

## SPATIAL PATTERN OF NOISE POLLUTION IN LAHORE CITY (2011)

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### ABSTRACT

*The objective of this study was to analyze and evaluate road traffic noise and to see its spatial pattern in Lahore City. A weighting sound level meter was used in the study. All the measurements were taken at a height of about 1.2 m from the ground. Noise measurements were taken at fifty six sample sites. Spatial pattern of noise was shown in the maps. Maps were also drawn to show buffers dividing areas into moderate, high and extremely high risk zones in accordance with noise risk levels. Day and night time noise maps were also drawn with the graduated symbol. The mean day-night values were exceeding the permissible environmental standards used in Pakistan. High level noise was found at all the sample sites. Areas in the North West of the City were highly polluted due to congested and narrow roads as well as high traffic volume. The noise levels were found at higher level along the roads having high traffic density.*

**Keywords:** Noise Pollution, Spatial Pattern, High Risk Zones.

### INTRODUCTION

Noise is unwanted sound or sounds of a duration, intensity or other quality that cause some kind of physiological harm to humans or other living things (Kupchella, 1993). Pollutants are something in the environment that causes harm. Sound is a special kind of wave action usually transmitted by air in the form of pressure waves and received by hearing apparatus present in body. There are different factors which have direct influence on the listener such as time, place and mood of the listener.

The effect of noise on humans depends not only on its magnitude but also on its frequency content because the ear is not equally sensitive to noise at all frequencies in the audible range of 16-20,000 Hz. but this range is reduced with age and other subjective factors (Katyal, 1989). Sound is measured by several complex systems, but the best known unit of measurement is the decibel (dB). The decibel is a tenth of the largest unit, the bel. One decibel is equivalent to the faintest sound that can be heard by human ear. Frequency of the sound is defined as the number of vibrations per second. Human ear is known to be sensitive to extremely wide range intensity from 0 to 180 dB. While 0 dB is the threshold of hearing and 140 is the threshold of pain (Kumar, 1999).

Noise levels in general have increased over the years. The noise levels in the cities have increased at about 1 dB per year for the last 30 years (Wang, 2005). The present study focuses on the patterns of noise pollution in Lahore City, Pakistan.

Lahore (the second largest city of Pakistan) is one of the worst affected cities due to unchecked noise pollution. There are several factors that contribute to increase the noise levels in the City. These factors include the increase in urban population that contributed to high traffic volume, the limited space to live in the City, high rise buildings as well as high traffic volume, which gave birth to multiple problems related to noise. The population of Lahore city district was 6,318,745 in 1998 (DCR, 1998). The estimated population of Lahore District as enumerated by the City District Government Lahore in 2011 was 9.3 million. Due to the increase in population the number of registered motor vehicles also increased in the city.

The main objective of this research is to see the spatial pattern of noise pollution in the city. There are certain locations in the city where noise level exceeds the maximum permissible limits. This research highlights those locations. In this research GIS techniques are also used to present the patterns of noise pollution.

## MATERIALS AND METHODS

Primary data of noise pollution were collected from the seventy six sample sites by field survey. The tool used for collection of primary data collection was Sound Level Meter (an instrument, which could measure noise range from 35-130dB). Measurements were kept as slow response. The microphone was kept 1.2 meter above the ground at a distance of 1.5-5meter. The noise level was measured thrice a day. First readings were taken from 6 A.M. to 8 A.M. Second readings were taken from 12 P.M. to 2 P.M. Third readings were taken from 8P.M. to 10 P.M. The noise levels were also measured along primary, secondary and tertiary roads along the sample points to see the pattern of noise with the increase in distances.

The second source used to see response of the people regarding effects of noise was questionnaire method. The questionnaires were filled by the people at seventy six sample sites where the level of noise was very high. The maps were developed by using GIS technique. Hierarchical cluster analysis was also done to make clusters of the relevant factors.

## RESULTS AND DISCUSSION

The environmental noise is generated mainly from traffic in the City. The noise levels at almost all the sample sites exceed the maximum permissible limits.

The above figure shows the extent of noise around the source area. Source is the location where a motor vehicle generates some noise. The GIS technique used to show the extent of noise is the creation of buffer zones, which give proximity analysis. Buffers were created according to the intensity of sound produced by a motor vehicle.

The high intensity buffer areas have been shown in pink shade showing radius of 120 meters and the area surrounded by each buffer shows that the people living within this zone directly suffers from the noise related problems.

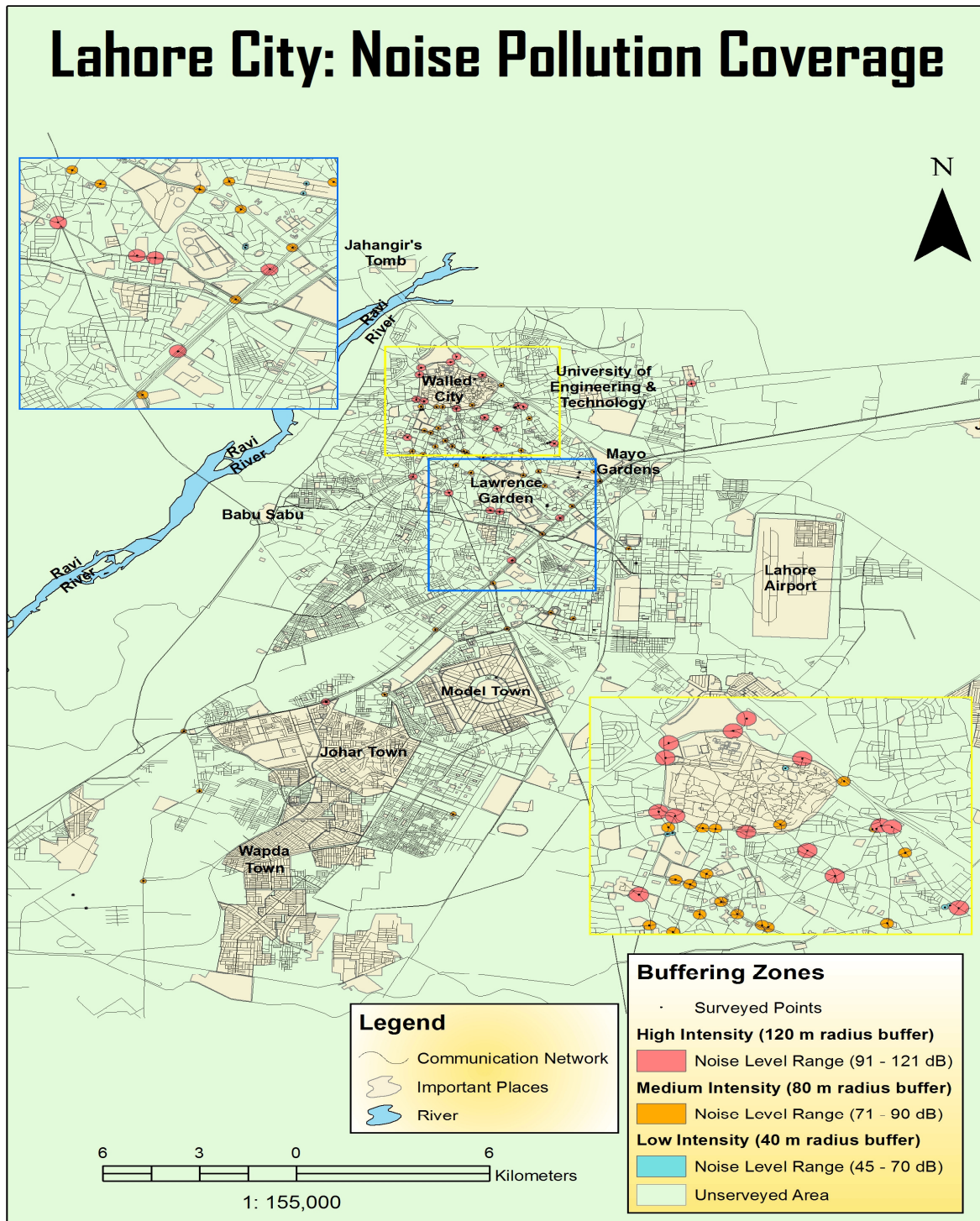


Figure 2: Noise pollution coverage.

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The medium intensity buffers have been shown in yellow color with 80 meter radius. These buffers show noise level range from 71-90 dB (A). The cyan blue color of buffers shows the low intensities of noise. These buffers show noise level range with a radius of 40 meters.

In and around walled city the noise level is high as well as roads are narrow to fulfill the need of traffic volume. Absence of green belt throughout the area makes it much noisier. People living in walled city are often annoyed by noise coming from outside source. External noise from emergency vehicles, traffic, the excessive use of horns, construction work and other city noises create problem for the dwellers. Adjacent vertical buildings in narrow streets along the major roads make their life horrible. The buffer zones in Gulberg, Thokar Niaz Beig and Township show medium intensity of noise. Gulberg, Thokar Niaz Beig and Township have wide roads. The huge traffic volume has been managed by making flyover at Thokar Niaz Beig.

The low intensity buffer zones include the areas either having wide roads or areas surrounded by green belts.

Figure 3 and 4 show the morning and evening time noise pollution levels in the city. During the morning time the noise levels were high at Shalamar Chowk, Badami Bagh inside and outside, Yadgar Chowk, Bhatti gate and Railway Station around walled city. It is also very high at, Shadman Chowk and Along Jail road canal bank.

The high values of noise have been shown in map with red color. The noise level at all these places ranges from 91-121 dB (A). There are many reasons of high noise levels in the morning time such as the high volume of traffic (because most of the people move to schools as well as to their work places during the early day timings), the use of motorcycle rickshaw, undisciplined traffic and narrow roads etc. The people living in these areas are suffering from severe problems related to hearing.

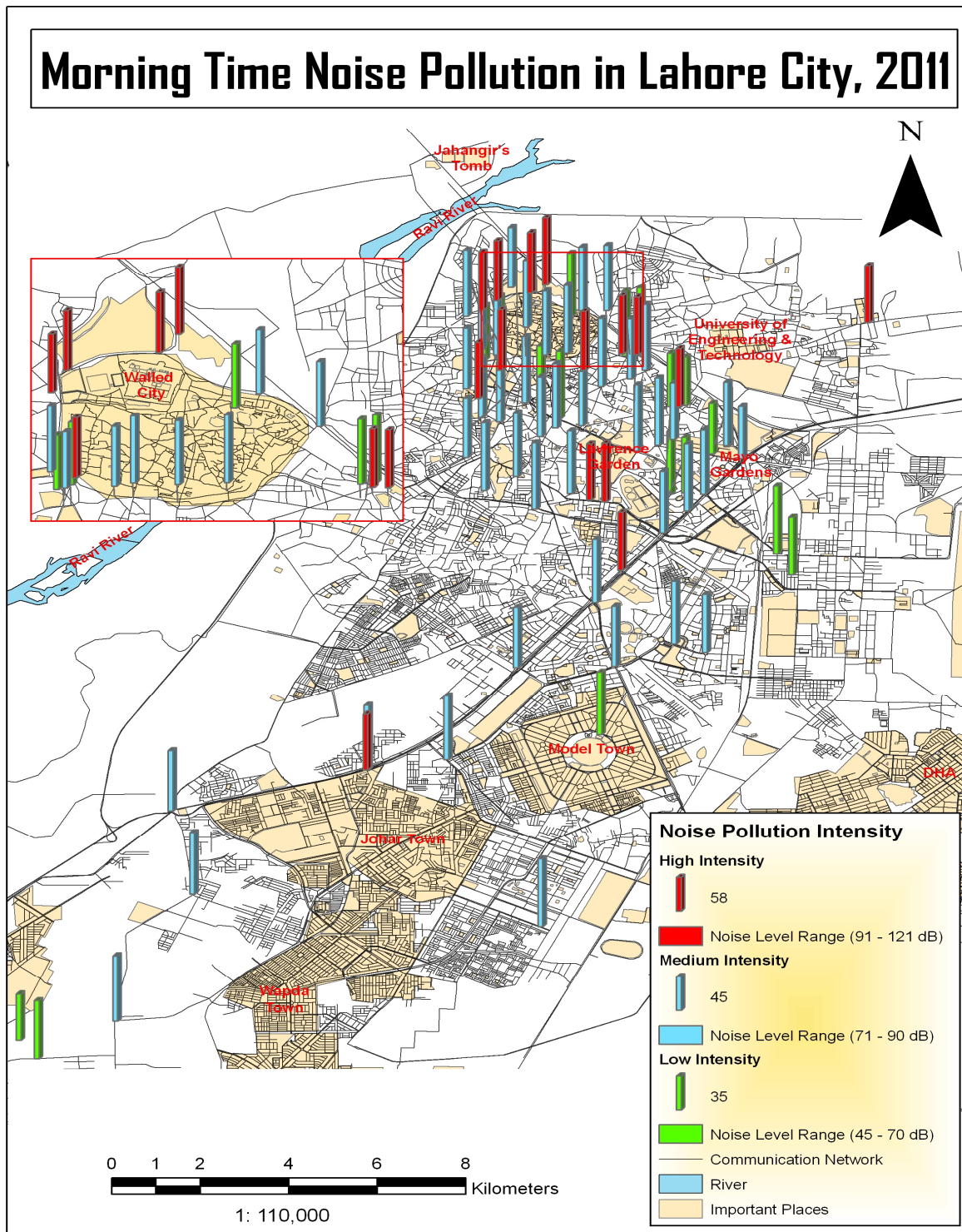
In the evening a slight decreases in noise pollution at some places such as Badami Bagh outside, Dharampura Bridge and Sheranwala gate was observed. This decrease in noise level is due to decrease in the traffic volume in the evening. Even then the values of noise pollution levels cross the maximum permissible limits.

## CONCLUSIUON

In this study the spatial pattern of noise pollution are explored. The areas along walled city, Badami Bagh, Garhi Shahu, Railway Station, Jail road Canal Shadman Chowk and Chouburgi Chowk were found to be the major locations of highest noise levels. People living in these areas are directly suffering from diseases associated with noise. A marked difference between morning and evening noise levels has been noted. It has been identified that there is no decrease in noise pollution at some places throughout the day. The places where noise pollution levels decrease in the evening are still experiencing noise levels that are exceeding the maximum permissible noise



limits. These high levels of noise pollution have serious implications on the health of the people living at noisy areas.



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