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Noise Mapping During Deepawali Festival in Raipur City of Chhattisgarh, India

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ABSTRACT

Noise pollution assessment and mapping is one of the outstanding tasks during the festivals which silently affect the health of human beings. Burning of crackers is part of celebration during the Deepawali festival which elevates the levels of noise in the ambient surroundings. This study is performed in order to monitor the levels of noise during the Deepawali festival at different zones of Raipur City. The observations were made by Sound Level Meter (SLM -100 Class II) for different time and locations. All the observations were taken during peak hours (16:00-18:00 for Silence, 18:00-20:00 for Commercial and 20:00-22:00 for Residential zone). Commercial zone showed maximum L_{eq} (83.78 dB)in evening time before Deepawali due to rush of traffic however the levels showed decreased value (79.19 dB) on festival day. Consequently residential area had maximum levels (88. 36 dB) on festival day however all the four observations were above 80dB which is required to be control for benefitting the human health. Lastly silence zone also showed level (71.8 dB) on festival day. Noise distribution map has also been prepared which is showing clear idea of the noise levels at different zones during the Deepawali festival. From this study it is brought to the light that noise levels are at elevated side for all zones during the festival (Deepawali) hence mitigation is very much essential for saving people from the harmful effects of noise.

Key words : *Noise Mapping, Noise Pollution, Deepawali Festival, Raipur, India.*

Introduction

Noise is spell out as sound which is unwanted, irritable and unpleasant that act as an originator for physiological and psychological stress in the humans. High levels of noise have adverse effect on the humans (Farooqi *et al.*, 2020). Information provided by ENT specialists and psychiatrists indicate that cases of hearing loss, mental disorder, and anxiety are increasing in day to day life (Lad, *et al.*, 2012). Rapid urbanization, human activities, increasing vehicles etc. are the main originators of noise in the environment (Farooqi *et al.,* 2020) (Lee *et al.*, 2014). Air and noise pollution are the two undesirable impacts of the vehicular traffic and are especially important in urban areas (Bodin *et al.*, 2009). After the air and water pollution noise pollution is considered to be 3rd most hazardous pollution as per WHO. 50 years hence, in living and working surrounding noise has become a annoying aspect by occupying high rank in problems of urban surroundings and considered to be hazardous to health. On silent environment as well as on citizens noise has ill effects (Tabraiz *et al.,* 2015). On the city dwellers auditory problems are increasing rapidly. Most sufferer from the noise pollution are old age citizens and sick people group (Singh and Dev, 2010) (Wu *et al.,* 2019). In developing countries noise has been recognized as major contributor to urban pollution (WHO 1999).

In India, the problem caused by noise pollution is more aggravated during celebration, festival, mar-

riage or religious functions (Lad *et al.*, 2012). Deepawali is one of the prime festivals in India (Goswami *et al.*, 2013) (Balashanmugam *et al.*, 2014.) (Patel and Bhave, 2014). On this day throughout the country fire crackers are burnt (Bhagwat and Meshram, 2013) (Patel and Bhave, 2014). Pollution problems in addition with noise pollution are rapidly growing with times mostly in festival periods. (Lad *et al.*, 2012). In India as well as other countries during the festive seasons problem in the environment is mainly caused by the crackers. Bursting of crackers not only causes noise but air pollution also in large amount due to presence of toxic materials (arsenic, magnesium, sulphur, aluminium and iron dust) and adversely affecting human health. The for most noise contributor on Deepawali which elevates levels of noise is crackers (Patel and Bhave, 2014). Instantaneous impulsive noise is generated by crackers bursting (Balashanmugam *et al.*, 2014.).

Representing the distribution of levels of noise of a region in graphical format is called noise mapping (Cai *et al.*, 2015). Generation of noise map helps in noise distribution visualization. (Alam *et al.*, 2011). Noise map is categorised as modern way for assessing the levels of noise along with this it is also utilized for mitigating affects of noise along with planning (Garg *et al.*, 2021). Moreover to have a clear idea about the ambient level of noise at different locations of Raipur city during Deepawali festival, during the year 2015 noise monitoring survey was performed and based on the data noise map was prepared. Attempt was made for comparison of obtained levels during the festival with the prescribed limit of noise.

Table 1. Central Pollution Control Board, Delhi Prescribed Standards

Types of Area	Environmental Noise Standards (L_{eq}) in dBA	
	Day Time	Night Time
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Area	50	40

Methodology and field work of the study

Study Area: Raipur city the capital of Chhattisgarh state in India with population about 4,063,872 people is located between 22º33′ to 21º14′N latitude and 82º06′ to 81 º 38′E longitudes. This city comes out to be commercial and industrial municipality of central India. Monitoring and recording of levels of noise at three selected sites of Raipur city during Deepawali festivals days were done by using Sound Level Meter (SLM-100, Envirotech make). The locations of the stations have been shown in Figure 1.

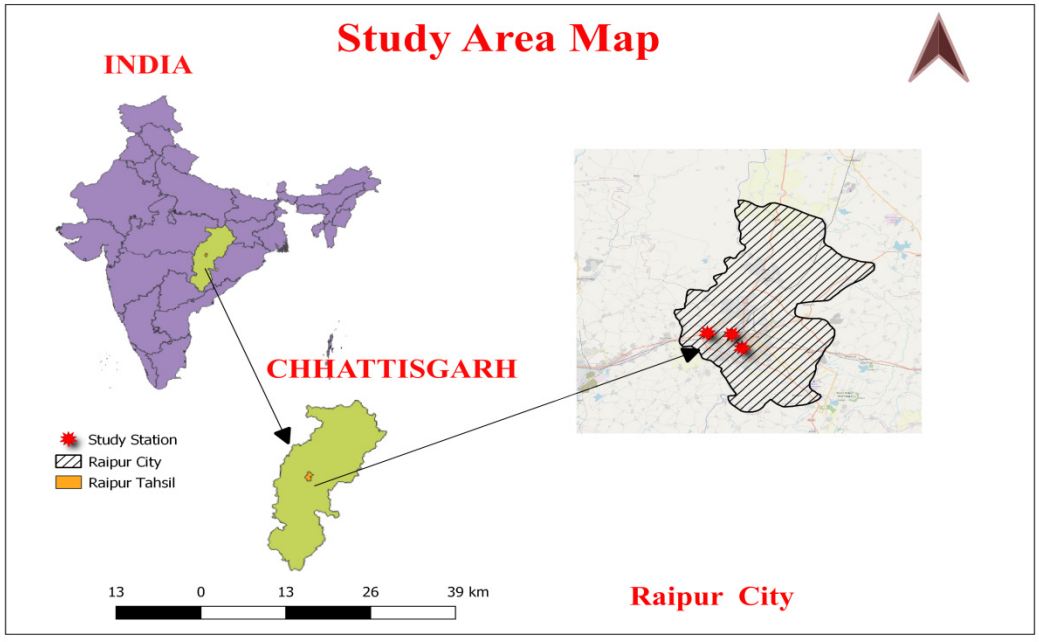

Fig. 1. Map of the study area

Tools and Techniques

A sound level meter (SLM 100 – Envirotech make) class II was used in this study for taking the observations at different locations during Deepawali festival. The instrument used in the study is shown in Figure 2. Observations were made at three different locations in order to get the noise levels during the festival. Three zones i.e silence, commercial and residential was selected for the study. City Kotwali (commercial zone), Ambedkar Hospital (silence zone) and Gudiyari- Janta Colony (Residential zone) were selected for observations and noise levels at these locations were collected for 4 days continuously. 2 day before festival (09/11/2015) 1 day before (10/11/2015), Deepawali Day (11/11/2015) and next day after festival (12/11/2015) sampling was performed. SLM was held 1.5 m above the ground for taking the observations. All the samples were taken from 16:00 to 22:00 hrs. With the help of QGIS study area map was prepared by utilizing the latitude and longitude of the station. Consequently the collected data was used in processing tool of QGIS in order to obtain the Noise Map of all the samplings done. After performing interpolation by IDW method the noise maps were prepared. The prepared noise map is shown in Figure 3. Noise levels given by Noise Pollution Rule, 2000 were used in

Fig. 2. Sound level meter used in the study

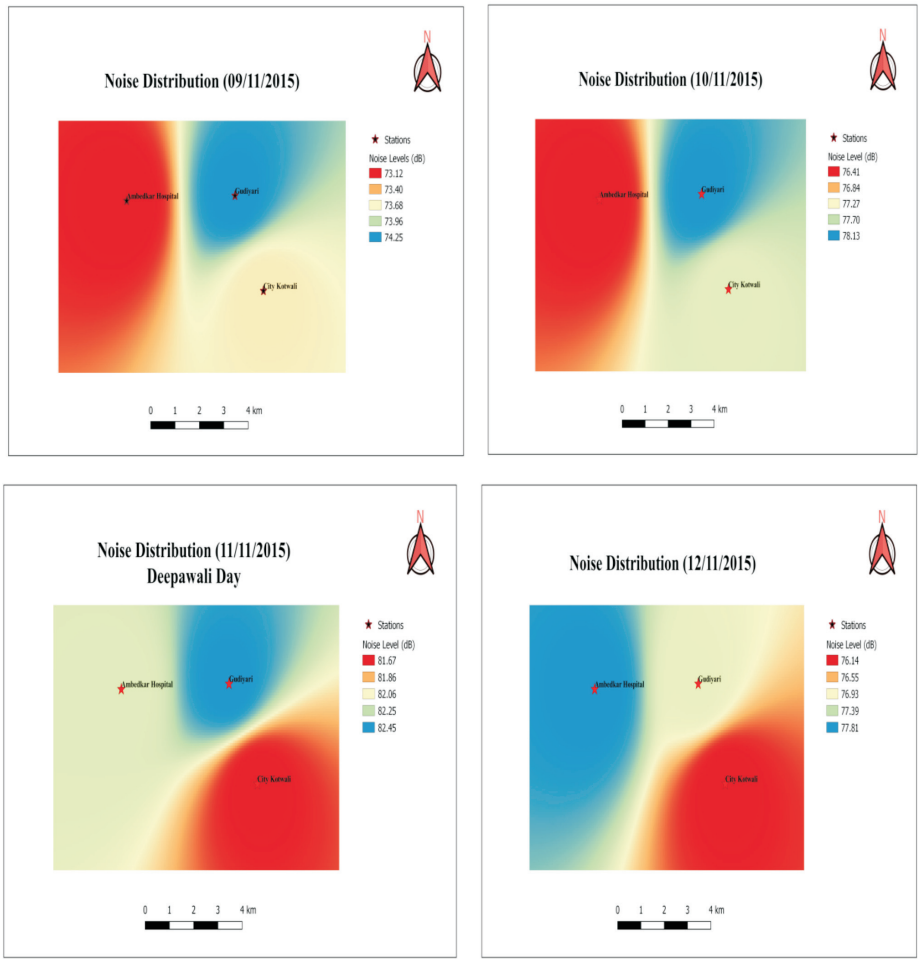

Fig. 3. Map of noise level (L_{eq}) at different locations during the Deepawali festival in Raipur City

Table 2. Observed Noise Levels during the study

Zone	Location& Time	Sound Levels L_{eq} (dBA) 09/11/2015	10/11/2015 (Deepawali)	11/11/2015	12/11/2015
Commercial	City Kotwali (18:00-20:00)	82.84 (max-95.14) (min- 70.98	83.78 (max-98.22) (min- 69.38)	79.19 (max-92.24) (min- 65.64)	80.06 (max-92.87) (min- 64.17)
Residential	Gudiyari (20:00-22:00)	83.08 (max-95.52) (min- 70.34)	85.47 (max-95.36) (min- 71.62)	88.36 (max-99.12) (min- 72.38)	84.19 (max-9342) (min- 65.30)
Silence	Ambedkar Hospital (16:00-18:00)	58.11 (max-76.42) (min- 53.30)	63.25 (max-62.24) (min- 39.37)	71.8 (max-83.14) (min- 45.98)	63.9 (max-71.64) (min- 54.17)

comparative study of observed data.

Results and Discussion

Observations made two days before festival reveals that average L_{eq} was maximum 74.25 dB while one day before it increased to 78.13 dB and on Deepawali it elevated to 82.45 dB. After festival it falls to 77.81dB. However all the days showed levels higher than the prescribed limit but on the day of Deepawali it was maximum as compared to other days. The main factor behind this is burning of crackers which elevated the levels. The L_{max} and L_{min} values are also tabulated in the Table 2 along with the L_{eq} value for all the locations. From the prepared noise map it is easily under stable that the noise levels were maximum (82.45 dB) in residential area (Gudiyari) on Deepawali day. Higher noise levels above 75dB were observed for commercial zone due to heavy traffic movement.

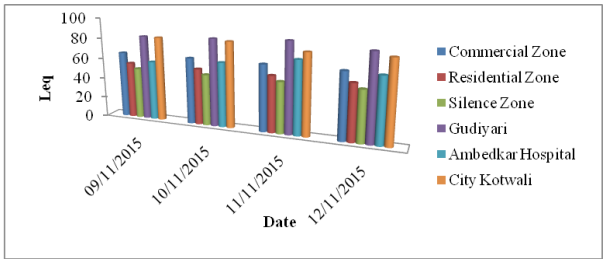

Fig. 4. Comparison of noise levels with the prescribed limits of CPCB, Delhi

Conclusion

All three locations showed higher levels than the limit given by Central Pollution Control Board, Delhi, India. From the study performed during the Deepawali festival it is revealed that the noise pollution due to burning of crackers elevates the levels of noise in the environment. However levels before festivals are also on elevated side when compared with the prescribed limit. There is serious need of study on mitigating noise pollution as it is one of the emerging pollutants present in the environment. From the noise map it is seen that all the zones are having higher limit of noise. Peoples should be discouraged for using crackers during festival to mitigate the pollution. Government should impose rules to control the noise on festivals so that maximum population can be benefited from it and make the environment a healthy place for the living beings.

References

Alam, W. 2011. GIS based Assessment of Noise Pollution in Guwahati City of Assam, India. *International Journal of Environmental Science,* ISSN 0976 – 4402 Volume 2, 2011.

Balashanmugam, P., Nehrukumar, V., Ramanathan, A., Balasubramanian, G., n.d. A Study on the influence of Deepavali festival on noise level in Chidambaram town, Tamilnadu, India 5.

Bhagwat, P. and Meshram, P.M. 2013. Study of Noise Pollution During Ganesh Utsav in Yavatmal City. *IJPCS.* ISSN:2277 5005 volume 2, 2014.

Bodin, T., Albin, M., Ardö, J., Stroh, E., Östergren, P. O. and Björk, J. 2009. Road traffic noise and hypertension: results from a cross-sectional public health survey in southern Sweden. *Environ. Health.* 8 : 38. https://doi.org/10.1186/1476-069X-8-38

Cai, M., Zou, J., Xie, J. and Ma, X. 2015. Road traffic noise mapping in Guangzhou using GIS and GPS. *Appl. Acoust.* 87 : 94–102. https://doi.org/10.1016/j.apacoust.2014.06.005

Farooqi, Z.U.R., Sabir, M., Latif, J., Aslam, Z., Ahmad, H.R., Ahmad, I., Imran, M. and Iliæ, P. 2020. Assess-

ment of noise pollution and its effects on human health in industrial hub of Pakistan. *Environ. Sci. Pollut. Res.* 27 : 2819–2828. https://doi.org/10.1007/s11356-019-07105-7

Garg, N., Chauhan, B.S. and Singh, M. 2021. Normative Framework of Noise Mapping in India: Strategies, Implications and Challenges Ahead. *Acoust.* 49: 23–41. https://doi.org/10.1007/s40857-020-00214-1

Goswami, S., Swain, B.K., Mohapatra, H.P. and Bal, K.K. 2013. A preliminary assessment of noise level during Deepawali festival in Balasore, India. *J. Environ. Biol.* 4.

Lee, E.Y., Jerrett, M., Ross, Z., Coogan, P.F. and Seto, E.Y.W. 2014. Assessment of traffic-related noise in three cities in the United States. *Environ. Res.* 132 : 182–189. https://doi.org/10.1016/j.envres.2014.03.005

Lad, R.J., Patil, V.N. and Raut, P.D. 2012. Study of Noise pollution during Deepawali festival in Kolhapur city of Maharashtra India: Review of Research (Feb; 2012)

Patel, N.L. and Bhave, P.P. 2014. Study Of Noise Pollution During Deepawali Festival. *Int. J. Innov. Res. Adv. Eng.* 1: 11.

Singh, V. and Dev, P. 2010. Environmental Impacts of Noise Pollution - A case Study of Saharanpur City, Western Uttar Pradesh, India. *Int. J. Earth Sci. Eng.* 03: 6.

Tabraiz, S., Ahmad, S., Shehzadi, I. and Asif, M.B. 2015. Study of physio-psychological effects on traffic wardens due to traffic noise pollution; exposure-effect relation. *J. Environ. Health Sci. Eng.* 13: 30. https://doi.org/10.1186/s40201-015-0187-x

Wu, J., Zou, C., He, S., Sun, X., Wang, X. and Yan, Q. 2019. Traffic noise exposure of high-rise residential buildings in urban area. *Environ. Sci. Pollut. Res.* 26 : 8502–8515. https://doi.org/10.1007/s11356-019-04640-1.