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NOISE CONTROL FOR A BETTER ENVIRONMENT

Noise levels management in recreational areas by using the Barcelona's noise monitoring network

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ABSTRACT

Barcelona is a city located at a strategic geographical point on the Mediterranean coast on the Iberian Peninsula. Its mild climate, the citizen's Mediterranean character and the fact that is one of the major tourist destination favours outdoor life and a high concentration of events and activities on the public space.

In recent years, citizens increasingly demand quiet as a key element of life quality, therefore Barcelona City Council has worked hard to revert the trend of growing noise levels promoting the use of the IoT technologies to manage sound on recreational areas.

Keywords: Noise, Monitoring, Nightlife

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1. INTRODUCTION

Barcelona is an open, mixed, cosmopolitan city, a cultural crossroads that attracts visitors, talent, investment, technological and scientific innovation, and pioneering cultural ideas.

It's the capital of Catalonia, a rich and diverse region located between the Pyrenees and the Mediterranean sea, with over 500 kilometres of coastline and a stunning cultural heritage.

Barcelona's distinguishing characteristics include creativity and innovation and the city also excels in the fields of business, research and knowledge. The city also has a reputation for offering high-quality living standards and for being a sustainable tourist destination.

It's an entrepreneurial city and also one of the major tourist destinations in Europe.

These main characteristics, in fact, have a direct impact on the acoustic quality of the city.

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The green spaces, parks and gardens are being protected with the purpose of maintain a high number of quiet areas. Moreover many urban redevelopment projects are implemented in the city, in order to reduce the number of square metres dedicated to private vehicles and reclaiming part of this public space for people.

In spite of the effort done by the administration these late years, the traffic noise remains as the main noise source of the city as is exposed in the Strategic Noise Map [1].

On the other hand, making an assessment of the citizens' perception, the traffic noise is not one of the most annoying sound sources. The major number of complaints is focused on the noise produced by the high concentration of people on the public space.

Barcelona's Mediterranean climate is very stable, with hardly any sudden changes, and the city has a wide range of leisure and recreational activities around all the city's neighbourhoods where you can enjoy having a great time outdoors.

Furthermore the high number of outdoor events like local festival, parties or cultural celebrations means that there's rarely a week in the year that doesn't include at least a couple.

Although the number of people exposed to leisure noise is less than the one exposed to traffic noise [fig.1] [fig.2], the annoyance degree caused by nightlife noise and agglomerations of people at night is on the top. This is a consequence of the intense use of the public space.

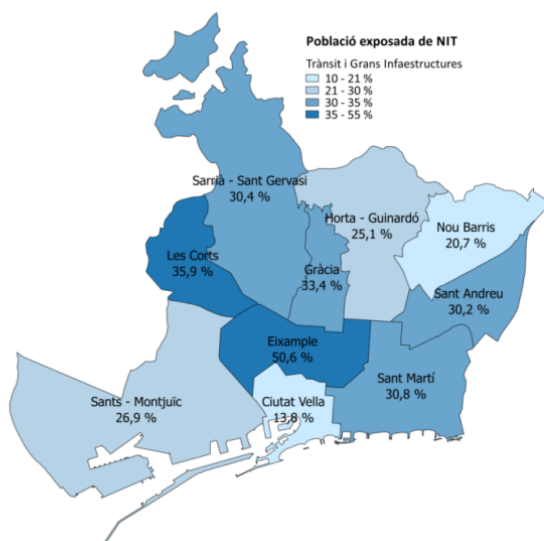


Figure 1. Percentage of population exposed by district, traffic noise and major road infrastructure at night >55dB(A)

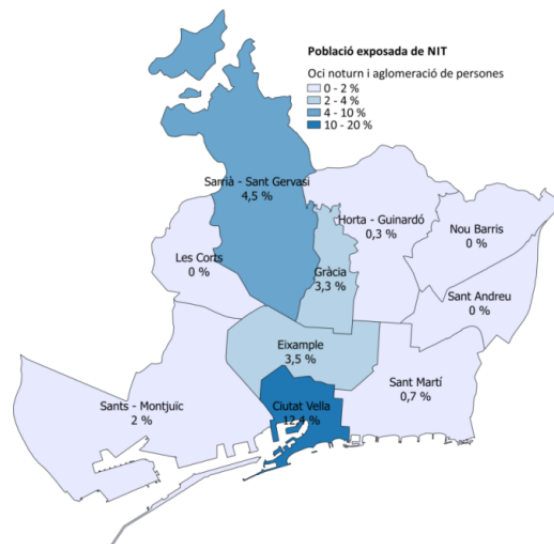


Figure 2. Percentage of population exposed by district, nightlife noise and agglomerations of people at night >55dB(A)

2. INITIATIVES TO IMPROVE THE ACOUSTIC QUALITY AT NIGHT

The Barcelona City Council is really concerned about noise and its impact on health. In addition, as the modern city it is, the citizens of Barcelona expect to have a good quality of life and appreciate to live in a place with a good acoustic comfort. That is why these last years the administration has promoted several strategies to reduce the impact of leisure noise during the night period.

3 main lines have been developed in order to reduce the noise levels of the agglomeration of people outdoors:

- Awareness
- Involving stakeholders
- Noise Monitoring

3. AWARENESS

Awareness is a long-term strategy. Changing the behaviour and habits of the people is a tough task to do, but different tools are used in order to make the people conscious that they live in a society and their acts have consequences to their fellow citizens

3.1 Awareness campaign

Extended to more than 600 leisure establishments and terraces every year since 2000 an awareness campaign is promoted by the administration to encourage civic behaviour at night, with collaboration of nightlife promoters.

This campaign also operates in English, with the main objective to inform also the tourists about the importance of living together in harmony.

Informers carry lollipops that they share out in order to achieve that people stop talking for a while after a brief dialogue.

Informers also control the leisure activities' accomplishment of legal requirements such as limit capacity of terraces or civic behaviour in public places.

3.2 Media reinforcement

Working in parallel with the awareness campaign media reinforcement is done. There is street marketing, like opis and pennants, general radio broadcasting is used to play short spots and these last years the use of social networks has been included as one of the main communication strategy.

The screens on metro stations and the internal metro TV channel *MouTV*, are used with the aim to arrive to tourists.

And finally, to have a direct impact on the sound source, different kind of elements are provided to the bars, like napkin holders or adhesives. In this way, the users of a terrace have a direct message while they can act to avoid this kind of annoyance.

3.3 Other tools to increase awareness

Another tools used to increase awareness go in the same line as the last point exposed before. Warning in real time groups of people they are having fun in an area where there are also people and families having rest, make people conscious about their actions and their consequences, which can be corrected in real time.

Sound level displays are placed in the façades of recreational locals. They are noise-warning signs that turn on when the sound pressure levels are above a noise limit. The establishments, to make their customers conscious of their acoustic impact, manage their devices.

Lighting effects projected on façades or on the ground of pedestrian areas are also used to reinforce the same message.

4. INVOLVING STAKEHOLDERS

Understanding and taking into account the priorities and concerns of different stakeholders is very important to plan innovative solutions and set communication strategies.

Citizens, customers, the City Council and the managers of leisure activities have to work in the same line to obtain satisfactory results, for this reason the City Council promote meeting points to share experiences and opinions.

The corresponsibility of the nightlife activities managers has a direct impact to the effectiveness of the actions planned. They are the clue to arrive to the customers.

5. NOISE MONITORING

The Barcelona noise monitoring system strategy is based in 3 main working lines[2]:

- *Evaluate the municipality's daily work.* It's a way to check if different actions and plans implemented by all the City Council Departments are giving good results.
- *Provide information to the citizens:* give response to the citizens' complaints
- *Update the strategic noise map:* increase the number of long-term measurements to be included on the noise map. This would allow a detailed analysis in areas where traffic noise is not the main noise source.

These 3 main working lines are developed on several actions, and the control of recreational areas is one of the most important. The noise-monitoring network has more than 120 devices, and more than the 30% are used to monitor recreational areas and outdoor events.

5.1 Noise monitoring in recreational areas

Nowadays 10 different areas are monitored and more than 40 devices are used to collect information of noise levels in challenging areas. This data is used to evaluate the effectiveness of the actions performed in a territory in order to reduce the noise.

There are two main criteria to select the area to monitor:

- If there are citizens' complaints, the installation is done as near as possible of the most exposed façade.
- The selected point has to measure the environmental noise of the studied area; trying not to focus on a specific activity.

The characteristics of the urban space, the kind of activities and the customers' profile, force to plan different strategies to decrease the sound pressure levels, consequently a specific analysis has to be done for every area.

5.2 Reporting

To share the information, the City Council has an internal platform where the sound pressure results and its evaluation are updated monthly. These are long-term reports, where the comparison of the noise levels with the levels of the same period during the years before are the clue to evaluate the effectiveness of the action performed.

On the other hand, some areas have specific needs and the noise monitoring system allows making different kind of analysis depending on the necessities.

5.3 Special projects

There are many different possibilities of using the data collected for the noise-monitoring network.

To optimize the outdoor events management, every year is done an analysis about the acoustic impact of all the activities in a specific neighbourhood. The increase of noise levels caused by these episodes is calculated and at the end of the

year the distribution of the noisy events on the territory is shown in order to reduce or redistribute these activities on different parts of the territory and many other decisions that can be taken with all this information.

Another special project developed with the use of this network is an on-going project with the main objective to localize different sound sources on a specific space and calculate the contribution of every source. This can be very useful to detect which are the sound sources with a highest impact on nearby dwellings with the objective of focus the efforts on points with more trouble.

6. CONCLUSIONS

The most annoying source for the Barcelona citizens is the one caused by nightlife noise and agglomerations of people at night. That's why the Barcelona City Council has focused efforts in order to reduce this kind of noise.

The Barcelona strategy to reduce the nightlife noise is based in 3 many lines:

- Use awareness tools thinking in a long-term benefit.
- Work on the corresponsabilization of all the stakeholders in specific parts of the territory
- Use a noise-monitoring tool to evaluate the results.

All the actions are important and having a tool to permanently know the noise levels on the territory is the clue to evaluate the effectiveness of the actions performed.

7. REFERENCES

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