IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Noise Mapping For Sustainable Urban Planning: A Case Study Perspective

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Abstract: Noise pollution, i.e., the propagation of noise or sound it causes severe harmful effects on humans and animals. When it exceeds 75 dB and feels painful at levels above 120 dB, cities have become the epicenter for pollution and acoustics, which, although invisible, are severely damaging to human beings. Many studies have estimated noise as responsible for premature deaths due to ischemic heart disease. Noise pollution has an enormous environmental impact—damaging wildlife as it interferes with breeding cycles and hastens the extinction of some species. WHO The World Health Organization defines sound above 65 dB as noise. As Mumbai is a large metropolitan city and has astounding noise levels, this study was undertaken to record the different noise levels in various regions of Greater Mumbai.

Keywords: Noise, pollution, decibels.

I Introduction

Status of noise pollution in Mumbai

Noise has increasingly been globally recognized as an important environmental pollutant and is a serious health hazard at high levels. Mumbai is considered one of the noisiest cities in the world. There is very little known knowledge about the difference between sound and noise, and thus its ill effects. Sound is a phenomenon created by an object producing vibrations, which form a stimulus for the tympanic membrane of living beings (Cuniff, 1977). The definitions of sound are varied, with the field and people defining it. A biologist accounts it as one of the five senses present in higher organisms and is a stimulus that generates a response in an organism. A chemist finds it as a form of energy significantly different from electromagnetic radiation, thus finding application in sonic chemistry. A physicist defines it as a travelling wave, which is an oscillation of pressure transmitted through a solid, liquid, or gaseous medium. Similarly, the perception of noise is very individualistic, e.g., a rock band is music for some and equally a nuisance for others.

Noise pollution thus refers to excessive or harmful levels of unwanted sound in the environment that can disrupt daily life and impact human and animal health. The most common and major sources of noise are urban noise pollution and industrial noise pollution (Satterthwaite, 1997). The other sources are transport or vehicular noise, social noise (60-80 dB), and ocean noise. These can be further classified on the basis of the sound range, e.g., road noise (70-85 dB), rail noise (50-60 dB), aircraft noise (150-200 dB), etc. (MPCB Report, 2004). Although invisible, noise pollution can lead to stress, sleep problems, hearing loss, and heart issues. Controlling it requires strict regulations, smart urban planning, and public awareness to promote a healthier environment.

The current paper is an attempt to carry out Noise Mapping in different locations of Mumbai City. In simpler words it helps differentiate the city into zones according to the different noise levels. It records noise as it actually is present in a location and compares it to ideal noise levels as they should exists (Probst and Huber, 2009).

II RESEARCH METHODOLOGY

A study was carried out using a basic Sound Level Meter (Model no. SL-4010) as well as other mobile apps. The observations for the study were recorded at different locations and also at different times. Since the instrument/app showed fluctuating values depending on the changing noise levels, a method was devised to maintain uniformity. Readings were recorded after every 10 secs. After 10 secs whatever value was displayed on the SLM screen was noted down. Three such readings were noted to calculate the average value. The data was later tabulated for any further study.

III RESULTS AND DISCUSSION

Table 1.1 Showing observations made at different locations in the Commercial Zone

Location	Time	Noise Level (dB)
Kandivali Station	5:30 pm	90
Magathane Metro Station (Kandivali east)	6:45 am	73
Colaba Market	9:30 am	80
Goregaon Station	5:00 pm	87
Oberoi Mall Goregaon	9:00 pm	91
Gundavli Metro Station	8:00 am	76
Malad Natraj Market	4:00 pm	89

As seen in Table 1.1 all the locations are showing extreme violation of noise levels. But the maximum noise levels were recorded at Oberoi Mall, Goregaon as late as 9 pm. The lowest noise recorded was at Magathane Metro station at early in the morning i.e. is at 6:45 am. Noise pollution at Magathane Metro Station, caused by construction activities like excavation and drilling, often exceeds allowed limits, reaching up to 110 dB. Once operational, metro trains could also contribute to noise. Prolonged exposure to high noise levels can cause health issues like stress and sleep disturbances. To mitigate this, measures such as noise barriers, restricting noisy activities to daytime, and soundproofing are recommended.

Table 1.2. Showing observations made at different locations in the Residential Zone

Location	Time	Noise Level (dB)
Thakur Village	9:00 pm	81
Jankalyan Nagar, Malad West	2:17 pm	83

Table 1.3: Showing observations made at different locations for Day and Night.

Sr. No.	Place	Day's Reading	Night's reading
1	Canossa High School	65.6	67.9
2	Mumbai Public School	69	72.1
3	Mama Heights	70	73.5
4	St. Teresa's Convent High School	50	83.4
5	Kolshet Road	60	64
6	Kalpataru Sunrise	54	47
7	Andheri Station	81	80
8	Jogeshwari Station	80	85
9	Ram Mandir Station	80	85
10	Goregaon Station	80	81

As seen in Table 1.3, noise pollution at Borivali Local Station is caused by train operations and road traffic, with noise levels often exceeding 89 dB. This can lead to health issues like stress and sleep disturbances. Measures such as noise barriers and traffic regulation are recommended to reduce the impact. At the same time, Linking Road in Bandra, one of Mumbai's busiest shopping and commercial areas, experiences significant noise pollution due to heavy traffic, honking, and pedestrian movement. Noise levels can often exceed 80 dB, which is above the permissible limit for residential areas. The constant movement of vehicles, especially during peak hours, adds to the noise. Prolonged exposure to such high noise levels can lead to health problems like stress, hearing loss, and sleep disturbances. Measures such as better traffic management, noise barriers, and controlling honking can help reduce the adverse effects of noise pollution in the area.

Table 1.4 Showing observations made at different locations.

Sr. No.	Place	Lowest Reading (db)	Mid Reading (db)	Highest Rrading (db)
1.	Juhu Residential Area:- The Golden Beach Society	67	73	82
2.	Devle Road	61	67	75
3.	PVR Dynamix	59	62	72
4.	Andheri Railway Station	75	83	90
5.	Ram Mandir Railway Station	40	55	70
6.	Goregaon Railway Station	71.0	75.4	79.8
7.	Kolshet Road: Residential area	41.4	44.7	48
8.	Dhokali Naka: Marketplace,	65.7	68.2	70.4
9.	Ghodbunder Road: Highway	80.3	82.3	84.0

IV Conclusion

The present study highlights that noise pollution in Mumbai has reached alarming proportions, with both residential and commercial zones consistently exceeding permissible limits. This confirms that noise is not merely an environmental nuisance but a critical urban health challenge linked to stress, sleep disorders, cardiovascular problems, and loss of biodiversity.

Noise mapping, as demonstrated in this study, provides an effective evidence-based framework for identifying critical hotspots and guiding mitigation strategies. The following measures are recommended for sustainable urban planning and management:

1. Regulatory Enforcement – Strict compliance monitoring near schools, hospitals, and residential zones.
2. Urban Planning Solutions – Integration of green belts, vegetative buffers, and acoustic barriers.
3. Transport Management – Regulation of vehicular honking, promotion of public transport, and creation of noise-control zones.
4. Construction Regulations – Restricting noisy activities to daytime hours and adoption of soundproofing measures.
5. Public Awareness – Community-level campaigns to educate citizens on noise hazards.
6. Technological Innovations – Use of noise-mapping systems, smart city sensors, and mobile applications for real-time monitoring.

In conclusion, effective noise management is vital for sustainable urban living. By combining scientific monitoring, strong governance, and active citizen participation, cities like Mumbai can transition toward healthier and more livable environments.

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