Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 741-746

AENSI Journals

Journal of Applied Science and Agriculture

ISSN 1816-9112

Journal home page: www.aensiweb.com/jasa/index.html

Measurement Of Environmental Pollution In Tourism Area (Case study: noise pollution)

[1]Mojgan Zaeimdar and [2]Hooman Bahmanpour

[1]*Faculty Member of Environmental Science Department, Islamic Azad University, North Tehran Branch, Tehran, Iran.*
[2]*Department of Environment, College of basic science, Shahrood Branch, Islamic Azad University, Shahrood, Iran.*

ARTICLE INFO

Article history:
Received 10 January 2014
Received in revised form 11 March 2014
Accepted 19 March 2014
Available online 1 April 2014

Keywords:
Noise Pollution, Standards, NPL, L_{Aeq}

ABSTRACT

Background: Noise is a physical stressor and Exposure to high level of noise is known as a health risk. In recent years, noise pollution studies have been considered in Iran and has been monitored periodically especially in large cities. **Objective:** The main goal of this research is measurement of noise pollution in tourism site. For measurement of noise pollution in tourism sites in this research, 5 recreational sites in the area were examined with the ST-8820 Multi-function Noise dosimeter. According to ISO 1995 standards, sample time was 15 minutes in each day of the week. For determination of each noise indicators, data were analyzed by Environmental Evaluator Software 7820/782, and SPSS and Excel software were used for comparison of Iranian DOE standards with the results of study. **Results:** The results show in site No. 1and at two measurement time, maximum NLP was 83.03 and 82.08 dB, respectively. Minimum NLP was 77.51 and 74.46 in site No. 2 and LAeq was about 72 dB in two measurements. Hence, in comparison with DOE standards, it is 17 dB more than noise standards. It indicates that the study area has a high noise pollution in the day, which is similar to most tourist sites and urban areas. **Conclusion:** Noise level was over DOE standards in the night. This problem relates to tourist activities which can disturb daily life and leads to dissatisfaction of local people.

To Cite This Article: Mojgan Zaeimdar, Hooman Bahmanpour. Measurement of environmental pollution, in tourism area (Case study: noise pollution). ***J. Appl. Sci. & Agric.,*** *9(2): 741-746, 2014*

INTRODUCTION

In recent years, technology and urban development, population and vehicles increase, and industrialization of countryside, has resulted in exposure to noise pollution (Golmohammadi, 1999). Noise is a physical stressor and Exposure to high level of noise is known as a health risk. It can cause blood pressure, heart disease, and migraine headache (Reshadmanesh *et al*., 1996). Noise pollution is one of the many problems faced by most people in the cities or other modernized areas. In human, psychological and physiological effects of noise pollution gradually appear in long term periods. It seems these effects don't appear in non-exposed people (Bahreyni Toosi, 1997).

Responses of human body to loud noise which includes producing of Adrenaline hormone, change of heart beating and blood pressure, are just like to warning symptoms (Smith, 1991). An important factor in noise pollution is Noise Induced Hearing Loss (NIHL), which can occur during years (Golmohammadi, 2007 & Neus *et al*., 1983). Furthermore, noise pollution has negative impacts on job efficiency and can be the cause of accidents (Meyer & Mccunney, 2007), cruel behavior, and concentration difficulties (Bengang *et al*., 2002). Since loud noise affects health conditions of the society, it is considered as an environmental pollution (Bron & Byrne, 2001).

In recent years, noise pollution studies have been considered in Iran and has been monitored periodically especially in large cities. These studies confirm other ones in other parts of the world. The studies of Iranian researchers show that noise pollution is serious environmental and health problem in urban areas, and in many commercial and industrial areas, noise level is more than DOE standards (Babisch & Elwood, 1993; Onuu, 2000; Barrigón *et al*., 2002; Zannin *et al*., 2002; Khosravian & Kavei, 2008; Emam jome *et al*., 2009; Mohammadi Ashnani *et al*., 2011; Naddafi *et al*., 2007; Gholami *et al*., 2010). Table 1 shows some studies on noise pollution in different parts of the world.

Corresponding Author: Hooman Bahmanpour, Department of Environment, College of basic science, Shahrood Branch, Islamic Azad University, Shahrood, Iran.
Phone: +98 912 218 35 10; E-mail: h.bahmanpour@srbiau.ac.ir

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 741-746

Table 1: Some studies of noise pollution

Author (s)	Title	Publication	Results
Babisch & Elwood (1993)	Traffic noise as a risk factor for myocardial infarction	Report	There is a significant relation between noise pollution of traffic, and increasing heart diseases.
Onnu (2000)	Road traffic noise in Nigeria: Measurements, analysis and evaluation of nuisance	Journal Article	High level of noise is related to cultural issues such as big African horns.
Barrigon *et al* (2002)	An environmental noise study in the city of Cáceres in Spain	Journal Article	There is a significant relation between Equivalent Noise Level, and traffic ratio.
Zannin *et al* (2002)	Environmental noise pollution in the city of Curitiba in Brazil	Journal Article	Most of urban areas of Brazil had Equivalent Noise Level of more 75 dB.
Khosravian & Kavei (2008)	Environmental noise pollution in the city of Tabriz, Iran	Journal Article	Most of urban areas of Tabriz had Equivalent Noise Level of more 75 dB.
Emam jome *et al* (2009)	Noise pollution in Qazvin	Journal Article	Equivalent Noise Level was more than DOE standards for residential areas.
Mohamaddi Ashnani *et al* (2011)	Urban environmental assessment use of HSE-MS metrics; Case study: Parks and green spaces of Ghom/Iran	Journal Article	Trees and gardens have an important role in noise pollution reduction.
Naddafi *et al* (2007)	Noise pollution in Zanjan city	Journal Article	Zanjan has a high noise level in residential and commercial areas.

In tourism areas, there are many infrastructures and tourists crowding in these areas cause environmental pollution such as noise pollution. This type of environmental problems occur in many natural areas, because natural attractions is one of the most factors for attracting tourists, and some studies estimate its role is over 50 percent (Gholami *et al*., 2010).

Study area is called Nekarman, which located in eastern Iran, Semnan province (Fig. 1). It has pleasant climate, beautiful landscapes, and many gardens. As one of most important recreation areas of Shahrood city, Nekarman attracts many visitors during the year. Field surveys show that tourism activities have decreased environmental quality of the area and local people are dissatisfied with tourism development. In this study, we examined noise pollution in the area induced by tourism activities in the peak season.

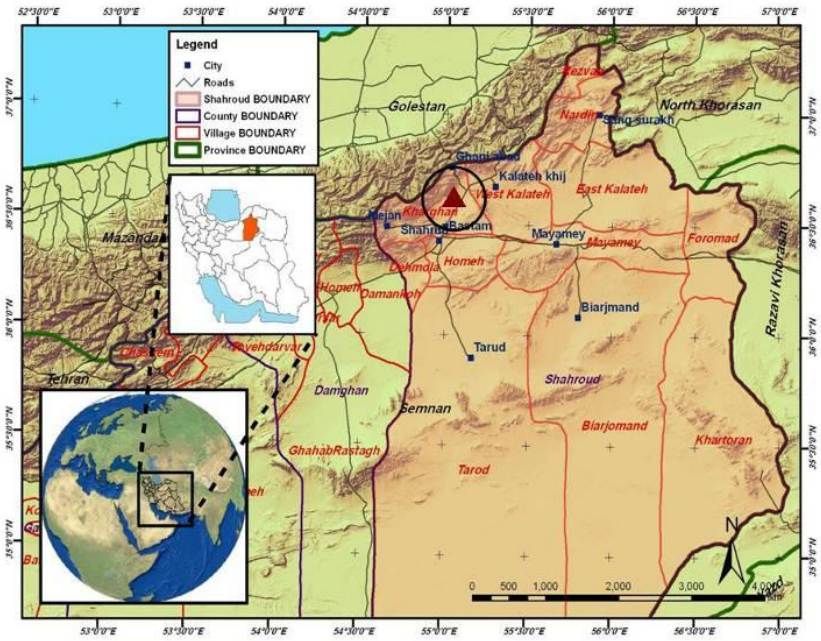

Fig. 1: Study area

MATERIALS AND METHODS

In spring and summer of 2011, 5 recreational sites in the area were examined. Figure 2 shows measurement sites in the study area. The ST-8820 Multi-function Noise dosimeter was used for measurement of noise level at 60 to 100 dB, according to Iranian DOE standards (DOE, 2002). At the present study, noise indicators were defined follows:

LAeq: Equivalent Noise Level

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 741-746

L 10 is the level exceeded for 10% of the times. For 10% of the time, the sound has a sound pressure level above L10.

L 50 is the level exceeded for 50% of the times. For 50% of the time, the sound has a sound pressure level above L50.

L 90 is the level exceeded for 90% of the times. For 90% of the time, the sound has a sound pressure level above L90.

Noise Pollution Level (NPL): For each site, NPL can be obtained by the following equation (8):

NPL= LAeq + (L10-L90), which LAeq is Equivalent Noise Level in a certain period time (3 hours).

Before daily measurement, noise dosimeter was calibrated in stop mode. For the purpose, a standard noise (frequency of 1 kHz and relative level 0/20 ± 94/00 dB) was induced by a calibrator model 4231 (made by B&K Company) (Bruel & Kjzer, 2000).

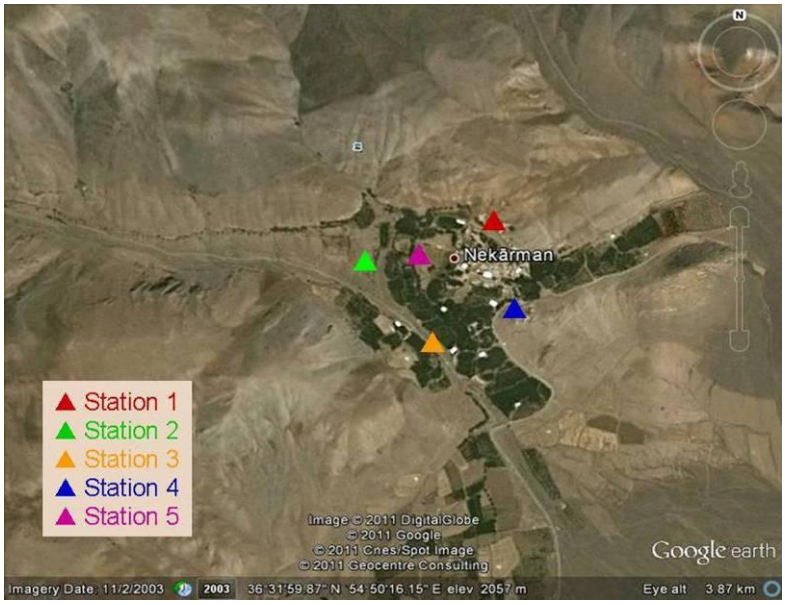

Fig. 2: Field measurement sites in study area

For meeting standards, measurement instruments were installed at the height of 150 cm, which means they were in front of free field (Sanford, 1978). According to ISO 1995 standards, sample time was 15 minutes (22 to 24). For determination of each noise indicator, data were analyzed by Environmental Evaluator Software 7820/782, and SPSS and Excel software were used for comparison of standards with the results of study (Table 2).

A pilot study showed that most tourists visit the area in June between 10 am to 13 pm, and 17 to 20 pm. Measurements were carried out in 5 to 12 June (during one week).

Table 2: Noise limits for open spaces in Iran [9], [10]

Type of area	Day (7 am-22 pm) LAeq dB	Night (22 pm-7am) LAeq dB
Residential	55	45
Commercial-Residential	60	50
Commercial	65	55
Residential-Industrial	70	60
Industrial	75	65

Results:

Table 3 shows the results of study.

Table 3: Noise Pollution Level (NPL) in measurement sites

Site No.	NPL {dB (A)}	
	10 am-13 pm	17-20 pm
1	83.03	82.08
2	77.51	74.46
3	81.68	78.78
4	81.68	77.05
5	82.12	81.30

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 741-746

In site No.1 and at two measurement time, maximum NLP was 83.03 and 82.08 dB, respectively. Similarly, minimum NLP was 77.51 and 74.46 in site No. 2. Other noise indicators are shown in figures 3 and 4. According to the above results, in site No 1 maximum LAeq at first (10 am-13pm) and second measurement (17-20 pm) was 71.39 and 74.41 dB, respectively. Minimum LAeq at first measurement was 71.52 dB in site No 2, and at second measurement was 70.61dB in site No 4. Average LAeq for 3 hours was 73.4 and 71 dB in all sites and measurements. Figure 6 shows patterns of noise pollution in study area.

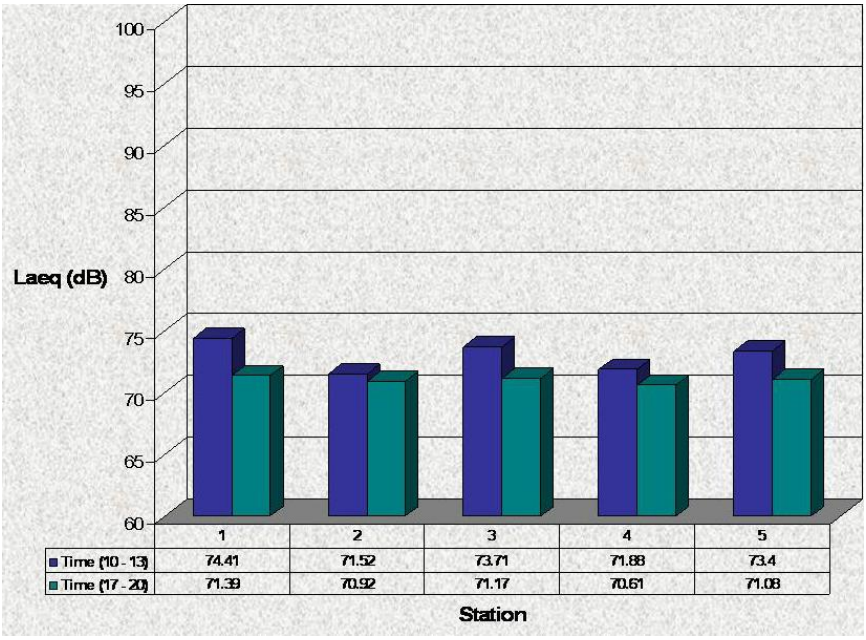

Fig. 3: LAeq in all measurement sites

Table 4: Noise Pollution Level in all sites

Site No	10 am-13 pm			17-20 pm		
	L 10	L 50	L90	L 10	L 50	L90
1	76.2	73.4	67.9	71.1	68.5	62.2
2	72.1	65.5	59.9	68.4	57.2	55.4
3	75.6	72.5	67.1	71	69.3	65
4	73.3	69	65.5	69.2	58	54.7
5	75.4	72.7	68	69.8	66.4	58.9

Comparison of DOE standards with NPL results in residential areas (in day and night) are shown in figures 4 and 5. Figure 6 shows Patterns of noise pollution in study area.

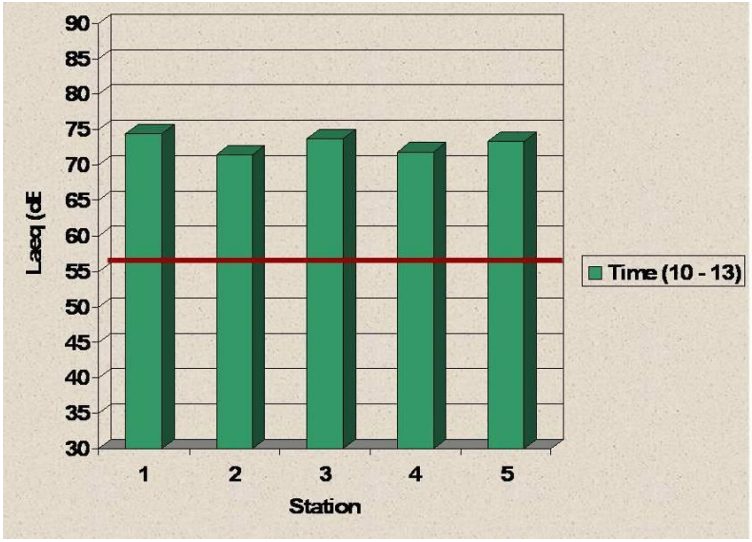

Fig. 4: Comparison of DOE standards with NPL at first measurement

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 741-746

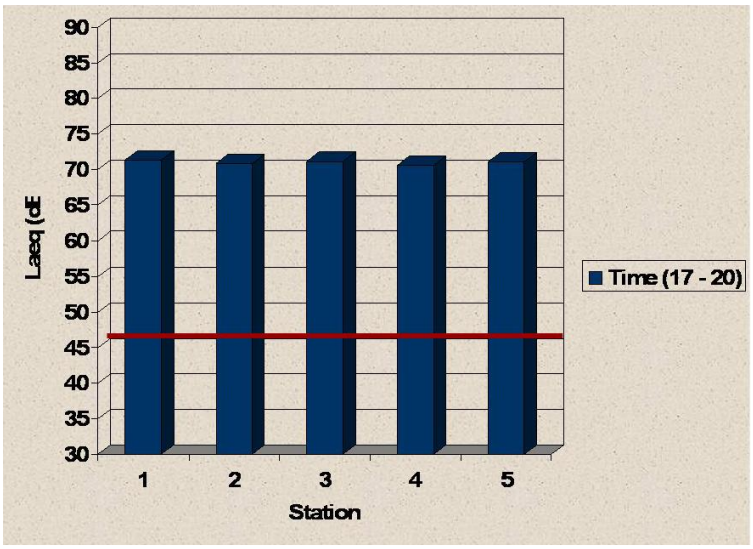

Fig. 5: Comparison of DOE standards with NPL at second measurement

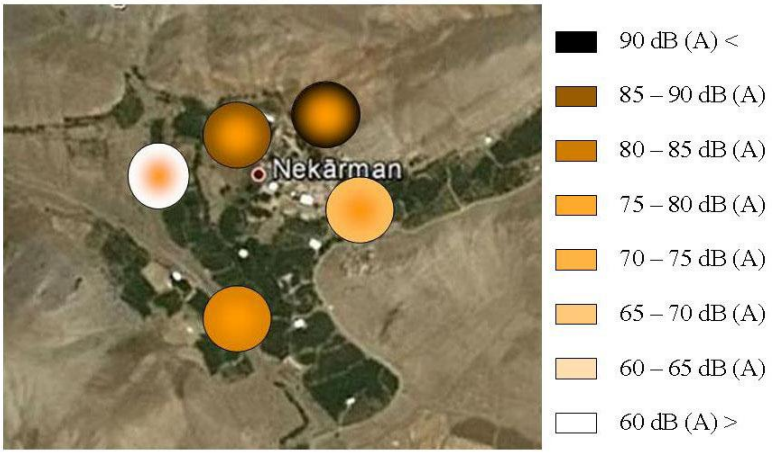

Fig. 6: Patterns of noise pollution in study area

Conclusion:

The results show that LAeq was about 72 dB in 2 measurements (all measurements were about 6 hours). Hence, in comparison with DOE standards, it is 17 dB more than noise standards. Sites No 2 and 4 have the minimum LAeq because they were out of tourism areas and have less tourists and vehicles. The main land use pattern of these sites are green space, therefore they have more potential to decrease noise pollution in June, because of their thick vegetation.

More tourists arrive in sites No 1 and 5 because they are in the central part of area, next to high traffic areas and have various land use patterns. These conditions lead to increase of noise level. As an adjacent site to the main road, No. 3 has a high noise level and many tourists camp near the site.

The results show that the study area has a high noise pollution in the day, which are similar to most tourist sites and urban areas around the world. In addition, noise level does not decrease unexpectedly in the night; because noise level was over DOE standards. This relates to tourist activities in the night which can disturb daily life and leads to dissatisfaction of local people.

The results of the study are similar to Naddafy *et al* (2007), Khosravani & Kavei (2008), Zannin *et al* (2002), and Mohamaddi Ashnani *et al* (2011). Our study shows traffic and other activities are a ubiquitous environmental problem in the tourism sites. In recent years, developed and developing countries have actively coped with noise pollution to reduce exposure and enhance public health conditions. Iran has not yet made any effort to control the noise pollution problem in tourism sites. However, the decision makers should be aware of

Journal of Applied Science and Agriculture, 9(2) February 2014, Pages: 741-746

the traffic noise levels, which might cause adverse health effects. A noise abatement plan should be implemented to control and manage noise levels in tourism sites.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge Mazdak Dorbeiki, faculty member of Islamic Azad University, Iran for providing most helpful comments on a draft of this paper. We thank Atoosa Halajian for assistance with census statistics and mapping.

REFERENCES

Babisch, W and P. Elwood, 1993. Traffic noise as a risk factor for myocardial infarction. J Schver Wasser, 88: 66-135.

Bahreyni Toosi, M.H., M. Pour-sadegh, A.M. Tamjidi and A.R. Bazri, 1997. Sound pollutants in the industrial environments of Mashhad. Medical Journal of Mashhad University of Medical Sciences, 40(57, 8): 27-32.

Barrigón, J.M., E.V.J. Gómez and S.A. Méndez, 2002. An environmental noise study in the city of Cáceres in Spain. J Appl Acoust, 63(10): 1061-70

Bengang, L., R. Shu Tao and W. Dawson, 2002. Evaluation and analysis of traffic noise from the main road in Beijing. Applied Acoustics J. 63(10): 1137-42.

Bron, R.A and D. Byrne, 2001. Social Psychology. Boston; Allyn & Bacon.

Bruel and Kjzer, 2000. Manual user of investigator 2260. Denmark; Bruel & Kjzer.

DOE, 2002. Guideline of Environmental Rules, I.R. of Iran Department of the Environment, Tehran, Iran.

Emam jome, M.M., A. Nikpey and A. Safari Variany, 2009. Noise Pollution in Qazvin, Scientific Journal of Qazvin Medical Science University, 15(1): 64-70

Gholami, S., H. Assayesh and A. Alipour-Nakhi, 2010. The Study of Tourism Geography in Rural Areas of Noushahr City of Mazandaran Province (Iran) – the Case of Balade Kojour Vill, American-Eurasian J. Agric. & Environ. Sci., 7(3): 341-346.

Golmohammadi, R., 1999. Vibration and sound engineering. Hamadan, Daneshjoo press. 1st ed. 57-63.

Golmohammadi, R., 2007. Noise and vibration engineering. 3rd ed. Hamadan: Daneshjo press; (Persian)

ISO-3746., 1995. Acoustics: Determination of sound power levels of noise sources using sound pressure surface over reflecting plane. ISO; 1995, pp: 4-15.

Khosravian, G and G. Kavei, 2008. Environmental noise pollution in the city of Tabriz, Iran. Asian J Water Environ Pollut, 5: 79-84

Kyani Sadre, M., P. Nasiri, M. Abaspoor and M.S. Sakhavatjoo, 2007. Evaluation of environmental sound pollution in Khoram Abad city. The 10th national congress on environmental health, Hamadan, pp: 847-855.

Meyer, J.D., R.J. Mccunney, 2007. Occupational exposure to noise. Environnemental occupation médicine. Edited by William N.Rom. 4th ed.U.S.A: Lippinctt-Raven., pp: 295-1308.

Mohammadi Ashnani, M.H., E. Salehi and E. Hassani, 2011. Urban Environmental Assessment Use of HSE-MS Metrics; Case Study: Parks and Green spaces of Ghom/Iran, American-Eurasian J. Agric. & Environ. Sci., 10(4): 702-710.

Naddafi, K., M. Yunesian, A.R. Mesdaghinia, A.H. Mahvi and S. Asgari, 2007. Noise Pollution in Zanjan City in 2007 Scientific Journal of Zanjan Medical Science University,16(62): 85-107.

Neus, H., Ruddel, W. Schulte, 1983. Traffic noise and hypertension: An epidemiological study on the role of subjective reactions. Int Arch Occup Environ Health, 51: 223-229.

Onuu, M.U., 2000. Road traffic noise in Nigeria: Measurements, analysis and evaluation of nuisance. J Sound Vib, 233(3): 391-405

Reshadmanesh, N., S. Naseri, M. Shariat and K. Imandel, 1996. Study of Environmental Health in Sannandaj. Medical Journal of Kordestan University of Medical Sciences, 1(2): 16-20.

Sanford, F., 1978. Nationwide urban noise survey. J Acoustic Soc Am. 64(1): 198-206.

Smith, A., 1991. A review of the non auditory effects of noise on health. Work & Stress; 5(1): 49-62.

Tempest, W., 1985. The noise hand book. Academic press INC: London., pp: 25-39.

Zannin, P.H., F.B. Diniz and W.A. Barbosa, 2002. Environmental noise pollution in the city of Curitiba in Brazil. J Appl Acoust, 63(4): 351-358.