

Permeable pavements, Lingang.
Photo: Helen Roxburgh



Why scale is vital to plan optimal Nature-Based Solutions for resilient cities

Dr Mike Hutchins

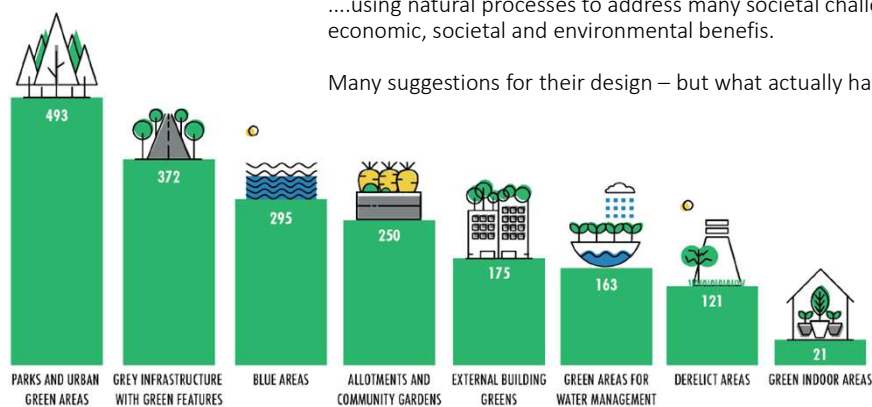


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Urban Nature-Based Solutions are resource-efficient...

...using natural processes to address many societal challenges and provide economic, societal and environmental benefits.

Many suggestions for their design – but what actually happens?



976 NBS projects have been reported. A clear prevalence of urban forestry and parkland.

(Almasy et al (2018), Urban Nature Atlas: A Database of Nature-Based Solutions across 100 European cities)



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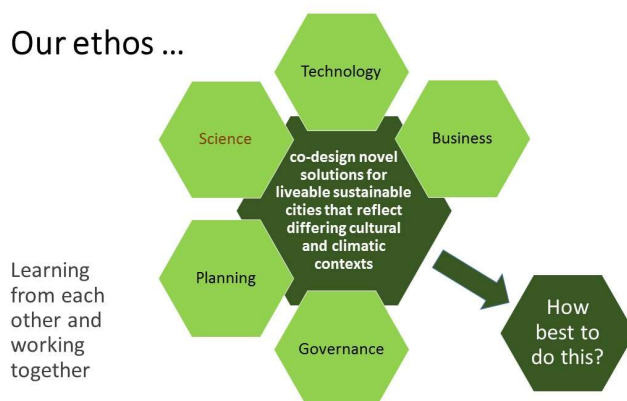
Sustainable urbanisation: terminology...



- Sustainable Urban Drainage Systems (SUDs)
- Sponge Cities
- Low Impact Development (LID)
- Nature-Based Solutions (NBS)
- Green Infrastructure (GI)

Objectives

Our ethos ...



Key questions:

- How does the size of implemented NBS and the spatial extent of its influence affect the arising co-benefits and trade-offs between a range of environmental quality indicators?
- How are these co-benefits and trade-offs affected by climate and social drivers?
- How can business innovation be incentivised to provide or contribute to NBS?

Specific focus on urban forestry and equitable access to urban green space.

Designing Sponge Cities for multiple benefits: integrating nature-based solutions to create sustainable places (DeSCIPHER)

Europe lead: Mike Hutchins (UKCEH),
China lead: Shen Yu (CAS Institute of Urban Environment (Xiamen))

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UK Norway China



UK Centre for Ecology & Hydrology



URBAN EUROPE



UNIVERSITY OF SURREY



NIVA

Uio Department of Geosciences
The Faculty of Mathematics and Natural Sciences

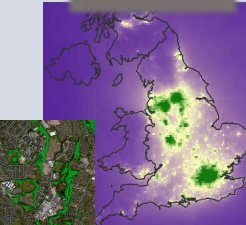
earthwatch
EUROPE

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Use of ongoing research as a basis

UKCEH


Change in exposure to PM2.5
Ave: $-0.55 \mu\text{g}/\text{m}^3$ (-10%)



1. Atmospheric chemistry transport models calculate health benefits of urban vegetation via **pollution removal**



2. Spatial models calculate which houses benefit from **noise reduction** by trees



3. **Riparian shade**: shade maps from canopy surface models enable simulation of **water quality** benefits (cooler water and suppressed eutrophication)

Reduces upper quartile temperature by 1.1°C in River Thames, UK.

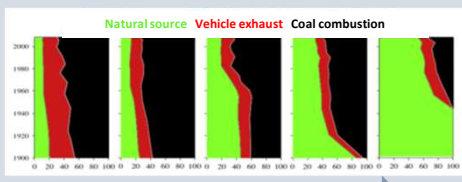
e.g. benefits of tall vegetation

.... DeSCIPHER puts sustainable urban hydrology and water quality in the context of impacts in other environmental domains

... identifying optimal NBS – what and where?

CAS-IUE

Lead in sediment cores along an urban gradient: 5 sites in Shanghai:



Natural source Vehicle exhaust Coal combustion

Urban core developed developing

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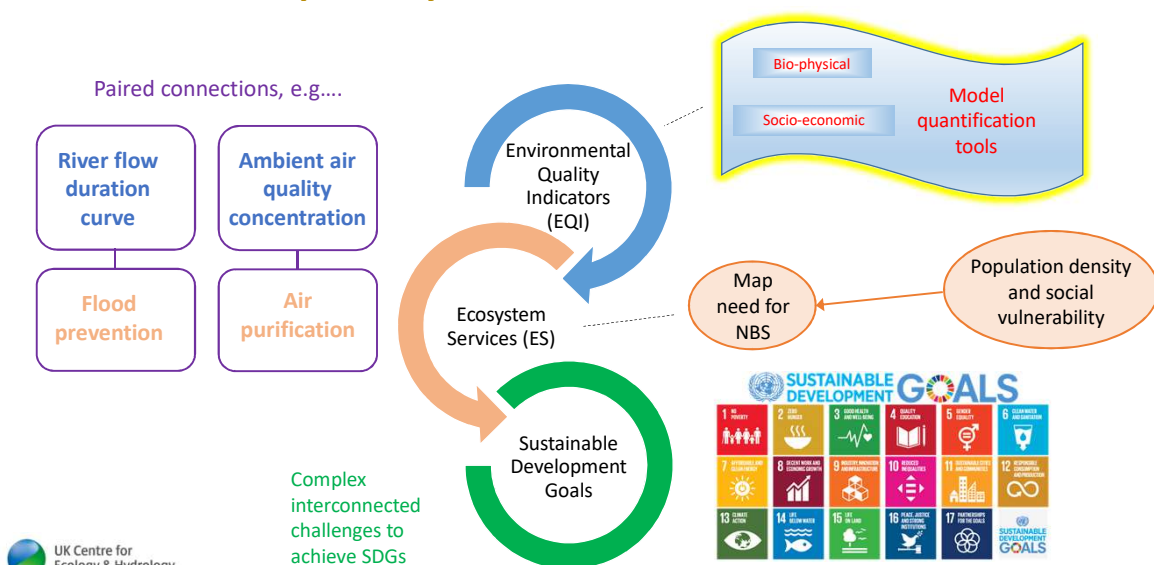
Case Studies...



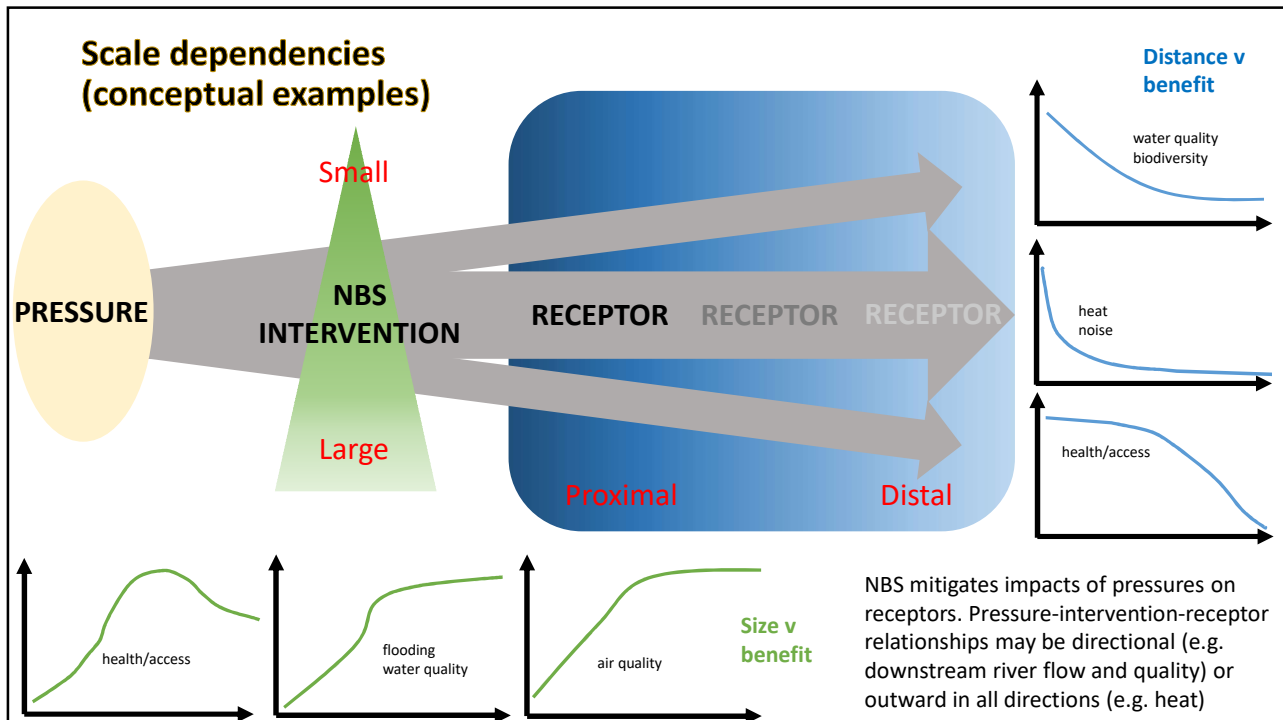
...involve developing and applying models to evaluate NBS
What should our models represent?....

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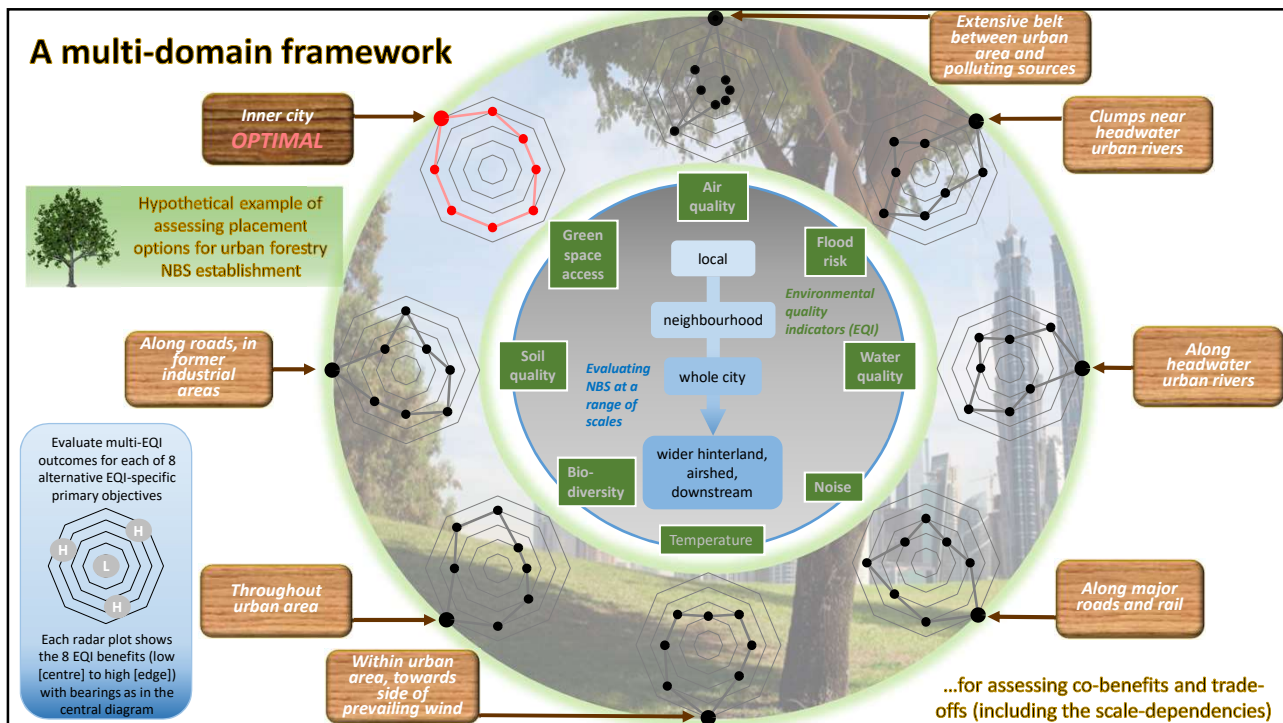
NBS (e.g. urban forestry, parkland) potentially deliver multiple ecosystem service benefits



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Thank you for your attention

Any questions?

For more information...



UKCEH work on challenges and solutions in urban areas:

- Environmental challenges: flood risk, water quality, air quality, heat waves, urbanisation, and biodiversity loss
- How can green and blue space reduce these impacts
- Understanding benefits to people (inter-disciplinary working with economists, social scientists, health experts)
- Partnership with city officials and policy makers to make a difference

More information:

<https://www.ceh.ac.uk/our-science/projects/urban-blue-and-green-space>

<https://jpi-urbaneurope.eu/project/descipher/>

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<https://www.regreen-project.eu/>



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