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LONG TERM ENVIRONMENTAL & TRANSPORTATION NOISE MONITORING IN THE CITIES OF VERIA & IOANNINA IN NORTHERN GREECE ACCORDING TO THE 2002/49/EC DIRECTIVE

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Abstract

The requirements resulting from the application of the EU directive 2002/49/EC are very important for each city. For this reason the authorities of Veria & Ioannina in Northern Greece in collaboration with the Aristotle University of Thessaloniki and the University of Thessaly have initiated a Noise Evaluation & Action Plan regarding :

1. for the city of Veria the installation of a long term Noise Monitoring Network (5 stations) in various types of urban environments. The factors that were considered for the location of the Noise Monitoring stations include different uses of the areas and different urban conditions. The locations included a major city road, a city access road with heavy traffic passing through a residential area, a low income residential urban district, a ring road with shops, a shopping area with residences etc. The Noise Monitoring Stations are already in operation for more than 24 months.

2. for the city of Ioannina an extended short term Noise Monitoring Network (4 mobile stations) in various types of urban environments with emphasis in transportation noise including traffic monitoring and urban transportation flows monitoring. The locations included the city center, major urban intersections, residential & educational facilities areas.

All noise measurements were taken according to the 2002/49/EC, at 4m height and per hour in order to be able to calculate the L_{den} indicator. Many conclusions have been drawn from these measurements and relevant noise actions proposals were evaluated. The daily, weekly, monthly, and yearly variations of each district have also been investigated, as well as the influence of important changes in traffic regulations. Besides the Noise Monitoring Campaign a Noise Abatement Awareness Project was also carried out in both cities.

INTRODUCTION

In the year 2003 the city of Veria in cooperation with the Aristotle University of Thessaloniki and the University of Thessaly have initiated a serious attempt concerning the long-term monitoring of urban noise in the city of Veria. The factors that were considered for the location of the Noise Monitoring stations include different uses of the areas and different urban conditions. The locations included a major city center road with commercial buildings, a city entrance road with heavy traffic in a residential area, a low quality residential urban district, a ring road with shops and a shopping area with residences.

The Noise Monitoring Stations were in operation for more than 24 months. All the measurements were taken according to the 2002/49/EC, at 4m height and per hour in order to be able to calculate the L_{den} indicator. Many conclusions have been drawn from these measurements. The different situations have been compared for very long periods. The daily, weekly, monthly, and yearly variations of each district have also been investigated, as well as the influence of changes in traffic regulations.

Parallel to the Noise Monitoring Campaign a Noise Abatement Awareness Project was also carried out. This campaign included press conferences, creation of radio spots about noise pollution, distribution of information material to public authorities and a major event with Noise experts.

One year later another Noise evaluation & action plan with different characteristics began in the city of Ioannina. Responsible for this project was the city of Ioannina in cooperation with the Aristotle University of Thessaloniki (AUTH) and the University of Thessaly.

This project included an extended short term Noise Monitoring Network (4 mobile stations) in various types of urban environments with emphasis in transportation noise including also traffic monitoring and urban transportation flows monitoring and counts. The locations included the city center major urban intersections residential & educational facilities areas.

After the Noise monitoring, and in order to get a better picture of the noise conditions in the city of Ioannina, the following actions were taken: calculation of the peoples exposure on Noise, counting the traffic flow of all the major roads and finally questioning authorities and drivers about their opinion on urban Noise and traffic conditions.

PROJECT DESCRIPTION

City of Veria

During the project, 5 noise-monitoring stations had been set up. Great attention had been given to the selection of the exact locations of the stations so as to be most representative in terms of area geography and usage. Having this in mind, the following areas were selected for the placement of the monitoring stations.

- a major city road with commercial buildings and the council-house (Mitropoleos str)

- a city access road with heavy traffic passing through a residential area (Pierion str)
- a low income residential urban district (Stratou str)
- a ring road with commercial buildings (Ring road)
- a shopping area with residences (Venizelou str)

The stations were all placed according to the requirements of the Directive 2002/49/EC i.e. 4m above ground at the most exposed forefront of the buildings. The period of measurement for each station was 1 hour i.e. receiving 24 values per day so as to be able calculate the new indices L_{den}, L_{night} etc.
The stations remained at their locations for 24 months, resulting in the collection of a large number of measurement data and hence in the capability of forming useful conclusions.

The analysis of the urban noise variation in the city of Veria during those two years was based on the new indices L_{den}, L_{night} .

During the last period of Noise Monitoring we hade an important change of traffic regulations in the city of Veria. Specifically the major city center road with commercial buildings and the council-house (Mitropoleos str) was converted from a one way road to a both directions road. The influence on Noise of this traffic converting had also been analyzed.

Parallel to the Noise Monitoring Campaign a Noise Abatement Awareness Project was also carried out.
The general objectives of the project were to provide general and specific information on environmental and urban noise in order:

- to increase citizens awareness in the matter of noise distribution in the urban environment,
- to provide information about the directives of the EU on the subject of noise,
- to provide knowledge about noise and quality of life in the urban environment
- to provide information about noise and the individual behaviour of the citizens, noise and personal health and noise and sustainable development

These objectives were archived by several actions like:

- creation of two radio spots about noise pollution, these spots played in all the local radio stations for about two months
- creation and distribution of information material to all the public authorities and schools of the city, these information material described the monitoring project and provided also general information on noise
- two press conferences with the local tv- and radio stations
- a major event with Noise experts from the European Commission Environment Directorate and from the Creek Ministry of Environment

City of Ioannina

The second Noise evaluation & action plan found place in the city of Ioannina. This project included:

- an extended short term Noise Monitoring Network in various types of urban environments with emphasis in transportation noise. The locations included the city center, major urban intersections, residential &

educational facilities areas.
- calculation of the people exposure on Noise
- counting of the traffic flow of all major roads and also counting of the illegal parking cars
- recording of the opinion of all the local authorities about the noise and traffic problem
- recording of the opinion of a large number of citizens about the noise and traffic problem
- recording the situation of the buildings in relation with their sound isolation (windows, doors)
- evaluation of different proposed Measures against Noise Pollution.

ANALYSIS OF URBAN NOISE VARIATION IN THE CITY OF VERIA ON THE BASIS OF INDEX L_{den}

Important conclusions arise from the analysis of the data base that has been created through the 24 month measurements:

- The most adverse month for the five areas is December while February and March follow with a small difference. On the contrary the lowest values of L_{den} appear in August followed by July. The low values during summer are obviously due to the occurrence of summer holidays.
- The daily variation from one area to another presents great interest. In this context, while for the area of the major city center road the area of the city entrance road with heavy traffic and the shopping area with residences the day with the lowest value of L_{den} is Tuesday followed by Wednesday and Thursday, this does not occur for the rest areas. More specific, in the area of the low quality residential urban district and in the area of the ring road with commercial buildings, Sunday has a slightly lower value than Saturday.
- The most adverse days are: Sunday followed by Friday and Saturday for the area of the major city center road the area of the city entrance road with heavy traffic and the shopping area with residences. Monday followed by Tuesday for the area of the low quality residential urban district and the area of the ring road with commercial buildings.
- Finally, when comparing the different areas, the shopping area with residences (Venizelou str) is the most adverse one with a value of L_{den}=74.1 dB(A) L_{night}=66.9 dB(A) followed by the city entrance road with heavy traffic in a residential area (Pierion str) with L_{den}=73.4 dB(A), L_{night}=65.5 dB(A), the major city center road with commercial buildings and the council-house (Mitropoleos str) with L_{den}=71.6 dB(A), L_{night}=64.2 dB(A) the low quality residential urban district (Stratou str) with L_{den}=69.62 dB(A), L_{night}=62.4 dB(A) and the ring road with commercial buildings (Ring road) with L_{den}=69.5 dB(A) and L_{night}=61.2 dB(A).

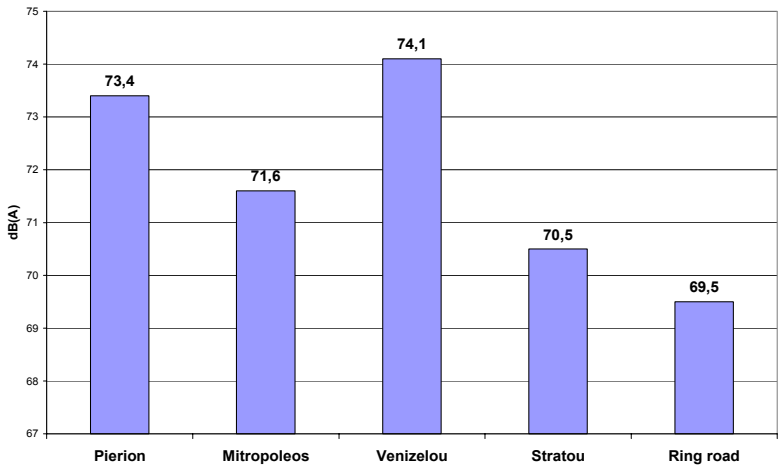

Figure 1 – Average Values L_{den}

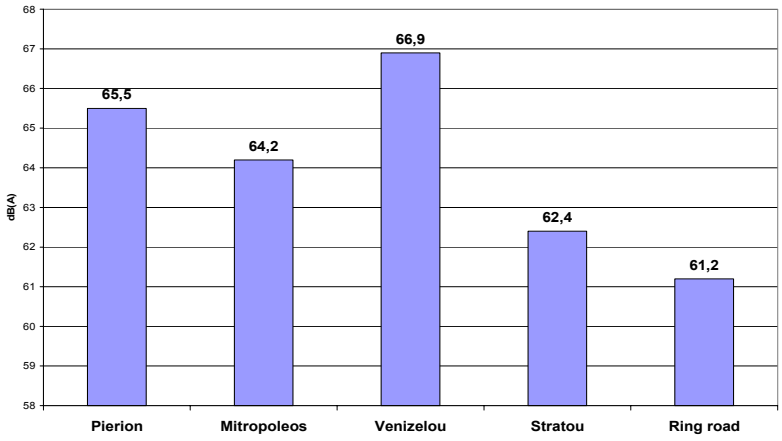

Figure 2 – Average Values L_{night}

INFLUENCE OF CHANGES IN TRAFFIC REGULATIONS IN THE CITY OF VERIA

As already mentioned during the last month of Noise Monitoring we hade an important change of traffic regulations in the city of Veria. Specifically the major city center road with commercial buildings and the council-house (mitropoleos str) was converted from a one way road to a both directions road.
This are the facts before and after the traffic change:

1. April 2005
   - Mitropoleos street is a one way road

- Street is 9m width,
- has only one traffic lane,
- vehicles parked on both sides of the street
- average speed of vehicles is 30-40km/h
- traffic flow at pick hour is about 800 vehicles
- 5% heavy vehicles
- L_{den} = 70.7 dB(A)
- L_{night} = 63.5 dB(A)
- L_{day} = 67.1 dB(A)

2. April 2006
   - Mitropoleos street is a two directions road
   - Street is still 9m width,
   - has one traffic lane for each direction
   - no parking vehicles except sometimes illegal ones
   - average speed of vehicles reduced to 20-30km/h
   - traffic flow at pick hour raised to about 1400 vehicles
   - 5% heavy vehicles
   - L_{den} = 72.5 dB(A)
   - L_{night} = 64.6 dB(A)
   - L_{day} = 69.0 dB(A)

IMPORTANT FACTS OF THE IOANNINA PROJECT

The second Noise evaluation & action plan was focused on the transportation noise. From several measurements we could calculate the exposure on Noise of the about 50.000 inhabitants of the city of Ioannina.

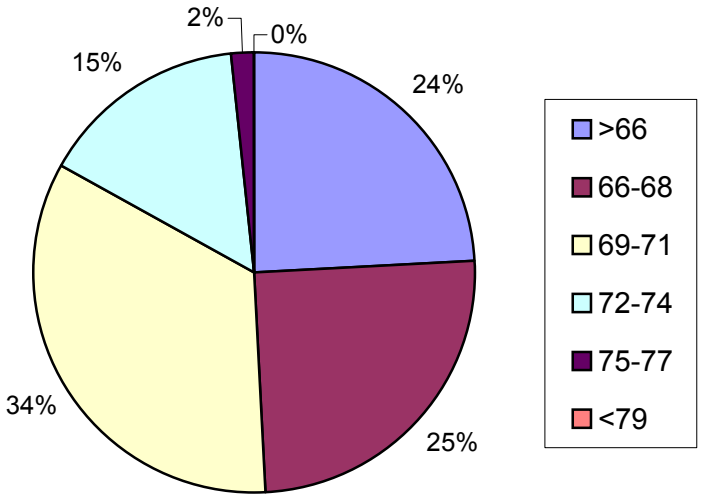

Figure 3 – Pleople's exposure on noise in the city of Ioannina

The traffic flow was measured at 21 critical points. The busiest road was Dodoni street witch is the main entrance of the city with 42.700 vehicles per 24h. However this street was not the noisiest one having L_{den} = 74.0 dB(A). The noisiest road with L_{den} = 78.5 dB(A) was Great Alexander street witch is also a city entrance with 26.000 vehicles per 24h. The illegal parked cars in the city were counted at 1750 vehicles, causing a big problem to the traffic conditions of the city.

Very interesting results come out of the interviews with the representatives of the local authorities (City of Ioannina, Police Department, Technical Chamber, Tourist Office, local transportation Association, Hotel owners Association).
The opinion of the most authorities on the issue of transportation noise and the traffic conditions in the city of Ioannina which are strongly related with another was the following:

- Noise is an important issue and must be treated efficient
- until now there is no coordination of the actions against Noise and the traffic problem between several authorities
- there is need of new parking places
- the traffic flow in the city is very bad because of the illegal parked vehicles
- there is need of better public transportation conditions
- the bus terminal must move outside of the city
- the buildings of the local authorities must also move outside of the city
- the drivers attitude must change (no honking for no reason)
- the vehicles must be kept outside of the city

At last the citizens themselves were asked about their opinion on the noise and traffic problem of the city of Ioannina. Specifically 400 drivers with the help of the police were stopped in several city roads and asked to answer a questionnaire. Here are the most important questions with the answers from the citizens.

Question 1: What is the scope of your transportation?

Work as an employer	31%
Work as an independent business man	22%
Education reasons	3%
Recreational reasons	8%
Shopping, bank transactions	35%
Other reasons	1%

Question 2: Do you believe that Ioannena city has a traffic problem?

Yes	98%
No	2%

Question 3: Do you use the public transportations?

Yes	4%
Sometimes	8%
No	88%

Question 4: Would you use the public transportations if they were offered with better conditions?

Yes 65%
No 35%

Question 5: How can the traffic problem in the city be solved?

Creation of bicycle lanes	8%
Restructuring of streets into footpaths	14%
Better the traffic flow	35%
Create underground parking	70%
Better public transportations	31%
Other	12%

(Many persons gave more than 1 option as an answer to this question)

SUMMARY

Long term noise monitoring projects according to the 2002/49/EC Directive in cooperation with an analysis of the traffic conditions can give an effective tool to the city Authorities to deal with Noise. The above actions become more efficient if they are accompanied by a Noise Abatement Awareness Project since with this project we can involve the citizens in the Noise treatment.

REFERENCES

[1| "Long Term Noise Monitoring in the city of Veria", Consortium Sinthesis SA and Traffic Transportation & Environment Consultants LTD (2003-2005).

[2] "Noise Action Plan in the city of Ioannina", Traffic Transportation & Environment Consultants LTD (2004-2006).