

"Green Walls" Against Air Pollution

Plants Along Roads Reduce Pollution Much More Than Assumed

Planting vegetation along streets in the city might reduce air pollution better than assumed so far, that is by up to 30 percent instead of one to two percent. This finding was made by Dr. Thomas Pugh, now working at Karlsruhe Institute of Technology (KIT), and his colleagues from the universities of Birmingham and Lancaster. The scientists published their results in the *Environmental and Technology Journal*.

According to the study, trees, bushes or creeping plants can improve air quality in the "street canyons" of glass and concrete. "And this is where pollution is highest. Green areas may be grown road by road without expensive or big initiatives," says Dr. Thomas Pugh from the Atmospheric Environmental Research Division of the Institute of Meteorology and Climate Research (IMK-IFU), who came to KIT from the University of Lancaster early this year.

The plants filter nitrogen dioxide (NO₂) and microscopically small particles (fine dust) from the air. Both represent a big health problem in the cities of industrialized nations and threshold countries. According to the World Health Organization (WHO), more than one million people worldwide die from the consequences of polluted air every year.

In the canyons of roads and houses, the polluted air can hardly escape. The researchers found that walls covered with grass, ivy, or other plants filter the air far better than assumed so far. According to the study, they might reduce air pollution by a factor higher than 10 rather than by one to two percent.

In a computer simulation of the air enclosed and chemical reactions influencing the concentration of pollutants in the air, the researchers compared the effects of plants grown directly along the streets with those of plants in parks or on roofs. Green walls were the clear winners. Trees along the road also produced good results, but only in less polluted streets, where the tree tops did not retain the polluted air on the ground. To increase the fraction of vegetation in inner cities, the scientists among others propose a type of "green billboard."



*KIT Climate and Environment Center:
For an Environment Worth Living in*

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Such ideas can be implemented piece by piece, road by road. “Big initiatives to fight air pollution, such as car-scrap bonuses, catalytic converters, or the introduction of a city toll, are not sufficient,” says Professor Rob MacKenzie from the School of Geography, Earth, and Environmental Sciences of the University of Birmingham. “Green walls may be an additional help. They are capable of cleaning the air that enters and remains in the city. When positioned strategically, they are comparably simple means to locally solve problems.” But according to Thomas Pugh, the plants have to be kept alive under the difficult conditions of the cities. “We have to pay more attention to how and where we plant such vegetation in order to prevent it from being exposed to strong air draft, big heat or vandalism.”

Study: “Effectiveness of Green Infrastructure for Improvement of Air Quality in Urban Street Canyons”, Thomas A. M. Pugh, A. Robert MacKenzie, J. Duncan Whyatt, and C. Nicholas Hewitt, *Environ. Sci. Technol.*, 2012, 46 (14), pp. 7692–7699, DOI: 10.1021/es300826w.

The KIT Climate and Environment Center develops strategies and technologies to secure the natural bases of life. For this purpose, 660 employees of 32 institutes produce fundamental and application-oriented knowledge relating to climate and environmental change. It is not only aimed at eliminating the causes of environmental problems, but increasingly at adapting to changed conditions.

Karlsruhe Institute of Technology (KIT) is a public corporation according to the legislation of the state of Baden-Württemberg. It fulfills the mission of a university and the mission of a national research center of the Helmholtz Association. KIT focuses on a knowledge triangle that links the tasks of research, teaching, and innovation.

This press release is available on the internet at www.kit.edu.