

## **TREES AND URBAN CLIMATE ADAPTATION**

### **A Treework Environmental Practice Conference in Collaboration with the Forestry Commission**

#### **Chairman's Introduction**

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Attention is currently focused on Copenhagen where, in December, world leaders will meet to plan the way forward in reducing greenhouse gas (GHG) emissions. The European Union and the UK Government are committed to reducing green house gas emissions by 80%, against 1990 levels, by 2050. Metropolitan areas in Europe have a key role to play here for together they account for around 14% of the global emissions total of 23,000m tonnes CO<sub>2</sub> equivalent.

The achievement of an 80% target would offer some prospect of holding the average global temperature increase to below 3°C, the level at which very serious climate change impacts may become widespread. The Stern Report has shown that the level of GHG in the atmosphere has to be stabilised at 500ppm to provide this degree of protection. Already, by 2005, that level was 430ppm so concerted early action is required by the world community. The issues for the Copenhagen conference are challenging and it will be very difficult to secure the necessary commitment to action. Climate scientists engaged in the policy process are suggesting that in planning to reduce GHG emissions we should work towards 2°C, but from a climate adaptation perspective we should anticipate and prepare for a 4°C temperature rise.

Climate change of that magnitude is towards the upper end of the climate change scenarios. Even under more conservative projections we can anticipate hotter, drier summers and warmer, wetter winters with rainfall becoming more intense. More rapid climate change will intensify these effects and bring more frequent extreme events, such as the 2003 heatwave and the severe flooding experienced in the summer of 2007.

Climate change of this order has very significant implications for towns and cities, in part, because it is here that people and property are concentrated, but also because of the particular biophysical properties of the urban environment itself. The reduction in greenspace through urbanisation, with its evaporative cooling potential and the increase in building mass, and with that heat storage capacity, means that cities warm more strongly and that the heat is stored and released later in the day, so producing an 'urban heat island.' Similarly, impervious surfaces are more prevalent and 'surface sealing' can exceed 70% in town centres and high density residential areas. This prevents infiltration of rain water and promotes rapid run-off into surface-water sewers and watercourses.

These special features of the 'ecology of cities' amplify the effects of climate change, which will strengthen the urban heat island and magnify surface water run-off. Furthermore, in recent years, there has been a trend towards densification of urban areas and conversion of town gardens to hard standings, which further reduces the resilience of the city in the face of climate change impacts. In many areas this has eroded 'climate headroom' within the surface water drainage system and increased the likelihood of pluvial (rain-induced) surface water flooding.

Fortunately, however, as Anne Whiston Spirn has observed, cities are 'granite gardens' where natural process can be sustained by careful management of urban greenspace. When we look out on the city from a high vantage point (the London Eye or the Manchester Hilton), what is really striking is the extent of the urban tree cover. The built fabric is embedded in a virtual urban forest. That 'forest' has very significant ecological functionality and provides shading, evaporative cooling, capture of polluting aerosols and fine particles, and interception and infiltration of rainfall. The trees also sequester CO<sub>2</sub> but it is important not to overstate the contribution to mitigation, although this can be valuable, for example when the 'arising' from the urban forest are used to reduce GHG emissions through fuel substitution as biomass e.g. co-firing in power generation.

The environmental services provided by the urban forest become critically important in a changing climate. We need trees in all parts of the city but especially the public realm (which takes on a new importance as lifestyles change in a warmer climate) and higher density residential areas. Unfortunately studies in Manchester and elsewhere have shown that tree cover tends to be the lowest in high density residential areas where socio-economic deprivation and ill-health are often concentrated. This Conference will address many facets of this agenda, including community engagement in greening disadvantaged locations. We also need to recognise the hazards associated with trees themselves (e.g. subsidence, windthrow and ozone precursors), which may be aggravated by climate change, and develop appropriate guidance and management strategies so that they can be managed effectively.

However, despite the heroic efforts of its many advocates, most notably the former National Urban Forestry Unit, we have, up until now, tended to underestimate the qualities of the urban forest and the services it provides. By contrast, in the United States of America the forestry arm of the US Department of Agriculture has developed robust methodologies for characterising the urban forest and quantifying its benefits, and has been closely engaged with the municipalities in developing strategies to conserve and enhance the urban tree population. There are good models too from mainland Europe of cities which properly recognise the importance of their tree population and act accordingly. In Britain there are some encouraging pointers, most notably in London, but responsibilities tend to be fragmented at both national and local levels.

This Conference will do a considerable service by highlighting the importance of urban trees and woodlands in a changing climate and the type of actions needed to conserve and enhance that resource. But we need proactive leadership at national level, in partnership with Local Government and other sectors, to secure effective delivery of policy, plans and programmes. Nicholas Stern has pointed out that it is action within the next 15 years which will determine whether we meet the GHG reduction targets for 2050. We need to act on a similar timeframe to prepare our towns and cities for the impacts of climate change. This will be difficult given the slow turnover of the building stock and the problems of retrofitting. By contrast, meaningful investment in green infrastructure is a cost-effective and practical alternative and we need to act now to ensure that we have the right trees in the right places to help meet the climate challenge that lies ahead.

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