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ASSESSMENT ON NOISE POLLUTION AT RAJAGIRIYA IN COLOMBO METROPOLITAN CITY OF SRI LANKA

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INTRODUCTION

Sound is a sensation produced in ear and brain by variations of the pressure in the air. These pressure variations transfer energy from source of vibration (Sherly, 1992). In the broadest sense of the term, a sound may be considered to be a noise pollution if it disturbs any natural process or causes human harm, even if the sound does not occur on a regular basis. Environmental noise is a world wide problem. However, noise pollution is not taken much attention of the community in Sri Lanka.

There are lots of sound sources (vehicles, factories, loud speakers etc.) in urban areas in Sri Lanka. The emission of sound from these sound sources has been a huge problem in metropolitan areas today. As the number of vehicles in Sri Lanka has been increased with the industrialization, urbanization and growth of population, increase of vehicular traffic has become the origin of noise pollution mainly in metropolitan areas in Sri Lanka. High noise levels for longer periods affects on diseases such as low hearing sensitivity, lack of sleep, irritability, high blood pressure and mental illness etc. The emission of high levels of noise is badly affected to officers and pedestrians. Hence it is of utmost important to facilitate policy makers in order to protect noise sensitive places and general public for a healthy nation.

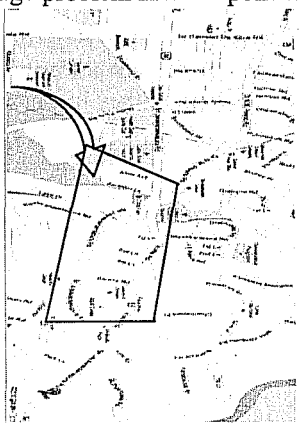

Figure 1. Study area at Rajagiriya Junction

Rajagiriya is a one of the metropolitan areas in Colombo district (see figure 1). There are lots of governments and private apartments, religious places, schools, hospitals etc., as well as thousands of vehicles are passing Rajagiriya in day time. Therefore large amount of noise has been emitted to the environment by vehicles in rush hours.

Therefore this research was aimed to develop a sound map to Rajagiriya area (along the Kotte Road (B 62) from Rajagiriya Junction to Ayurvedic Junction) and to identify sound sensitive places. Further this research was also aimed to get attention on noise pollution by different stake holders.

METHODOLOGY

Questionnaire survey was carried out among 100 people in the study area to identify the location, main sources, the main problems, age of respondent, occupation and a number of general psychological, personal as well as physical aspects of the people in Rajagiriya area. After identifying about the problem due to high noise levels, sound meter measurements were taken in the area in two positions of the Kotte road (near Rajagiriya church and Ayurvedic hospital) for two weeks to identify the peak hours. Then sound levels were measured at different locations on either side of the road with GPS coordinates.

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Sound map was developed (manually and by using IMMI software) to identify the distribution of noise on either sides of the road. And sound barriers were proposed to some sound sensitive places with suitable sound absorptive materials.

Sound mapping was carried out after the conversion of GPS data to UTM coordinates. Then locations were marked in a X,Y plot. Average sound levels were interpolated within the main source (road centre) and the corresponding position. Then positions which have equal sound levels were connected. Auto Cad 2008 version was used to plot the sound map. Average sound level of the line source, building dimensions and their absorption ratios, vegetations, and other obstacles such as boundary walls were used as input data for IMMI software. The most noise polluted areas were recognized based on the model results.

RESULTS AND DISCUSSION

This study recognized very important details on noise pollution in the study area using the questionnaire survey and sound level meter measurements.

CURRENT NOISE POLLUTION STATUS

Results showed that 93%of people in Rajagiriya area are suffering from high levels of noise while 7% people are not suffering from the noise. This may be due to the less exposure for the noise sources such as they just pass Rajagiriya area or lives far away from Rajagiriya Area.

THE MAIN SOURCES OF NOISE POLLUTION

The questionnaire was also focused on the main source of the noise. As the sources of the area, vehicles, lottery posts, neighbors entertainment music, loud speakers and etc were selected. Sources causing the high levels of noise are shown in Figure 2. The results show that 82% of sound pollution is caused by vehicular noise, which is the main source of noise pollution in study area. All others sources are shown less than 6% and there are no factories in the area. And considerable amount of percentage ie 5% is contributed by noise of lottery posts.

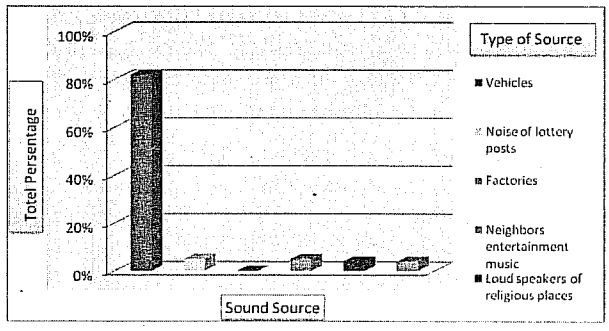

Figure 2. Sources generating the high levels of noise

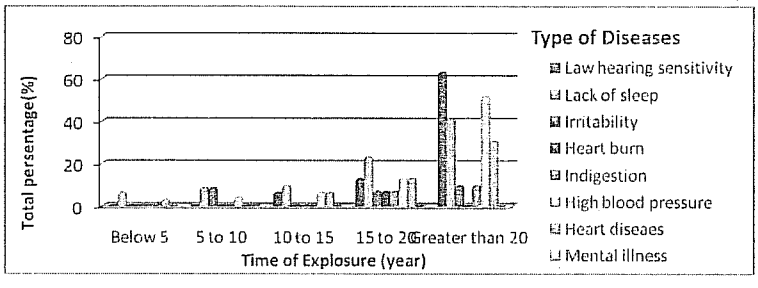

Figure 3. Diseases variation in period of exposure

VARIATION OF DISEASES WITH TIME OF EXPOSURE

According to the Figure 3 People who were exposed to high level of noise greater than 20 years are affected to diseases than others. It is clearly identified that people who are exposed high levels of noise greater than 20 years are suffering from lack of sleep

and low hearing sensitivity. They are also suffering with high blood pressure and indigestion. But those diseases can be caused due to some other reasons.

VARIATION OF DISEASES WITH DISTANCE FROM THE MAIN SOURCE

Sound level decreases with the distance from the main source of noise. Hence there must be a relationship between distance and percentage of people who are affected by the diseases. Figure 4 shows that people who works/lives within 5m from the major sound source are the one who suffers from most of the diseases. 13.33% are suffering from low hearing sensitivity and high blood pressure while 23.33% from lack of sleep and 6.6% from irritability. When the source is away from the residences the diseases have been reduced. This shows that the distance to the major source of sound is very much affected to the health of the people.

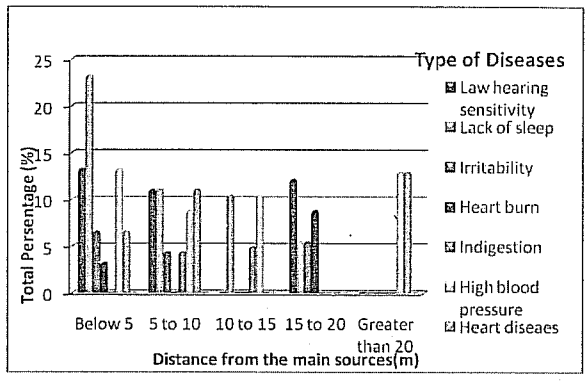

Figure 4. Diseases variation with distance

SOUND MAPPING

Rajagiriya Church Aurvedic Hospital ENT Hospital, Electional Secretariat, schools were identified as a sound sensitive locations at Rajagiriya. From the developed sound map it was found that these places are within the higher sound level zones as shown in Figure 5.

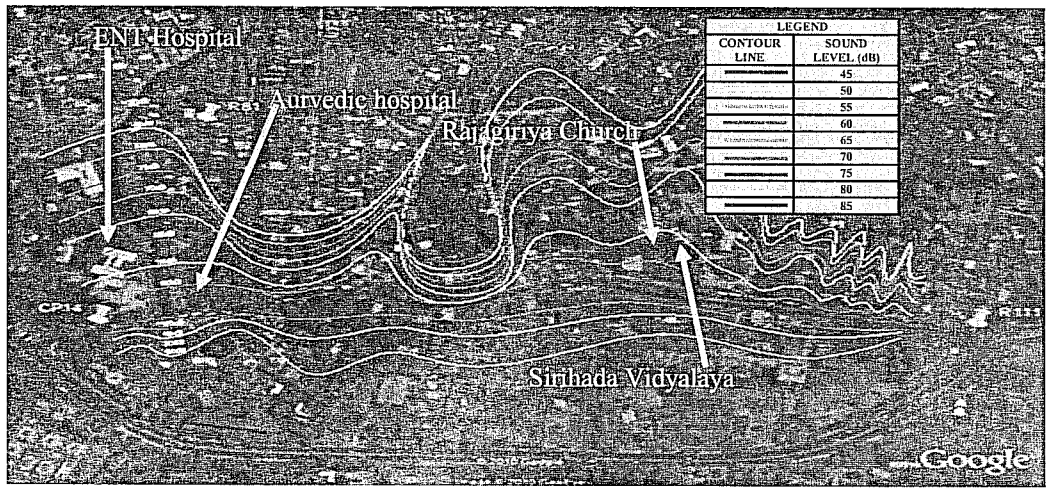

Figure 5. Sound contour map for Rajagiriya area

A computer software, which helped to make modeling sound levels in two dimensional and three dimensional manner on a Google image as shown in figure 6 and 7 respectively. From these maps it can be identified that the above mentioned sound sensitive places are located within the same noise level contours. According the sound map, Sound level(dB) at the sound sensation places such as Srihada Vidyalaya, Rajagiriya Church, Ayurvedic Hospital, ENT Hospital were in between 75-85 dB, which was considerably higher than the permissible level of 50 dB.

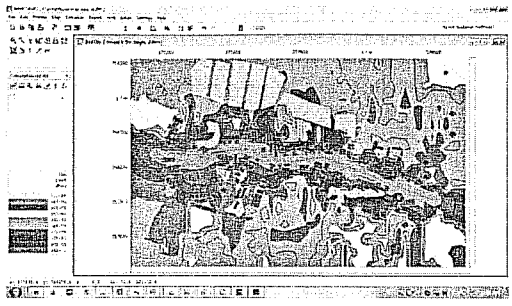

Figure 6. Two dimensional sound map

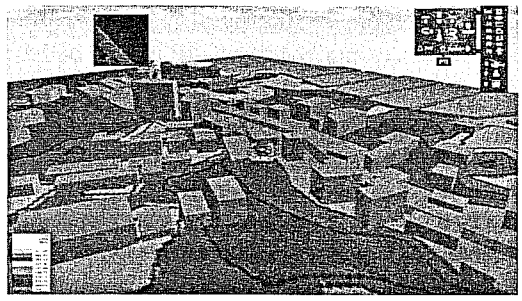

Figure 7. Three dimensional sound map

Sound barriers can be used to reduce the noise levels of the roadsides. Noise level inside the building can reduce by using building sound insulation systems such as air conditioning, using sound absorptive materials to walls, constructing cavity/hollow walls (Jorge & Ana, 2001; Kotzen & English, 1997). Hence it is needed to design suitable cost effective noise barriers.

CONCLUSION & RECOMMENDATIONS

93% of people in Rajagiriya area are suffering from noise and 86% of noise pollution is caused by vehicular noise. People who were exposed to high level of noise greater than 20 years are affected to diseases than others. Drivers are affected by the noise than any other occupation. According to the sound contour map, it is revealed that the average sound levels of Ayurvedic hospital, church, and Sirihada Vidyalaya and Election Secretariat office were between 75dB-80dB during peak hours. That is well above the permissible level of 50dB.

Noise barriers have to introduce for sound sensitive places and further reduction have to be done using suitable sound insulation systems. Public awareness programs on noise pollution and its mitigations are important. Regular maintenance of vehicles and regulate engine noise through eco-tests can be used to minimize the noise levels of vehicles. Further, development of noise maps is important for metropolitan cities which can be used for city planning.

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