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Estimating the influence of different urban canopy cover types on atmospheric particulate matter (PM10) pollution abatement in London UK.

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In the urban environment atmospheric pollution by PM10 (particulate matter with a diameter less than 10 x 10-6 m) is a problem that can have adverse effects on human health, particularly increasing rates of respiratory disease. The main contributors to atmospheric PM10 in the urban environment are road traffic, industry and power production. The urban tree canopy is a receptor for removing PM10s from the atmosphere due to the large surface areas generated by leaves and air turbulence created by the structure of the urban forest. In this context urban greening has long been known as a mechanism to contribute towards PM10 removal from the air, furthermore, tree canopy cover has a role in contributing towards a more sustainable urban environment.

The work reported here has been carried out within the BRIDGE project (SustainaBle uRban plannIng Decision support accountinG for urban mEtabolism). The aim of this project is to assess the fluxes of energy, water, carbon dioxide and particulates within the urban environment and develope a DSS (Decision Support System) to aid urban planners in sustainable development.

A combination of published urban canopy cover data from ground, airborne and satellite based surveys was used. For each of the 33 London boroughs the urban canopy was classified to three groups, urban woodland, street trees and garden trees and each group quantified in terms of ground cover. The total [PM10] for each borough was taken from the LAEI (London Atmospheric Emissions Inventory 2006) and the contribution to reducing [PM10] was assessed for each canopy type. Deposition to the urban canopy was assessed using the UFORE (Urban Forest Effects Model) approach. Deposition to the canopy, boundary layer height and percentage reduction of the [PM10] in the atmosphere was assessed using both hourly meterological data and [PM10] and seasonal data derived from annual models. Results from hourly and annual data were compared with measured values. The model was then applied to future predictions of annual [PM10] and future canopy cover scenarios for London.

The contribution of each canopy type subjected to the different atmospheric [PM10] of the 33 London boroughs now and in the future will be discussed. Implementing these findings into a decision support system (DSS) for sustainable urban planning will also be discussed.