Study of noise pollution in Sulaimani city

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Abstract:

A study of noise pollution at six location by the month of Jun 2009 in Sulaimani city of Kurdistan region was conducted; Data on the intensity of noise during two different intervals of time 10 (am) and 17 (pm) were collected using a digital sound level meter with arrange of (34-130) dB. The source of must noise is transportation system, vehicles, car alarms, emergency services sirens, loudspeakers, construction works and noisy people. Because of the direct links between noise and health, the establishment of an agency under the name of Kurdistan Environmental Protection Agency (KEPA) is important for controlling this issue.

Keywords: Noise pollution, Sound pollution, Environmental noise.

الخلاصة

تم استحصال بيانات شدة الضوضاء من خلال دراسة تلوث الضوضاء فى ست مواقع خلال شهر حزيران ٢٠٠٩ فى مدينة السليمانية من منطقة كردستان فى فترتين زمنيتين ، فى العشرة صباحا والخامسة مساءا باستخدام مقياس مستوى صوت رقمى لمدى من (٣٤-١٣٠) ديسبل. اغلب المصادر عبارة عن انظمة متنقلة، مركبات ،منبهات السيارات ،صفارات سيارات الاسعاف ،مكبرات الصوت ،اعمال البناء وضوضاء الناس .بسبب العلاقة المباشرة بين الضوضاء والصحة، فأن تأسيس منظمة تحت عنوان منظمةحماية بيئة كردستان (Kurdistan Environmental Protection Agency) (KEPA) ، مسألة ضرورية للسيطرة على تلك المسائلة .

1. Introduction:

The thought of pollution to the majority of people brings reflection of chimerical spills, radiation holes in the ozone layer and noise is usually last on the list, every day we experience different types of noise and most of the time we are not bothered by it some times it can be too loud unnecessary or just happen at the wrong time or without warning. On the other hand noise pollution sources nearby schools and universities can effect on education process, and environment policy is recognition and restriction of all types of pollution [1]. Noise is a public health problem in modern daily life which adversely affects the live of millions of people. It arises from growing of industries, fabrication, automobiles and developing towns to huge industrial cities and finding a countless application for noise producer instruments and a huge application for noise producer instruments [2]. Today control and reducing noise in urban is so important because noise pollution creates many psychological effects in daily life for most of people especially, children and elderly people and patients [3], there is evidence that among American people hearing sensitivity is decreasing year by year because of exposure to noise including excessively amplified music, the hearing loss of 5.2 Million (6-19) year olds Americans is directly related to noise exposure [4]. Noise may be related to birth defect, and low birth-weight babies [5]. Noise is also negatively affecting on woodland birds communities [6].

2. Experimental details

Sound as a classical field in modern physics yet has many application and that is an interested field in both theoretical and experimental branches [3, 7, 8]. To avoid noise pollution needs to know, sound and noise, producing of sound and characteristics of that for example frequency, wavelength, intensity and so on and can be shows all wave properties similar to interference and scattering [9]. Sounds are considered noise pollution if they adversely affect human activity. Measuring level intensity of noise in environment problem is an attractive field for scientist [1]. Recently some studies in the field of noise pollution in some parts of Kurdistan as other places in the world were measured [1,10]

Sound is a disturbance that propagates through an elastic medium (air, water, etc.) at a speed characteristic of that medium. Sound is a

mechanical wave and shows all wave properties and the other hand is a most known wave experimentally for scientist. The velocity of sound in air depends on pressure and temperature of air , the magnitude of that can be obtain by

$$c = 20.05\sqrt{T_k}\, m/s \qquad (1)$$

Where c is velocity of sound and T is temperature in Kelvin

The frequency of sound has a long range and every interval of wave lengths has special properties and application in different fields of physics and medicine [2,11].The sound intensity is measured in decibel scale intensity of sound is defined as power per unit area with and can be standard by threshold intensity of hearing at KHz for the human ear which can be stated in terms of sound intensity 10^{-12} watt/m^2. The most common approach to measuring intensity of sound is using dB(decibel) that can be define by

$$I(dB)=10\log(I/I_0) \qquad (2)$$

Where I is intensity of measured sound and I_0 is threshold intensity of sound [12].

The sound intensity is logarithmic each 10 decibels increase represents a ten fold increase in noise intensity, 80 dB is 1 million times, more intense than 20 dB and sounds 64 times as loud. Distance diminishes the effective decibel level reaching the ear. Thus moderate auto traffic at a distance of 30 m rates about 50 dB at a distance of 600 m the noise of a jet take off reaches about 110 dB, approximately the same as an automobile horn only (1m) away.

Subjected to 45 dB of noise, the average person can not sleep. At 120 dB the ear registers pain but hearing damage begins at a much lower level, about 85 dB [13]

This work is down by using a precision sound level meter digital instrument as noise meter with two different range (34-94) and (70-130)dB which usually applied for measuring sound level for a scientific and research work.

3. Result and discussion

Data collection have been done during two different times 10 and17 o'clock at the mean street of Mawalawi, Peramerd , Goran , Kak Ahmadi Shekh and Hamdi streets . Noise measured at the end

terminals of the streets as well as at an interval of 20 meters between two points, the results are illustrated in figure 1, 2, 3 4, 5 and figure 6 shows the noise pollution produced by an advertisement tablet in Sara square as a function of distance, increasing the distance from the tablet, the effective decibel level meter is decreasing. In figure 7 the intensity of the audible measured sounds in front of the children hospital is drawn as a function of time , the time interval between the points is only 10 sec .

The relation between the intensity of noise and the distance at Goran street is show in figure1 the noise at the (pm) is more that in the (am) by 20 dB and in general it is fluctuating between 60 and 70 dB in the (am) times and between 65 and 85 in the (pm) times. In Hamdi street figure2 the noise is always above 60 dB and it reaches 95 dB at the (am) times it is a special street with this characteristics although we have more that 7 hospitals around. Figure 3 and 4 (Peramerd and Mawlawi streets) represent respectively the noise is between (60-80)dB.In Kak Ahmadi Shekh street (figure 5) which is locating between Mawlawi and Hamdi street the minimum of noises always above 70 dB. In figure 6 the intensity of noise will be change between 60dB to 80dB depend on the position measurement for an advertisement tablet in Sara square. Figure 7 shows that noise doesn't depend on the time and varied between 60 dB to 90 dB.

The results show that a continuous noise interacts with impulse noises in all the studied locations. The impulse noises which is above 95 dB is due to the sudden, car alarm, the emergency services, siren or the sellers sudden shout. The continuous noise is fluctuating between 60 and 80 dB. Goran street is the less crowded and noisy at the am times while Hamdi street is the more crowded noisy at the same interval of time

Conclusion

The study revealed that day time noise level in all locations exceeded the prescribed limit. The afternoon time noise level is much higher in all locations (excepted for Hamdi street) in respect to the am time and average of noise in the center of Sulaimani is between 60 dB and 80 dB with some pulses of more than 95 dB.

4. Figures

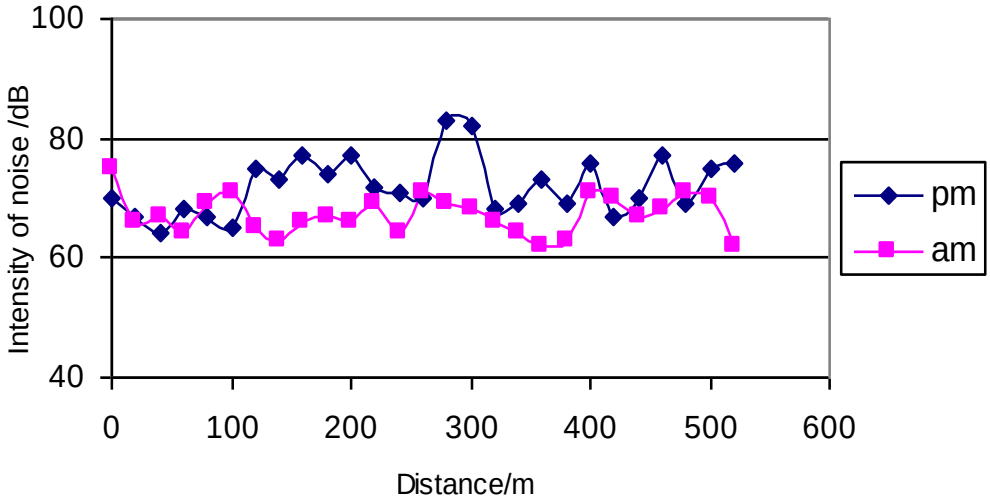

Figure 1 : Intensity of noise as a function of distance for Goran street

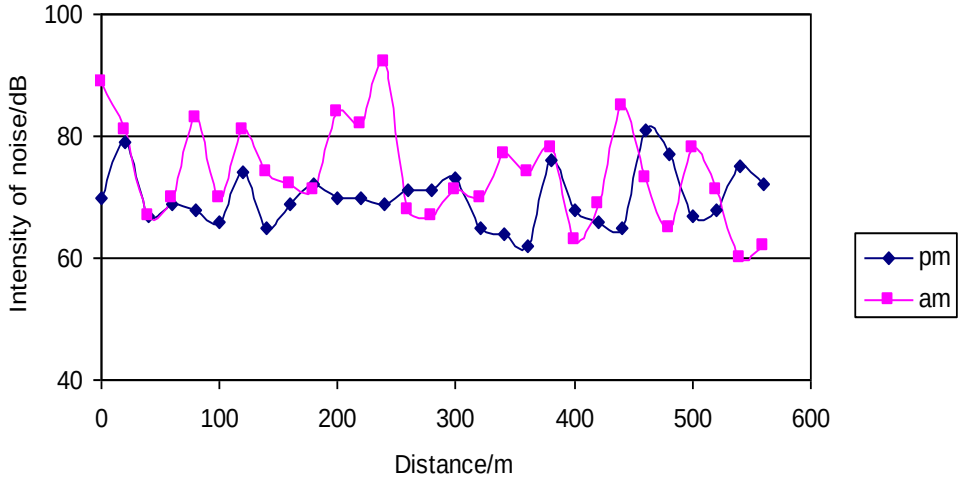

Figure 2: Intensity of noise as a function of distance for Hamdi street

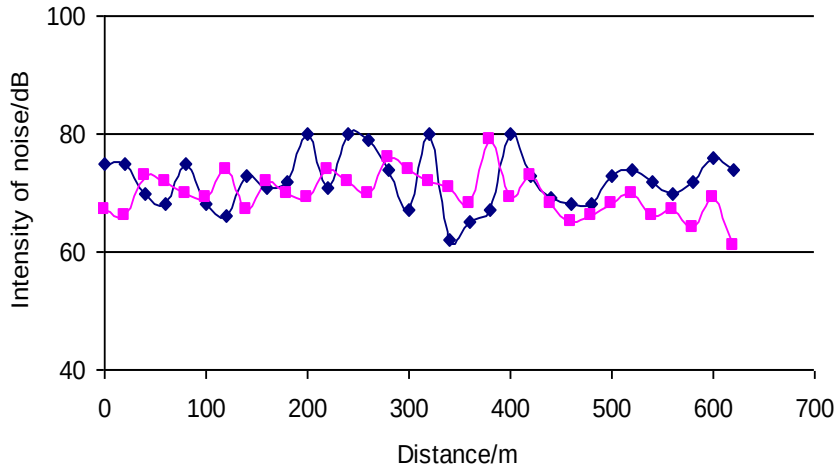

Figure 3 : Intensity of noise as a function of distance for peramerd street

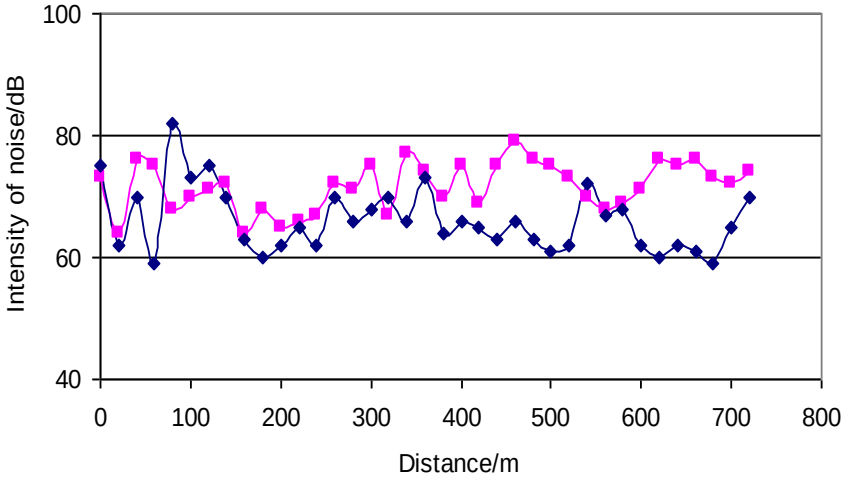

Figure 4 : Intensity of noise as a function of distance for Mawlawi street

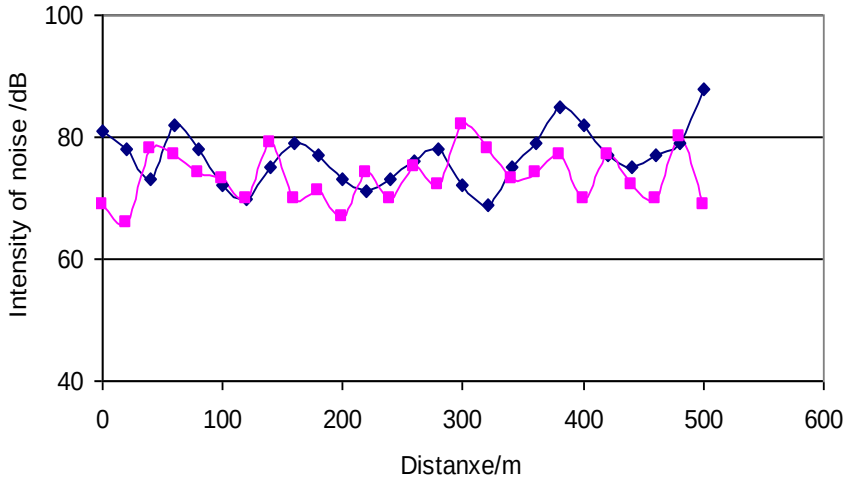

Figure 5: Intensity of noise as a function of distance for Kak Ahmadi Shekh street

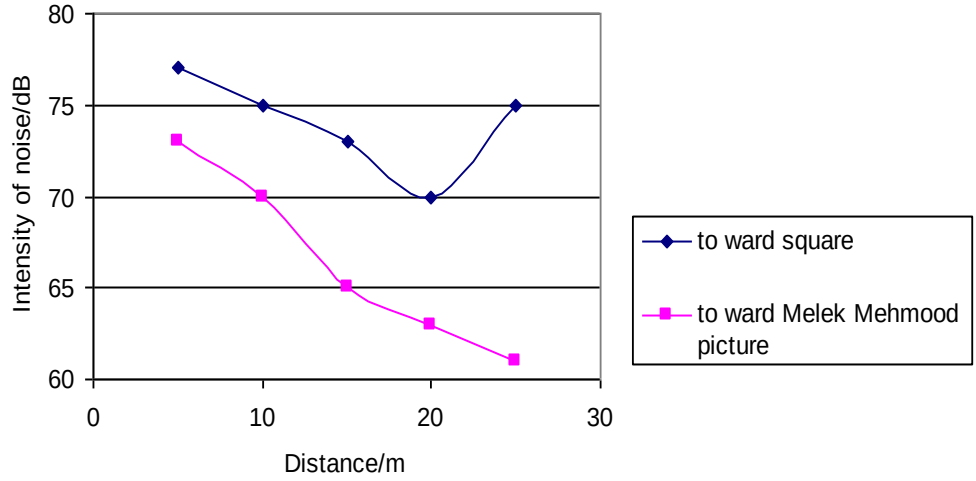

Figure 6 : Intensity of noise for Sara advertisment tablet as a function of distance

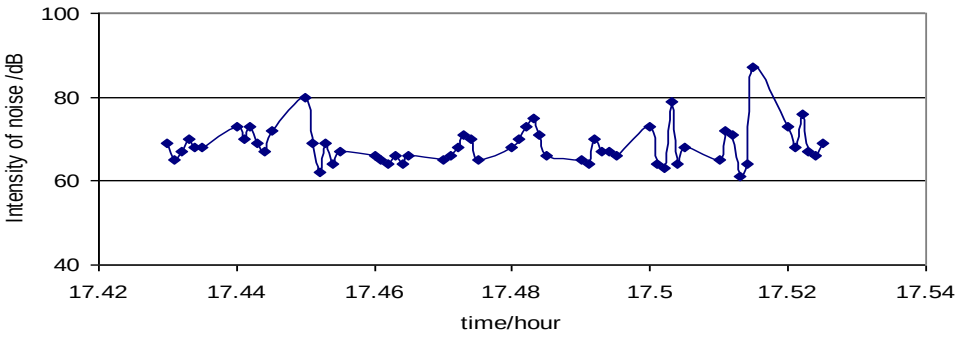

Figure 7: Intensity of noise as a function of time in front of Children's Hospital

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