Noise Quality Monitoring in Gorakhpur City

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Abstract— **In Past few decades traffic noise has become one of the major sources of noise pollution. The main aim of the present study is to monitor and map the noise level which was carried out at different locations of Industrial zone, commercial zone, residential zone and silent zone of the city. As compared to the standard prescribed by central pollution control board (CPCB) Gorakhpur city is suffering from high level noise pollution. It was observed that the value of Leq is far beyond the standards very high above the permissible limits. The main reasons of Gorakhpur city to be in grip of noise are population, high traffic, fast livelihood, intolerance among public, disobeying noise act and rules made for different zones. The pace of the development in the city is very high and is the major source of increase in noise level. The regulation of traffic volume and speed can be implemented to control noise pollution. The Leq, noise levels are calculated with the help of noise level meter to assess the day and night sound level variations. Gorakhpur city is rapidly developing city of Uttar Pradesh. The outcome of the study may be of immense help in traffic planning and environment assessment with respect to noise pollution.**

I. INTRODUCTION

Due to urbanization, there is a huge increase in the vehicular population on the urban corridors. In India, transportation demand in urban areas continues to increase rapidly as a result of both population growth and changes in travel patterns. During the first decade of the 21st century only, the urban areas in the country confront a historic transportation crisis that has become a planning war against increasing mobility gridlock and noise pollution. Due to absence of a good, convenient and efficient public transport system in urban areas, there has been a need to develop the major corridors of the cities.

The present district of **Gorakhpur**, 265 km east of capital Lucknow, on National Highway -28, lies between Lat. 26°132N and 27°292 N and Long. 83°052 E and 83°562 E situated on the basin of rivers Rapti and Rohini; the geographical shape of the Gorakhpur city is of bowl. The famous Ram Garh Tal has also been included in the National Lake Conservation list.

A city of saints and revolutionaries is situated on the banks of the river Rapti and Rohini, which originates from the Himalayan Kingdom, Nepal. It is named after the great saint of Nath cult Guru Gorakhnath who is said to be an incarnation of Lord Shiva.

II. METHODOLOGY ADOPTED

Noise levels have been recorded by means of a Precision Noise Level Meter of Make „Bruel and Kjaer, Denmark (2232)". The basic parts of a sound level meter include a microphone, amplifier, weighting networks and a display reading in decibel (one-tenth part of "bel", unit of sound). The data has been collected for overall 10 h on the respective day at the selected sites. Possibly, the readings have been taken from at least 1.5 m above the ground level, at the concerned hours for 10 min duration at fixed intervals of 15 s, so that gives about 40 readings for each observation hour. Further, calculations have been done using formula of Leq,

$$L_{eq}=10\log \sum_{i=1}^{i=n} 10^{L_i/10}\cdot t_i$$

Where,
n = total number of sound samples
L_i = noise level of any i^{th} sample
t_i = time duration of i^{th} sample expressed as fraction of total time sample

III. EXPERIMENTAL PROCEDURE

The study consists of dividing the city into three zones- **Silent Zone, Residential Zone and Commercial Zones.** The sound levels in these zones are recorded at two time intervals- Day (6 A.M. to 10 P.M.) and Night (10 P.M to 6 A.M.). The Leq of recorded noise level is determined and Compared to Noise level prescribed by CPCB.

Silent Zone- This zone includes the institutional Campuses, Colleges, Religious places, hospitals etc. Gorakhnath temple, DDU Campus, MMMUT Campus, Medical Collage, AIIMS of Gorakhpur are considered for study under silent zone. Their data is shown below-

Graph 01: Comparison of sound level of different areas of Silent zones

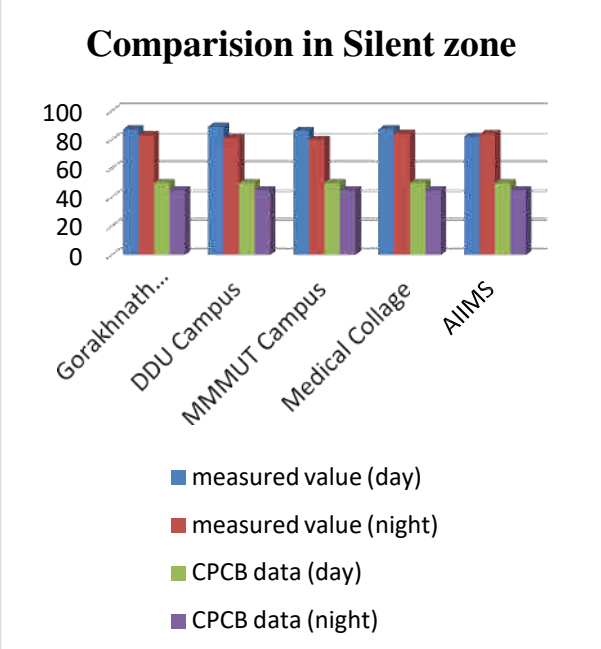
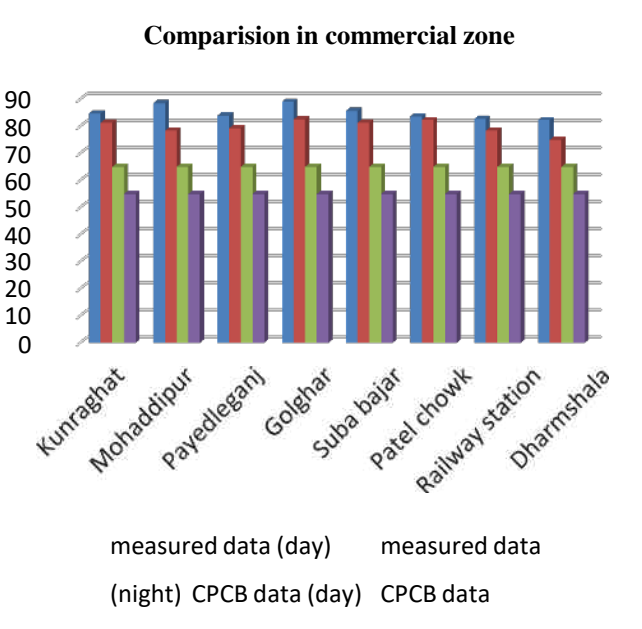


Table 01: Comparison of sound level of different areas of Silent zones

Sr. no	Sampling sites	Day dB (6 A.M. to 10 P.M.)	Night dB (10 P.M to 6 A.M.)	Whether in limit Yes/No
1	Gorakhnath temple	87.2	83.1	No
2	DDU Campus	89.1	81.1	No
3	MMMUT Campus	86.2	80	No
4	Medical Collage	87.3	84	No
5	AIIMS	82	83.8	No

Commercial Zone- This zone includes the market area of the City. This area is mostly crowdy and accommodates heavy traffic in day and night. During night there is movement of loaded trucks which cause the heavy noise. Kunraghat, Mohaddipur, Payedleganj, Golghar, Suba bajar, Patel Chowk and Railway station, Dharmshala are considered for the study.

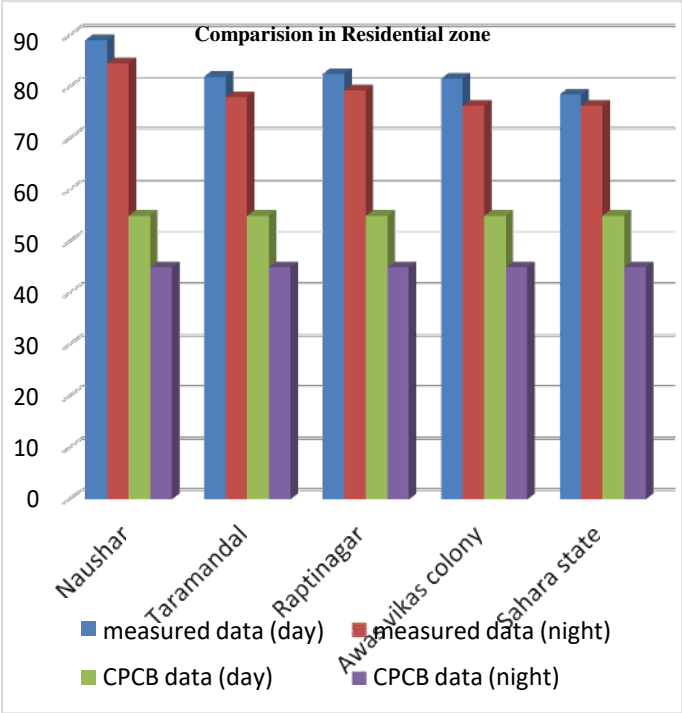


Graph 02: Comparison of sound level of different areas of Commercial zones

Residential Zone- This zone includes the Naushar, Taramandal, Raptinagar, Awas vikas colony, Sahara state of the city. In these areas most of the population have their houses, Apartments and buildings.

Table 02: Data for Residential zone

Sr. no	Sampling sites	Day dB (6 A.M. to 10 P.M.)	Night dB (10 P.M to 6 A.M.)	Whether in limit Yes/No
1	Naushar	89.1	84.6	No
2	Taramandal	82.0	78.0	No
3	Raptinagar	82.5	79.3	No
4	Awas vikas colony	81.6	76.3	No
5	Sahara state	78.5	76.3	No



Graph 03: Comparison of sound level of different

IV. INDIAN STANDARDS FOR AMBIENT NOISE LEVELS

The standards for noise level in India are prescribed by Central Pollution Control Board of India. The noise level in divided into two categories- Day (Time6.00 a.m. to 10.00 p.m) and Night (10.00 p.m. to 6.00 a.m). The sound levels are prescribed in the units of decibels.areas of Residential zones

Table 03: Ambient Noise level prescribed by CPCB.

Area	Noise limits, Leq, dB(A)	
	Day time	Night time
Silence zone	50	45
Residential area	55	45
Commercial area	65	55
Industrial area	75	65

RESULTS AND DISCUSSION

The noise was recorded in different area of Gorakhpur city categorized in silent, commercial residential zones, respectively. It is revealed that the range of noise levels in all the areas were much higher than the permissible values as per standards.

Case 1: The permissible noise limits of the silent zone are 50 dB in the day time and 45 dB in the night time. However, noise levels at all the observation sites were found insatiable and reasons being mostly the shops and traffic.

- The noisiest observation site is MMMUT Campus with night noise 88 dB and the day noise at DDU Campus has the highest noise with 89 dB.
- The least noisy site among is AIIMS in the day time while DDU Campus in the night time but still affected by noise pollution.

Case 2: The permissible noise limits of the commercial zone are 65 dB in the day time and 55 dB in the night time. The sources mostly seemed to be domestic, loudspeakers and automobiles.

- The noisiest site is Golghar at day time and night time as well and for more than permissible limit.
- The least noisy site at day time is Patel chowk and Dharmshala at night time but still not under the permissible limit.

Case 3: The permissible noise limits of the Residential zone are 55 dB in the day time and 45 dB in the night time. Generator, traffic congestion, indiscipline and over commercialization were basically responsible for the high noise pollution.

- The noisiest site is Naushar at day time and night time as well and much more than permissible limit.
- The least noisy site is Sahara state at day time and Awas Vikas Colony at night time but still not under the permissible limit.

CONCLUSION AND RECOMMENDATIONS

During the study period it was found that all the values of noise level at all the selected sites was high than the prescribed limit of CPCB. The noise in all the areas of Gorakhpur city is drastically higher and therefore suitable control measures need to be adopted urgently in the city before it is too late. Here are some recommendations.

1. There should be no submergence of the silent zone with the other zones to avoid the interference of noise pollution by any means.
2. The residential areas should be guarded by the noise barriers like green belt development to enhance the sustainable development, turn down global warming and coherently reduce the noise pollution.
3. The commercialization of the residential areas should be immediately barred to avoid the chaos in the city.
4. The commercial areas apart from being separated from the other zones must be kept under the CPCB guidelines. Strict penalty should be put on the persons responsible for noise from generator. Traffic should be handled in a proper way by providing parking space and broadening the roads without affecting the eco-system.
5. The unlawful use of loudspeakers by the persons in disguise of religious aspects or other reasons without permission should be heavily penalized.
6. A committee can be organized to maintain the peaceful environment in the city, with the anonymous public complain system and penalize whosoever against it.
7. Apart from the above official measures, proper awareness must be spread among the people, about the negative impacts of noise pollution and the legislative rules, through schools, engineering and other educational institutions. This can be further supported by other communication means of entertainment like radio, etc., thus teaching people to be in discipline the first thing being taught to a child.
8. Technically, the noise pollution can be controlled by advancing the automobile horn system and public traffic system by using sensors, etc.
9. More research and development seems to be needed in this area, followed by more and more surveys.
10. Proper Environmental Impact Assessment Survey should be conducted keeping in mind the increase in noise level due to any construction.

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