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ASSESSMENT OF NOISE POLLUTION BEHBAHAN CITY, IRAN

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ABSTRACT
Noise pollution in urban areas of many countries in the world is a widespread problem and now worldwide recognizes it as a major problem for the quality of life in urban areas. Road traffic, industrial and production units and construction machinery are the causes of urban noise pollution. Behbahan city is one of the most populous Khuzestan cities in Iran. Assessment of noise pollution in Behbahan city was performed by seven stations as indicators and a station as a witness of commercial-residential areas. The Testo 815 Sound level meters device was used for data collection. Collecting data started from 20 February 2010 for duration of 28 circadian by the stations. Standard sound of commercial-residential zone in the open air Iran, for day time and night time are 60 dB and 50 dB respectively. Compared to the noise measurement in studied stations in Behbahan city we could say that Behbahan has noise pollution problem. Noise pollution can be due to high traffic volume, the width of streets, cars, motorcycles and distance disregard between commercial-residential areas and noise pollution sources noted.

Key words: noise pollution, Behbahan city, Commercial-Residential areas, testo 815.

INTRODUCTION
Environmental pollutions over the past three decades attract the world's attention a lot. The issue of noise pollution in urban areas of many countries in the world is a widespread problem [10] and now worldwide recognized it as a major problem for the quality of life in urban areas [5]. Noise pollution is the acoustic undesirable, unpleasant or unwanted. In terms of quantity, noise is a mixture of different sounds with different wavelength and intensities of certain compounds and not for the human ear is annoying. Abnormal noise is an annoying sound and unwanted that is caused due to frequent changes in ambient air pressure. Since one exposure to excessive noise, it reduces the wellbeing of all living creatures and the whole effects are negative, therefore it is considered as one of the environmental pollution [7]. Among the things that cause noise pollution such as traffic, industry, construction and community, traffic noise that disturbs the peace of residents in large cities has attracted a lot of attention of world society [2]. Road traffic noise level depends on many factors such as the kind of tire, the kind and condition of the road asphalt. Also drivers cause a high traffic noise by using vehicle horn, playing loud music, unnecessary gear change and braking. Road, highway and freeway construction and maintenance, generally require using heavy machinery and so on at this condition the noise level will be increased [11]. Existing evidence indicates that noise pollution may have negative impacts on human health; therefore, it justifies a lot of researches in order to provide better understanding of noise pollution problems and how to control it [3]. Noise pollution has been stated as a serious health hazard, with noise-related damage to human ranging from annoyance to difficulty in falling asleep and high blood pressure [12]. In comparison with other pollutants, the control of environmental noise has been hampered by insufficient knowledge of its effects on humans and of dose–response relationships, as well as by lack of sufficient data. The effects of

noise in developing countries are just as widespread as those in developed countries, and the long-term consequences for health are the same. Practical actions to limit and control the exposure to environmental noise are therefore essential [9]. In countries with severe social problems such as Iran, urban noise has not received enough attention. However, some researchers have been shown the problem of environmental noise in Iran large cities such as Tehran [8], Yazd [7]), Isfahan [1], Khoram abad [4]. The purpose of this paper is Assessment of noise pollution of Behbahan city in commercial-residential areas and compares it with standard sound in open air Iran (Table 1).

Table 1. Standard sound in the open air Iran dB (A) [6]

Zone dB(A)	**Day Time (7am-22pm)-dB(A)**	**Night Time (22pm-7am)-**
Residential	55	45
Commercial-Residential	60	50
Commercial	65	55
Industrial –Residential	70	60
Industrial	75	65

MATERIALS AND METHODS

2.1. Study area

Behbahan city with an area of 3195 km ² and a population of about 185 thousand people located in the southeastern province of Khuzestan. It is located in 65 km north of the city of Gachsaran, 75 kilometers distance away from the South East of the Dailam bay, and a distance of 110 kilometers and 72 kilometers from the south of Ramhormuz and Omidiyeh city, respectively. The capital city of Behbahan is geographically located between 30 ° and 36 minutes of north lateral and 50 degrees 14 minutes and 15 seconds Eastern longitudinal of Greenwich. Behbahan city comprise of 3 parts, the central part of the city and two Zydun and Aghajary countys. Behbahan City's population is over 105,000.

Figure 1 Study area

2.2. Studied stations

In order to determine the amount of noise pollution from commercial-residential areas in Behbahan city, we used eight stations, seven stations as indices and one station as witness. The following stations are listed in Table 2. Due to the proximity of sensitive sites such as schools,

commercial and residential areas, doctor Clinics, hotel, schools, hospitals and etc, all of which are sensitive to the presence of noise, so these places were chose as indicators.

Table 2. The name of Stations

Station Name	Mohseni (Witness)	National Bank	Javanmardi	Marahel	Bid Boland	Hospital	Nahvi	shahfazl way Three
Number	1	2	3	4	5	6	7	8

2.3. Method of data collection

In this study, the model appliance testo 815 Sound level meters was used for data collection. This device is suitable for this type of measurement, because it is portable, easy to use and very sensitive. It has Accuracy and resolution of ±1.0 dB and 0.1 dB, respectivley (Fig. 1). Collecting data started from 20 February 2010 for the duration of 28 dB circadian at the stations. According to the standard of sound in air at Iran, for day time from 7 A.M to 22 P.M and for night time from 22 P.M to 7 A.M, the data collection was performed(Mehravaran et al, 2011). In each noise measuring of the stations, measuring sound device was located in the height of 1/2 meter distance from the ground and in the nearest distance from residential and commercial areas. In each station, data collection took half an hour and in order to collect accurate data for each station noise measurements were done in three points and the maximum numbers of repetitions are recorded as the final number at each point.

Figure 2 Testo 815 Sound level meters

RESULTS

Considering that the stations are exposed to noise pollution source of the commercial-residential zone in Behbahan city, The sound that measured in 8 stations in day and night times for 28 circadian are given in Tables 3 and 4. Analysis was performed for each station for the entire duration; the data collected from the stations include maximum and minimum measurement noise level, median, mean and standard deviation.

3.1. Variations of noise measuring for day

The variations of noise measurment for daytime are shown In table 3 at desired Stations. Minimum noise level that measured at the stations is 51.5 dB for the Mohseni station which was

the witness station. Also maximum noise level is 75.4 dB for the corresponding Javanmardi station. Minimum standard deviation, which represents distance of the average amount, is data collected from the Shahfazl way three stations and the maximum standard deviation is the corresponding Mohseni station.

Table 3. Analysis of the measured noise for day dB (A)

Station Name	Min	Median	Max	Mean	Standard Deviation
Mohseni (Witness)	51.5	58.5	59.5	58.2	1.47
National Bank	72.3	73	74	73.1	0.39
Javanmardi	74.2	74.9	75.4	74.9	0.3
Marahel	71.6	72.4	72.8	72.3	0.33
Bid Boland	70.4	71	71.8	71	0.4
Hospital	70.1	71.4	71.7	71.2	0.38
Nahvi	69.4	70.2	70.6	70.1	0.28
Shahfazl way Three	68.9	69.3	69.9	69.3	0.26

3.2. Variations of noise measuring for night

The variations of noise measurement for night time are shown in table 4 at desired Station. Maximum noise level that measured at the stations is 69.6 dB for the corresponding Javanmardi station and the Minimum noise level measurement is 47.7 dB for the corresponding Mohseni station which was the witness station. Maximum standard deviation was at the marahel station and the minimum is at the two stations, hospitals and Shahfazl way Three.

Table 4. Analysis of the measured noise for night dB (A)

Station Name	Min	Median	Max	Mean	Standard Deviation
Mohseni (Witness)	47.7	48.6	49.2	48.6	0.4
National Bank	66.3	66.8	68.8	66.8	0.46
Javanmardi	67.2	68.4	69.6	68.4	0.6
Marahel	60.1	65.7	67.8	65.4	1.3
Bid Boland	64.3	64.5	65.4	64.5	0.2
Hospital	65.3	65.4	65.6	65.4	0.09
Nahvi	63.9	64.2	64.4	64.2	0.15

Shahfazl way Three	63.4	63.5	63.7	63.5	0.09

DISCUSSION

According to standard sound in the open air in commercial-residential zone of Iran, 60 dB and 50 dB for day and night times respectively, And considering that the stations we studied them are good choice for commercial-residential zone behavior, the results that are shown in Tables 3 and 4 indicate that, the measured sound level at Mohseni station (witness) for period of day and night time is less than the standard amount, therefore, there was no noise pollution at this station. The reason could be the wide streets, the low volume of traffic. The rest of the stations, for both period of day and night times, sound level is higher than standard, therefore in all 7 stations we have noise pollution. The maximum noise pollution amount that is in the period of day time is 75.4 dB as we saw at Javanmardi station. The reason of the most noise pollution at the station is due to the high volume of traffic within a few streets leading to the station. And minimum noise pollution 68.9 dB is Shahfazl way three stations. The maximum noise pollution in the period of night time is 69.6 dB at Javanmardi stations and minimum noise pollution is 68.9 dB at Marahel stations.

CONCLUSION

Behbahan city is one of the most populous Khuzestan cities in Iran. According to the noise measurement at the chosen stations and compared with the standard of environmental noise in iran, It is concluded that there is high level of noise pollution in Behbahan city. Therefore, we must do some actions to prevent exposure to the high level of noise pollution in future. The following reasons can be noted for the causes of noise pollution in the city,:

1- Low width of streets that can cause high volume of traffic.

2- Too much traffic for cars and motorcycles that are causing a lot of noise.

3- High commuting of citizens especially in Javanmardi, national bank and Marahel stations.

4- Distance disregard between noise pollution source in Behbahan city and commercial-residential area.

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