

Science for Environment Policy

Urban greening reduces noise pollution

Green roofs have the potential to significantly reduce road traffic noise in the urban environment, according to a new study. The results suggest that greening of roofs and walls with materials suitable for growing plants softens the urban environment keeping sound levels low, whereas hard, manmade structures tend to amplify traffic noise.

The Environmental Noise Directive (2002/49/EC)¹ recognises the need to protect quiet areas in cities and towns as sites of value to the local community. Plants can play a role in this by softening the [urban environment](#) and reducing [noise](#). Green roofs and vertical gardens also offer far greater benefits than noise reduction, and thus 'greening' is also considered under the Green Infrastructure Strategy (COM(2013)249)².

The researchers investigated what type of greening produced the greatest benefit in terms of reducing noise in places that were already of some value as 'quiet areas'. They considered green roofs, green facade walls on the fronts of buildings and low, vegetated screens at the edges of flat roofs.

Researchers simulated how sound made by cars travelling at different speeds would be transmitted to enclosed courtyards shielded from the road by buildings. In the simulations, each courtyard was positioned at the centre of a six-storey tower block building, with each block separated from the next by a crossroad. To show how sound would travel between the road and the courtyards, two numerical methods for simulating sound propagation were used. One method modelled how sound travels in three dimensions, whereas the other modelled it in only two dimensions, but was able to account for the complex characteristics of the materials involved. The study only considers the noise from the adjacent street – the authors add that distant noise may also be important depending on the wind direction.

The substrate materials modelled (i.e. those used to provide a surface for plant growth) accounted for most of the noise reduction seen in the simulations. According to the results, green roofs have the greatest potential for attenuating noise, and on certain roof shapes, may be able to reduce noise by up to 7.5 decibels. The noise reduction was smaller for green facade walls, and depended on the materials used in the adjacent street – the harder the bricks in buildings on the street, the greater the reduction in noise in the roadside courtyard.

The model also predicted that green facade walls would be best positioned high up on the walls surrounding the courtyard, unless the materials used for buildings in the nearby street are softer, in which case the facades would be better positioned around the courtyard itself. Vegetated screens on roof edges were only effective when the screens themselves were made from absorbent materials as opposed to rigid materials, which even had the potential to increase noise levels.

The researchers also used their models to test combinations of different types of building greening. Soft roof edge screens in combination with either green roofs or walls were the most effective at reducing noise.

According to the researchers, greening could be used to limit noise from other sources, such as air conditioning units, although the current study focuses solely on traffic noise. Vegetation (as part of 'Green Infrastructure') also has other important environmental benefits, such as absorbing carbon dioxide, improving air quality, reducing the urban heat island effect, increasing urban biodiversity and making streets and roofs look more attractive.



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

2. http://ec.europa.eu/environment/nature/ecosystems/index_en.htm