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STUDY ON THE DEGREE OF POLLUTION IN THE CITY ALBA IULIA, ROMANIA

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Abstract

In recent years noise pollution has begun to make its presence felt more and more through intense road traffic and its effects, thus requiring a much higher dose of attention to this issue. This research work was carried out in order to bring to the forefront the harmful effects of the phonic pollution of the biotic and abiotic factors, the methods of improvement of the registered parameters and their evolution in the last years.

Keywords: *noise, sound pollution, traffic.*

INTRODUCTION

Noise is a group of sounds that have the effect of damaging both the psychological and biological stems of humans and other living organisms. In the beginning, sound pollution was considered a minor issue, not too important. This concept came into being following the publication of the Wilson Committee Report (1953), in which the first comprehensive review of the effects of noise was presented. With the passage of time, this subject became more and more publicized and more sensitive, Worrying values for wave and vibration recording.

So sound pollution has succeeded to rank among the main types of pollution classified according to the degree of harm.

The gravity of this problem was demonstrated by Kiernan (1997) who found that, although noise is relatively low, it affects human health, generating heart and insomnia, but also reduces the quality of optimal functioning of the auditory system, and all these in turn, lead to the generation of other health problems affecting organs of the human body over time.

In case of high levels of noise, there are more serious diseases of the human body which can lead to loss of hearing and diminish the capacity of the optimal functioning of the nervous system. The main factor in terms of noise pollution is road traffic. In the polls conducted by Pol. J. Environ (2004), which studied the effect of road traffic noise on the cardiac system, concluded that the results indicate a relationship between traffic noise exposure and the incidence of myocardial infarction among men aged 55-64 years. The study by Vinita Pathak (2007), which analyzed the problem of noise pollution in the city of Varanasi in India and its effects on the health of exposed people, showed that 65% of interviewed people were extremely disturbed by traffic noise, 51% reported they had headaches, 58% suffered from high blood pressure, 53% felt fatigued, 49% felt irritated, and 54% had dizziness.

Unfortunately, the noxious effect of road traffic noise is not only felt by man but by the whole ecosystem, whether biocenosis or abiotic factors, the effects are damaging to both categories. From buildings damaged by long exposure to noise pollution to birds and animals affected by noise often suffer from panic attacks, especially wild species, which, following our decisions, humans have invaded and destroyed the comfort of the natural environment life being exposed to pollution through a well-known action in our country, namely mass deforestation of the forests without considering the consequences of these decisions. In fact, according to the research,

one of the methods for reducing the effects of the noise pollution was removed. All these harmful effects from the road traffic effect affect the entire ecosystem for a long time, thus imposing the monitoring, research, discovery and application of the most efficient methods necessary to reduce these effects as much as possible. In the "Combating the noise pollution caused by the means of transport "have highlighted the following possible ways of reducing noise pollution in large cities and beyond: The machines or engines to be built is desirable to produce minimal noise. The blocks to be built must have an anti-static sound absorbing layer. Ideally, it would be the introduction of tree insulating curtains around industrial noise sources and around residential quarters. Until now, no sound quality standards have been established in Romania (Jadaneant and Mihon, 2010). This has been demonstrated in several research papers aimed at improving or reducing the noise pollution but unfortunately this topic still requires careful attention, so another solution for noise reduction intervenes in our help as a result of L. Dai's research that concluded: In order to reduce traffic noise, it is advisable to control the volume of traffic instead of its speed. (Dai L et al., 2015). In the "Novel solutions for quieter and greener cities" research, vegetal facades in the courtyard of the houses have been shown to significantly reduce the noise from all sources outside them, and the vegetation facades are also beneficial and for the noise that comes from inside the courtyard. The effect of the facades in the vegetation yard is higher at the highest frequencies and for the lower receptor with an average reduction of 4 dB (A) compared to the non-vegetal facades with very low absorption noise. In an elongated courtyard adjoining the street traffic, the longer side exposed to trafficking has shown that plant fa- cades only reduce the noise slightly, with no more than 0.5 dB. When a barrier is placed along, the edge of that roof closest to the yard reduces an average noise level of about 1 dB for a 0.6 m barrier. Placing low barriers along both sides of the central building reduces noise by an average of approximately 3 dB (A). For a narrow configuration with a street width of 10 m, the noise is reduced slightly more, still about 1 dB (A). Noteworthy is that low-height barriers without vegetation have an insignificant effect in terms of noise reduction being practically useless in order to reduce the degree of noise pollution.

The purpose of the paper is to investigate and determine the noise pollution degree of Alba Iulia but also to find the most efficient solutions to combat and reduce its noise pollution. The work also sought to compare the current noise level, with the one existing in 2012 (Popa et al., 2015), given the fact that in recent years the import of vehicles, especially second-hand, gradually increased with the elimination of the pollution tax.

MATERIALS AND METHODS

To determine the noise level, we chose five monitoring points in Alba Iulia, where I made noise determinations between 8-10 and 15-17, which are usually the busiest traffic hours.

Site 1, which is located in the Stadium area, at the intersection of Calea Motilor Street and Republicii Avenue. Site 2 is situated at Transilvania and Revolutiei 1918 Avenues intersection. Site 3 is located near Unirea shop, at Alexandru Ioan Cuza and Calea Motilor Streets intersection. Site 4 is located at the intersection of Incoronarii Avenue and Ferdinand I Avenue. Site 5 is located in Partos, Ferdinand I Avenue.

For the measurements it was used a portable acoustic analyzer 2250, manufactured by Brüel & Kjær is one of the best analyzers/ sound level meter/ portable vibration and noise meters. It is made for advanced applications of determination, analysis and recording of noise and vibration.

We determined the following parameters:

-LAFmax – the maximum ‘A’ frequency-weighted and ‘F’ time-weighted sound pressure level detected during a measurement-LAeq – the ‘A’ frequency-weighted equivalent continuous sound pressure level, that is, the average level representing the same energy as the measured fluctuating levels-LCpeak – the maximum ‘C’ frequency-weighted sound pressure level detected during a measurement.

In each of the six measurement points, measurements were performed in the same time spot. The sound meter installation was made respecting measurement conditions: the sound

meter was placed on a stand at a height of 1.2 m; the stand was placed at a distance of about 7 m from the road axis. Then it was measured the noise on the sound level meter for 15 minutes.

RESULTS AND DISCUSSIONS

The measurements were made in two hours of the day so that we can check the current parameters and compare the evolution of the noise pollution by comparing the parameters registered seven years ago at the same monitoring points of Alba Iulia. In the first part of the day the parameters were as follows: Center area -70.3 dB, Cetate area 62.5, Railway station -66.2, Partos-81.0 dB area, Stadion area -63.9 dB and in the second part of the day have registered: 63.7 dB-Cetate, 66.1 dB- Center, 80.4 dB -Gara, 78.1 dB- Partos and 65.3 dB - Stadium.In what follows they will be reported in the form tab values the sound parameters registered in the five monitoring points and maximum permissive limit. According to STAS 10009/2017, the level of continuous equivalent acoustic pressure weighted A - LAegT is: - for streets of technical category II, link: 70 dB, and the weighted sound pressure level infrequency A and weighted in time F exceeded10% of time T, L AF10T = 80 dB;- for the inhabited area, the permissive limit of noise at the property limit in the case of buildings with enclosed land (courtyard) with destination residential building with two or more levels is it; LAeqT = 65 dB (A);
for the inhabited area, the limit of the noise at the facade of the residential building that is the most exposed to the action of noise outside the building for any type of building residential or assimilated is; +LAeqT = 50 dB (A).

Table 1. Results obtained in the Cetate area, 12.03.2019

Measured parameters	Hour-09:32	Hour-16:36
LCpeak(dB)	100.3	100.9
LAFmax(dB)	86.1	85.2
LAFmin(dB)	46.5	58.2
LAeq(dB)	63.9	65.3
Permissible limit (dB)	70.0	70.0

At this point of measurement it can be appreciated from the table above that the values are below the legal limit and below the values recorded in 2012 by 4.9 dB (Popa et al., 2015).

Table 2. Results obtained in the Center area, 11.03.2019

Measured parameters	Hour-08:45	Hour-15:55
LCpeak (dB)	101.5	
LAFmax (dB)	74.9	88.2
LAFmin (dB)	53.5	58.5
LAeq (dB)	62.5	63,7
Permissible limit (dB)	70.0	70.0

As can be seen from the table above, the results obtained are below the limit, with a maximum value of 63.7 dB, which is by 4.44 dB less than the maximum value recorded at the same time interval in 2012 (Popa et al., 2015).

Table 3. Results obtained in the Stadion area,12.03.2019

Measured parameters	Hour -08:06	Hour -15:12
LCpeak (dB)	102.5	109.3
LAFmax (dB)	93.0	83.1
LAFmin (dB)	62.6	55.4
LAeq (dB)	70.3	66.1
Permissible limit (dB)	70.0	70.0

At this point of measurement it can be observed that the maximum admitted value is slightly exceeded in the morning and at the same time there is a slight increase of the noise level by 2 dB compared to 2012 (Popa et al., 2015).

Table 4. Results obtained in the Partos area, 12.03.2019

Measured parameters	Hour -08:00	Hour -15:00
LCpeak (dB)	114.1	114.7
LAFmax (dB)	106.3	100.8
LAFmin (dB)	57.4	58.8
LAeq (dB)	81.0	78.1
Permissible limit (dB)	70.0	70.0

As can be seen from the table above, the obtained results exceed the admissible limit, registering the maximum value of 81.0 dB, which is 4 dB higher than the value registered in 2012. Taking into account the provisions of SR 10009 of 2017 regarding the allowed limit in the zones residential measurement, at the measuring point, the maximum limit admitted to the 60 dB yard boundary limit and the permissible limit on the facade of residential buildings in the 50 dB area (Popa et al., 2015).

Table 5. Results obtained in the Train Station area, 12.03.2019

Measured parameters	Hour -08:42	Hour -15:32
LCpeak (dB)	99.1	138.3
LAFmax (dB)	81.4	111.8
LAFmin (dB)	53.7	52.0
LAeq (dB)	62.2	80.4
Permissible limit (dB)	70.0	70.0

According to the table above, the maximum registered parameters exceed the legal limit but also the values registered in 2012 by 11.8 Db (Popa, et al., 2015).

CONCLUSIONS

The study shows that over the past few years the noise pollution has increased by about 40% compared to the previous years.
In the city of Alba Iulia, in the follow-ups performed, the allowed parameters of the noise pollution were exceeded.
According to the above, the effects of noise pollution are very damaging to the entire ecosystem and its values are on the rise, therefore requires urgent application of reduction methods to avoid a global disaster in future years.

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