

Analysing The Traffic Noise Pollution Using Gis

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Abstract- This project involves the observation of traffic noise level in busy corridors of Chennai. Noise measurements were taken at seven chosen areas with high population density, heavy traffic, commercial and residential buildings. Noise pollution was measured and analyzed and it was noted that the maximum average of noise level was measured. The noise level was measured using sound level meter. The noise level at different places were compared and analyzed using arcGIS software.

I. INTRODUCTION

Noise is unwanted sound. Noise can be produced by many sources- man's vocal cord, a running engine, a vibrating loudspeaker diaphragm, an operating machine tool, and so on.

The word **noise** comes from the Latin word **nauseas**, meaning **seasickness**.

There are two important characteristics of sound or noise .They are Frequency and Loudness.The response of the human ear to sound is dependent on the frequency of the sound. The human ear has peak response around 2,500 to 3,000 Hz and has a relatively low response at low frequencies. As such, the loudness of sound is commonly expressed in decibel (dB).

Noise pollution is excessive, displeasing human, animal or machine created environmental noise that disrupts the activity or balance of human or animal life.

Noise can come from many places. Let us see a few good sources:

- Household sources
- Social events
- Commercial and industrial activities
- Transportation

Environmental pollution such as air, water, hazardous waste and noise pollution has always been a global concern affecting both the public's health and the planet's fragile ecosystems. The concentration of environmental pollution is

significantly increasing and causing serious threat to the quality of the environment.

One of the serious issues of environmental pollution is noise. Noise pollution in large urban areas is regarded as a growing problem of communities. Road traffic noise pollution is one of the major environmental problems encountered in our daily life. The exposure to noise from roads, affects more people than noise from any other source. It has become a major highway corridor. The noise produced by these vehicles is particularly disturbing due to wide variations in frequency and volume. Noise mapping is (a optimization technique) in its various forms can be derived for different periods of the day or night and by using different noise indicators, noise dose-effect relationships, calculation heights, calculation techniques.

The main uses of noise maps is to identify and quantify the scale of noise problems at local, regional, national level and provide information for town planning and traffic management. Urban noise is directly associated to human activities, in transport and industry development. New mapping approaches supported by a GIS can be combined with spatial data analysis and mathematical modelling that further improves the quality of noise maps. Noise maps provide spatial presentation of acoustic situation. Noise maps build in GIS can be used for analysis and management process. Noise effect can be determined in GIS by combining noise levels with the location of people living in the area and their sensibility to noise The extent of the noise problem is large. In the Europe countries about 40 % of the populations are exposed to road traffic noise exceeding 55 dB daytime and 20 % are exposed to levels exceeding 65 dB. Taking all exposure to transportation noise together about half of the Europe citizens are estimated to live in zones which do not ensure acoustic comfort to residents. More than 30 % are exposed at night to noise levels exceeding 55 dB which are disturbing to sleep. In some Europe countries 20-25% is being annoyed by road traffic, 2-15 % aircraft, and 2-4 % by railway noise. Traffic planning and correction policies may diminish the number of people exposed to the very high community noise levels (>70dB) but the number exposed to moderately high levels (55-65 dB) continues to increase in industrialized

countries. High –levels noise exposures giving rise to noise-induced hearing deficits are by no means restricted to occupational situation. Such levels can also occur in concerts, discotheques, motor sports, shooting ranges, and leisure activities and other impulse noise from toys and fireworks. It has also been argued that community noise exposure would be a contributing factor to hearing deficits with increasing age. The existence of such a “silicosis” waits for final scientific verification since so many other factors and agents are also influencing hearing.

Noise is one of the leading causes of hearing loss in the 28 million people with impaired hearing in the United States, and health statistics suggest a trend that the incidence of hearing loss is occurring at younger and younger ages. Noise-induced hearing loss, though preventable, is permanent.

II. GEOGRAPHIC INFORMATION SYSTEM (GIS)

Geographic Information System (GIS) is a computer based information system used to digitally represent and analysis the geographic features present on the Earth surface and the events (non-spatial attributes linked to the geography under study) that taking place on it. A GIS is an information system designed to work with data referenced by spatial / geographical coordinates. In other words, GIS is both a database system with specific capabilities for spatially referenced data as well as a set of operations for working with the data. It may also be considered as a higher order map. GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprise for explaining events, predicting outcomes and planning strategies. The GIS has the power of organizing effective Social Information System (SIS) towards decision-making or resource management. The spatial information system comprises synthesis of spatial formation and non-spatial data within GIS framework. The GIS aims and works at bringing together, the diverse information, which is gathered from various different sources. Hence, this is also known as integrated analysis software. A geographic information system may be defined as an integrated system designed to collect, manage and manipulate information in a spatial context. The geographic component, the various technologies involved and the approach to information modelling set a GIS apart from other types of information systems. A GIS provides an abstract model of the real world, stored and maintained in a computerized system of files and databases to facilitate recording, management and reporting of information.

III. OBJECTIVES OF THE STUDY

The objective of this work is to develop a road traffic noise prediction model for the busy corridors of Chennai. The developed model is capable of predicting the combined traffic noise generated from vehicles in highways. The main objective of this research is to build noise map within a GIS environment using ArcGIS.

The objectives of this project

1. To collect the traffic noise data on different locations.
2. To generate the noise maps observation points which represents virtual microphone using ArcGIS and to calculate noise levels at each observation point.
3. To determine and compare the noise contours of each interpolation techniques used for Noise mapping.
4. To determine applications of ArcGIS in creating noise maps for the prevailing different noise levels in the study area.

Scope Of Study

To reduce the following effects of noise pollution

1. Hearing problems
2. Health issues
3. Sleeping disorders
4. Cardiovascular issues
5. Trouble communicating

Hearing problems: Any unwanted sound that our ears have not been built to filter can cause problems within the body. Constant exposure to loud levels of noise can easily result in the damage of our ear drums and loss of hearing. It also reduces our sensitivity to sounds that our ears pick up unconsciously to regulate our body’s rhythm.

Health issues: Excessive noise pollution in working areas such as offices, construction sites can influence psychological health. Studies show that the occurrence of aggressive behaviour, disturbance of sleep, constant stress, fatigue and hypertension can be linked to excessive noise levels.

Sleeping disorders: Loud noise can certainly hamper your sleeping pattern and may lead to irritation and uncomfortable situations. Without a good night sleep, it may lead to problems related to fatigue and your performance may go down in office as well as at home.

Cardiovascular issues: Blood pressure levels, cardio-vascular disease and stress related heart problems are on the rise. Studies suggest that high intensity noise causes high blood

pressure and increases heart beat rate as it disrupts the normal blood flow.

Trouble communicating: High decibel noise can put trouble and may not allow two or more than two people to communicate freely. This may lead to misunderstanding and you may get difficult understanding the other person.

IV. DATA COLLECTION AND ANALYSIS

Intersection near Retteri:

	TIME(AM-PM)	DISTANCE (dB)			
		EDGE	5M	10M	15M
1.	8.00-9.00	72.8	75.2	72.1	71.1
2.	9.00-10.00	81.7	82.1	82.1	81.2
3.	10.00-11.00	80.7	81.7	81.4	79.2
4.	11.00-12.00	77.3	78.4	77.1	76.5
5.	12.00-1.00	76.2	77.5	76.1	75.1
6.	1.00-2.00	75.2	76.5	75.3	73.9
7.	2.00-3.00	78.5	81.2	78.3	76.1
8.	3.00-4.00	81.4	82.4	81.3	80.7
9.	4.00-5.00	82.3	82.8	83.1	81.0
10.	5.00-6.00	81.7	83.4	81.2	80.5

Detailed Noise level map on “RETTERI”



V. CONCLUSION

In this project we have observed the traffic noise level using sound meter in busy corridors of Chennai. Since traffic noise creates the peak sound pollution in urban areas. We have taken the study area as Retteri, Parry’s corner, Koyembedu, Egmore, Vadapalani,

T-Nagar and Anna Nagar.

The traffic noise levels are observed in the range of 70-90 dB during peak and non-peak hours and most of the

noise is generated only due to horns of vehicles like rickshaws, buses, wagons and trucks etc., The city is rapidly developing, more and more vehicle are being used regularly which adds thrust on noise level in the city which in turn will create many health issues. The noise levels further decrease with increase in distance. These noise levels are in excess of the prescribed limits. The noise pollution level in the study area of Chennai city has been plotted in spatial analysis map using ArcGIS software.

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