



### Mitigating Particulate Matter by Planting Trees in Urban Environments

Trees in urban environments are effective scavengers of both gaseous and particulate pollutants from the atmosphere. In a recent study, a British team of scientists developed an environmental information system for town planners that takes into account the latest data on the effects of tree planting strategies on airborne aerosol concentrations. When applied to real case studies, their results suggest that in some cases reductions can be sufficient to meet air quality objectives for particulate matter.

Particulate matter (PM) is tiny particles of a solid or liquid suspended in a gas, PM<sub>10</sub> being particles with a 50% cut-off diameter of 10 micrometers or less. PM<sub>10</sub>s are important agents in damaging human health, and have been shown to increase mortality. In the urban environment, the main sources of PM<sub>10</sub> include fuel combustion and brake and tyre wear in motor vehicles. Particulates emitted in the environment are deposited either through precipitation or directly onto surfaces, including vegetation. Due to their large leaf areas, trees are effective scavengers of particulates from the atmosphere. Assessing and quantifying the potential reduction in PM that may be achieved by planting trees is therefore important for town planners, as it may contribute to meeting local air quality objectives.

In a recent study, a British team of scientists implemented a model for PM<sub>10</sub> dispersion and capture by trees in an environmental information system for planners. The model was applied with the current land cover data as well as a range of scenarios in which an increasingly larger fraction of the available space was planted with trees in two UK cities.

For both case studies, trees reduced PM<sub>10</sub> concentrations across the whole domain. Reductions of 7%-20% could be achieved if a high number of trees were planted, depending on the availability of suitable planting areas. In industrial areas, which are often associated with high PM<sub>10</sub> concentrations, smaller reductions could be achieved because areas for tree planting were very restricted. Simulations revealed that reductions in the range 2.5%-7% could be achieved in such areas if a quarter of every available space were planted.

As the model also revealed that the potential mitigating effect on a single development and its effects over that small area are very limited, the authors emphasize that trees should not be seen as a replacement for the mitigation of emissions. However, on a strategic level, the potential for use of trees is far greater when land use policies and air quality policies are explored over the whole local area or even better at a regional level with collaborative local authorities.

As a conclusion, the tool could provide valuable information for predicting where tree planting may have the greatest potential for scavenging PM<sub>10</sub>.

**Source:** Bealey W.J., McDonald A.G., Nemitz E., Donovan R., Dragosits U., Duffy T.R., Fowler D. (2007): "Estimating the reduction of urban PM<sub>10</sub> concentrations by trees within an environmental information system for planners", *Journal of Environmental Management* 85:44-58

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