Noise Mapping during New Year Eve in selected residential zone of Raipur City

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Abstract
Noise can be said to be invisible danger which present in our environment. Monitoring and mitigating of noise is very much important to build a health environment. This study mapped the noise levels increased during the New Year Eve 2022 of selected residential area of Raipur City. Increase in the levels of noise was seen during the Eve due to burning of crackers and use of loudspeakers during the celebrations. Five locations were selected for the study and noise map was prepared for pre and post New Year Eve 2022. From the map all the five locations showed higher noise levels (above 70dBA pre Eve and above 67dBA post Eve) than the prescribed limit (above 55 dBA day time and 45 dBA night time) of Central Pollution Control Board, New Delhi.

Keywords: Noise Map, Noise Pollution, New Year Eve.

1. Introduction

Sound levels which are unacceptable by the ear are defined as noise. Hampering mental health and disturbing the physical peace of human are among the common ill effects of noise[1][2]. Noise pollution is occurred in the environment mainly due to the vehicles and machines along with the human activities such as burning of crackers during different eve and functions[3]. Adverse health effect of on humans due to noise pollution was reported in 2011 by World Health Organization in seven categories. Sleep disturbance, hearing problem, mental health, cardiovascular, task performance, annoyance and social behaviour in negative were categorised in it[4]. In developing countries hearing impairments causing factor is environmental noise along with the occupational noise (WHO 1999). Exposed population of the residential zones are mostly affected by the cardiovascular disease due to higher levels of noise[5]. Blood pressure of higher noise levels exposed population also goes higher than the population exposed to lower levels of noise [6].

Duration of noise in the environment is lowest than the other pollutants of air and water. Major contribution of noise in the environment is done by the vehicles and there honking while running on road[7]. Number of vehicles are generally increasing due to the increase in population of the country[8]. Noise map shows the distribution of noise levels in the environment due to the various sources at different locations in graphical form[9][10]. It is easy to understand the levels of noise in the single platform of various locations simultaneously. The distribution of noise can be prepared by the GIS software using interpolation[4][11]. The noise map helps the policy maker for better understanding the levels of noise in different zones of the selected area or the cities[12]. The main objective of this study is to measure the noise levels on New Year eve at selected residential zones with high population density and prepare the noise map in order to understand increase in noise levels from crackers and music systems. Also the noise levels were compared from the prescribed limit of Central Pollution control Board, New Delhi.

2. Study Area

Raipur city the capital of Chhattisgarh state is one of the cities with highest population density in the state. It is located at 22º33’ to 21º14’N latitude and 82º06’ to 81 º 38’E longitudes with 40,63,872 population. The study was carried out in the selected residential areas of the city which are having high population density. The five locations: Tagore Nagar, KatoraTalab, Shankar Nagar, AwantiVihar and VIP Chowk were selected for the study. Fifth location is having the highest number of hotels.
where the New Year Eve celebration was going on. The locations of the sampling stations are shown in figure 1.

![Figure 1: Study Area Map of Noise Mapping during New Year Eve 2022](image)

### 3. Methodology

Sampling was done with the help of Sound Level Meter (SLM-100, Class II Envirotech make) as shown in figure 2. The readings were recorded at four different locations during New Year Eve (31/12/2021 - 02/01/2022). The duration of sampling was taken from 7:00PM to 12:30PM (Tagore Nagar (7:00 to 7:52) PM, Katora Talab (8:00 to 8:52PM), Shankar Nagar (9:08 to 9:56 PM), AwantiVihar (10:08 to 11:00 PM) and VIP Chowk (11:20 to 12:28AM) measure the noise levels. At all the locations the coordinated of the locations were recorded. Instrument was set 1.5m above the ground and Leq values were recorded along with Lmax and Lmin. After taking the observations the data along with the coordinates was used in Arc GIS to make noise map. The methodology has been shown by the flow diagram in figure 3. Interpolation was performed in the software and noise maps were generated as shown in figure 5 and figure 6 respectively.

![Figure 2: Sound Level Meter used in the study](image)
4. Result and Discussions

Average sound levels recorded is shown in the table 1 along with the CPCB prescribed limit. The Leq value of all the five locations is shown along with the Lmax and Lmin value. In all the locations the sound levels are higher on both the days however on 31st December it is higher due to the New Year Eve celebrations. Tagore Nagar is situated nearer to the National Highway so the noise levels on both the days were higher than prescribed limit of CPCB. At VIP Chowk difference of 6 dBA is observed due to the loud speakers and burning of crackers at mid night. A sudden increase in noise levels were observed from 11:59 PM to 12:20 AM on 31st December. Noise map shows the difference in noise level post New Year Eve. On comparing the levels of noise with prescribed limits( 55dBA day time & 45 dBA night time) all the five locations are at higher end( above 72 dBA pre Eve and above 67dBA post Eve). The comparison has been shown in figure 4.

Table 1: Observed Noise Levels during the New Year Eve 2022

| Zone          | Location& Time | Latitude & Longitude of Study Station | 31/12/2021 | 02/01/2022 | CPCB Limit |
|---------------|----------------|--------------------------------------|------------|------------|------------|
| Residential   | Tagore Nagar (19:00-19:52) | (21°13' 23.2032") (81°39' 10.4076") | 75.78 (max-90.50) (min-47.20) | 73.13 (max-88.70) (min-61.40) |
|               | KatoraTalab (20:00-20:52) | (21°14' 09.2832") (81°39' 00.0072") | 75.01 (max-95.50) (min-54.60) | 72.12 (max-92.40) (min-48.60) |
|               | Shankar Nagar (21:08-21:56) | (21°15' 41.9220") (81°40' 26.3892") | 73.23 (max-98.70) (min-53.30) | 70.30 (max-94.30) (min-51.20) |
|               | AwantiVihar (22:08-23:00) | (21°14' 32.8416") (81°40' 10.9704") | 72.22 (max-96.50) (min-40.20) | 67.77 (max-89.20) (min-50.40) |
|               | VIP Chowk (23:20-00:28) | (21°13' 23.2032") (81°39' 10.4076") | 73.47 (max-96.30) (min-60.20) | 67.92 (max-93.10) (min-46.20) |
5. Conclusion

From the observations we can say that all the selected locations shows higher noise levels than the prescribed limit of CPCB. However noise levels are on elevated side during the New Year Eve 2022. From the noise map it reveals that noise in the environment elevated during the Eve due to the burning of crackers and uses of loudspeakers at all the five residential areas of Raipur City. Government should make policy on uses of crackers and loudspeakers in order to mitigate the noise pollution in the residential areas of densely populated. Noise pollution shall be controlled to make our environment good for living a healthy life.
6. References

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