

Landscape and Ecology in a Changing Climate

Landscape
Institute
South East



Member
Networks
South East England

Introductions

Debbie Bartlett CMLI FCIEEM will

introduce the COOL TOWNS project

raise some issues for both landscape

Architects/Urban Designers and

Ecologists/Environmental Managers

Peter Massini will

- set the policy framework in London
- describe some tools to inform decision-making
- give a view about future policy and practice



Climate Emergency and Biodiversity Crisis: The Facts and Figures

CIEEM Briefing Paper
September 2019



THE CHARTERED INSTITUTE OF ECOLOGY AND ENVIRONMENTAL MANAGEMENT (CIEEM) IS THE PROFESSIONAL BODY FOR ECOLOGISTS AND ENVIRONMENTAL MANAGERS WORKING TO MANAGE AND ENHANCE THE NATURAL ENVIRONMENT IN THE UK AND IRELAND.



Human activities which result in the release of greenhouse gases are estimated to have caused 1°C of global heating above pre-industrial levels². As a result, there have already been sea level rises, increased likelihoods of extreme weather events and melting of sea ice and permafrost³. This has direct and devastating impacts on society, including land loss⁴; increased severity and occurrence of wildfires⁵; drought; and difficulties producing food⁶.

Alongside this, there have been unprecedented declines in global biodiversity, with the average abundance of native species in most major land-based habitats falling by at least 20%, mostly since 1900⁷. The quality of habitats which support this biodiversity has also declined, with a 30% reduction in global terrestrial habitat integrity caused by habitat loss, fragmentation and deterioration.

Biodiversity is essential both to humans, through the provision of ecosystem services such as food, fuel, flood prevention and enjoyment; and in its own right as part of the natural world.

The recent *Global Assessment Report on Biodiversity and Ecosystem Services* by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)⁸ states that the key drivers of biodiversity decline are:

- Changes in land and sea use
- Direct exploitation of organisms
- Climate change
- Pollution
- Invasive alien species

The combined effects of these human activities have put an estimated one million species at risk of extinction⁹, threatening the stability of ecosystems and the services we receive from them. For example, more than 75% of global food crop types

LI Policy Paper | Autumn 2020

GREENER RECOVERY

Delivering a sustainable recovery from COVID-19

How investing in better places can support the UK's recovery from Coronavirus while tackling climate change



The Climate and Ecological Emergency Bill



The screenshot shows the UK Parliament website page for the Climate and Ecological Emergency Bill. At the top left is the UK Parliament logo. Below it, the text 'Early Day Motions' is displayed. A breadcrumb trail reads 'UK Parliament > Early Day Motions > Climate and Ecological Emergency Bill'. The main heading is 'Climate and Ecological Emergency Bill' in large green text. Below this, it says 'EDM 832: tabled on 02 September 2020'. Further down, it notes 'Tabled in the 2019-21 session.' and 'This motion has been signed by 64 Members. It has not yet had any amendments submitted.'

Calls for:

- the UK to make and enact a serious plan.
- our entire carbon footprint be taken into account
- Consider nature conservation in supply chains, acknowledging damage caused by consumption
- stop using technology as an excuse to carry on polluting as usual
- a citizens' assembly

Does your MP
support this Bill?

<https://www.cebill.uk/>

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Partners



Gemeente Breda



UNIVERSITY of
GREENWICH



Amsterdam University
of Applied Sciences



AGENCE
D'URBANISME & DE DÉVELOPPEMENT
Pays de Saint-Omer - Flandre Intérieure



Creating a better
Southend
www.southend.gov.uk



Cool Towns Project

To provide cities and municipalities with knowledge and tools to become heat-resistant

- Determine objectives regarding heat stress and investment decisions
- Effective spatial interventions with additional benefits - testing and measuring pilot projects - decision tool
- Integrating heat resistance into policy: climate and spatial strategies - road map
- Increase skills and sense of urgency regarding heat resilient urban design among spatial specifiers

Project Runs from Sept 2018 - Sept 2022

COOLTowns

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This presentation will cover

- Heat stress basics
- The risks
- Action to mitigate heat stress





UK heavy rainfall / floods

Extended periods of extreme winter rainfall are now **7 times more likely**.

Extreme weather: October downpour sees UK's wettest day on record

By Matt McGrath

Environment correspondent

6 hours ago | [Science & Environment](#)

Saturday 3 October was the wettest day for UK-wide rainfall since records began in 1891, Met Office researchers have said.

The downpour followed in the wake of Storm Alex and saw an average of 31.7mm (1.24ins) of rain across the entire UK.

UK weather: Hottest August day for 17 years as temperatures top 36C

7 August

UK heatwaves



The UK has seen its hottest day in August for 17 years, as temperatures reached more than 36C (96.8F) in south-east England.

Crowds headed to the coast to enjoy the weather, but people have been urged to adhere to social distancing.

Exceptionally hot weather is set to continue in parts of the UK throughout the weekend, the Met Office said.

Climate change

Likelihood of 40C temperatures in UK is 'rapidly accelerating'

Such deadly heat may become regular occurrence later this century, scientists find

Damian Carrington
Environment editor

@dpcarrington

Tue 30 Jun 2020
16.00 BST



1345



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Poll 1

Most of us welcome hot weather, but when it's too hot for too long, there are health risks. In England, there are on average 2000 heat related deaths every year. If hot weather hits this summer, make sure it does not harm you or anyone you know.

<https://www.nhs.uk/live-well/healthy-body/heatwave-how-to-cope-in-hot-weather>

[Curr Epidemiol Rep. 2014 Jun; 1\(2\): 67-74.](#)

PMID: [25422797](#)

Published online 2014 Apr 5. doi: [10.1007/s40471-014-0009-1](#)

Health impacts of heat in a changing climate: how can emerging science inform urban adaptation planning?

[Elisaveta P. Petkova](#), DrPH, [Haruka Morita](#), MPH, and [Patrick L. Kinney](#), ScD[✉]



[BMJ. 2003 Sep 6; 327\(7414\): 512-513.](#)

doi: [10.1136/bmj.327.7414.512](#)

PMCID: [PMC192832](#)

PMID: [12958084](#)

Death in heat waves

Simple preventive measures may help reduce mortality

[William R Keatinge](#), emeritus professor

UK heatwave may have caused hundreds of deaths

Fears for elderly and vulnerable as sharp rise in fatalities is linked to hot weather



▲ Women enjoy the hot weather in Weymouth, Dorset. An official health alert is in place warning that the heatwave poses a risk to the elderly and vulnerable. Photograph: Kathy deWitt/Alamy

Britain's heatwave could have caused a sharp rise in deaths over the past two weeks, health officials warned today.



Wellcome Trust press release Oct. 19, 2020

The London-based philanthropy, which spends more than £1 billion per year, announced boost in research funding for the

health impacts of global warming, which include the spread of

infectious diseases and heat-related sickness and death

C⁰O⁰L⁰T⁰W⁰n⁰S

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Why the heatwave railways

Friday 26 July 2019 12:45 pm

London heatwave: Tower Bridge manually cooled to stop it jamming shut

From sagging lines to buckled rails - heat's effects on rail travel

Michael Searles



Rob Davies

@ByRobDavies

Thu 25 Jul 2019 12.01 BST



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RISKS for the Economy

nature
climate change

LETTERS

PUBLISHED ONLINE: 4 MAY 2015 | DOI: 10.1038/NCLIMATE2623

Heat stress causes substantial labour productivity loss in Australia

Kerstin K. Zander^{1*}, Wouter J. W. Botzen², Elspeth Oppermann¹, Tord Kjellstrom^{3,4} and Stephen T. Garnett⁵

Industrial Health 2013, 51, 3–15

Review Article

Effects of Heat Stress on Working Populations when Facing Climate Change

Karin LUNDGREN^{1*}, Kalev KUKLANE¹, Chuansi GAO¹ and Ingvar HOLMÉR¹

Estimated that in a future warm year economic loss due to heat stress on productivity could be 0.4% of Gross Value Added (GVA) totalling around £1.9 billion for London.

Centre for Climate Change Economics & Policy/Grantham Research Institute on Climate Change and the Environment (Costa et al, 2016)

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Education

Opinion
Education

Making school cool helps children do better in exams
Torsten Bell

Sun 3 May 2020
06.30 BST

Hot weather makes it harder for students to focus, and that shows in their results

Recent research has demonstrated the physiological impacts of heat directly interfere with learning and the effect is cumulative

Prediction under medium warming scenario is of 10% lower achievement in an average school year with impacts for macroeconomic growth

Heat and Learning

R. Jisung Park

Joshua Goodman

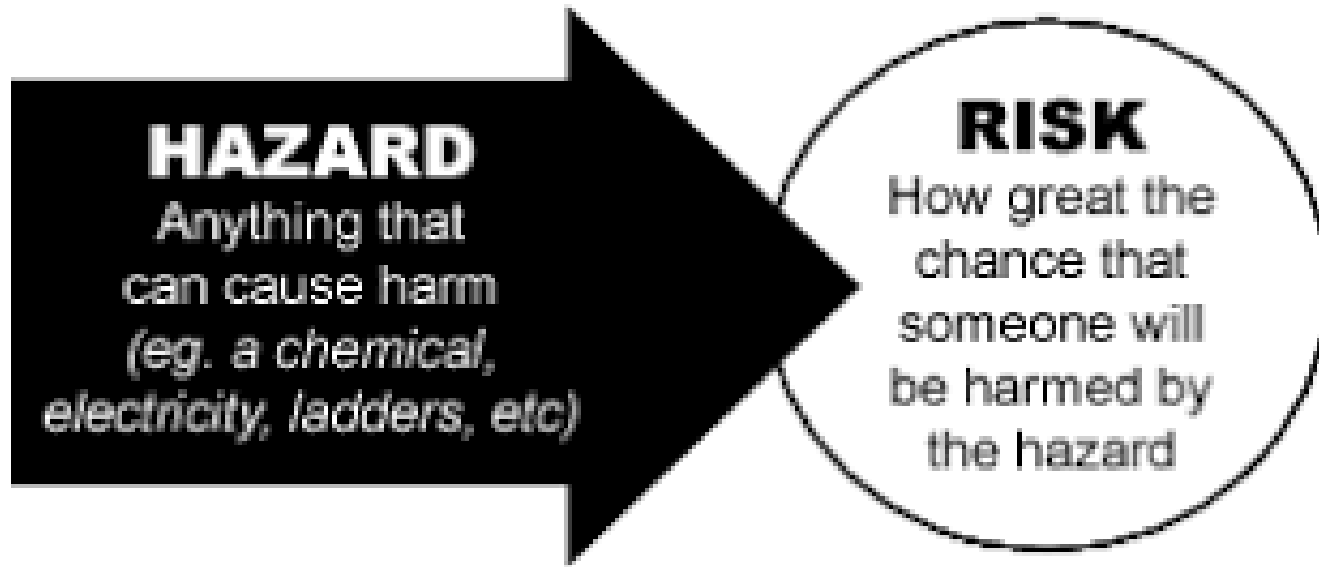
Michael Hurwitz

Jonathan Smith

AMERICAN ECONOMIC JOURNAL: ECONOMIC POLICY
VOL. 12, NO. 2, MAY 2020
(pp. 306-39)

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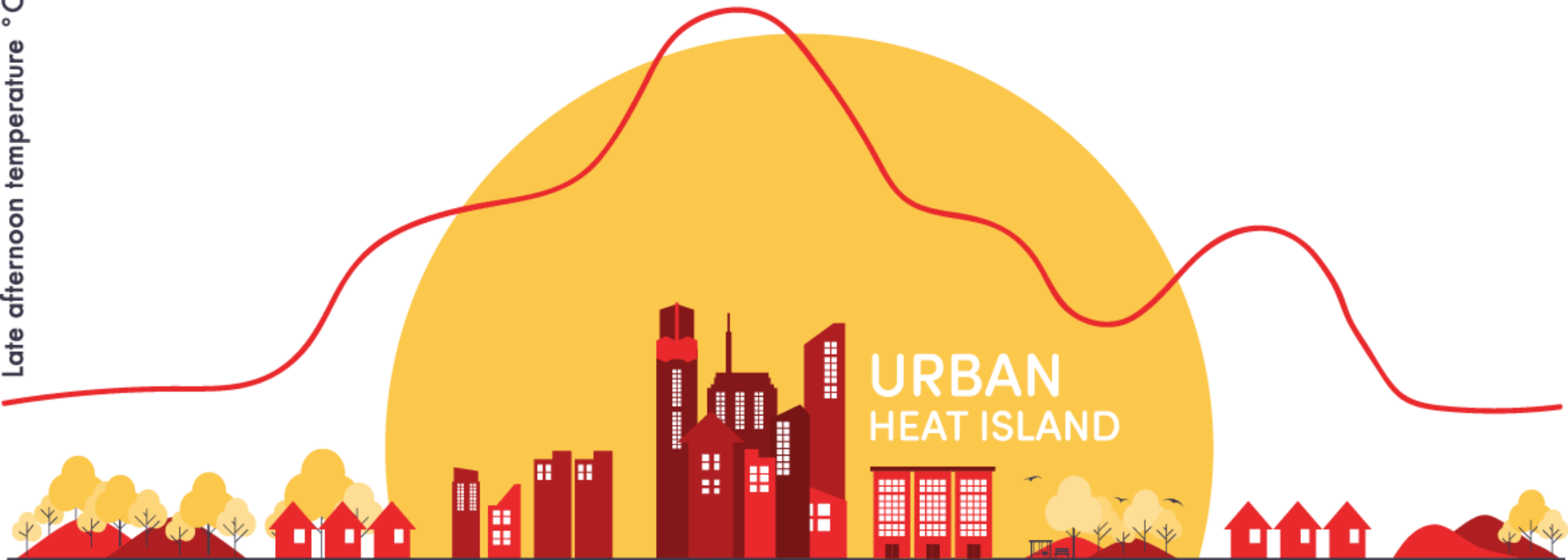
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Heat stress is a **hazard** with **significant and increasing risk** to

- People
- The economy
- Infrastructure

Late afternoon temperature °C



URBAN HEAT ISLAND

Rural

Suburban Residential

Commercial

City

Urban Residential

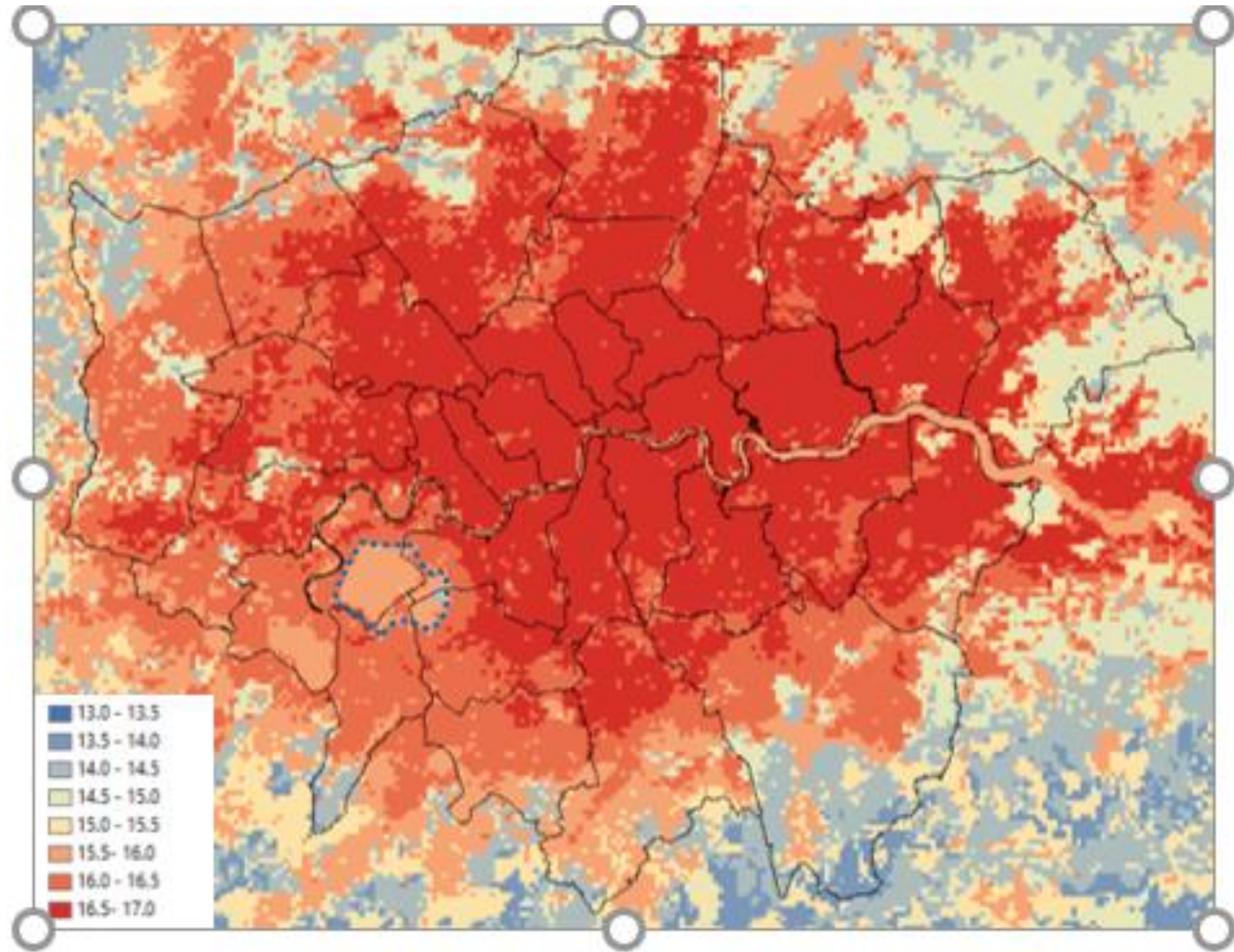
Park

Suburban Residential

Rural Farmland

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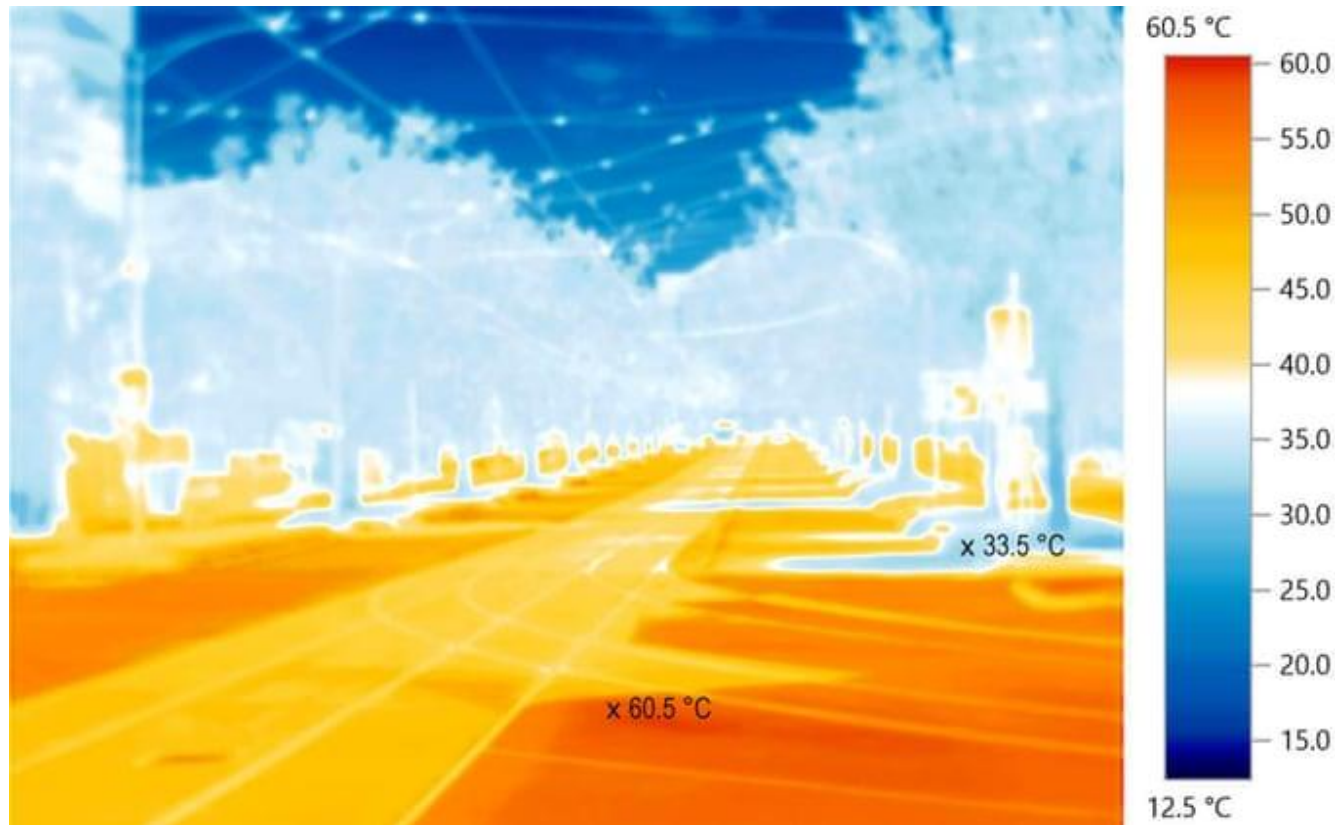


UrbClim' simulation for the mean temperature at midnight London (*source VITO*)

C^oOL T^oWns

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Are there places in your area where people are likely to suffer heat stress?



Public open space in towns is typically paved, with few trees or features to provide good access and usability

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Creating Heat Maps

Open squares are hot every hour of the afternoon

No shadow in North-South orientated streets

Enables identification of where heat resilience interventions are most needed

What could support authorities to pin-point those places?

The model will combine information on temperature, thermal comfort, spatial functions and vulnerabilities in GIS. This will be high-resolution so authorities can pin-point the places in their territory where heat resilience interventions are most needed and compare the expected effectiveness of different measures



Vulnerability mapping

Cool area per inhabitant
"pin-point the places ... where heat resilience interventions are most needed"

Area (m²) is:

- Cool

PET Physiological Stress
Grade
Not more than moderate
heat stress

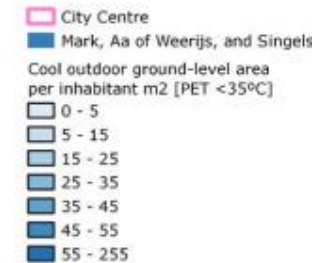
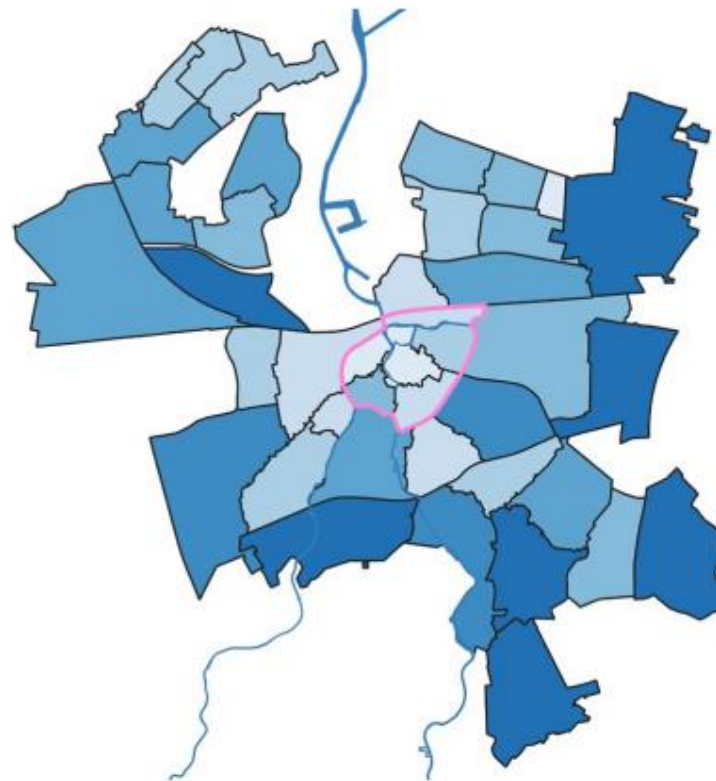
- Outdoors

Public and private

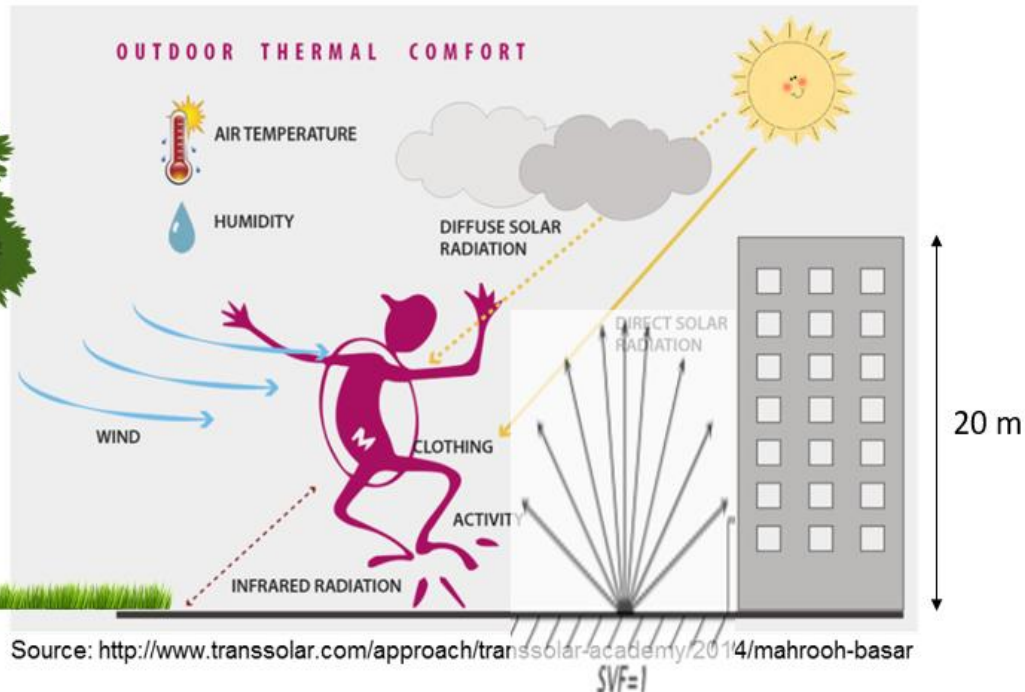
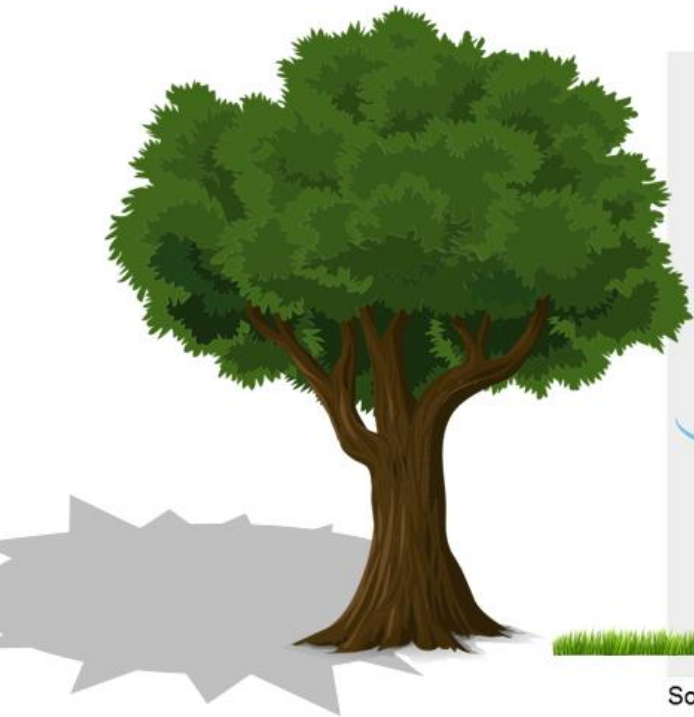
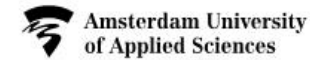
- Ground-level

2D map, so no balconies or
roof terraces are included

- Per inhabitant
- So neighbourhood averages



Thermal comfort: Physiological Equivalent Temperature



PET	Stress Category
<4	Very high cold stress
4 – 8	High cold stress
8 – 13	Moderate cold stress
13 – 18	Slight cold stress
18 – 23	No thermal stress
23 – 29	Moderate heat stress
29 – 35	High heat stress
35 – 41	Very high heat stress
>41	Extreme heat stress

What can be done?

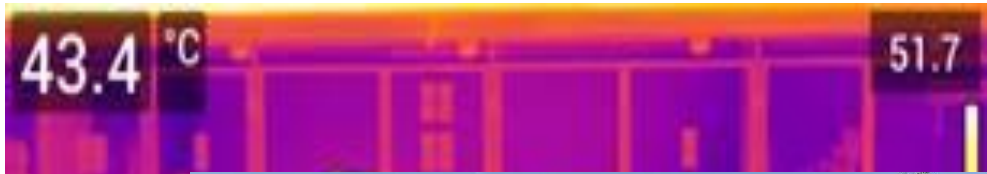
Increasing Shade
Evaporation
Reflection
and Ventilation

Can all make people cooler

Poll 2





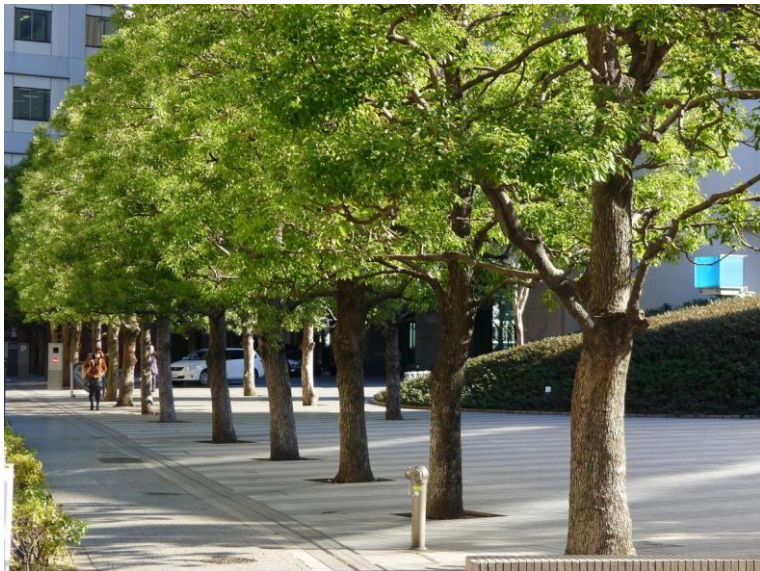
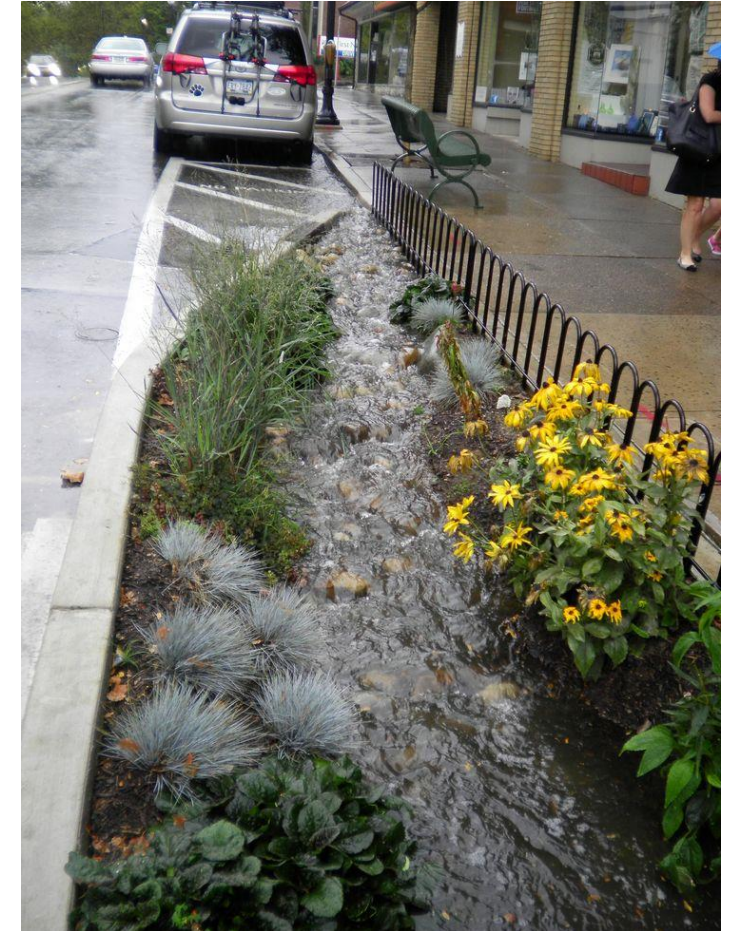


FLIR

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Green & Blue Infrastructure



But which is most effective for cooling?

Cooling effectiveness depends on:

- Foliage shape and dimensions
- Leaf area density
- Seasonal cycle
- Daily transpiration
- Water availability

Shade potential:

- Height
- Shape
- Canopy spread

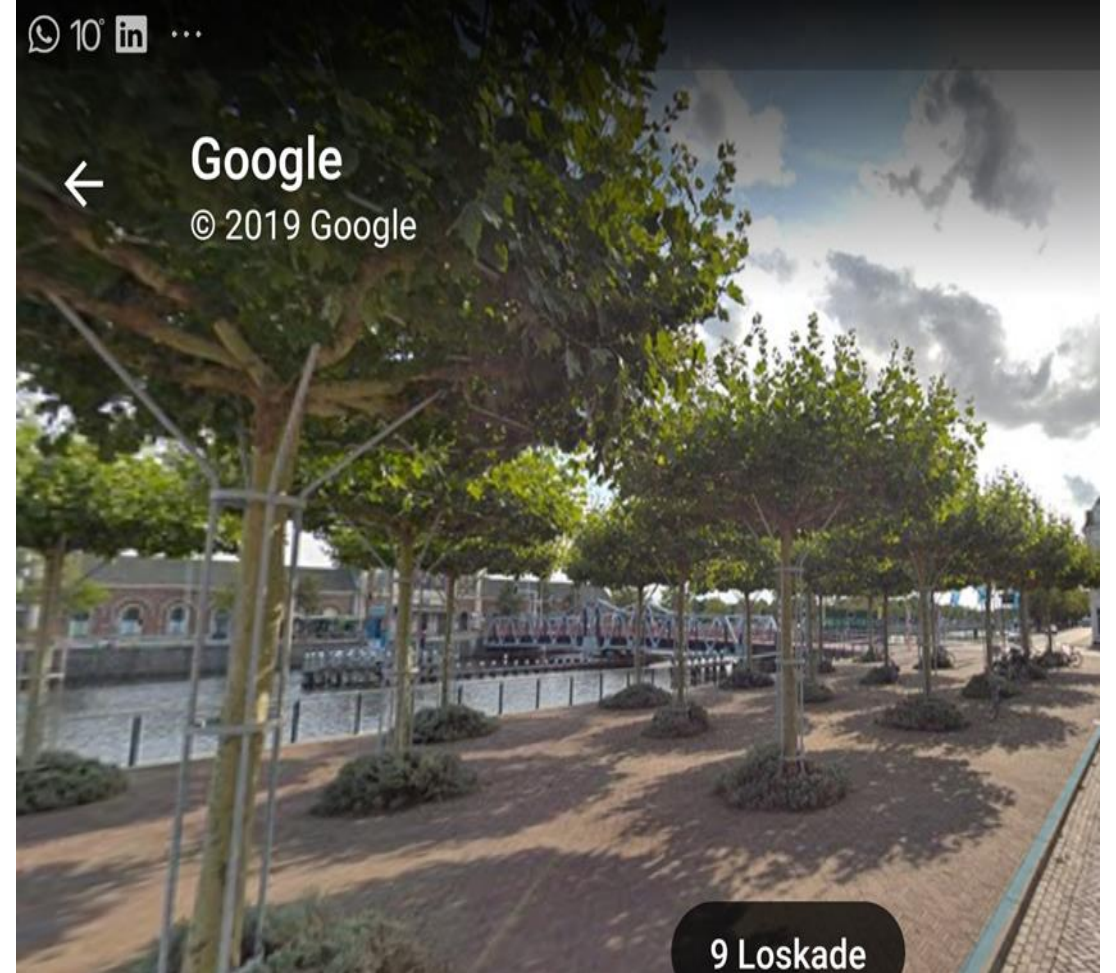
Additional benefits:

- Aesthetics and place making
- Air quality
- Noise reduction
- Nature
- Health and wellbeing

Disbenefits:

- Establishment costs
- Maintenance
- Pests & disease
- Leaf fall
- Health & Safety

C^oO^lT^oWⁿs



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Measuring cooling effect



Decision Support Tool Kit

- ✓ Effectiveness at mitigating heat stress
- ✓ Cost/maintenance implications
- ✓ Product information/case studies
- ✓ Co benefits & Public opinion

The role of GBI in mitigating heat stress is an additional argument for inclusion in public open space design

Drawdown: trees for carbon sequestration

Tree planting on the up in England

[Defra Press Office, 12 June 2020 - Uncategorized](#)



On Thursday 11 June, the Forestry Commission published the latest government tree planting statistics.

Analysis of the statistics has been covered by national media today in [The Times](#), [The I](#) and The Sun, as well as regionally in The Yorkshire Post. Coverage notes that tree planting in England increased last year but was below the rate needed to reach the manifesto commitment to plant 30,000 hectares of trees across the UK by 2025. The articles also reference calls by campaigners for government to ramp up tree planting efforts to meet targets to help absorb carbon emissions.

Tree-planting in England falls 71% short of government target

New figures show 1,420 hectares were planted in year to March 2019 against target of 5,000

11 Jun 2020

Disappointing planting figures in England still far below Government target

[source](#)

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How to decide which species?

The Right Tree in the Right Place for a Resilient Future

This Urban Tree Manual provides advice on selecting and procuring the right tree¹ for the right place in urban areas. For the purposes of this manual urban areas are defined as places in and around where people live and work. The manual also highlights long term issues of the threats to existing trees from pests, disease and climate change, and describes the benefits to the environment and for well-being that urban trees can provide.

The Manual is not intended as an exhaustive compendium on tree selection, aftercare and management. Instead, it presents current thinking on these matters and provides valuable sign posting to further relevant information.



<https://www.forestresearch.gov.uk/tools-and-resources/urban-tree-manual/>

Native species?



[Home](#) [About CIEEM](#) [News & Blogs](#) [Training & Events](#) [Jobs & Opportunities](#)

I am
an ecologist or
environmental manager

I want to be
an ecologist or
environmental manager

I need
an ecologist or
environmental manager



Britain's climate zones shifting 5km a year

On 4th November 2020

Rewilding Britain has released a new report claiming that Britain's climate zones are shifting 5km a year, and that a nature recovery era is needed to avert a wildlife catastrophe.

Well fitted species?



Remember
Ellenburg's
Indicators?

Climate change challenges conventional ideas
reminding us the future will not be the same as the past.

Effective urban landscape design requires plantings based on ecological
concepts

**using plant species well fitted to the local environment based on
three critical factors: precipitation, CO₂ concentration, and temperature**

suggests planting maritime climate species (well-fitted) and southern
European, Mediterranean climate species (intermediate-fitted) as these will be
sustainable in current/future UK climate scenarios.

B. Alizadeh B & Hitchmough J D (2020) Designing sustainable urban landscape and meeting the challenge of climate change: a study of plant species adaptation and fitness under different climate change scenarios in public landscape of UK, Landscape Research, 45:2, 228-246, DOI: 10.1080/01426397.2019.1606185

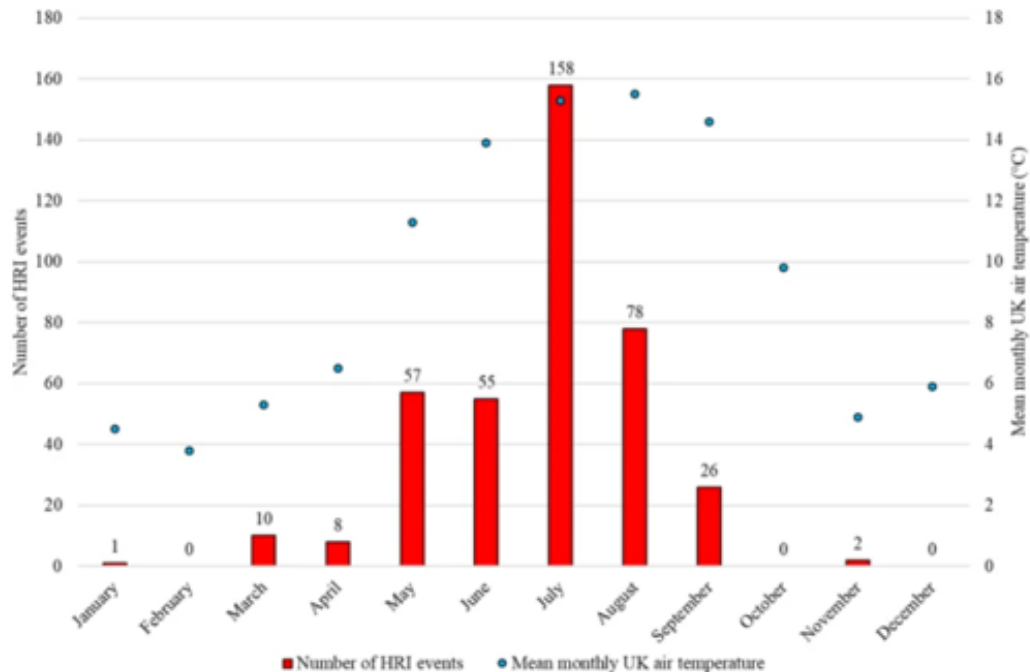
Poll 3

Incidence and risk factors for heat-related illness (heatstroke) in UK dogs under primary veterinary care in 2016

Emily J. Hall , Anne J. Carter & Dan G. O'Neill



Figure 1



Heat-related illness cases by month for UK dogs under primary veterinary care at practices in the VetCompass Programme, against mean monthly UK air temperature for 2016.

HEAT STRESS WARNING SIGNS

- nocturnal animals out during the day
- arboreal (tree dwelling) animals on the ground
- animals displaying any loss of balance, seizures or confusion.

Animal Conservation

ZSL
LET'S WORK
FOR WILDLIFE

Original Article

Forecasting wildlife die-offs from extreme heat events

H. U. Ratnayake , M. R. Kearney, P. Govekar, D. Karoly, J. A. Welbergen

First published: 31 January 2019 | <https://doi.org/10.1111/acv.12476> | Citations: 10

Editor: John Ewen

Associate Editor: Rob Slotow

Birds Are Falling Out Of The Sky Dead, In Australia, Because Of Heat Exhaustion

3 min read 2 K Shares



Shreya Chauhan

Updated on Dec 23, 2019, 15:17 IST



<https://www.indiatimes.com/trending/environment/birds-are-falling-dead-in-australia-because-of-heat-exhaustion-even-as-koalas-die-of-wildfire-502865.html>

Australia's severe heat is affecting the sperm of the bird population: study

<https://www.smh.com.au/environment/conservation/australias-severe-heat-is-affecting-the-sperm-of-the-bird-population-study-20180116h0j7ke.html>



Worst marine heatwave on record killed one million seabirds in North Pacific Ocean

January 15, 2020 7:07pm GMT

<https://theconversation.com/worst-marine-heatwave-on-record-killed-one-million-seabirds-in-north-pacific-ocean-129842>



Marine heatwaves are getting hotter, lasting longer and doing more damage

May 30, 2018 11:56pm BST

<https://theconversation.com/marine-heatwaves-are-getting-hotter-lasting-longer-and-doing-more-damage-95637>

So ... the aim was to “Increase skills and sense of urgency regarding heat resilient urban design”

On Thursday 19 November we are launching our open access

Cool Towns Heat Stress Measurement Manual

At the Cool Towns and Nature Smart Cities Experience Exchange Event

Sign up using the following link – its free

<https://www.trybooking.com/uk/events/landing?eid=14648&>

Dr Debbie Bartlett CMLI FCIEEM SFHEA

d.Bartlett@gre.ac.uk

The Cool Towns Project

<https://www.interreg2seas.eu/nl/cooltowns>

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