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RECREATIONAL NOISE ASSESSMENT IN MÁLAGA (SPAIN)

César Asensio.; Guillermo de Arcas; *Luis* Gascó; Juan Manuel López and Jesús Alonso

Universidad Politécnica de Madrid – Instrumentation and Applied Acoustics Research Group – Ctra. Valencia km 7, 28031 Madrid, Spain
email: casensio@i2a2.upm.es

Ruiz, Antonio; Castillo, Aitor and Herranz, Cristina

Vatia Energía S.L., Parque Tecnológico de Andalucía, c/ Marie Curie 8, 29590 Málaga, Spain

Medina-Montoya, Luis

Ayuntamiento de Málaga. Dirección General de Medio Ambiente y Sostenibilidad. Avda. Cervantes 4, 29401 Málaga, Spain

Tourism is one of the most important activities in Málaga, having a quite important socio-economic impact in the city. The growing development of tourist and leisure activities has a main drawback, which is noise, affecting the residents of those busy areas. Malaga's City Council has set the goal of mitigating noise produced by leisure activities, restaurants and bars by developing a strategy that started with noise assessment throughout 2015. A moveable noise monitoring system set by 17 monitoring units was implemented during 6 months, assessing noise impact in more than 40 locations across the city (mainly in the Old Town). The subjective response of citizens was collected through the system, and also by a noise attitudes survey which was executed on the web along the project.

1. Introduction

Leisure noise compiles the uproar produced by people agglomerations around bars, pubs, terraces, parks, but it can be also related to tourism activities or special events, like festival or sports. Generally, it is a mixture of voices, music, shouts, but it can have a great variety of other improper behaviours as well. Leisure noise pollution continuously causes complaints from the residents of the areas affected, most of them connected to annoyance or sleep disturbance. This is a hard subject for local authorities, as, usually, the overall acoustic environment is produced by the added effect of many different activities. The background noise becomes very loud, as a consequence of a high concentration of people in the streets, and this makes recreational noise management a very hard topic, especially in the Mediterranean European countries. Therefore, the research in this area is starting to grow in the latest years [1-5], as cities are being enforced to face its diagnosis and to implement mitigation measures.

In this paper we are presenting the experience undertaken in Málaga.

Málaga is a big city in the south of Spain, in the Mediterranean coast, having over half a million inhabitants. Its warm climate and the great number of sunny days have promoted tourism for years, and stimulate people's activities outdoors (along the day, and throughout the year). Bars and restaurants attract all kind of public especially during the evenings and first hours in the nights, while there are other venues more focused in young people until late hours of the nights, especially during the

weekends. Although there is some indoor activity, most people stay outdoors. These accumulations of people, having fun in the streets, produce high noise levels, damaging residents' welfare. In consequence, the authorities in Málaga have detected leisure noise as one of the most important environmental problems in the city, and initiated in 2014 a strategy to confront that problem. This strategic action started with a noise monitoring campaign along 2015, in order to make a full diagnosis of the extent of the problem. It focused in two different areas: City Centre and Teatinos.

Figure 1: Areas of study.

2. Noise monitoring

The City Centre is a main focus of tourism and commercial activity, having a lot of narrow streets with a high concentration of bars and restaurants, and other commercial activities, while Teatinos is a quite new residential area with wide streets and avenues, having a lot of terraces. In each of these areas, the city council selected, the street segments to study based on their deep knowledge of the city, and the complaints raised by citizens.

After a field visit to the area, we selected 40 locations to install the monitors. All the locations were chosen to properly describe the predominant leisure noise in the area, but also having in mind basic security, safety and accessibility constrains. Most of the locations were selected in the City Centre (Figure 2), while the rest were selected in Teatinos.

Each noise monitor consisted of a type 1 certified sound level meter, having the microphone at a height of 4-8 metres. The monitors were installed in street lamps, so that they can have a power supply to charge the batteries during the night period. As an example, figure 3 shows the installation of one of the monitors.

The monitors were installed at each location for 10- 20 weeks, and then moved to a different one. This is a quite long period that we have considered as representative of the long term.

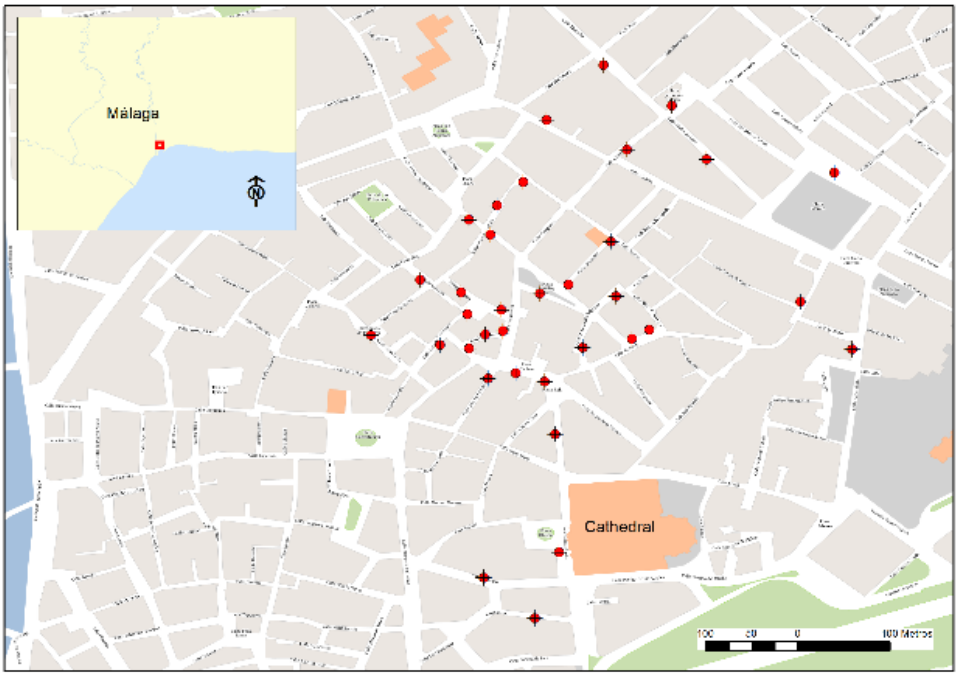

Figure 2: Monitoring locations in the City Centre.

Figure 3: Installation of the noise monitoring unit.

The noise monitoring system was implemented with a web service, so that the residents could acces the measurement results in real time (20 minutes delay). The web platform (Figure 4) showed these noise data in one second intervals, trying to show some dynamic content to the user, in a friendly format. The platform showed information regarding the location of each monitor, pictures, and time histories of the noise measurements, and also allowed the user to get some reports that could be compared to regulations.

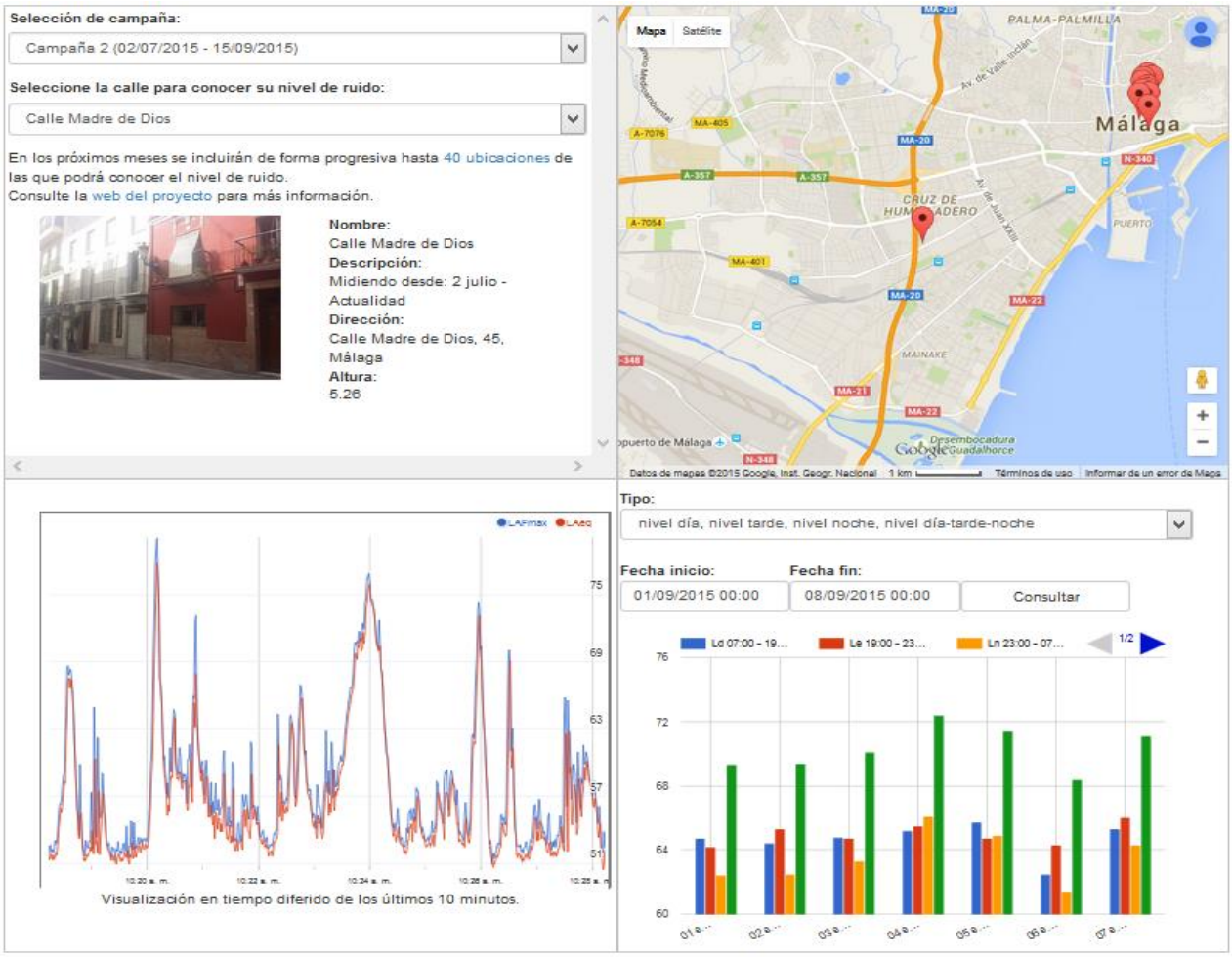

Figure 4: Web access to noise monitoring system.

3. Results

Figure 5 shows the distribution of the long term indicators [6-7] measured during the monitoring campaign, for the day, evening and night periods (Ld, Le and Ln). We can observe that the noise level during the day period is in average 64 dBA, which is one decibel below the acoustic quality target established by the Spanish regulations for that period. Only 22% of the locations showed a cumulated noise level over the target (65 dBA).

During the evening, noise pollution is a little higher. The noise levels are, in average, 65.5 dBA, and the percentage of locations exceeding the targets (65 dBA) almost doubles the one observed during the day (39%).

But the situation becomes worse during the night period, as, in general terms, the noise levels are higher (66 dBA in average), and the quality targets are stricter (55 dBA). In this period, 95% of the locations exceeded the acoustic quality targets over 5 dBA.

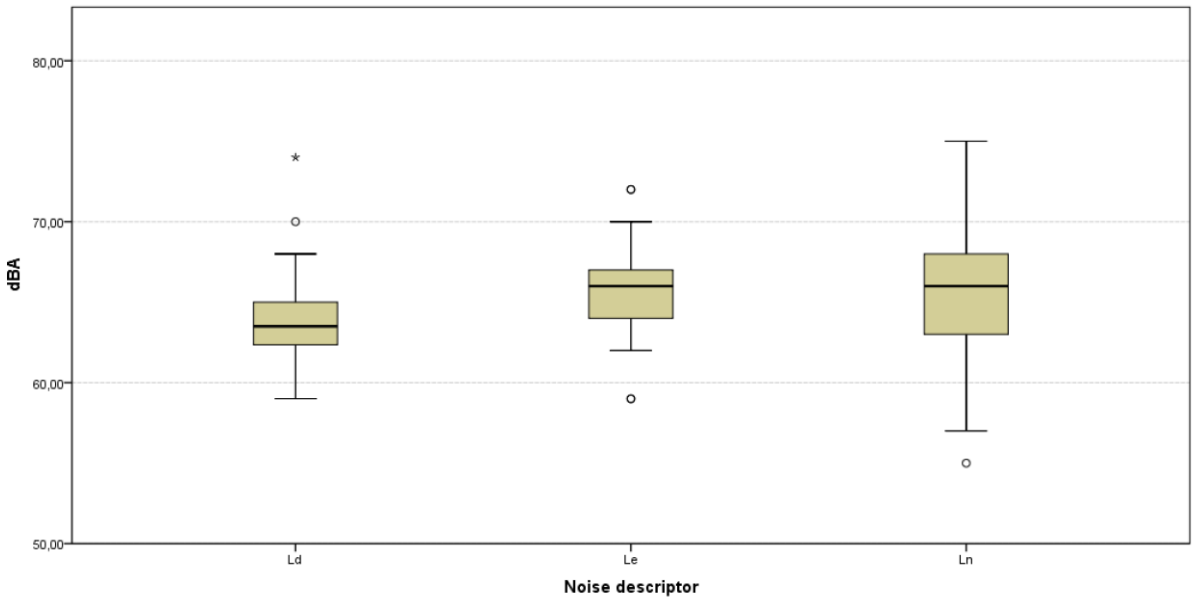

Figure 5: Long-term noise assessment in the day, evening and night intervals.

Figure 6 shows a map with the long term results for the night period (Ln). We can easily notice that noise levels in all the locations are over the targets, but the exceedance is not the same among the different locations, showing higher level in those areas more directly connected to youth recreational activity.

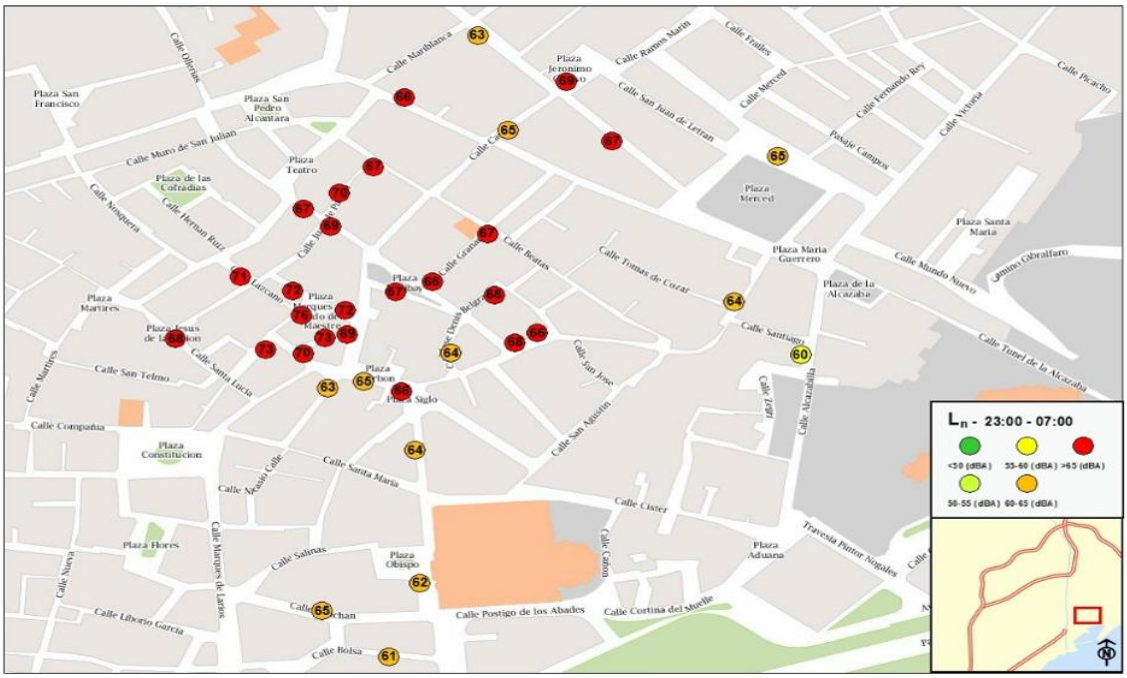

Figure 6: Map of long-term noise assessment during the night period.

4. Conclusions

We have assessed recreational noise levels in Malaga for a long 6 months period, using up to 40 locations in a quite limited area. The results have clearly shown that leisure is the main noise source in the areas under study, and that the noise levels exceed the acoustic quality targets established by the Spanish regulations. The situation is especially difficult during the evening and night period in the weekends.

The measurement results have allowed to quatify the extent of the problem and detect hotspots where mitigation measures must have a higher priority.

REFERENCES

1 Fiamini F, Luzzi S. Monitoring and reducing noise related to Movida: Real cases and smart solutions, *Proceedings of the 22nd International Congress on Sound and Vibration 2015 (ICSV 22)*, Florence, Italy, (2015).

2 Ottoz E, Rizzi L, Nastasi F. Recreational noise in Turin and Milan: Impact and costs of movida for residents, *Proceedings of the 22nd International Congress on Sound and Vibration 2015 (ICSV 22)*, Florence, Italy , (2015).

3 Ballesteros MJ, Fernández MD, Flindell I, Torija AJ, Ballesteros JA. Estimating leisure noise in Spanish cities, *Applied Acoustics*, (2014).

4 Ballesteros MJ. *Análisis del ruido de ocio, propuesta de procedimientos y herramientas de gestión* , Phd. Thesis, Universidad Politécnica de Madrid, (2014).

5 Ballesteros MJ, Fernández MD, Ballesteros JA. Acoustic evaluation of leisure events in two mediterranean cities, *Applied Acoustics*, (2015).

6 ISO. *Description, measurement and assessment of environmental noise. Part 2: Determination of environmental noise levels*.ISO 1996-2:2007, (2007).

7 European Commision. *Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise*, (2002).