

THE INTERACTION OF FORESTS AND THE ATMOSPHERE

WEDNESDAY 21 FEBRUARY 2007

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**Chemistry/climate feedbacks – the biogenic (forest) emissions - Prof John Pyle, FRS,
Centre for Atmospheric Science, University of Cambridge John.Pyle- at -
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**Forests and the climate – what is the story and the policy message? - Prof Ian
Calder, Centre for Land Use and Water Resources Research, University of
Newcastle upon Tyne**

Misconceptions about the role of forest in relation to the water environment have sometimes led to poor policymaking; examples are given for the UK, India, Panama and China.

A new Task Force of the International Union of Forest Research Organisations on Forest and Water Interactions aims to better connect science and policy through:

- * Identifying the process whereby a consensus can be obtained amongst the forest hydrology community on the key forest and water interaction issues – recognizing and making explicit any caveats with respect to uncertainties in our knowledge about the interactions;
- * Highlighting issues that remain poorly understood as the foci for further policy–relevant research;
- * Contributing to the development of a framework for assessing the cost/benefits of forestry schemes in relation to: timber production, biodiversity, societal, environmental and water resource factors.

The role of forests in relation to climate, particularly beliefs in relation to modifying rainfall and their potential as major sources of renewable energy are discussed and the request is made for assistance on these issues, within the task force, to develop a clear policy message.

**Modelling climate forcings and feedbacks by global forest changes - Dr Richard
Betts, Hadley Centre for Climate Change, Met Office richard.betts- at -
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Vegetation change is involved in climate change through both forcing and feedback

processes. Emissions of CO₂ from past net deforestation are estimated to have contributed approximately one quarter of the global radiative forcing by anthropogenic increases in CO₂ up to the year 2000. This is partly offset by a negative radiative forcing arising from increased surface albedo. Changes in the fluxes of latent and sensible heat due to tropical deforestation may exert other local warming effects, with the potential for remote effects through changes in atmospheric circulation. The effects of forest cover change on the physical properties of the land surface may complicate the issue of using carbon emissions / uptake as an indicator of the effects of forestry in driving or mitigating climate change. The CO₂ rise due to fossil fuel emissions and deforestation may be accelerated by up to 66% by feedbacks arising from global soil carbon loss and forest dieback in Amazonia as a consequence of climate change, and Amazon forest dieback may also exert feedbacks through changes in the local water cycle.

Atmospheric chemistry interactions with urban forests – Dr A Rob Mackenzie, Lancaster Environment Centre, Lancaster University

The term urban forest refers to all bushes and trees present in, and adjacent to, cities. These trees may be in public parks, in derelict/undeveloped land, along streets, or in private gardens, and have only recently come to be considered as a single entity. The reasons for considering the urban forest as a whole are many. Aesthetic, social, educational, ecological, etc (Konijnendijk et al., 2006). There has been, for example, a substantial amount of work looking at the impact of the urban forest on the urban climate; the cooling and shading effects of trees in towns are now recognised as a significant benefit. Here I focus on the impact of the urban forest on the urban air quality. This has two aspects. Firstly, trees improve urban air quality by providing a surface for the efficient deposition of ozone, nitrogen dioxide, and aerosol particles. Secondly, trees can emit volatile organic compounds that participate in ozone-formation reactions. I describe one way to balance these positive and negative effects on air quality: the Urban Trees Air Quality Score (UTAQS) (Donovan et al., 2005). I will also draw attention to the deficiencies in our understanding of the atmospheric chemistry of the compounds emitted by trees, deficiencies that may be corrected as new NERC consortium projects to study this chemistry start to produce results.

Konijnendijk, C. C., et al. (eds) *Urban Forests and Trees*, Springer, 2005, ISBN 3540251262

Donovan, R.G., S. M. Owen, H. E. Stewart, A. R. MacKenzie, and C. N. Hewitt, Development and application of an Urban Tree Air Quality Score using the Birmingham, United Kingdom, area as a case study, *Environ. Sci. Technol.*, 39(17); 6730-6738, 2005. DOI: 10.1021/es050581y.

Measurement and modelling using the straits flux station – Dr Sebastien Lafont, Forestry Commission