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Evaluation of Noise Pollution Using GIS:

Case study: 9th District of Tehran, Iran

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Abstract:

Noise pollution is a challenging environmental issue in our today's societies. The issue arises when it disturbs the daily life of civilians in large metropolitan areas. Airport and railway stations are of major sources of noise in large cities. This study attempts to scientifically assess the noise pollution through identifying Ldn, and NEF parameters. Ldn is used for the entire study area while NEF is applied for airport noise pollution.In order to compute the parameters and assess the results, a case study has been selected. The study area is located in the 9th distract of Tehran municipality. This research is done in two temporal ranges, namely: day time (7 - 22), and night time (22 - 7) in summer and spring of 2006. . In this research, the study area is divided to 78 stations for measuring of noise rate. 28 stations have been chosen for surveying of Noise Exposure Forecast (NEF) and 6 stations for study of noise that produced by train as neighbor noise. Geospatial Information System (GIS) is, then, used to produce the NEF and Ldn map zonations. A questionnaire has been designed and distributed to 234 candidates. The results of the questionnaires are used for the determination of noise pollution & annoyance awareness.
The paper presents the details of the methodologies used. The results are also discussed. It is found that: 38864 persons are in higher than NEF-40 (the most disturbance noises for residents) and 7500 are in NEF 30-40. It is interesting to note that a significant correlation found between the rate of NEF and listening of Radio & TV (P>0.001) and sleep disturbance in males & females.

key words: Noise pollution – Environment, GIS - Ldn, NEF.

Introduction:

Noise pollution is by now worldwide recognized as a major problem for the quality of life in urban areas. Noise effects include various impacts on mental and physical health and disturbance of daily activities (may affect sleep, conversation, lead to perception of annoyance, cause hearing loss, cardiovascular problems as well as affect task performance) **(9)**. Then, assessing the problem and programming actions for controlling its adverse effects have become issues of immediate concern for community as evidenced by the large number of anti-noise laws, ordinances and regulations decreed by many governments . The 9th municipality is in west of Tehran (capital of IRAN) and one of the most important district about near to industrial and traditional areas. also the Mehrabad airport is in 9th district . Noise pollution is an environmental problem in cities. Although recent field research has focused on transportation noises, the effects of exposure to building construction noise and residential areas have not been studied. This study attempts to scientifically assess the noise pollution through identifying Ldn(Leq.$dB_{A)}$, and NEF parameters **(8,1)**. Ldn is used for the entire study area while NEF is applied for airport noise pollution.

Methods:

In order to compute the parameters and assess the results, a case study has been selected. The study area is located in the 9th distract of Tehran municipality. This research is done in two temporal ranges, namely: day time (7 - 22), and night time (22 - 7) in summer and spring of 2006. . In this research, the study area is divided to 78 stations for measuring of noise rate. 28 stations have been chosen for surveying of Noise Exposure Forecast (NEF) and 6 stations for study of noise that produced by train as neighbor noise. The sound level meter **B&K 2230** for measuring is used. And we use Ldn equation for computation**; Ldn**= 10 log {1.24[(15×10^leq dT.10)+(9×10^leqnT+10.10)]}. (3,7,1,4)

Geospatial Information System (GIS) is, then, used to produce the NEF and Ldn map zonations. A questionnaire has been designed and distributed to 234 candidates. The results of the questionnaires are used for the determination of noise pollution & annoyance awareness. **(2)**

Main goal: evaluation of environmental noise pollution in 9th district Tehran municipality.

So we measure noise (Leq.dB_A or A-weighted sound level L_{eq}) in two part time ;daytime (7.00 to 22.00) and night time (22.00 to 7.00) in summer and spring. In this research we use **Arc Gis** for analyzing of data.**(3,7)**

Findings (Important):

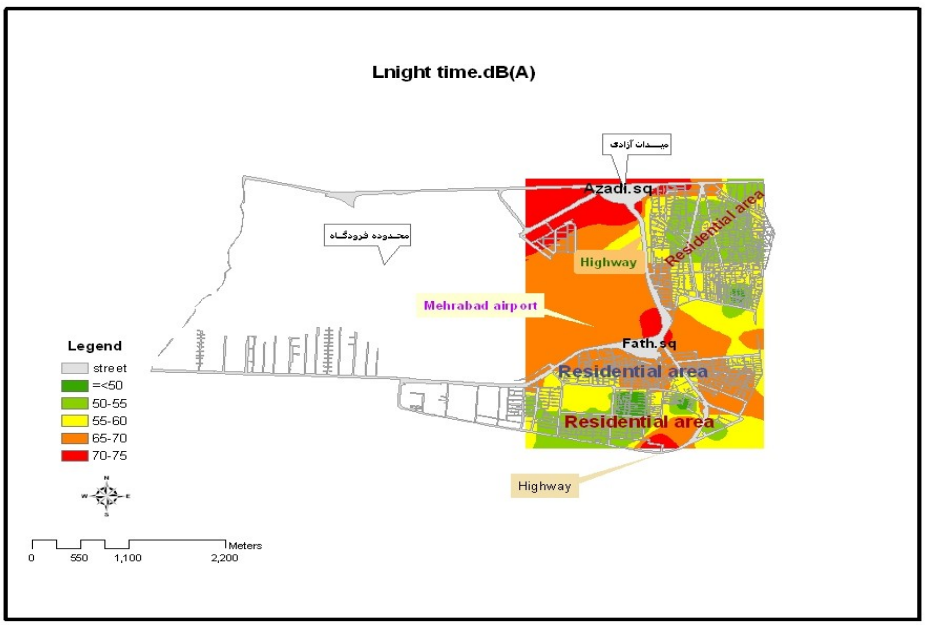

Fig.1: L_{night} Time.dB_A(A-weighted sound level L_{eq}**)**

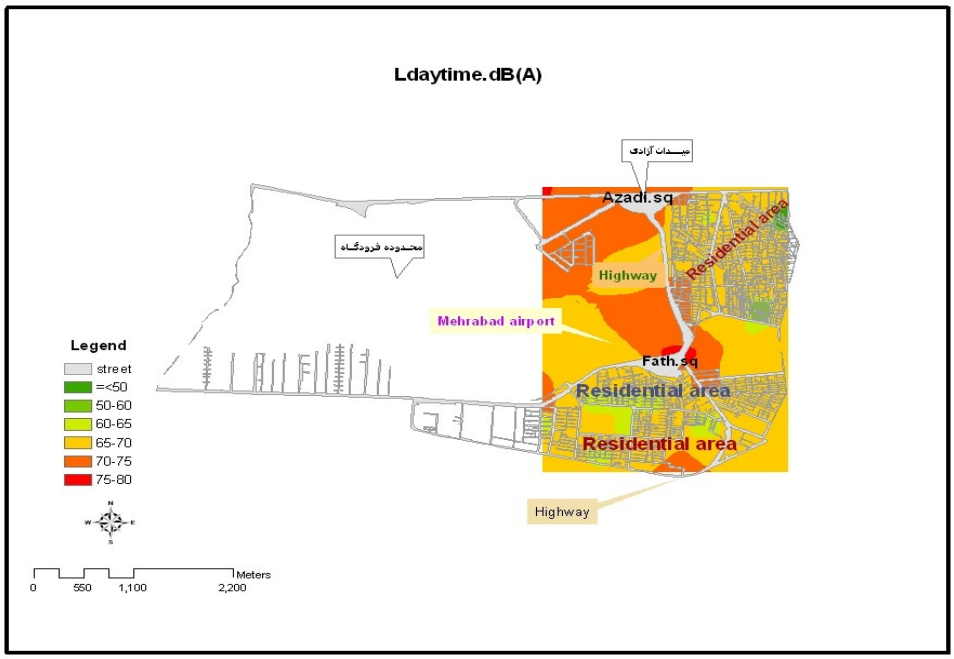

Fig.2: L_{day} Time.dB_A (A-weighted sound level L_{eq}**)**

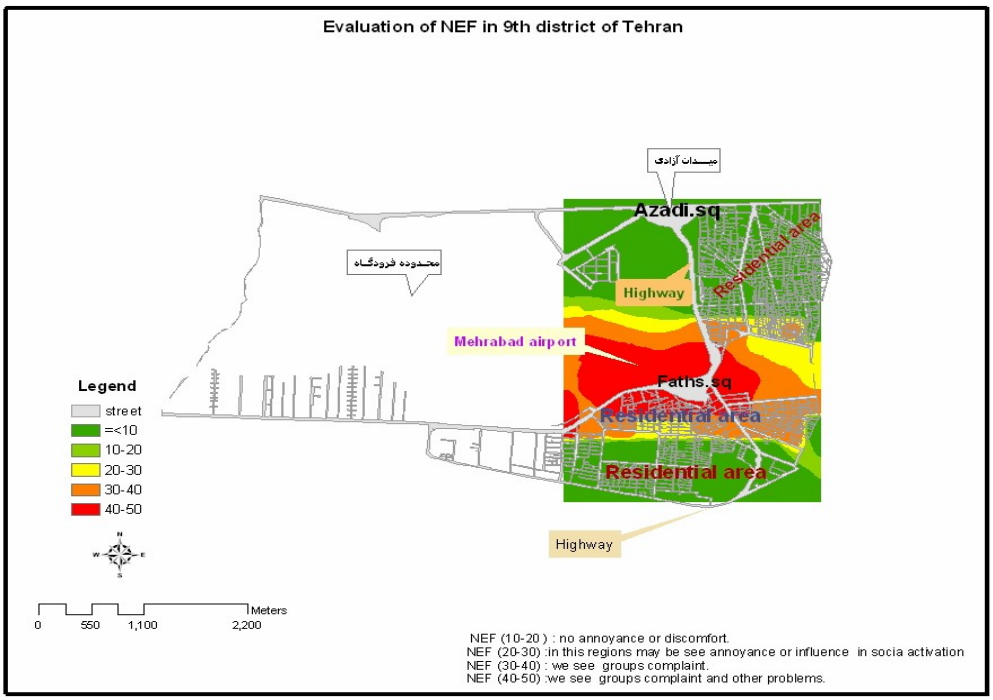

Fig.3: Evaluation of NEF in 9TH district of Tehran

Table.1 : (A-weighted sound level L_{eq}) in regions of 9th district of Tehran

No.	**Area**	**Lday(dB_A)**	**Deviation of IRAN's Standard**	**Lnight(dB_A)**	**Deviation of IRAN's Standard**
1	Farhanghian(residential)	65-70	10-15	55-60	10-15
2	Farhanghian.17(residential)	65-70	10-15	65-70	20-30
3	Tohid . (residential)	60-75	5-20	50-80	5-35
4	Air power (residential)	65-70	10-15	70-75	25-30
5	Mehrabad. (residential)	60-70	5-20	50-60	5-15
6	shamshiri.(park)	60-70	----------	55-60	----------
7	Almahdi.(park)	65-75	----------	55-75	----------
8	Razavi.(hospital)	65-70	10-15	70-75	25-30
9	Army 503.(hospitals)	60-70	5-20	50-60	5-15
10	Air power university	60-65	5-15	55-60	10-15

Table.2 : (A-weighted sound level L_{eq}) in regions of 9th district of Tehran

No.	Street /Area	Lday(dB_A) **Leq dB_A**	Lnight(dB_A) **Leq dB_A**
1	A.Sidi.Highway	65-80	55-75
2	Karaj.highway	65-75	65-75
3	Azadi.stt	65-75	50-75
4	Gazvin.st	65-75	55-70
5	Azari.st	65-70	50-70
6	Zarand.st	65-70	50-75
7	Shahidan.st	50-70	50-60
8	Ostadmoin.st	65-70	50-60
9	21m.jey.st	65-70	50-60
10	30.jey.st	65-75	55-70
11	Dampezeshki.st	65-70	55-70
12	Hashemi.st	65-75	50-60
13	Shamshiri.st	60-70	50-75
14	Jorjani.st	65-70	70-75
15	Azadi.sq	70-75	70-75
16	Fath.sq	65-80	70-75
17	Azari.sq	65-70	65-70
18	Shamshiri.sq	65-70	65-70
19	Ostadmoin.sq	65-70	65-70

Conclusions:

Obviously, the identification of the worst affected areas requires the employment of noise mapping that, cause the relatively small number of measurement points, has not been possible to draw up in the present work. Anyway, available data have allowed to point out that an unsuitable and acoustically incompatible location of important facilities can give rise to marked spatial variations in the city noise, with the existence of areas characterized by sound level distributions obeying to different statistics. Since the most penalized areas cannot be easily redeveloped by the introduction of "facility pertinent zones" suitable to the urban characteristics of the specific areas, it is necessary to think of recovery plans. This phase should come after the drafting of a noise map, actually in progress. At this point we can only affirm that, as the heavy traffic,airport constitutes the main source of noise pollution, a desirable mitigation action would be that to find a new location for the landing-places far from residential areas to decongest the urban centre from the heavy traffic and air traffic.

It is found that: 38864 persons are in higher than NEF-40 (the most disturbance noises for residents) and 7500 are in NEF 30-40. It is interesting to note that a significant correlation found between the rate of NEF and listening of Radio & TV ($P>0.001$) and sleep disturbance in males & females.

Recommendations:

1. Decrease of flights in Mehrabad airport or transferring of flights to IMAM'S Airport in south of Tehran .
2. Application of residential's standard in design of building.
3. Consideration and establishment of ISO14001 .
4. Application of specified asphalt for noise reduction .**(5,6)**
5. Management of traffic and Training or awareness of people in 9th district .

References:

1. Abbaspour.M, Environmental Engineering ,2nd volume,2005
2. Control Air Pollution Co , municipality of Tehran , Noise Pollution project,,2005
3. EPA,1981,"Community Noise Assessment Manual Acoustical Survey of Community ",Office of Noise Abatement and Control , washington,d.c.
4. M.A. Martín' ' A. Tarrero, J. González and M. Machimbarrena ,2006, Exposure–effect relationships between road traffic noise annoyance and noise cost valuations in Valladolid, Spain ,.,(www.elsewier.science..com)
5. P.S. Kandhal , ,2004, P.E. Associate Director Emeritus National Center for Asphalt Technology.
6. Nordic Road & Transport Research , 1999, noise-reducing Pavement for urban Roads , No.3.
7. Environmental Impact Statements ,2000,Population (or Area) Affected by the noise , Overall Noise Impact, Chapter fifty-four ,.
8. Nassiri. P.General Health Handbook ,1.edition , Departement of Health Engineering , School of Public Health and Institute of Health Resarch , Tehran University of Medical Sciences ,2005