residential area, Jagat farm, Petrol pump near P3 golchakkar, Gautam Buddha University

commercial and residential area, Site 5 industrial area and Surajpur industrial area where the noise level has been checked. The noise level in this area has been checked thrice in a day – morning from 8 to 9 am, afternoon from 2 to 3 pm and at evening from 8 to 9 pm on 1st February 2016. The instrument used to measure the noise level is Sound Level Meter. It measures sound pressure level and equivalent noise level (Leq) of a particular area up to ___ km. To measure the loudness of sound, electronic filtering circuits are built into the sound measuring meters which filter out certain frequencies [5]. There are 3 types of filter circuit's i.e. A, B and C, but A type of network is generally used in sound level meters. The A network largely filters out very low and very high frequencies below about 200 Hz and above about 10,000 Hz. Hence the measured sound in dB (decibel) is written as dB (A) [5]. Filter A measures low frequencies which are quite severely filtered, moderate frequencies are measured by filter B and hardly at all by filter C. Therefore the sound measured on network A is much lower than that on C network [5].

OBSEVATIONS

The following observation is made using sound level meter in different areas of the city in three shifts- morning, afternoon and evening. The noise level given below of different areas is the average of at least 10 readings of noise level in the area. The sound level meter used consist of electronic filter circuit A, hence the unit of noise level is turned out to be dB (A).

Table 6: Sound pressure level in Greater Noida city at morning (8 to 9).

S.No.	location	Time	Noise level dB (A)
1.	Kasna Market	8:00-8:05 am	72.5
2.	Kasna Chowk	8:06-8:10 am	81.25
3.	Pari Chowk	8:11-8:15 am	91
4.	Tugalpur commercial area	8:16-8:20 am	66.25
5.	Sector alpha commercial area	8:21-8:25 am	54.3
6.	Sector alpha residential area	8:26-8:30 am	62.7
7.	Jagat farm	8:31-8:35 am	74.82
8.	Petrol pump near P3 golchakkar	8:36-8:40 am	70.2
9.	Gautam Buddha University commercial area	8:41-8:45 am	58.9
10.	Gautam Buddha University residential area	8:46-8:50 am	45.9
11.	Site 5 industrial area near kasna	8:51-8:55 am	77.35
12.	Surajpur industrial area	8:56-9:00 am	85.6

Table 7: Sound pressure level in Greater Noida city at afternoon (2 to 3).

S.No.	location	Time	Noise level dB (A)
1.	Kasna Market	2:00-2:05 pm	74.5
2.	Kasna Chowk	2:06-2:10 pm	85
3.	Pari Chowk	2:11-2:15 pm	93
4.	Tugalpur commercial area	2:16-2:20 pm	86
5.	Sector alpha commercial area	2:21-2:25 pm	67.3
6.	Sector alpha residential area	2:26-2:30 pm	72
7.	Jagat farm	2:31-2:35 pm	86.6
8.	Petrol pump near P3 golchakkar	2:36-2:40 pm	79.2
9.	Gautam Buddha University commercial area	2:41-2:45 pm	61.5
10.	Gautam Buddha University residential area	2:46-2:50 pm	58.4
11.	Site 5 industrial area near kasna	2:51-2:55 pm	77.8
12.	Surajpur industrial area	2:56-3:00 pm	82.9

Table 8: Sound pressure level in Greater Noida city at evening (8 to 9).

S.No.	location	Time	Noise level dB (A)
1.	Kasna Market	8:00-8:05 pm	93.75
2.	Kasna Chowk	8:06-8:10 pm	88.5
3.	Pari Chowk	8:11-8:15 pm	92.82
4.	Tugalpur commercial area	8:16-8:20 pm	86
5.	Sector alpha commercial area	8:21-8:25 pm	77.25
6.	Sector alpha residential area	8:26-8:30 pm	70.25
7.	Jagat farm	8:31-8:35 pm	82.15
8.	Petrol pump near P3 golchakkar	8:36-8:40 pm	74.5
9.	Gautam Buddha University commercial area	8:41-8:45 pm	72.5
10.	Gautam Buddha University residential area	8:46-8:50 pm	60.3
11.	Site 5 industrial area near kasna	8:51-8:55 pm	68.2
12.	Surajpur industrial area	8:56-9:00 pm	71.7

RESULT

Table 9: Noise level in Greater Noida at day and night time.

S.No.	Category of area/zone	Noise level in dB (A) at day time	Noise level in dB (A) at night time
1.	Industrial area	81	70
2.	Commercial area	70.2	82.4
3.	Residential area	68	77.6
4.	Traffic /roadway zone	87.7	96.80

From the above table it can be analyzed that the noise level in industrial areas of Greater Noida is acceptable with respect to the Table 5 which gives the limits of noise level at day and night time according to the Environmental Protection Act, 1986. But the commercial and the residential areas of the city are having higher noise level than acceptable, especially at night time. The noise level in Greater Noida due to vehicles is very high than the limits which are acceptable, which can be compare from Table 1.

CONCLUSION

The study concludes that the noise level in commercial and the residential areas of Greater Noida is higher than the acceptable limits. Greater Noida is a developing city of Uttar Pradesh which is attracting more and more population towards it and due this increasing population the number of vehicles in the city is growing rapidly which are creating high level of noise pollution. The increase noise nuisance in the city should be reduced and abated, if their adverse effects on human health are to be controlled. Some noises can be controlled by legal laws and there are other which has to be damped by use of good technology and town planning. The firms in the industrial area of Greater Noida are abating and reducing the noise by raising obstructions and barriers in between the noise sources and the residence due to which the noise level in industrial areas of Greater Noida is under limit.

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