

Treework Environmental Practice

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Treework Environmental Practice

Cost benefit comparison of smaller and larger tree planting and impact on the ecosystem, sense of place and community



**Trees & Design
Action Group**

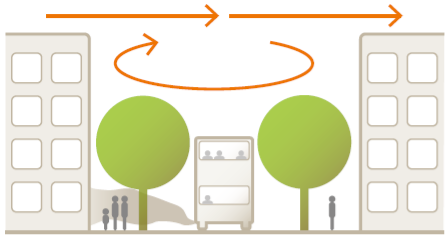
Tree Costs and Financing Options





The Benefits and Craperfits (Right/Wrong Tree/Place)

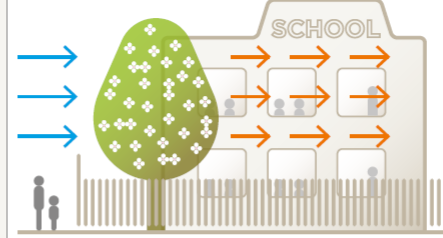
Wrong Street canyons trap pollutants creating poor air quality and less dispersion



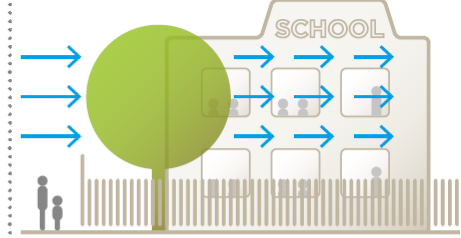
Right Only suitable for trees on one side or occasional trees eg crossings and landmarks



Wrong Allergenic tree species close to buildings eg schools and hospitals



Right Right species is the first decision if tree cover is desirable in that location



Wrong Footway width reduced as trees grow eg wheelchair and pushchair access



Right Create build-outs into road which can also calm traffic and create parking places



Wrong Street tree planting not taking into account high sided vehicles



Right Raise canopy cover by post-planting formative pruning



Wrong Restricting canopy by planting too close to buildings



Right Allow space for natural canopy growth and shape over time



Wrong Tree root damage to low-rise buildings with inadequate foundations



Right Provide resilient foundations to accommodate tree roots in shrinkable soils

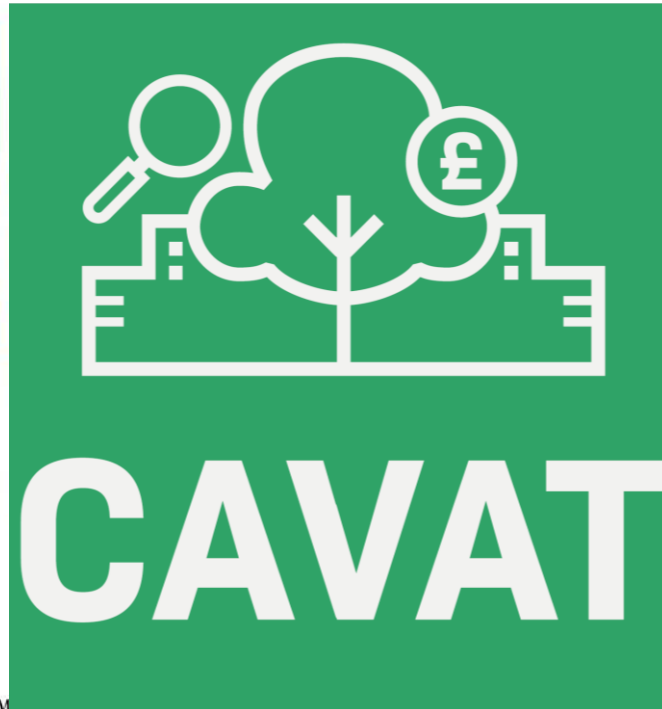




Current Tools for Communicating Tree Value



i-Tree™

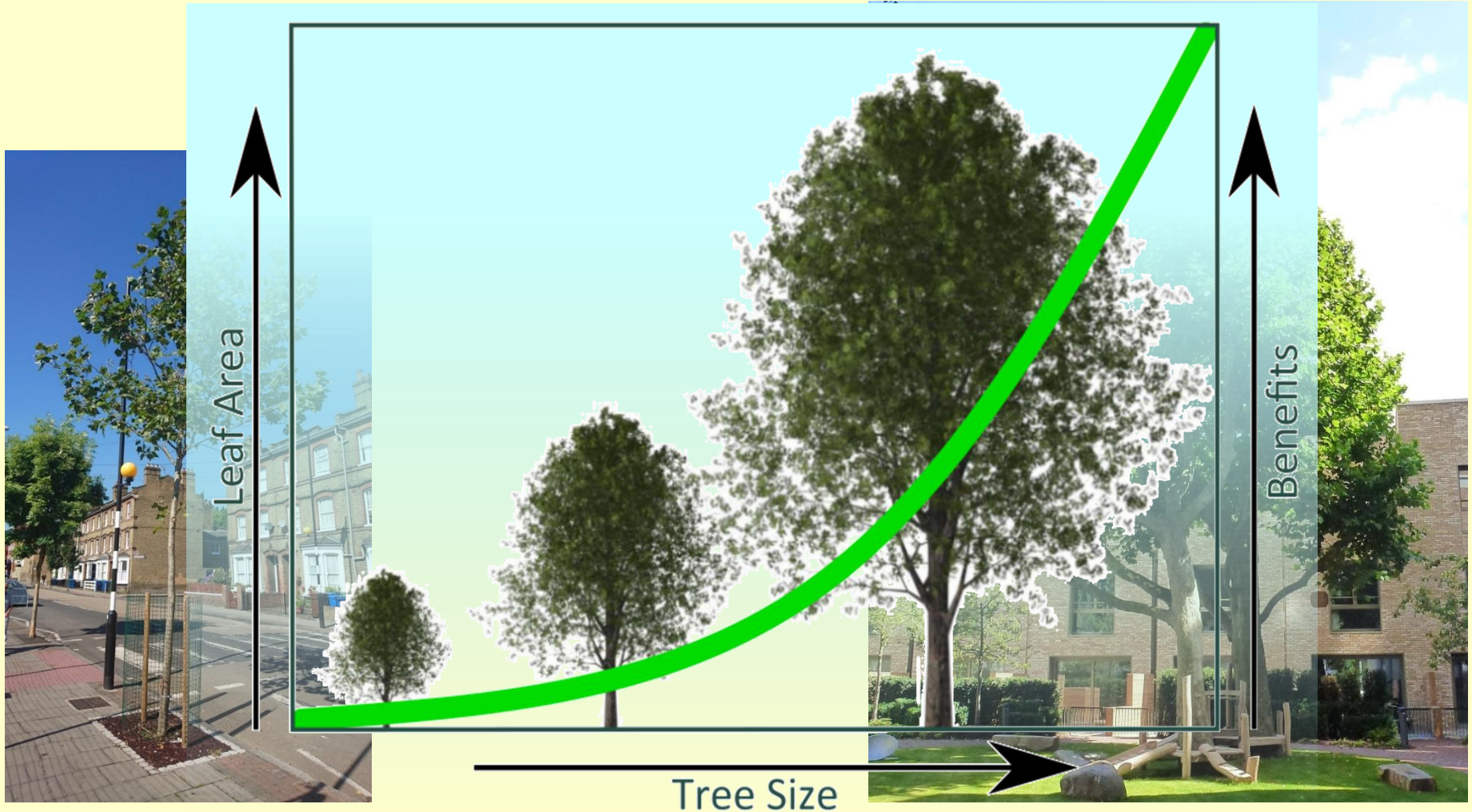


Department
for Environment
Food & Rural Affairs

**Biodiversity
Net Gain**



Large Long-Lived Trees Provide More Benefits



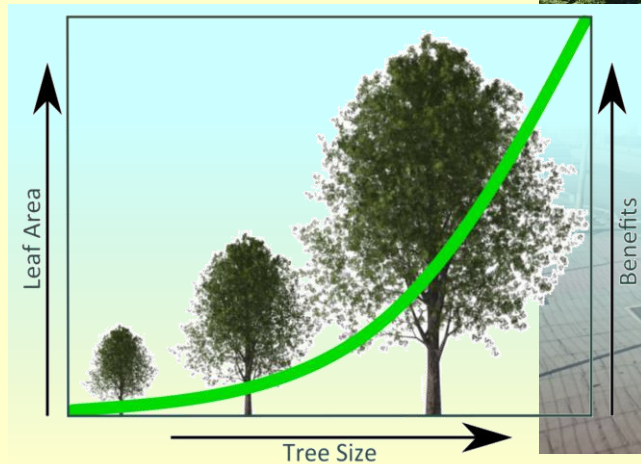


Planning for Trees Must Allow for Growth





Modelling Growth & Value





Modelling Growth & Value

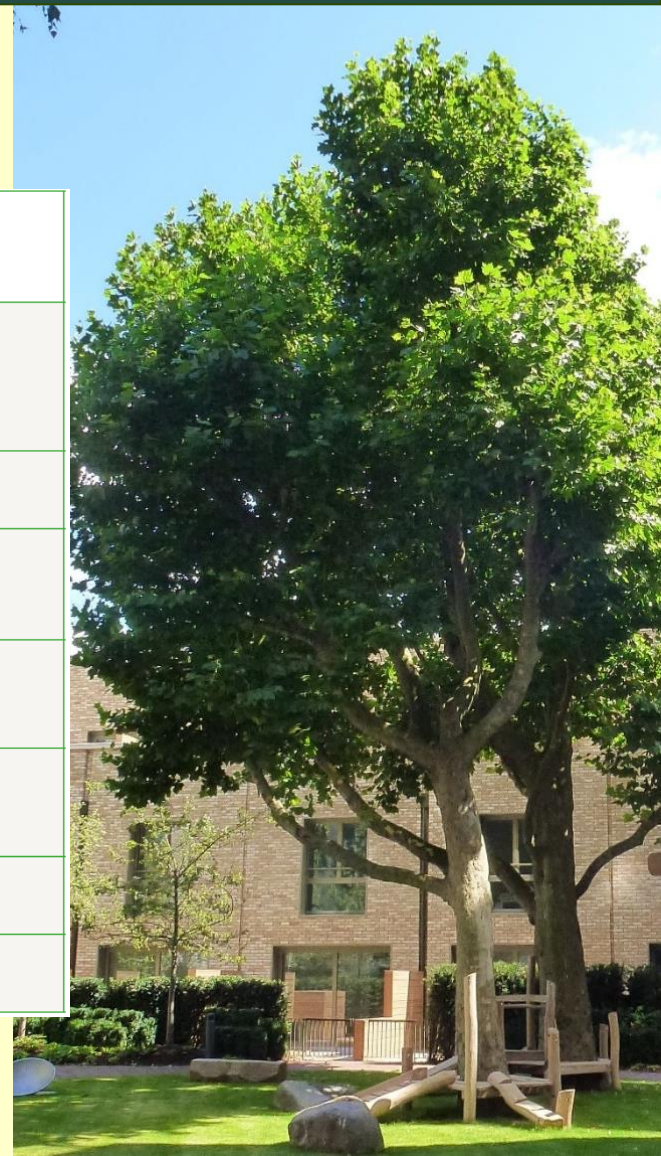


This example assumes:

- Both the existing mature tree and its replacement sapling are in a publicly accessible urban area. Trees in cities will generally have a higher value, but equivalent costs.
- The replacement sapling is planted carefully, and allowed to thrive.
- The location is one where a tree can grow without constraint to maturity and reach its full potential.
- It shows if a mature tree has to be replaced, it must be done in a way that can achieve the potential lifelong asset value.



Modelling Growth & Value



Service/ Benefit	Felled tree: Beech tree (DBH 60cm)	Replacement option: 17-year-old Norway maple (DBH 30cm)		Replacement option: 17-year-old Callery pear (DBH 16cm)	
		Service provision at planting + 10 years	Number of trees required	Service provision at planting + 10 years	Number of trees required
Carbon stored (kg)	1,473	245	7	51	29
Carbon sequestered (kg/year)	22	27	1	5	5
Air pollution removal (kg/year)	0.8	0.3	3	0.04	20
Rainfall interception (litres/year)	2,400	900	3	100	24
Amenity/ CAVAT (£)	82,269	19,693	5	5,899	14
Canopy cover (m ²)	113	42	3	29	4



Modelling Growth & Value

Tree to be removed		Replacement Option 1		Number of trees required
Species common name	London plane	Species common name	Callery pear	
Species scientific name	<i>Platanus occidentalis</i> x <i>orientalis</i> = <i>P. x hispanica</i>	Species scientific name	<i>Pyrus calleryana</i>	
Stature*	Large	Stature*	Medium	
Leaf type	Broadleaf	Leaf type	Broadleaf	
DBH / cm	25	DBH / cm	13	
Estimated age	13	Years after planting	5	
CLE	5	CLE	5	
Site	Open	Site	Open	
Carbon storage / kg	121	Carbon storage / kg	25	5
Carbon sequestration / kg yr ⁻¹	20	Carbon sequestration / kg yr ⁻¹	3	7
Avoided runoff / m ³ yr ⁻¹	1.1	Avoided runoff / m ³ yr ⁻¹	0.1	11
Pollution removal / g yr ⁻¹	379	Pollution removal / g yr ⁻¹	36	11
CAVAT value / £	13,935	CAVAT value / £	3,857	4
Summed normalised ES provision	0.193	Summed normalised ES provision	0.023	9



Selecting urban trees for ecosystem service provision - Forest Research



Planting Costs



Location/ Item	Skeleton/ structural soil on street	Crate system in street or on podium	Soft verge in street	Parkland and green space
Average cost of a 12-14cm trunk diameter Lime tree	£110	£110	£110	£110
Cost of planting the tree itself	£8,085	£10,965	£135	£135
Cost of establishment	£375	£375	£325	£325
Total planting cost	£8,570	£11,450	£570	£570
Annual inspection, general maintenance	£10	£10	£10	£10



Lifetime Tree Costs

Propagation / nursery

Transport

Planting

Establishment care

Management (people / infrastructure costs)

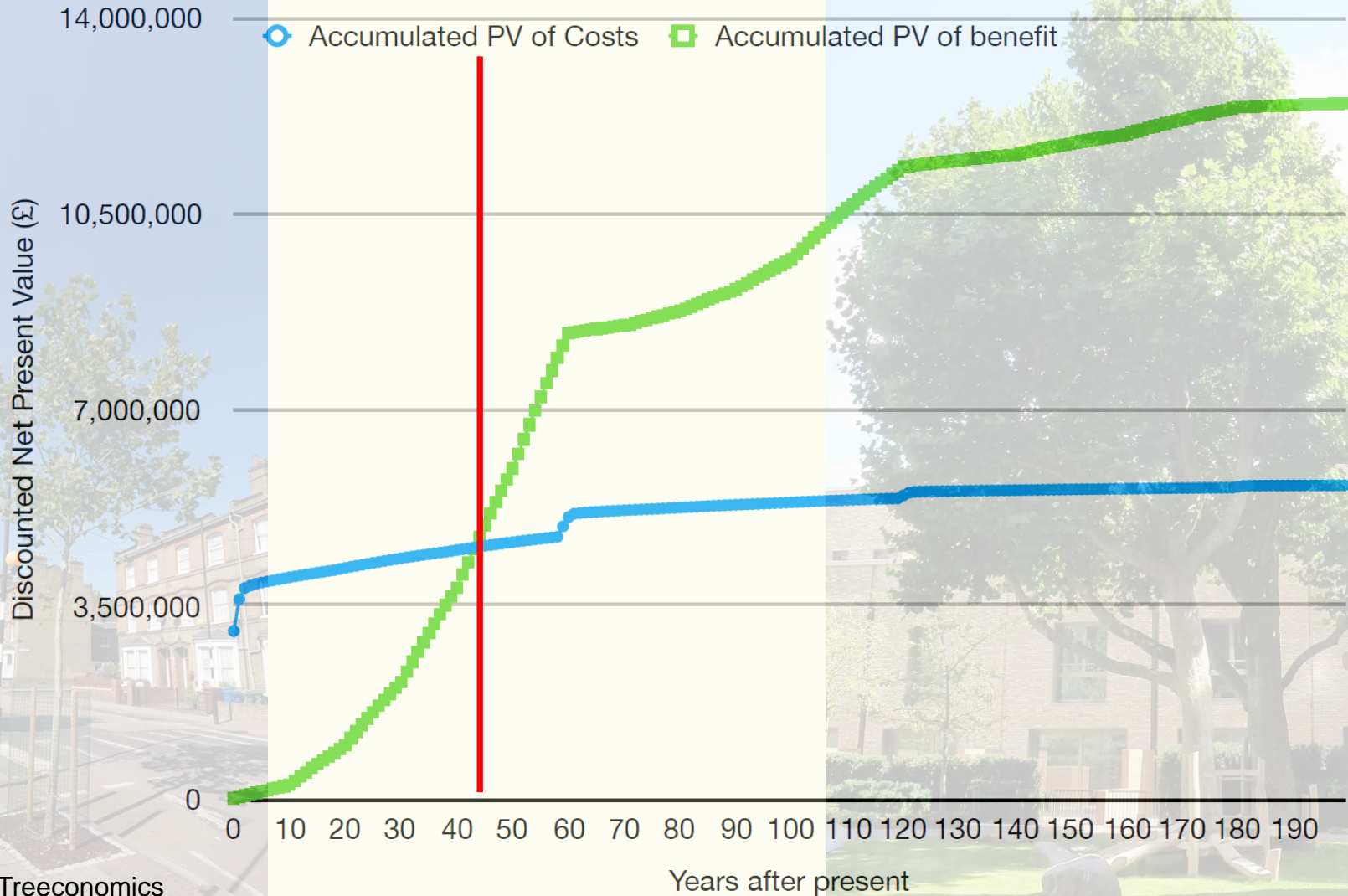
Mature tree maintenance

Removal



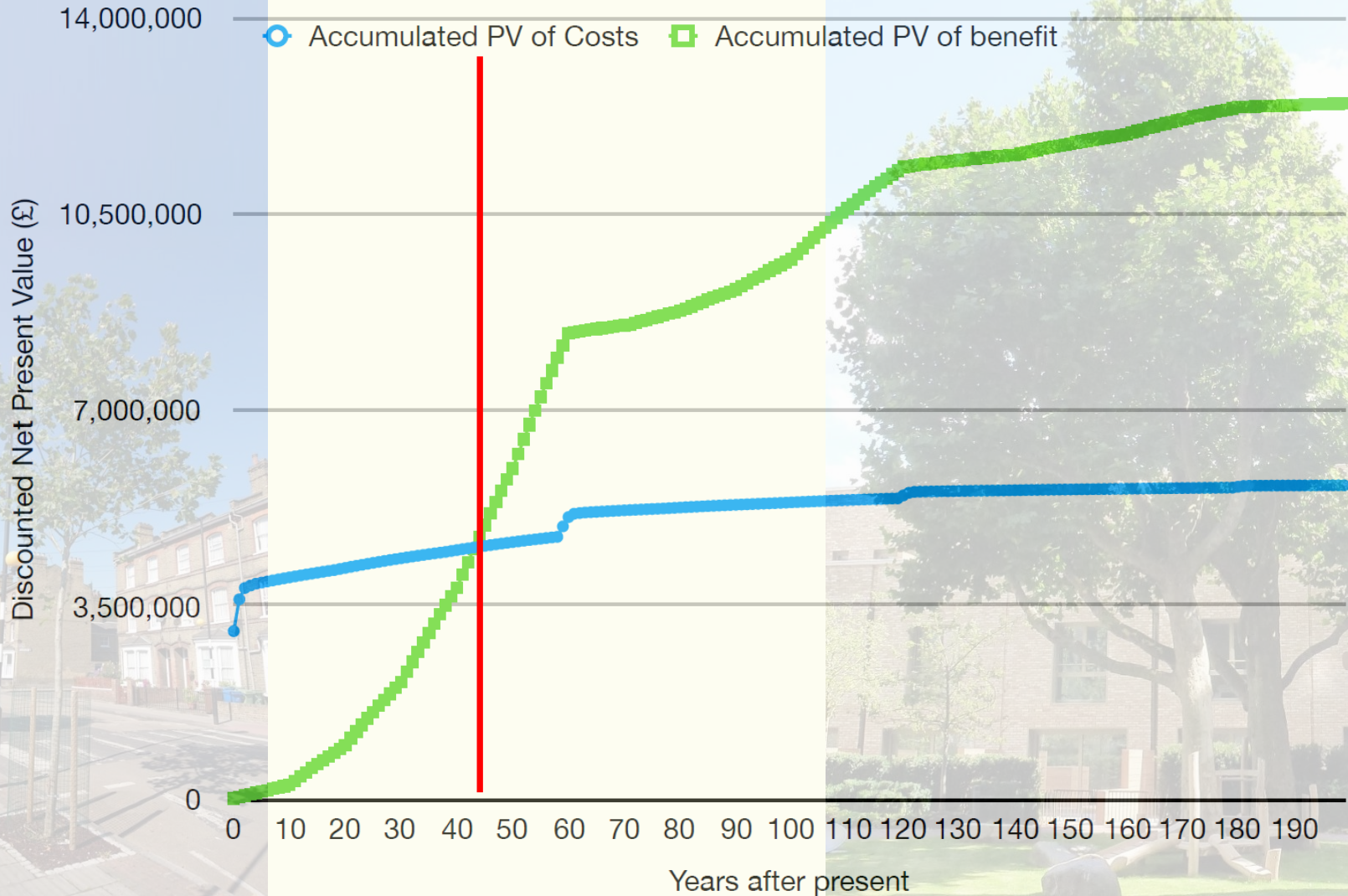


Accumulated Net Present Value of Costs and Benefits





Generally Benefits Exceed Costs Between 30 and 45 Years





...The Tree Planting Performance Gap...

Progress??

- Failure rates range between 10% - 80% within year 1 of planting
- Average young tree mortality rates in the UK are ~25%



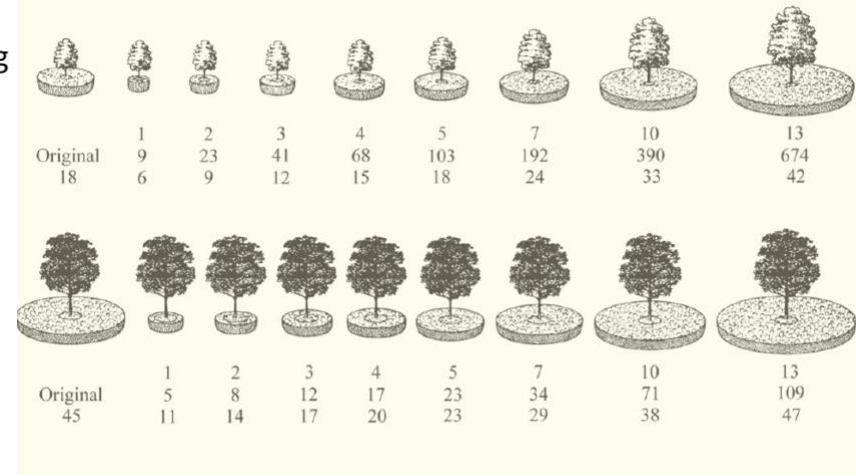
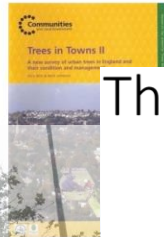
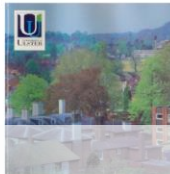
- Urban tree life expectancy is 19-28 years (Roman and Stena (2011))

Gilbertson and Bradshaw 1999

Johnston and Rushton 1999

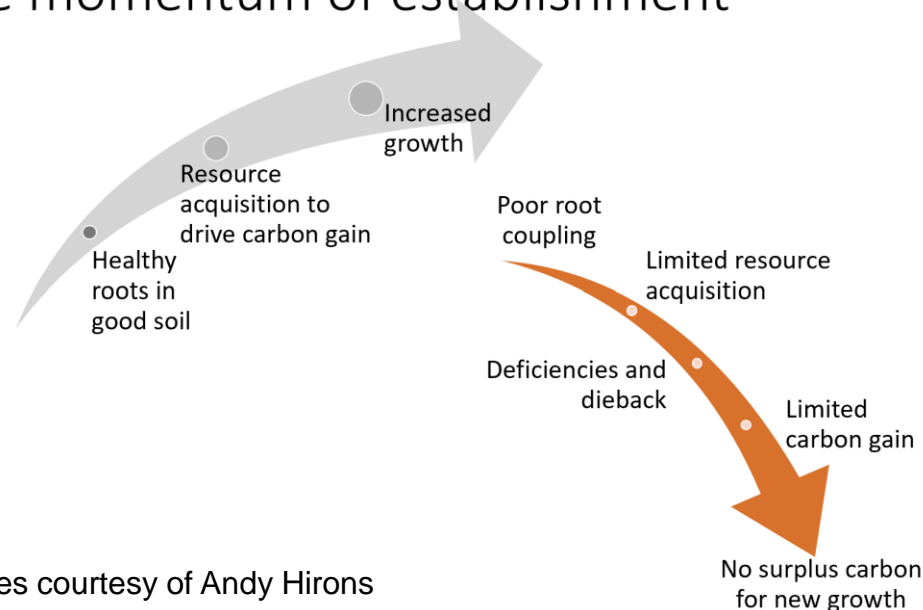
Britt and Johnston 2008

Journal of Applied Ecology 2000, Vol 37, pp 287-299
Publications: 2000
Printed in Great Britain
THE SURVIVAL OF NEWLY PLANTED TREES IN URBAN CITIES
P. Gilbertson* and A.D. Bradshaw**



W. Tod Watson

The momentum of establishment



Slides courtesy of Andy Hirons



...when do Costs Outweigh the Benefits?

One way lorry journey of approx. 500 mile → approx. 0.66 tonnes of CO₂

**30 Years for a 30 cm DBH
Plane Tree to Sequester**



Image from Horticulture Weekly



A Flourishing Mature Landscape Defined by its Trees



1. Retain and plant trees for success:

- **If we are serious about planting (and retaining) trees to deliver benefits, then we MUST be aiming for them to thrive in the landscape for a sufficient length of time (e.g. 100 years).**

2. Large / longer-lived trees provide more value than small trees.

3. Planting trees at large sizes has its place, however the risk of failure and the investment required for success are massively increased.

4. Consider the environmental benefits AND costs of the trees that we plant.