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New method to accurately estimate levels of urban noise

New research has identified 25 variables that influence noise in urban areas. By combining these into an equation, the study produced an accurate tool to describe urban sound environments that could be useful in urban planning.

Environmental noise, especially in urban areas, has a significant impact on human well-being. Ensuring that noise does not reduce quality of life requires an accurate assessment of noise levels. The EU Directive on Environmental Noise[1] requires Member States to monitor environmental noise and draw up action plans to reduce noise where necessary.

Urban noise is notoriously difficult to estimate due to the range of different acoustic variables in the environment. The research identified 25 variables that it considered the most influential for its model of urban environmental noise. These included some variables previously not considered by models, such as the number of motorcycles and mopeds, the number of vehicles with sirens and the presence of irregular sound events, such as horn blasts, brake squealing, shouts and banging.

The model was divided into two modules: one that estimated the actual emission of sound and one that estimated the spread of the sound based on variables, such as pavement type and distance from the source of the sound.

In order to test the model, measurements for the different variables and measurements of environmental noise were taken from 12 locations in the Spanish city of Granada. Locations were selected to represent a broad range of the different variables. For example, some locations had high traffic congestion and some had a constant traffic flow. Others were on very narrow streets and some were on the edge of a city. This variety allowed the study to analyse the model's ability to accurately describe the complexity of the urban sound environment.

Each location had very different characteristics. The research evaluated the model's accuracy by analysing how each variable influenced the level of measured environmental noise. The results indicated that all 25 variables influenced environmental noise and taken together they accounted for 90 per cent of (total) noise. In particular, variables that were previously not considered, such as the number of motorcycles and mopeds, all contributed significantly. When the study incorporated measurements of sound variation over time into the values of environmental noise, the accuracy of the model's predictions remained virtually the same.

The model was capable of accurately describing a range of acoustic situations that are typical in urban environments. In addition the model also accounted for temporal variation of sound in its estimations. Such a model could provide an easy-to-use tool for authorities in urban planning to perform an initial diagnosis of the noise situation in different locations in a city. This could lead to a further in-depth analysis with the final goal of adapting the acoustic characteristics to improve quality of life for the population or selecting spaces with a good sound quality for residential buildings. This makes it potentially useful for the implementation of the EU Directive on Environmental Noise.

1. See http://ec.europa.eu/environment/noise/directive.htm

Source: Torija, A.J., Genaro, N., Ruiz, D.P. *et al.* (2010). Prioritization of acoustic variables: Environmental decision support for the physical characterization of urban sound environments. *Building and Environment.* 45: 1477-1489.

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