

## **Environmental Noise Pollution Monitoring and Impacts On Human Health in Dehradun City, Uttarakhand, India.**

Dev Pramendra (Corresponding author)  
School of Studies in Earth Science, Vikram University  
Dewas Road, Ujjain, M. P. 456010, India  
Tel: 91-9407 131514 E-mail: drpdev@yahoo.com

Singh Vartika  
School of Studies in Earth Science, Vikram University  
Dewas Road, Ujjain, M. P. 456010, India  
Email: vartika\_vartu@yahoo.co.in

### **Abstract**

Noise pollution monitoring and environmental impacts on human health in Dehradun City of India are discussed. Major source of noise pollution includes transportation and frequent use of horn in vehicles. Dehradun is at a cross road and prominent national institutions like Survey of India, Oil and Natural Gas Corporation, Forest Research Institute, Indian Military Academy, Indian Institute of Remote Sensing, Wadia Institute of Himalayan Geology, Central and State Government offices are changing Dehradun into a busy, economically active vibrant city. Noise pollution levels (50.70 – 82.54 dB) more than recommended permissible limits (30 -75 dB) are observed in the Survey Chock, Prince Chock, Saharanpur Chock, Gandhi Park and Clock Tower. Exposure to high level of noise cause stress on human health such as auditory, nervous system, insomnia, hearing loss, reducing efficiency, sexual impotency, cardio-vascular, respiratory, neurological damages and limiting the human life. The execution of an appropriate management strategy for limiting noise pollution on affected sites is recommended.

**Keywords:** Environmental monitoring, Noise pollution, Human health, Dehradun, Uttarakhand, India.

### **1. Introduction**

Environment has been described as that surrounds an individual or community, including both the physical and cultural surroundings. It is also sometimes used to designate a certain set of the circumstances surrounding a particular occurrence for example, environment of the deposition (Keller, 1976). According to Coates (1981) the environmental geology is a mission oriented and problem solving discipline. Valdiya (1987) remarked that the geologist plays a very crucial role in understanding, preserving, ameliorating and restoring the natural environment, and considered that environmental geology is an integrated application of geology for the benefit of man and his living and inanimate world.

The natural environment is one of the most valued elements of Dehradun city, being placed in the attractive Doon Valley that is having the Himalayas to its north, the Shivalik range to its south, the sacred river Ganga to its east and the river Yamuna to its west. Dehradun area (latitudes 30° 15' to 30° 30' N; longitudes 78° 00' to 78° 15' E; Survey of India, toposheet no. 53J/3) is surrounded by river Song on the east, river Tons on the west, Himalayan ranges on the north and Sal forests in the south. Dehradun is bordered by dense forest all around and number of streams and canals dissect the city in the north-south direction. The high hills in the east and north and Shivalik in the south present an interesting topographical setting to the city. All the hill ranges around Dehradun are rich in limestone reserves. The demands and challenges of development and preservation of its rich natural environment require to be met concurrently. The present environmental pollution problems are universal in almost all the countries. Road traffic, jet planes, garbage trucks,

construction equipment, manufacturing processes, and lawn movers are some of the major sources of this unwanted sound that are routinely transmitted in to the air (Birgitta & Lindvall, 1995). All these problems are resulting as a consequence of rapid growth of population, self centered human mentality, fast life style, no of vehicles, use of large number of instruments in daily life, excessive exploitation of natural resources, rapid rate of urbanization and industrialization. In the present scenario, noise is becoming an increasingly source of discomfort and danger in the vicinity of Dehradun city.

### *1.1 Concept of noise pollution*

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. The noise generally consists of three inter-related elements - the source, receiver and transmission path followed by the noise to reach receiver. This transmission path is usually the atmosphere through which sound is propagated, but can include structural materials of any building containing the receiver. Discrimination and differentiation between sound and noise also depends upon the habit and interest of the person or species receiving it, the ambient conditions and impact of the sound generated during that particular duration of time. Singh & Davar, (2004) explained that the noise is an unwanted sound that may cause some psychological and physical stress to the living and non-living objects exposed to it.

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 (Martin et al., 2006; Chien & Shih, 2007). Gangwar (2006) described that the increasing number of vehicles, musical instruments, small scale industries, urbanization and human activities are the main sources of noise pollution. Traffic noise levels increase with increasing density of traffic related with the traffic composition, the road slope, width, and surface structure distance to crossroad (Williams & McCrae, 1995). Important factors affecting noise values are continuity of the city centre traffic, and the dimension, position, and surface materials of roads with city centre crossroad signal system (Tang & Tong, 2004). Traffic can be considered as the major source of noise pollution in large cities (Jamarah *et al.*, 2006; Murthy *et al.*, 2007; Omidvari & Nouri, 2009).

Hence, the term Noise refers to a sound without agreeable musical quality or as an unwanted or undesired sound. Noise is no less a pollutant than the toxic chemicals in the environment. As a result of increasing mechanization, the use of increasingly voluminous and complicated machinery, equipment and the stepping up of the pace of production, the noise is becoming an increasingly widespread and serious source of discomfort and danger (Singh & Dev, 2010).

The noise is commonly measured as sound intensity that is determined in terms of the pressure of sound waves on the eardrums, and the scale is logarithmic. Loudness of sound corresponds to the degree of sensation depending on the intensity of sound and sensitivity of ear (Garg *et.al.*, 2007). The unit of sound intensity measurement is decibel (dB) and each decibel rise depicts ten-fold increase in sound intensity. The permissible noise tolerance levels are displayed (Table 1). Noise is causing environmental pollution as well as human health hazards.

## **2. Noise pollution analysis**

Deharadun city is facing noise pollution majorly because of being the capital of Uttarakhand state, where several major government offices and people have shifted, good job opportunities and facilities are available and hence people intend to prefer to reside here, which create extra pressure on the environmental scenario of the city. In order to realize concrete reasons of the noise pollution in Deharadun city, it is necessary to study the road network, transport system, escalating number of vehicles and rising rate of population growth that plays a vital role in the physical, social and economical development of the city.

## *2.1 Increase in population and vehicles*

Dehradun is one of the most important city and capital of new born state of Uttaranchal and is situated at the nodal point of roads connecting it to the other part of the country. Geographically the valley lies between latitude 29° 55'N and 38° 30'N, longitude 77° 35'E and 78° 20'E covering an area of about 3088 sq. km, with a population of 12, 82,143 (2001 census). The grim situation of tremendous increase in number of vehicles is generating multiple problems such as encroachment, poor parking facilities, poor condition of roads, no control system of passing heavy traffic through the city, no facility of bypass or flyovers connecting the main roads from border of the city. Therefore, traffic has to bear the load of local traffic as well as heavy traffic passing through the core of city without concern (Singh & Dev, 2010). In the past, Dehradun city was having slow moving traffic namely the bicycles, rickshaws etc., but at present, the senario has totally changed, and city traffic is mainly occupied by the heavy vehicles, motor-cycles, vikram (type of auto-mobile), cars and others generating the noise pollution.

## *2.2 Road network*

The road network of the Dehradun city has been categorized into three types: (1) Zonal and inter-zonal roads, (2) Main city roads, and (3) Local roads. In the present effort, the noise pollution data have been recorded in the silence zone, residential zone and commercial zone of Dehradun city during the period from 2008 to 2010. The noise data have been measured with the help of D. B. Meter and are displayed herein (Table 2, Figure 1).

## *2.3 Effects of noise pollution*

Noise causes significant impact on the quality of life and health ailments, such as cardiovascular tribulations, hypertension, increased levels of diabetes, changes in social behavior and induces the depressive tendencies. The disorders of human, animal and plant bodies due to the noise pollution are described in the following lines:

**Human Efficiency** - Regarding the impact of noise on human efficiency there are number of experiments, which shows that the human efficiency increases with noise reduction.

**Lack of concentration** - For better quality of work there should be concentration, Noise causes lack of concentration. Mostly all the offices are on main road and the noise of traffic or the loud speakers of diverse types of horns, divert attention of people working in the offices.

**Memory loss** - The effects of excessive noise could be so severe that either there is a permanent loss of memory or a psychiatric disorder (Bond, 1996).

**Fatigue** - Because of noise pollution, people cannot concentrate on their work. Hence they spent more time for completing the work and they experience exhaustion.

**Digestion problem** - The digestion, stomach contractions, flow of saliva and gastric juices all stop proper working due to the high frequency of noise, because the changes are so marked, repeated exposure to astonishing noise should be kept to a minimum (Broadbent, 1957).

**Abortion crisis** - There should be cool and calm atmosphere during the pregnancy. The unpleasant sounds create a lady to be of irritative nature. Sudden noise causes the abortion.

**Blood pressure problem** - Noise pollution causes certain diseases in human sue to traffic noise such as the headache, high blood pressure and other stresses among the exposed individuals in adjoining working places in Varanasi City (Pathak *et al.*, 2008).

**Deafness disaster** - The effect of noise on audition is well recognized. Mechanics, locomotive drivers, telephone operators etc., all have their hearing impairment as a result of noise at the place of work. Physicians and psychologists are of the view that sustained exposure to noise level above 80 to 100 dB is

risky and thunderous noise causes temporary or permanent deafness.

Hypertension - Relatively low level of noise affects human health adversely and it may cause hypertension, disrupt sleep and or hinder cognitive development in children (Kiernan, 1997).

Animals - Noise pollution damage the nervous system of animals. They lose control of the mind and may become dangerous.

Plants - Noise pollution causes poor quality of crops even in a pleasant atmosphere.

### 3. Conclusion

This research paper elucidates the levels of noise pollution in different zones in Dehradun city. The measurements of noise levels have been recorded at the different Silence, Residential and Commercial zones of the city. The analysis has revealed that noise pollution levels are rather higher than prescribed Indian Standards at all the examined sites. such as Survey Chock, Clock Tower and Prince Clock. It is evident from the noise data analysis (Table, 3; Figure 5) that during the months of September to March, noise pollution of the Dehradun city is higher than in comparison to other months of the year. This could be due to celebrations of the festivals and marriages during this period. It is not possible to impose a ban on the celebrations in the society, however, the use of higher frequency loud speakers should be allowed for specified period only.

Suggested that frequent use of the vikram may be prohibited principally in the city area, because horn and music from autoriksha or vikram generate noise as well as air pollution. Implementation of a scheme for plantation of trees and buffer zones must be shaped in diverse parts of the city. People can be consistently educated through news papers, magazines, radios, televisions, and exhibiting adds in cinema halls relating to reduce noise pollution. The regular monitoring of pollution, proper maintenance of vehicles, ban on use of old vehicles, plantation, widening of roads and public awareness are the most vital, and essential measures to be implemented in order to improve present status of environmental entity in the Dehradun City

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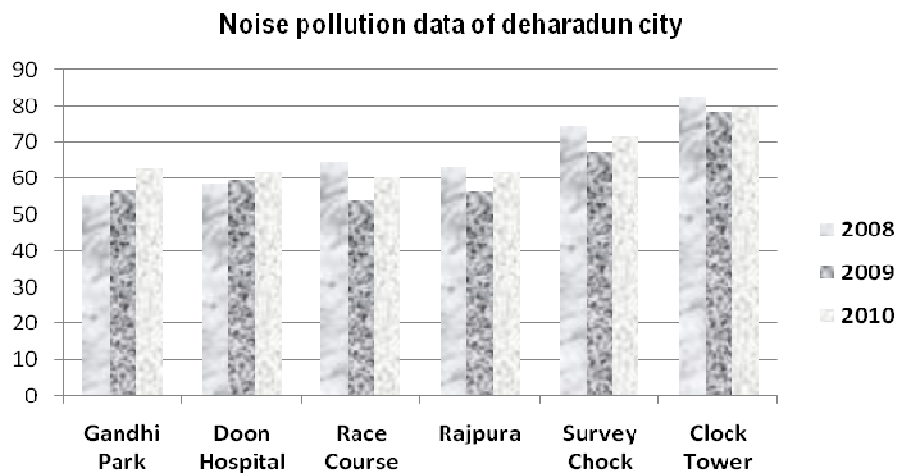


Figure 1: Noise pollution data of Dehradun city, during 2008 – 2010.

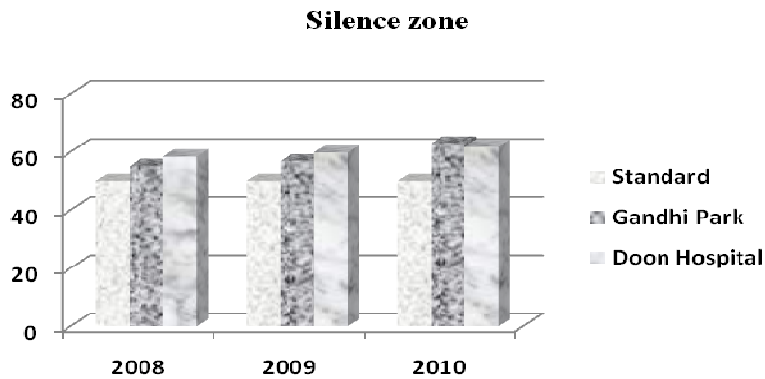


Figure: 2 Noise pollution data of silence zone, Dehradun city, during 2008 – 2010.

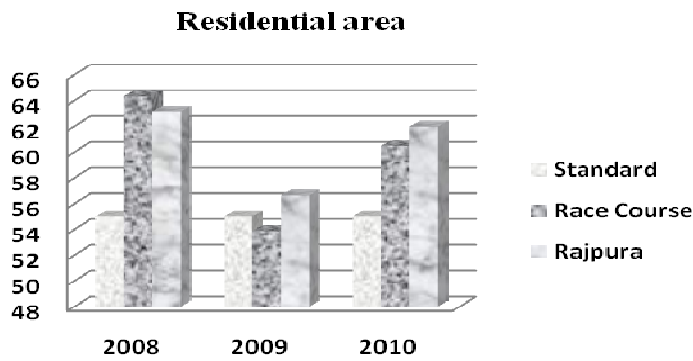


Figure: 3 Noise pollution data of residential zone, Dehradun city, during 2008 – 2010.

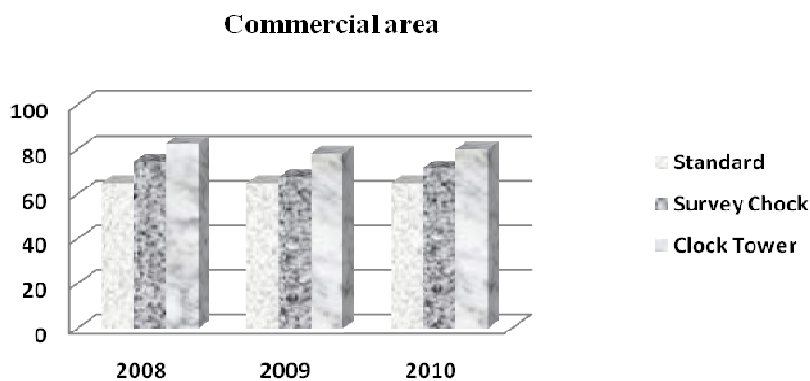


Figure: 4 Noise pollution data of commercial zone, Dehradun city, during 2008-2010.

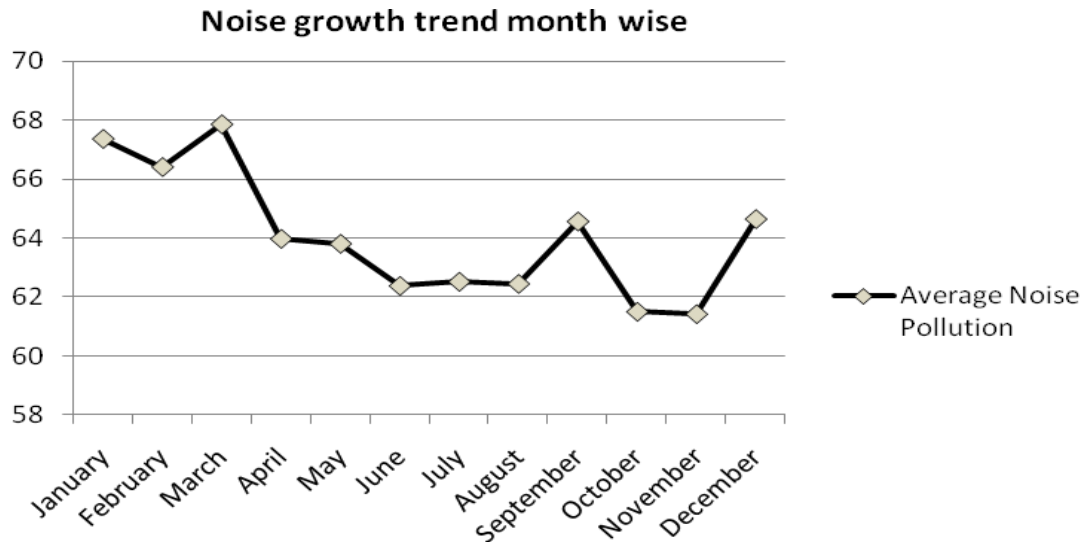


Figure: 5 Average noise growth trend month wise, of Dehradun city, during 2008-2010.

Table 1: Permissible Limits of Noise Levels Laid by Central Pollution Control Board.

Area/ Zone	Category of Area / Zone	Limits in dB(A) Leq Day Time (from 6.00 a.m. to 10.00 p.m.)	Limits in dB(A) Leq Night Time (from 10.00 p.m. to 6.00 a.m.)
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	40

Table 2: Measurements of Average Noise Levels in Dehradun City, Uttarakhand, India .(Values are expressed in unit dB)

Year	Silence Zone		Residential Zone		Commercial Zone	
	<i>Gandhi Park</i>	<i>Doon Hospital</i>	<i>Race Course</i>	<i>Rajpura</i>	<i>Survey Chock</i>	<i>Clock Tower</i>
2008	55.27	58.49	64.35	63.16	74.57	82.54
2009	56.94	59.79	53.89	56.64	67.53	78.13
2010	62.89	61.78	60.46	61.97	71.52	79.91

Table : 3 Average noise growth trend month wise during 2008-2010

S.No.	Month	Average Noise Data
1	January	67.375
2	February	66.42
3	March	67.87
4	April	63.98
5	May	63.81
6	June	62.38
7	July	62.52
8	August	62.45
9	September	64.57
10	October	61.5
11	November	61.42
12	December	64.65



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