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A GEOGRAPHICAL ANALYSIS OF NOISE POLLUTION IN KARAD CITY

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Abstract:

This study investigates the pervasive issue of noise pollution in urban environments, focusing on Karad city in Maharashtra, India. Noise pollution, derived from the Latin term "nausea," denotes unwanted, loud, and disruptive sounds that impact human well-being. The research underscores the growing concern of noise pollution in rapidly developing cities, with road vehicles being the primary source of the problem. The objectives of the study encompassed evaluating the spatio-temporal distribution of noise pollution in Karad, identifying its main regions, and proposing potential remedies. Through a comprehensive methodology, the research employed both primary and secondary data sources. Primary data collection involved fieldwork at various locations within Karad, using sound meters and GPS for measurements and spatial referencing. Secondary data was drawn from census handbooks, socioeconomic abstracts, and published materials. The study revealed that noise pollution levels in Karad have risen due to industrialization, urbanization, and increased human activity. The findings indicate that noise pollution is particularly prominent in areas such as the bus stand, railway station, and market center, while locations like Rukimi Nagar and Bheda Chowk experience comparatively lower levels. Notably, noise pollution levels reached potentially harmful ranges, causing adverse effects on human health, particularly during periods of high traffic and congestion.

Keywords: Noise Pollution, Urban Environment, Spatio-Temporal Distribution, Karad City, Health Impact, Mitigation Strategies.

Introduction:

Noise is derived from the Latin word “nausea” implying ‘unwanted sound’ or ‘sound that is loud, unpleasant or unexpected (Singh and Davar, 2004). Noise is present in every human activity, and when assessing its impact on human well-being it is usually classified either as occupational noise (i.e. noise in the workplace), or as environmental noise, which includes noise in all other settings, whether at the community, residential, or domestic level e.g. traffic, playgrounds, sports, music (Concha - Barrientos *et.al*.2004). Noise pollution is a significant environmental problem in many urban areas. This problem has not been properly recognized despite the fact that it is steadily growing in developing countries (Jamrah *et.al*., 2006).

Undoubtedly, the most important source of noise pollution in urban areas is

related to road vehicles (Behzad *et.al.*, 2007). Hearing is one of the most important of the human senses. It is essential for the location of sounds that may warn of danger, the enjoyment of pleasant sounds such as music and the natural environment and, most importantly for humans, the development of speech and language for communication (Safetyline, 2009).

The World Health Organization (WHO) states that there is sufficient evidence that night noise exposure causes self-reported sleep disturbance and noise induced sleep disturbance is viewed as a health problem. WHO also state there is evidence, albeit limited, that disturbed sleep causes fatigue, accidents and reduced performance (Naish *et.al.*, 2012). The effects of noise are seldom catastrophic, and are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. Sleep disruption, the masking of speech and television, and the inability to enjoy one's property or leisure time impair the quality of life. In addition, noise can interfere with the teaching and learning process; disrupt the performance of certain tasks, and increase the incidence of antisocial behavior.

The effect of noise on hearing varies among people. Some people's ears are more sensitive to loud sounds, especially at certain frequencies. But any sound that is loud enough and lasts long enough can damage hearing and lead to hearing loss.

In recent times, the environmental noise pollution has been recognized as one of the major environmental factors that adversely affects the quality-of-life in the urban areas. Levels of environmental noise pollution increase rapidly with the progress of years due to the rapid increase in human activities such as transportation, industrialization, and urbanization and Karad city has rapid increase in urbanization and transportation which lead towards increasing noise pollution therefore there is need of assess the level of noise pollution in newly growing urban centers such as Karad.

Objectives:

1. To assess the spatio-temporal distribution of noise pollution in Karad city.
2. To identify the main regions of noise pollution in Karad city.
3. To suggest some remedies for controlling noise pollution in Karad city.

Database & Methodology:

The present study is based on the both primary and secondary data sources.

Primary data was collected through intensive field work by visiting various destinations such as Kolhapur Naka, MSRTC Bus Stand, Krishna Naka, Krishna Ghat, Vidyanagar, Cottage (Venutai Chavan) Hospital, Dutta Chowk etc. with sound meter app to collect sound level in the study region. GPS was used for collecting Ground control point in the study region. Secondary data was collected from district census handbook of Satara district, District Socio-economic abstract as well as published and unpublished materials.

Collected primary as well as secondary data has been analyzed by using different methods. In that minimum, maximum and average density of sound, sound rate as well as sound average has been calculated for analysis. Cartographic and graphical techniques are also used where the necessary.

Study Region:

The Karad city is selected for the present study. Karad city is situated in the Satara District of Maharashtra state of India. Geographically Karad city lies in between $17^0$26' to $17^0$31' North latitude and $74^0$17' to $74^0$23' East longitude. It has an average elevation of 566 metres (1856 feet). Karad city is lies at the confluence of Koyna River and the Krishna River. Karad is well known for sugar production and is known as the sugar bowl of Maharashtra owing to the presence of many sugar factories in and around Karad. It is considered as an important educational hub in Western Maharashtra. Karad has an adjoining small town named Malkapur, Karad and this city is growing very rapidly in terms of urbanization. Major landmarks in the city include Kolhapur Naka, MSRTC Bus Stand, Krishna Naka, Krishna Ghat, Historical Manora, Shivaji Stadium, Vidyanagar, Cottage (Venutai Chavan) Hospital, Dutta Chowk etc. The National Highway No. 4 (NH 4) goes nearby Karad city. According to census 2011 Karad city has 2.50 sq Km. area with 11,395 households. Total population of Karad city is 53879 in which 27,134 males and 26,745 females.

Spatio-Temporal Distribution of Noise Pollution Karad City:

Karad city is a tehsil place in the state of Maharashtra, India with population 53,879. It is one of the emerging industrial and commercial cities of western Maharashtra. Karad is rapidly emerging as industrialized and urbanized cities in the state of Maharashtra. In the recent times, the city has started facing noise pollution problems due to rapid industrial growth,

increased human population, high traffic density and modernized man-made activities. The present study was carried out to assess the environmental noise pollution in different selected locations of Karad city viz., educational area, commercial-cum-residential area, industrial-cum-residential area, Railway station, Bus Stand and Market Centre etc.

Table No. 1: Levels of Noise Pollution near Cottage Hospital

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	30	86	69
12:00 to 1:00pm	26	86	56
4:00 to 5:00 pm	21	74	38
Average	25.66	82	54.33

Source: Field Work

Above table no. 1 shows the one day sound level near the Cottage Hospital, Karad. The highest sound level observed at the time of 9:00 to 10:00 am. (86db) as well as at 12:00 to 1:00 pm (86db). Due to it is main area of Karad city, there is seen more traffic as well as many people's are come to take medicine during this time. The minimum sound level is observed at the time of 4:00 to 5:00 pm (74db). About 54.33db Average sound level recorded near the Cottage Hospital, Karad.

Table No.2: Levels of Noise Pollution near S.T. Stand Karad

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	44	90	66
12:00 to 1:00pm	45	85	65
4:00 to 5:00 pm	47	81	64
Average	45.33	85.33	65

Source: Field Work

The table no 2 shows the minimum, maximum and average sound levels near the S. T. Stand. At the time 9:00 am to 10:00 am the average sound level is 66 dB whereas at the time of 12:00 pm to 1:00 pm the average sound level is 65dB and at the time of 4:00pm to 5:00pm the average sound level is 64dB. Near the S. T. Stand noise level is always more than 65 because continuous incoming and outgoing buses make large sound which indicates very high noise pollution. Minimum average sound level is 45.33dB and Maximum average is 85.33dB. All this average sound level is shows at the bus stand always crowd of passengers, buses and hawkers. Therefore in this area has level of noise is high.

Table No. 3: Levels of Noise Pollution near Krishna Ghat

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	29	88	49
12:00 to 1:00pm	31	78	50
4:00 to 5:00 pm	36	89	56
Average	32	85	51.66

Source: Field Work

The above table no 3 shows that the minimum, maximum and average sound levels near the Krishna Ghat. At the time 9:00 am to 10:00 am the average sound level is 49 dB whereas at the time of 12:00 pm to 1:00 pm the average sound level is 50dB and at the time of 4:00 pm to 5:00 pm the average sound level is 56dB. Minimum average sound level is 32dB and maximum average is 85dB. All averages of sound level is 51.66dB. Krishna ghat is the tourist attraction place, kids have toys to play, and that's why there is always crowd in this area. At the time of evening there is highest noise level.

Table No. 4: Levels of Noise Pollution near Railway Station

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	37	84	49
12:00 to 1:00pm	36	87	54
4:00 to 5:00 pm	33	86	51
Average	35.33	85.66	51.33

Source: Field Work

The table no 4 shows the minimum, maximum and average sound levels near the railway station Karad. At the time 9:00 am to 10:00 am the average sound level is 49 dB. At the time of 12:00 pm to 1:00 pm the average sound level is 54dB. At the time of 4:00 pm to 5:00 pm and the average sound level is 51dB. Minimum average sound level is 35.33 dB. Maximum average is 85.66dB. And all average sound level is 51.33dB.There is always peace in that area. There is only a lot of noise in the train at that time.

Table No.5: Levels of Noise Pollution near Bheda Chawk

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	44	84	66
12:00 to 1:00pm	33	85	65
4:00 to 5:00 pm	30	87	75
Average	35.66	85.33	68.66

Source: Field Work

The table no 5 shows that the minimum, maximum and average sound levels near Bheda chawk, Karad. At the time 9:00 am to 10:00 am the average sound level is 66 dB whereas at the time of 12:00 pm to 1:00 pm the average sound level is 65dB and at the time of 4:00pm to 5:00 pm the average sound level is 75dB. Minimum average sound level is 35.66 dB. Maximum average is 85.33dB. While all average sound level is 68.66dB.There is always many vehicles and crowd so there is always high volume intensity which reflects high noise pollution.

Table No.6: Levels of Noise Pollution near Krishna Hospital

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	30	87	75
12:00 to 1:00pm	33	88	71
4:00 to 5:00 pm	46	87	67
Average	36.33	87.33	71

Source: Field Work

The table no 6 explain the minimum, maximum and average sound levels near Krishna hospital Karad. At the time 9:00 am to 10:00 am the average sound level is 75 dB which is highest in day so average noise pollution near Krishna Hospital at morning Minimum average sound level is 36.33 dB. Maximum average is 87.33dB and average sound level is 71dB. Krishna hospital is the largest hospital in Karad as there are plenty of patients coming. So there are vehicles and patient crowd so there was more noise pollution in morning time.

Table No. 7: Levels of Noise Pollution in Rukmini Nagar

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	37	72	54.5
12:00 to 1:00pm	40	52	65
4:00 to 5:00 pm	44	70	57
Average	40.33	64.66	58.83

Source: Field Work

Rukmini nagar is the largest residential area in the Karad city and the table no 7 shows that the minimum, maximum and average sound levels in Rukmini Nagar. At the morning time average sound level is 88 dB. While at the 12:00 pm to 1:00 pm the average sound level is 65dB. and at the evening time i.e. 4:00 pm to 5:00 pm average sound level is 88dB. The average sound level is 58.83dB.This is residential area and there are large number of hospitals here so there is silence zone where very minimum noise pollution is observed.

Table No. 8: Levels of Noise Pollution near Kolhapur Naka

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	48	89	70
12:00 to 1:00pm	65	90	81
4:00 to 5:00 pm	68	90	80
Average	60.33	89.66	77

Source: Field Work

The Kolhapur Naka is located on the NH – 4 and above table no 8 shows that the minimum, maximum and average sound levels is near Kolhapur Naka Karad. At the time 9:00 am to 10:00 am the average sound level is 70 dB. At the time of 12:00 pm to 1:00 pm the average sound level is 81 dB. while at the time of 4:00 pm to 5:00 pm the average sound level is 80dB. whereas average sound level is 77dB. This figures indicates Kolhapur Naka has highest noise pollution in the city because it's location near the national highway.

Table No.9: Levels of Noise Pollution in Market

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	17	82	63
12:00 to 1:00pm	17	80	57
4:00 to 5:00 pm	19	82	60
Average	17.66	81.33	60

Source: Field Work

Market place in every city has more noise pollution because of crowd of buyers and loudness of vegetables seller. The above table no 9 shows the minimum, maximum and average sound levels is in market of Karad city. At the time 9:00 am to 10:00 am the average sound level is 63 dB. Whereas at the time of 12:00 pm to 1:00 pm the average sound level is 57dB. and at the time of 4:00 pm to 5:00 pm the average sound level is 60dB. This figure clearly indicates at the morning and the evening noise pollution in market is high because it is peak period of market.

Table No. 3.10: Levels of Noise Pollution near Datta Chawk

TIME	Sound level dB		
	Min.	**Max.**	**Average**
9:00 to 10:00am	37	85	69
12:00 to 1:00pm	55	84	68
4:00 to 5:00 pm	40	82	67
Average	44	83.66	68

Source: Field Work

The above table 3.10 shows that the minimum, maximum and average sound levels near Datta chawk, Karad which central place of Karad city. At the time 9:00 am to 10:00 am the average sound level is 69 dB. At the time of 12:00 pm to 1:00 pm the average sound level is 68dB. At the time of 4:00 pm to 5:00 pm the average sound level is 67dB. as per values in the table maximum noise pollution near the Datta chawk is in morning. S.T. Bus stand is near to the datta chawk therefore in this area where always crowd of peoples and vehicles is observed.

Conclusion:

Noise is present in every human activity, and when assessing its impact on human well-being it is usually classified either as occupational noise (i.e. noise in the workplace), or as environmental noise, which includes noise in all other settings, whether at the community, residential, or domestic level e.g. traffic, playgrounds, sports, music (Concha - Barrientos *et.al*.2004). Noise pollution is a significant environmental problem in many urban areas.

In the assessment of spatio – temporal variation of noise pollution in the Karad city total 13 different places are selected on the basis of educational area, commercial-cum-residential area, industrial-cum-residential area, Railway station, Bus Stand and Market Centre etc.

In these places Karad Bus stand, Railway station, Karad Market and Kolhapur Nakka has high noise pollution. Krishna ghat, Cottage hospital , Datta chowk and Vidyanagar has moderate noise pollution and Rukimi nagar and Bheda chowk has low noise pollution in the Karad city.

The daily highest noise pollution is 84 dB to 90 dB is observed which is very harmful to human life. This noise pollution cause many problems on human health. The Average maximum noise pollution in Karad city is observed at morning and evening time due to heavy traffic and crowd of people.

Suggestions:

1. People use earplugs to reduce effect of noise pollution. It is a cost-effective solution of reducing noise pollution
2. Trees have been planted within urban settings, around major highways because it is effective in reducing noise levels.
3. Declare a "no horn zone" in hospital, school and residential areas.
4. Karad Municipal Corporation may introduce noise regulation policies.
5. Create awareness and education on the consequences of noise pollution in the students and young pollution.

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