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A new way to predict urban noise pollution

Noise pollution in urban areas can harm our physical and mental wellbeing, and can have damaging effects on urban wildlife. Now, researchers from China have shown for the first time how a 'land use regression method' can be used to model urban noise and predict the effects of future planning decisions on noise levels.

Noise pollution in cities, for example, caused by industry and roads, has been linked to health problems, including hypertension and stress, so it is important that planners consider potential sources of noise pollution when making planning decisions. However, current methods to model urban noise pollution, such as experiment-based models, statistical models and noise mapping, are not always appropriate. For instance, experimental models, while accurate, often require a large amount of data and are limited to relatively small areas.

To address this, the researchers used land use regression to model urban noise. Land use regression models have recently been used to explore urban air pollution. The approach can predict average levels of pollution over long time scales (e.g. annually) and takes account of local land use as well as the distribution of traffic in an area. Land use regression models are also relatively inexpensive and do not require complex inputs of data to produce useful results.

The model was created and tested using data from 202 monitoring stations in the urban areas of Dalian Municipality in northeast China. It included industrial and transport noise pollution, as well as noise from social activities, as together these sources accounted for over 90% of urban noise in the area.

To check the accuracy of the model, the researchers compared its results against data from monitoring stations that were not used during the construction of the model. Overall, the model was considered accurate at 83.2% of the verification sites.

The model was then tested at three spatial scales; the largest was the area of urban sprawl, followed by the urban centre. The smallest scale was an area defined as urban downtown. The researchers found that the model demonstrated approximately the same level of accuracy at all three spatial levels. The lack of some land use information at the smallest, urban downtown, scale meant that this was the least accurate of the three, accurate at just 75% of verification sites.

The researchers also found that their model performed better than a 'spatial interpolation' model based on the same data. The land use regression model was better at representing sharp changes in noise levels, whereas the spatial interpolation model tended to produce smoother noise gradients, particularly where there were little monitoring data. The new model was also better at adapting to the different spatial scales, and could be adapted easily for different urban environments.

Source: Xie, D., Liu, Y., & Chen, J., (2011) Mapping Urban Environmental Noise: A Land Use Regression Method. *Environmental Science and Technology*. 45: 7358-7364.

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