CLAIRO | INOVATIVNÍ VÝSADBA STROMŮ V OSTRAVĚ

European Union
European Regional Development Fund

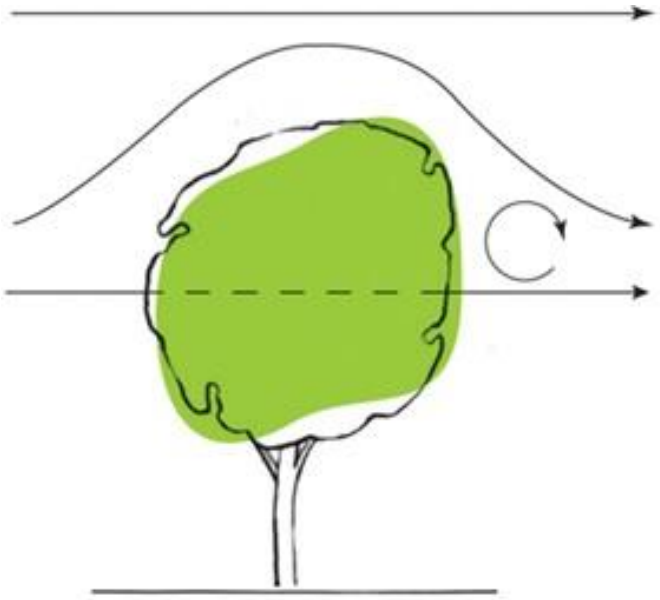
UIA URBAN INNOVATIVE ACTIONS
The Urban Lab of Europe !

CLAIRO Urban Innovative Actions project

Reduction of air pollution with the use of greenery

CARI Boot Camp, Szeged, 9 September 2021

dispersion



Source: Hewitt, C. N. et al

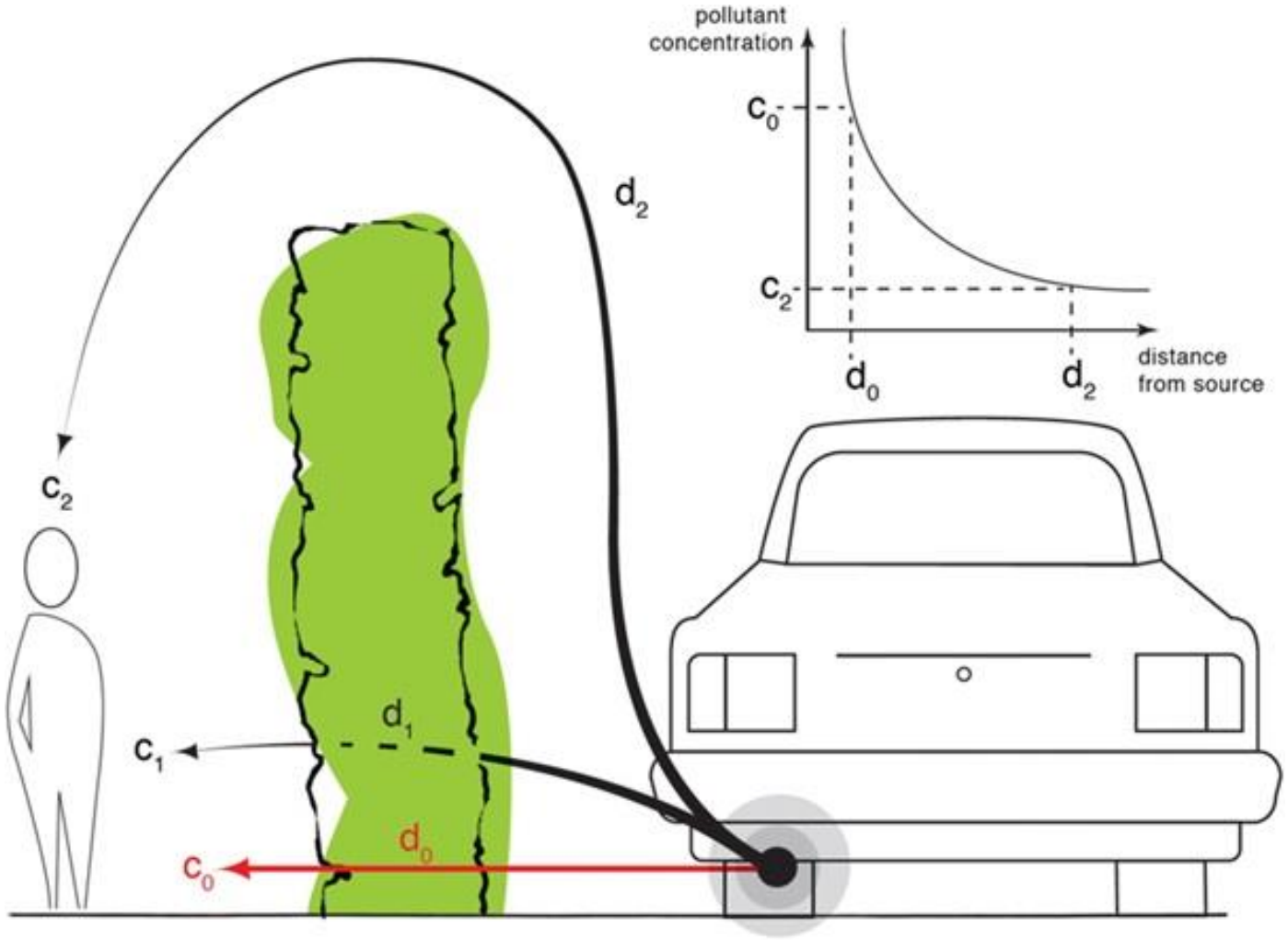
- Trees and hedges introduce turbulence and increase dilution of pollutants.

- An average 8% reduction can be achieved in ground-level concentration of $PM_{2.5}$ due to the dispersive effect of trees.

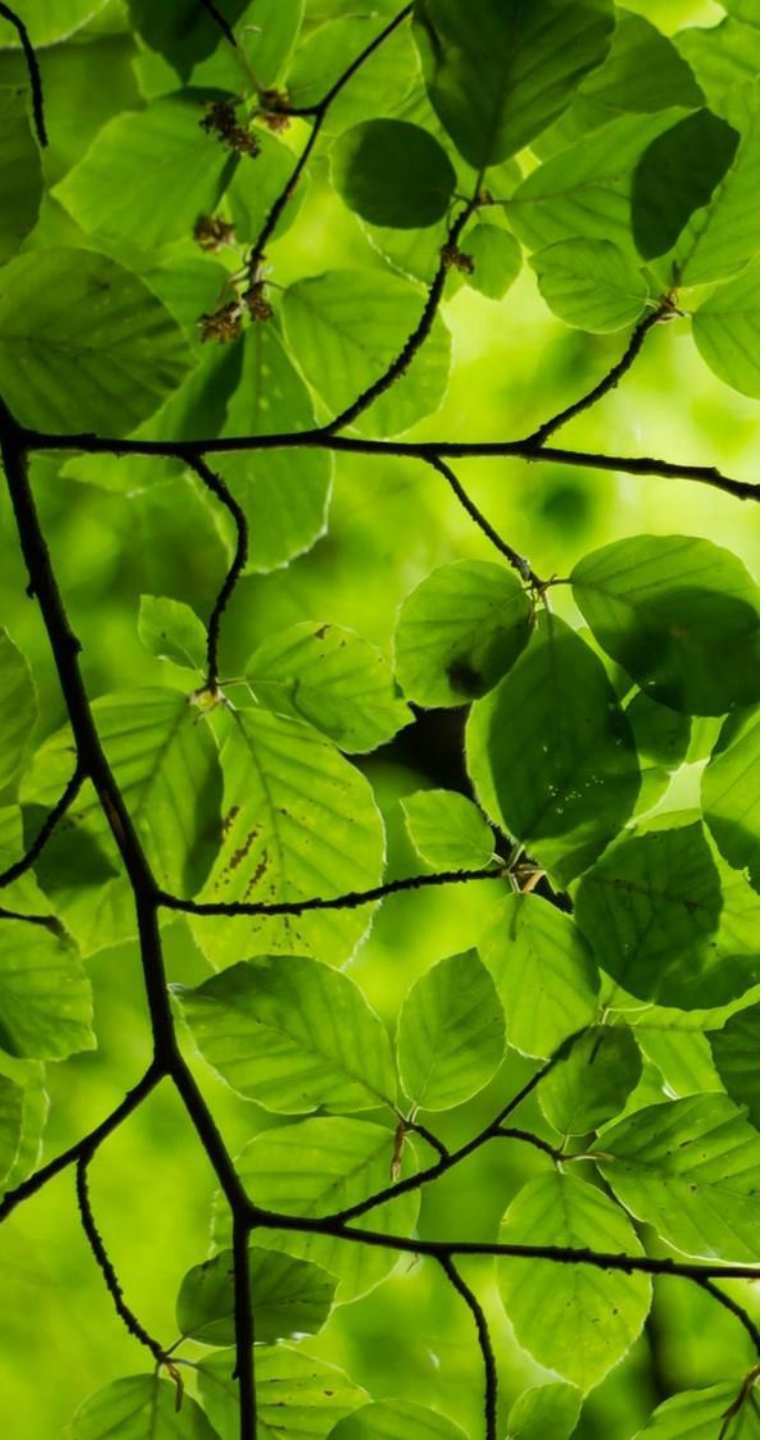
dispersion, linear obstacles

Hedges: extended effective path-length of air from source to receptor

Hedges can cut exposure to black carbon by up to 63% (University of Surrey)



Source: Hewitt, C. N. et al



deposition

- Greenery can potentially protect against air pollution by enhancing the deposition rates of pollutants
- Pollutants deposit more efficiently on vegetation than on smoother artificial surfaces
- Highly dependent on the available surface area and the aerodynamic roughness of the surface

Image: @modernafflatusphotography, Unsplash

Which are the

BEST TREE SPECIES

to reduce air pollution?

filtering activity of trees depends mainly on the

canopy size

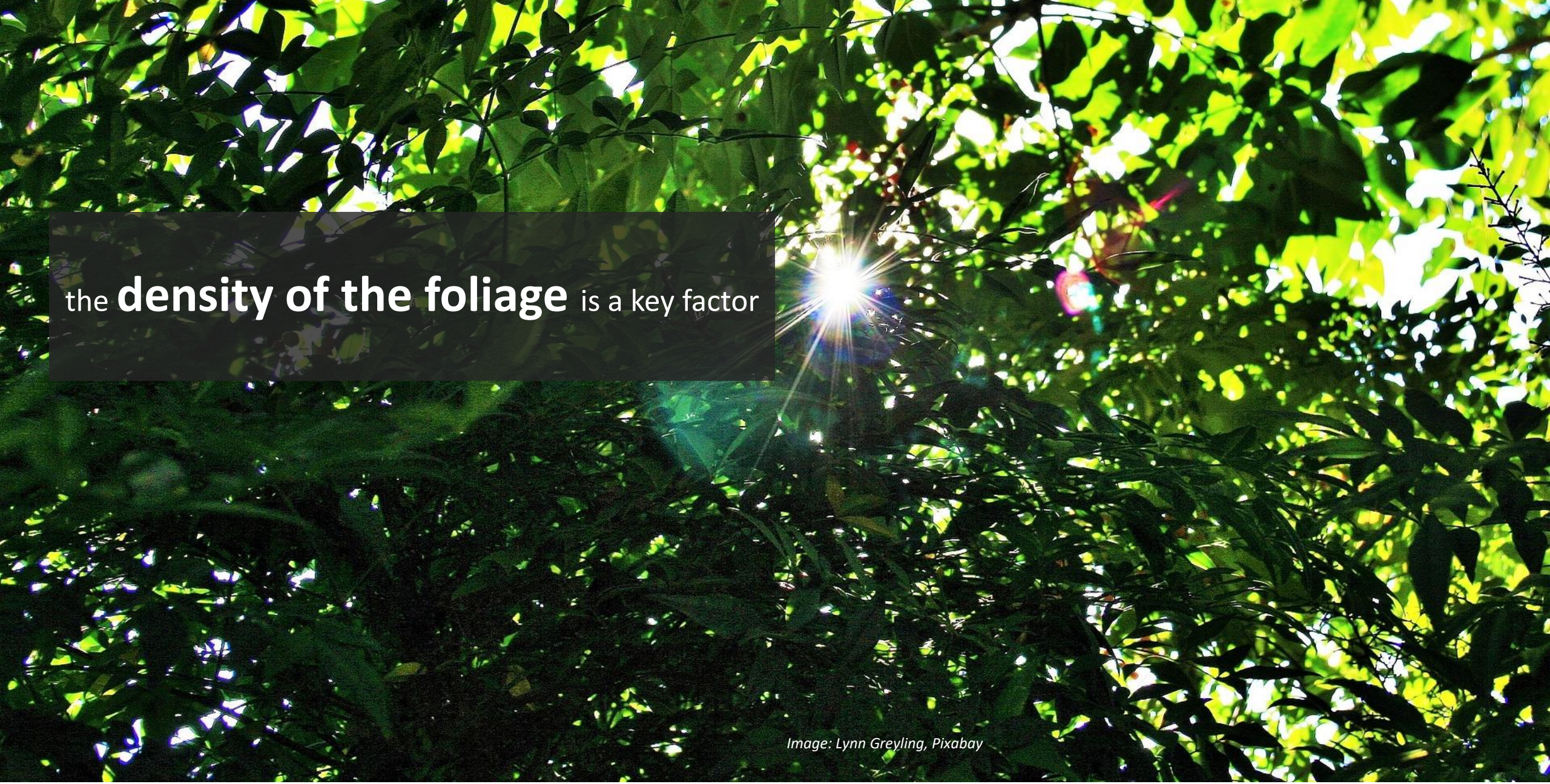
Small Trees
1-4m canopy diameter
3-7.5m²* planting area
e.g. Malus 'John Downie'
Amelanchier lamarckii
'Robin Hill'

Medium Trees
4-7m canopy diameter
7.5-23m²* planting area
e.g. Prunus 'Pandora'
Betula pendula
Alnus cordata

LargeTrees
7-25+m canopy diameter
23-300m²* planting area
e.g. Quercus robur
Platanus x hispanica
Tilia platyphyllos

* This area calculation assumes that a 1m depth of soil is available, if there is less depth then a larger area is required.

Image: Anna French Associates Ltd



the **density of the foliage** is a key factor

Image: Lynn Greyling, Pixabay

shape of the crown

Source: Organically Green Blog

shape of the crown

a **spherical crown** is more effective
than one with a pyramid shape

foliage longevity is a key aspect

Image: Yoksel Zok, Unsplash

leaf size

species with **smaller leaves** tend to be more effective in filtering pollutants

features of leaf surface

rough, **hairy** surfaces, **sticky** leaves
have better filtration potential

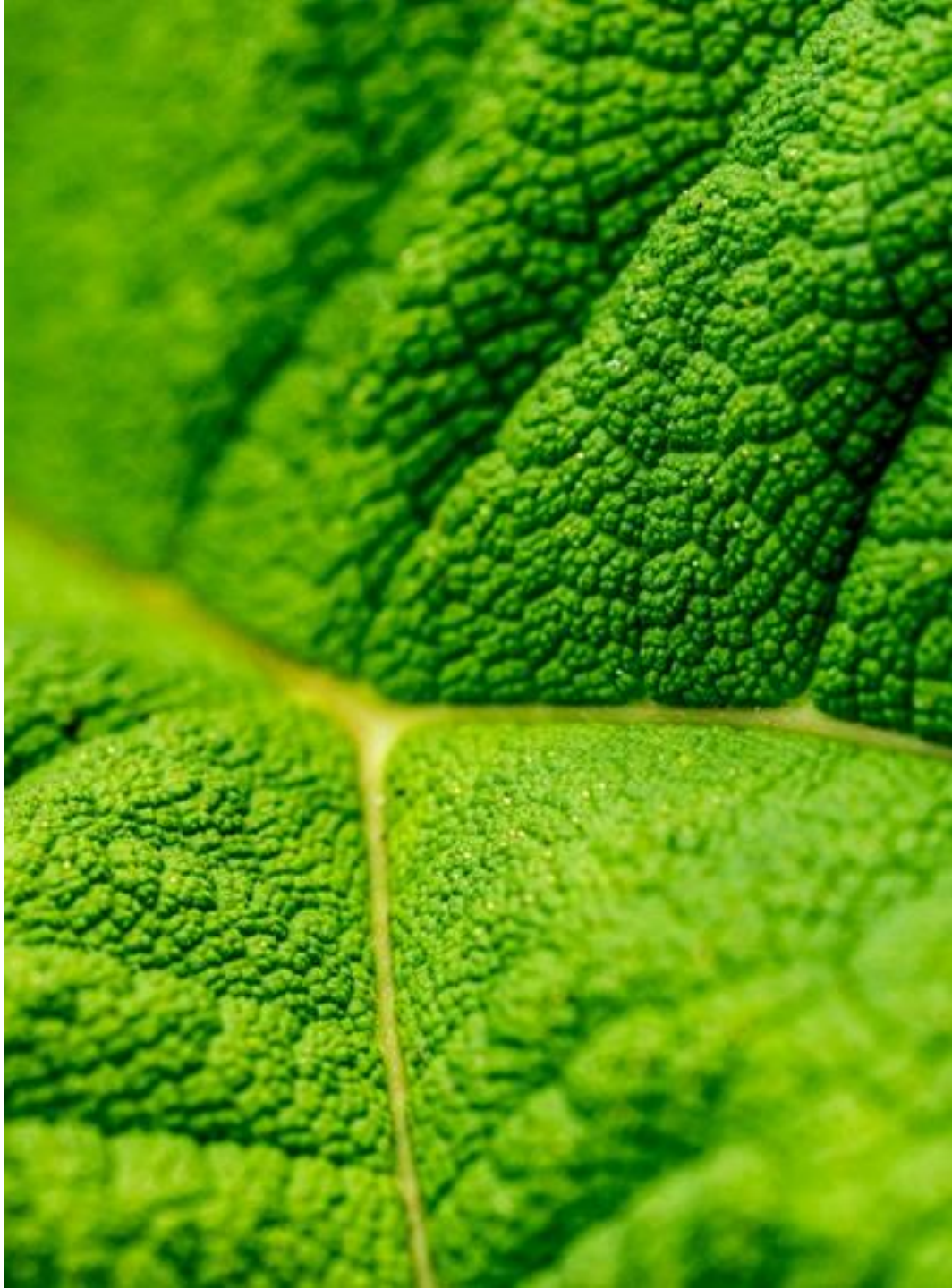


Image: Stefan Steinbauer, Unsplash

COMPOSITION and STRUCTURE

of the vegetation

complex, well-functioning urban ecosystems

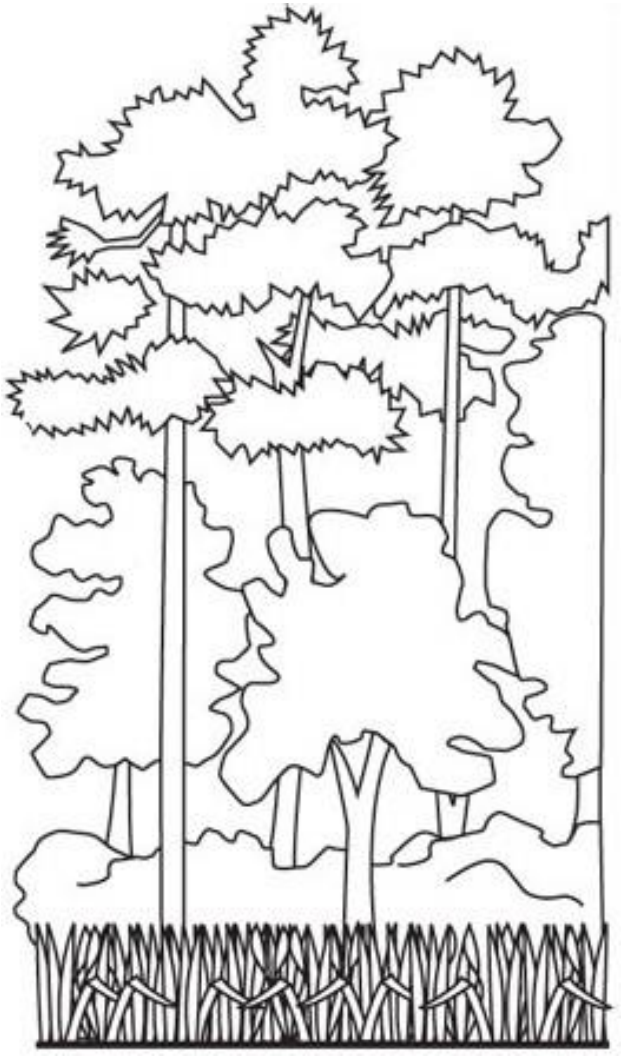
- focus on environmental conditions
- plants to be adapted to topographical, soil and climatic conditions
- plant diversity

Image: Gábor Adonyi, Unsplash

vertical layering of forests

Multi-level tree cover:

multiple floors with trees complemented by shrub floors



Source: University of Missouri

sensitivity of the proposed greenery to the **air pollution**

species with increased tolerance to air pollution

Image: Mike Marrah, Unsplash

CLAIRO Plant Database

(Silesian University in Opava)

- climatic requirements
- sensitivity to acid deposition
- sensitivity to ozone
- ability to remove dust particles

Image: Jan Antonin Kolar, Unsplash

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https://www.london.gov.uk/sites/default/files/green_infrastruture_air_pollution_may_19.pdf

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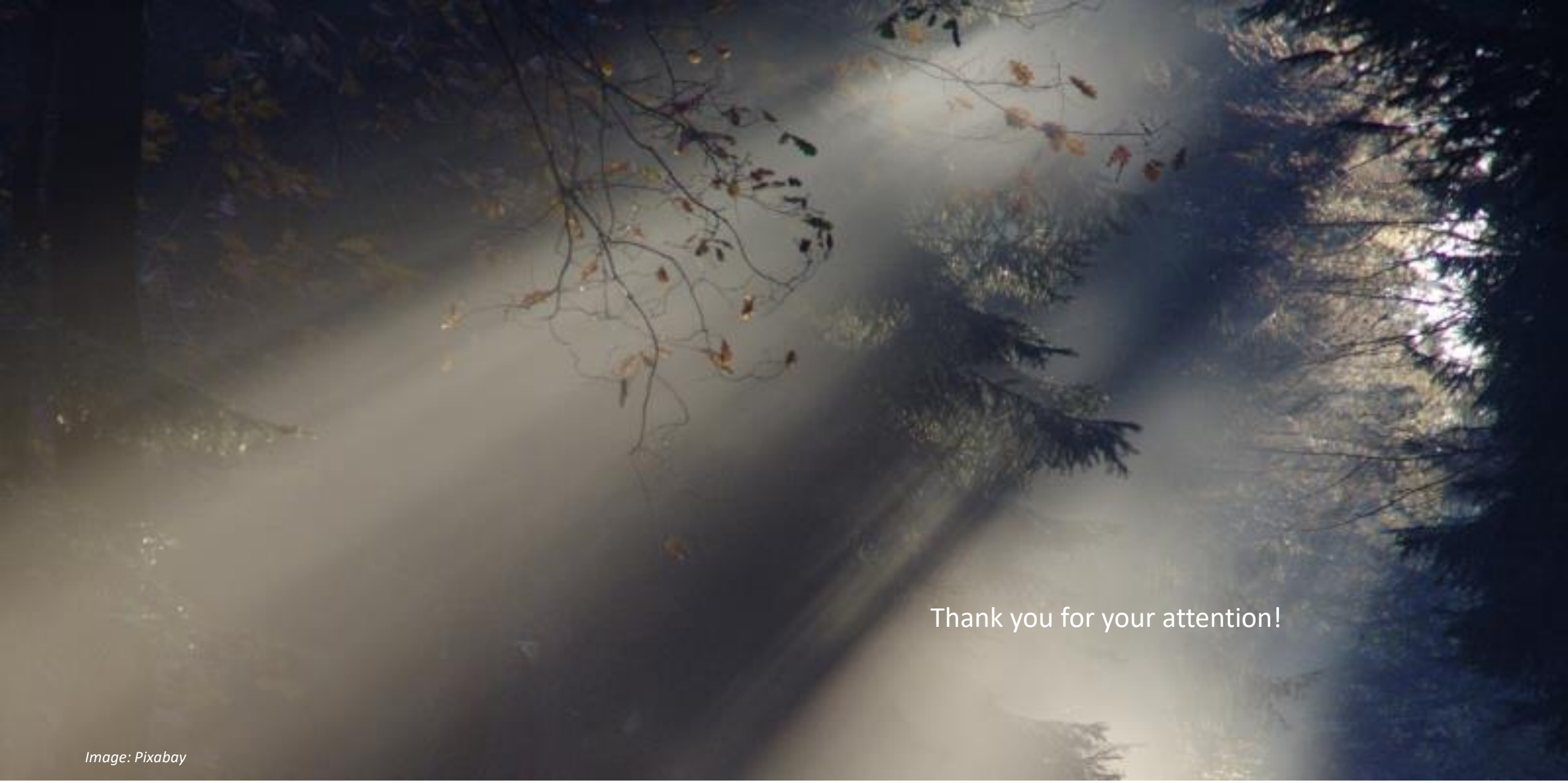
Street canyons			Open roads	
street canyons with **little or no traffic**	street canyons with **moderate or heavy traffic**		people to be protected **immediately at the roadside**	people to be protected **further away**
	wider canyons (height/width ratio > 2)	**narrower canyons** (height/width ratio < 2)		
A dense avenue of trees	**Addition of green open space** to one side	**A hedge or green wall** between vehicles and people	**A hedge or green wall** between vehicles and people	**A combination of hedge and dense line of trees**

Source: Greater London Authority (2019) 'Using Green Infrastructure To Protect People From Air Pollution'



Thank you for your attention!

Image: Pixabay

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