The use of green infrastructure to air condition a city ...and deliver other essential services

The art of the possible

Anne Jaluzot | Trees and Design Action Group What Have Plants Ever Done for Us? | PALMSTEAD Event | Ashford | 21.09.2016

No history of impact of high temperatures = Poorly understood, new threat.

UKCP09 Medium Emission Scenario: 2050: +2.7°C (avg summer day) +6.5°C (hot day) 2100: +3.9°C (avg summer day) +10°C (hot day)

Mostly impacts urban areas, esp. areas affected by Urban Heat Island effect.

Source: The LUCID project

293.70 293.44 - SKALDAT KA

London study suggests that by 2050 80-92% of flats and 56-61% of detached dwellings would exceed overheating thresholds in a heatwave event.

Study London School of Hygiene and Tropical Medicine & PHE (2014) 2020s + 66% heat-related death (En &Wa) 2050s +257% 2080s +535% ...compared to today's yearly baseline It is not possible to prevent hot weather from occurring, but it is possible to limit how much the urban realm intensifies hot weather, our exposure to heat and how we look after vulnerable city residents.



KEY DELIVERY CHANNELS FOR CHANGE?





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"Our tree and sustainable transport strategies go hand in hand: the latter frees up some space for the former, the former creates the environment needed for the latter. There is no other way we could have succeeded."

Frédéric Ségur Arboricultural Manager, Greater Lyon Authority



Source: MeteoFrance – based on IPCC A2 Emission scenario

Garibaldi Street, Lyon, France

















Water management strategy for Garibaldi Street refurbishment

Polluted surface water runoff
Non-polluted surface water runoff



- Surface water runoff infiltration
- Overflow and/or storage of surface water runoff
- Surface water runoff re-use
- Controlled rate outflow into combined sewer (during heavy storms)
- 1. Remains directed to existing combined sewer
- Only directed to combined sewer when winter treatment is applied to the bus lanes



POLLUTION	Lower	Higher, incl. salt	
HUMIDITY	Wetter	Drier	
MAINTENANCE	More manicured	Limited: once a year	
FUNCTIONS	Water management & ecological functions		















Relevance to the UK context?



Embedded in Strategy

Collaborative design for holistic infrastructure solutions

Built-in research & learning



"What is the Stockholm system? Tree-rooting environments built with large stones where we infiltrate stormwater and ensure the gas exchange works"

Björn Embrén Arboricultural Manager, Municipality of Stockholm



Positioning of concrete frame in continuous planting trench with large stones for skeleton soil along Hornsgatan, Stockholm (see Case study 25, p128).



Soil has been flushed into the first layer of compacted large stones. A second layer of large stones is being applied.



Utilities are being accommodated as part of the installation.



A geotextile separates the aeration layer (dry stones, smaller grade) placed above the skeleton stone-soil mix, and the paving sub-base.



- 1. New tree size 20-25 cm
- 2. Tying in tree support
- 3. Planting soil.
- Crushed rock at grid 4-8mm thick c. 50 mm
- 5. Surface grid 1400 x 2800 mm
- 6. Surfacing superstructure
- 7. Geotextile
- 8. Stormwater cover, dished for laying by gutter

- 9. Air hole placed at level of aerated bearing layer
- 10. Aerated bearing layer
- 11. Air and water supply
- 12. Crushed rock structural soil with planting soil
- 13. Fertiliser at each structural soil level
- 14. Pipes in structural soil protected with geotextile and gravel surround.

Section of a skeleton soil installation for new planting, as shown in the *Stockholm Handbook*. Image: Municipality of Stockholm

Erik Dahlbergsallén, Stockholm, Sweden

Erik Dahlbergsallén, Stockholm, Sweden Case study 20, p124

Erik Dahlbergsallén, Stockholm, Sweden Case study 20, p124

4 years after planting 3.5 meters from the tree

Erik Dahlbergsallén, Stockholm, Sweden Case study 20, p124

On the left = 80-year old tree, on the right = 6-year old tree



Planted in 2004, size = 35-40 cm 2008 60-65 cm 2012 70-83 cm Approximately 2 000 planting beds have been rebuilt with structural soil





Stockholm Biochar

Project



"we got permission to start investigating the possibility of producing biochar"

Image courtesy of the Municipality of Stockholm



Collaboration enables Change



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