Modelling the effect of land cover change on local air quality

Stefan Reis  
NERC Centre for Ecology & Hydrology, srei@ceh.ac.uk

Massimo Vieno  
NERC Centre for Ecology & Hydrology, mvi@ceh.ac.uk

Laurence Jones  
NERC Centre for Ecology & Hydrology, lj@ceh.ac.uk

Rachel Beck  
NERC Centre for Ecology & Hydrology, racbec@ceh.ac.uk

Edward Carnell  
NERC Centre for Ecology & Hydrology, edcarn@ceh.ac.uk

See next page for additional authors

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Modelling the effect of land cover change on local air quality

Stefan Reisa,b, Massimo Vienoa, Laurence Jonesc, Rachel Becka, Edward Carnella, Katrina Sharpsc, Eiko Nemitza

a) NERC Centre for Ecology & Hydrology, Bush Estate, Penicuik, EH26 0QB, United Kingdom
b) University of Exeter Medical School, Knowledge Spa, Truro, TR1 3HD, United Kingdom
c) NERC Centre for Ecology & Hydrology, Environment Centre Wales, Deiniol Rd, Bangor LL57 2UW, United Kingdom

Corresponding author: srei@ceh.ac.uk

Abstract: The role of vegetation in removing air pollution from the atmosphere as a beneficial ecosystem service for human health and well-being have been quantified in a recent study for the United Kingdom’s Office for National Statistics (ONS). In this study, our estimates for the UK indicated a monetary value of ~£1 billion per annum due to the removal of fine particulate matter, nitrogen dioxides and ground level ozone by existing vegetation land cover. We will here illustrate the methodological approach chosen for this initial assessment, as well as work in progress to further refine the approach by improving the UK land cover representation in the atmospheric chemistry transport modelling (ACTM), expanding on the representation of vegetation via land cover and vegetation-specific deposition rates. Currently, the EMEP4UK (http://www.emep4uk.ceh.ac.uk/) ACTM distinguishes the following land cover types: Deciduous forest, coniferous forest, crops, semi-natural, water, bare soil/desert, urban. Emerging future work is focusing on interactions between rural and urban land cover, and as a consequence requires additional levels of detail to adequately account for small area changes in vegetation types, and hence deposition parameterisations. The work presented here will apply spatial data analysis techniques in GIS, combined with health data, to generate quantitative assessments of different scenarios for land cover changes, and how these can be used to calculate the economic value of health benefits due to pollution removal by vegetation.

Keywords: air quality; land cover; atmospheric modelling; air pollution removal.