International perspectives on solutions and innovations to greening compact cities

Keynote Presentation

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Evolution of the tree growth form

Cambrian Ordovician Devonian
Paleozoic

Mesozoic

Cenozoic

Development of flowers and fruits:
Volatile compounds for pollination

Development of seeds:
Expressions of tannins in seeds and other plant parts as antifeedants

Root development for anchorage and getting water from the soil:
Many roots expressed special isoflavanoids as defense against microbes

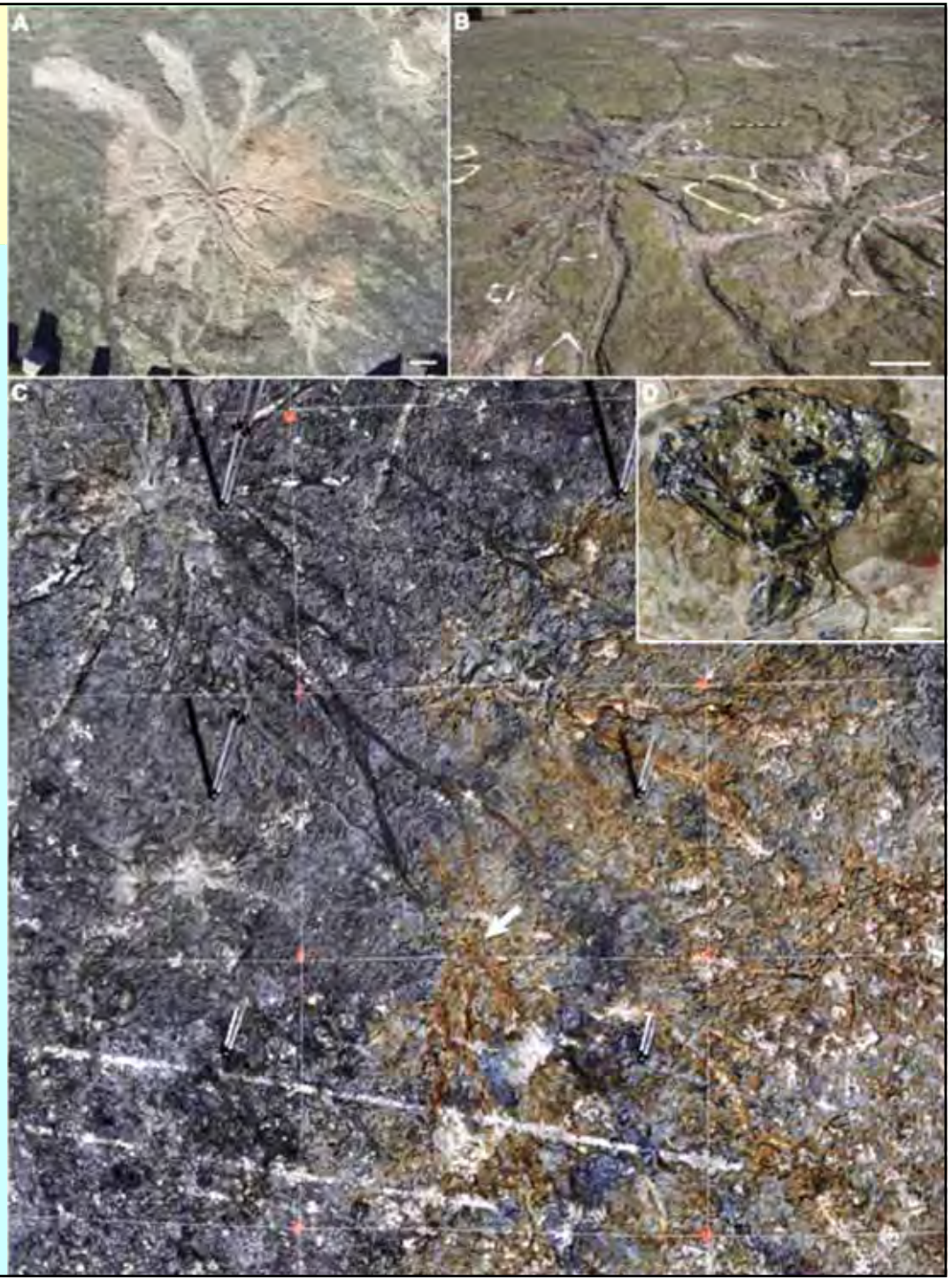
Formation of true leaves with trichomes, as well as thorns, hairs and crystals :
Terpenes, phenolics, alkaloids were expressed in trichomes to repel feeders

Vascular development for efficient transportation of nutrients:
Lignin expression also took place for strength and rigidity to stabilize plant in an upright form

Adaptations to terrestrial life:
Phenylpropanoids, flavonoids, abscisic acid and sporopollenins were biosynthesized to protect against UV damage.
Bryophytes also developed cuticles to overcome desiccation.

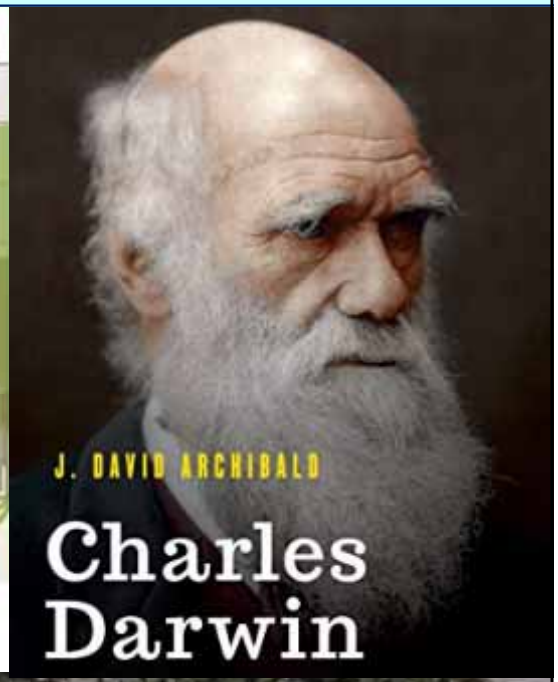
Fossil record of early tree roots

- Palaeosol, Cairo, NY
- Circa 380 MBP
- Mid-Devonian
- Early evolution of trees
- Tree fern like plant
- Complex & advanced root system
- Radial spread pattern
- Ramified, hierarchical, tapering
- Nature’s survival strategy



Inadequate and hostile aerial and soil growing space

- **From survival of the fittest, to expecting the unfit to survive**



Compact city development mode

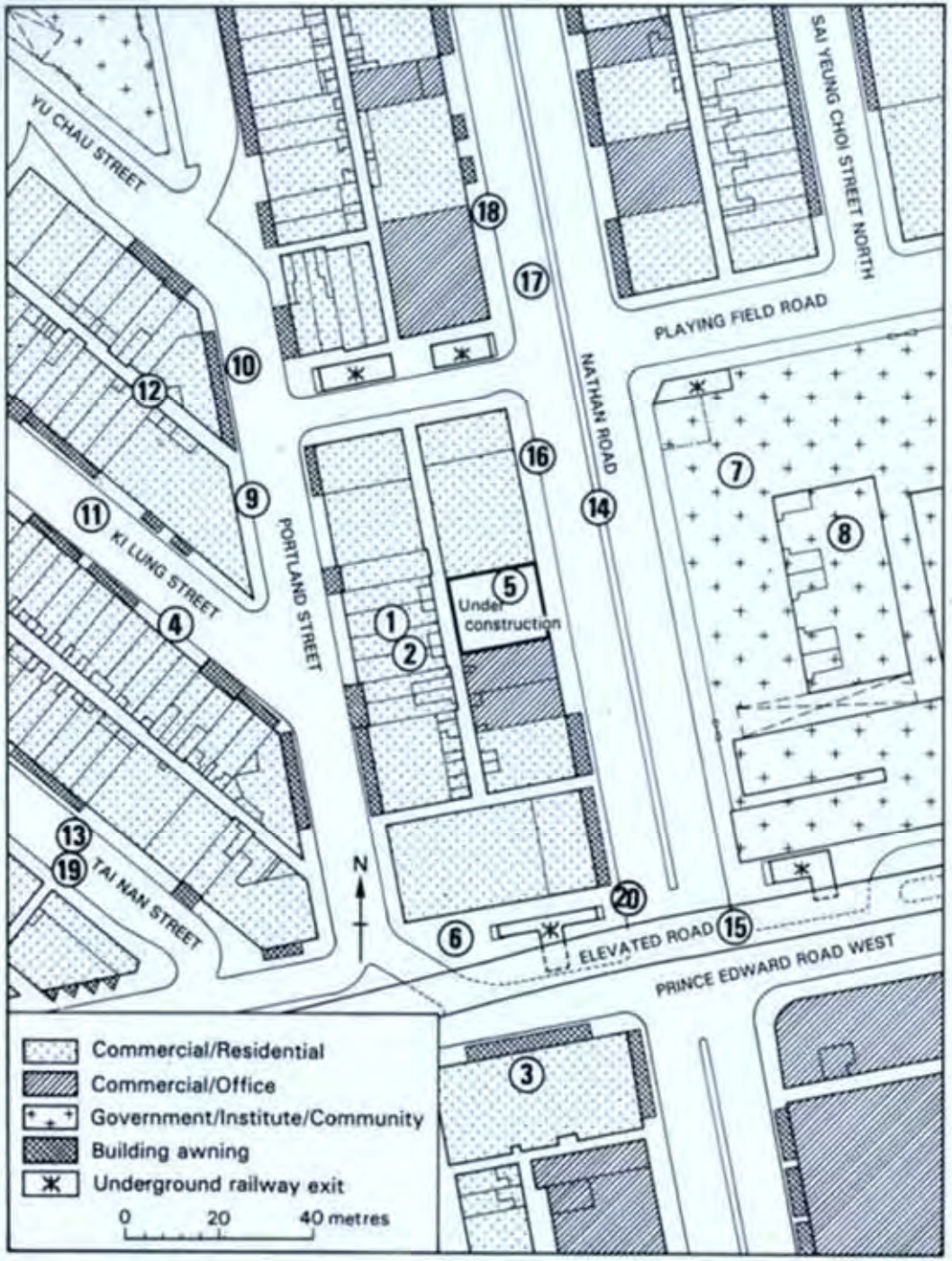
Tight urban fabric: Meagre planting space

A Building and related constraints

1 High building density
2 Finely divided building lots
3 Site coverage at 100% at street level
4 Narrow frontage of buildings
5 Redevelopment at higher intensity with more site coverage and floor area
6 Scanty occurrence of incidental and remnant amenity plots
7 GIC ground level space usurped by vehicle parking with hard paving
8 GIC sites threatened by redevelopment and infilling at higher density

B Road and related constraints

9 Narrow pavements
10 Awning above pavements
11 Narrow roads
12 Narrow lanes
13 High road density
14 Narrow or no central dividers
15 Elevated roads
16 Profusion of underground utilities
17 Heavy vehicular traffic
18 High pedestrian flow
19 No pedestrianization
20 High density of traffic signs



Tree-unfriendly development

Raise green cover in built-up areas

Preserve interstitial greenery

Nice

Kuala Lumpur

Allocate green space in urban renewal

Singapore

CY Jim

Maximise green plot ratio

Assign generous roadside greening space

Furnish wide roadside green verge

Grasse

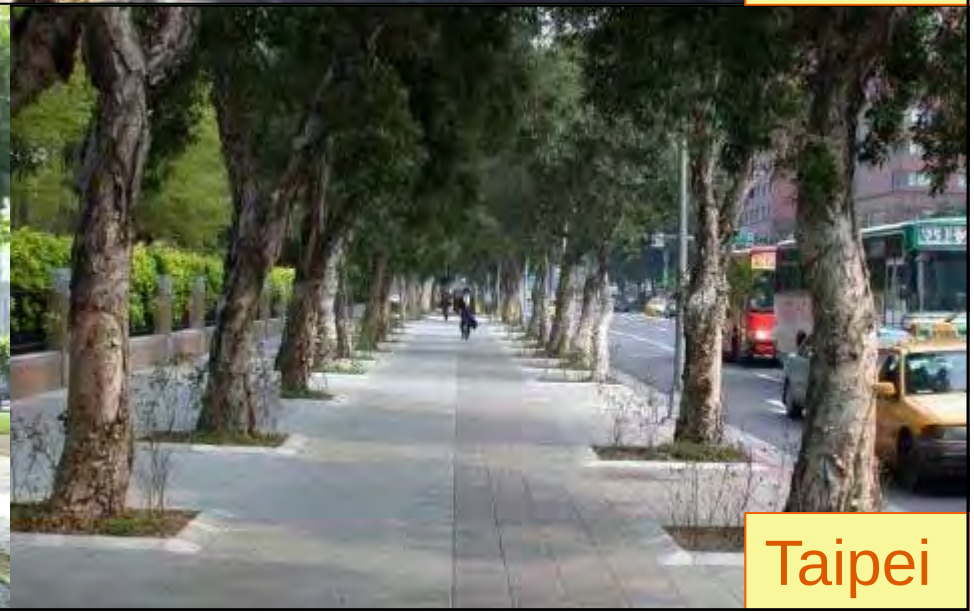
Baltimore

Install multiple rows of roadside trees

Bruges

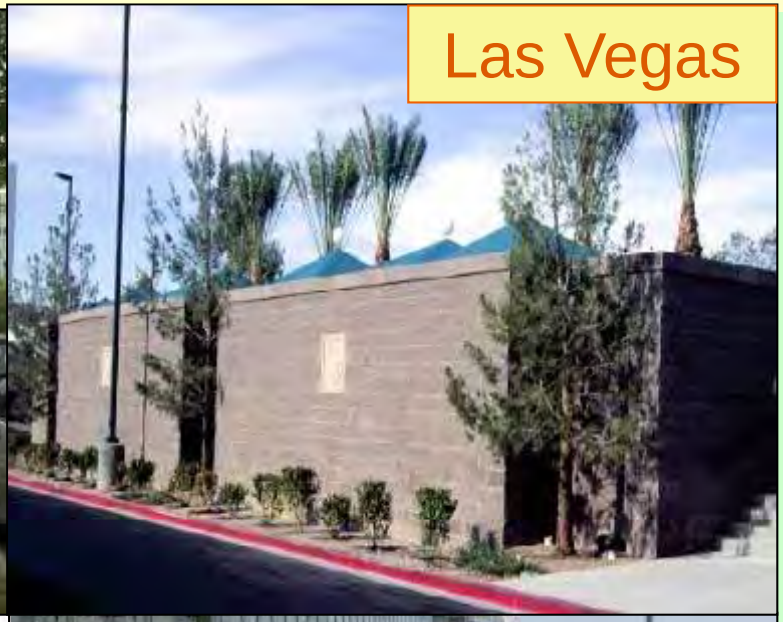
Rome

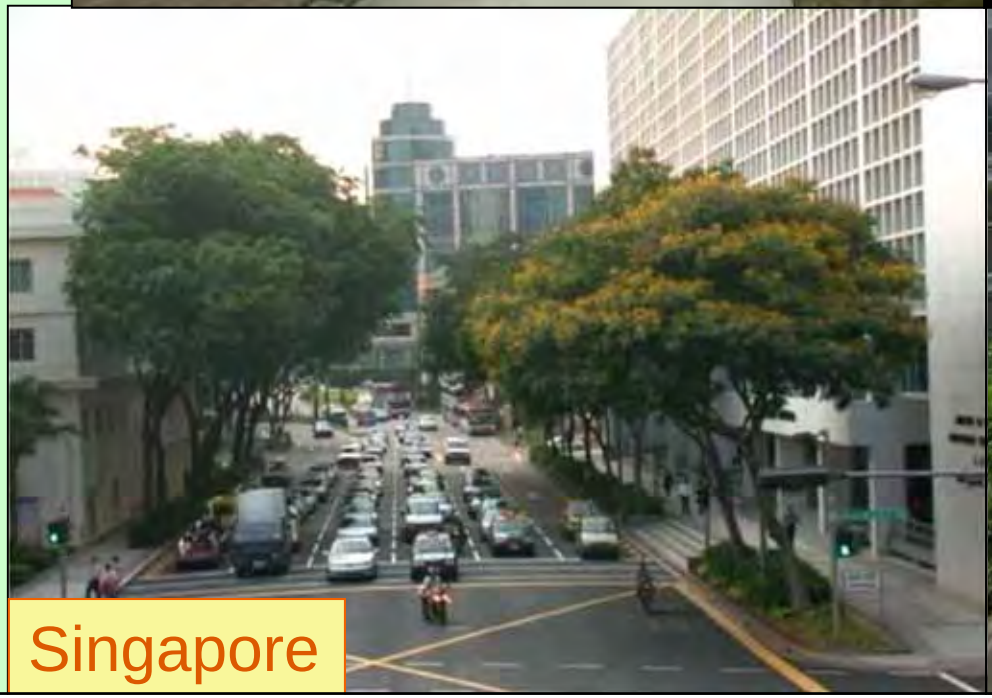
San Francisco



Taipei

Set back buildings or roadside trees





Widen pavements for trees

Lanzhou

Singapore

Accommodate trees in central business districts

San Francisco

Zurich

Dunhuang

Green pedestrianised shopping streets

Barcelona

Frankfurt

CY Jim: G

Maximise street greening

Tokyo

Plant trees along narrow pavements

Zurich

Dunhuang

Sapporo

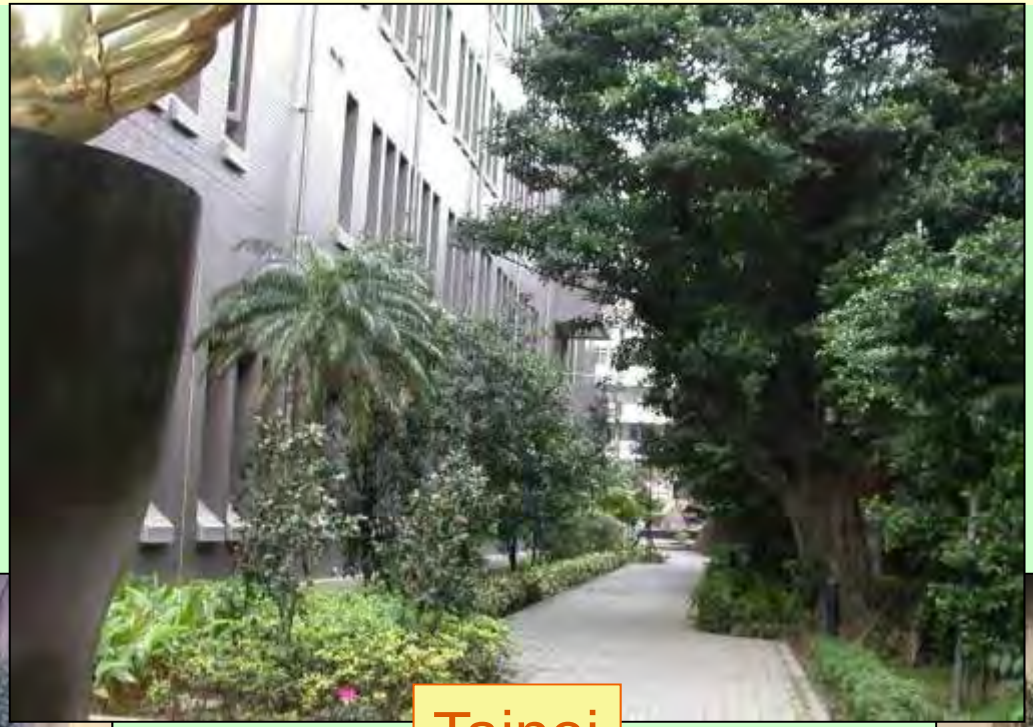
Fit trees into narrow roadsides

Venice

Vancouver

Vancouver

Nurture trees in narrow lanes



Taipei

Venice

Barcelona

Adopt high hedge and tree pleaching

Berlin

Brussels

Brussels

Generate green tunnel effect

Brussels

Nanjing

Establish exemplary highway greening

Singapore

Green civic space in city centre

New York

Sydney

Establish high-quality urban lawns

Paris

Seoul

Develop greenways or linear parks

Tokyo

Vancouver

Leuven

Kagoshima

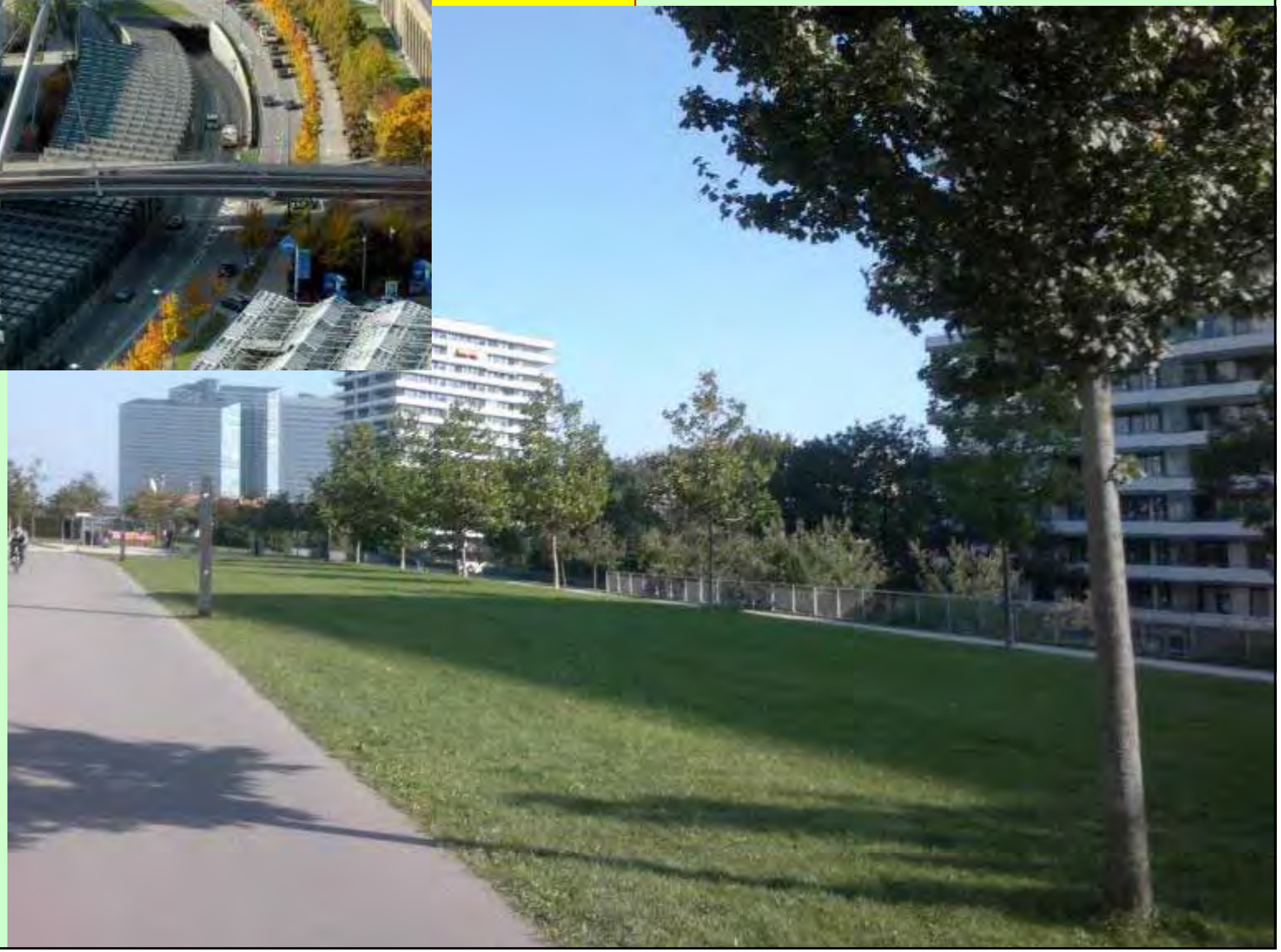
Insert greenway between buildings

Build greenway above railway tracks

Munich

Build greenway above highway

Munich



Convert old railway viaduct to greenway

Paris

CY Jim: Greening compact cities

Convert old railway viaduct to greenway

New York

Rehabilitate old flyover as greenway

Seoul

CY Jim: Greening c

Cover tramways with grasses or herbs

Barcelona

Dublin

Vienna

Zurich

Enhance greenway landscape design

Singapore

Versailles

Sapporo

Reserve green fingers in urban development

Moscow

Xiamen

Hong Kong

Preserve combined blueway & greenway

Dublin

Revive urban river as blueway-cum-greenway

Seoul

Create green-cum-blue infrastructure

Tokyo

Optimise greening of promenades

Plant tree clusters to create mini-woodlands


Paris


Osaka


Singapore


Bruges

Preserve or conceive urban forest parks

Dublin: Phoenix Park

London: Holland Park

Paris: Bois de Boulogne

Tokyo: Meiji Shrine

Maximise greenery cover and biomass

San Francisco

Vancouver

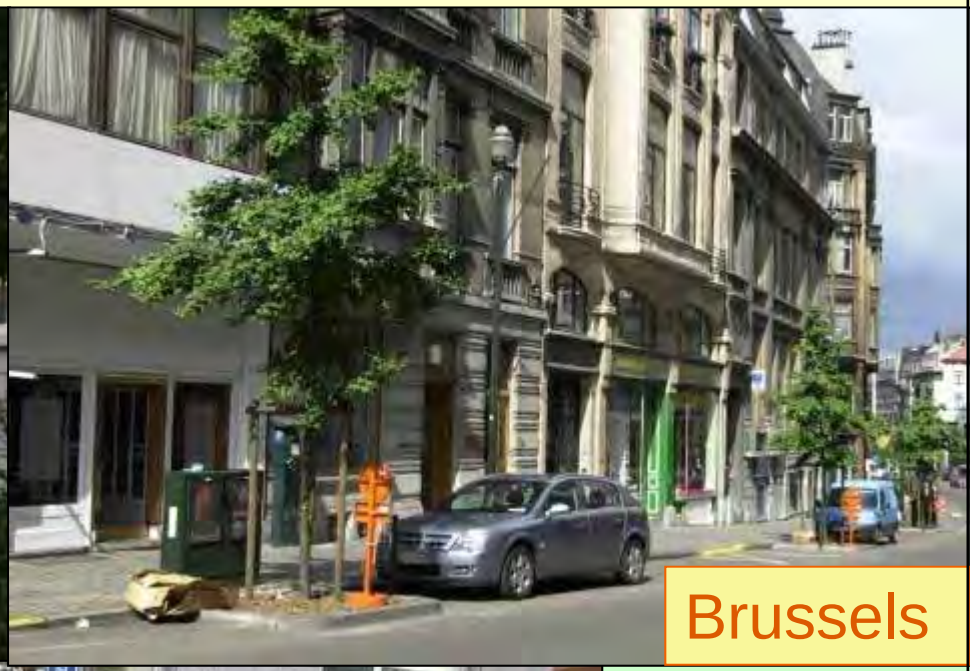
CY Jim: C

Green emergency vehicle access

Singapore

Plant trees at roadside parking spaces

Saint Gallen



Brussels

Zurich

Green areas below flyovers

Singapore

CY Jim: Greenin

Green bus stops

Green urban space collaterally using florist shop

Prague

Green temporarily vacant building lot

Singapore

Adopt minimum-space vertical greening

Venice

Leuven

Zurich

Establish roadside shrub screen

Anaheim

Lido

Prague

Plant trees in indoor space

San Francisco

Singapore

Vancouver

Sapporo

Design naturalistic parks

Tokyo

Tokyo

Insert natural pockets into green spaces

London

CY Jim: Greenin

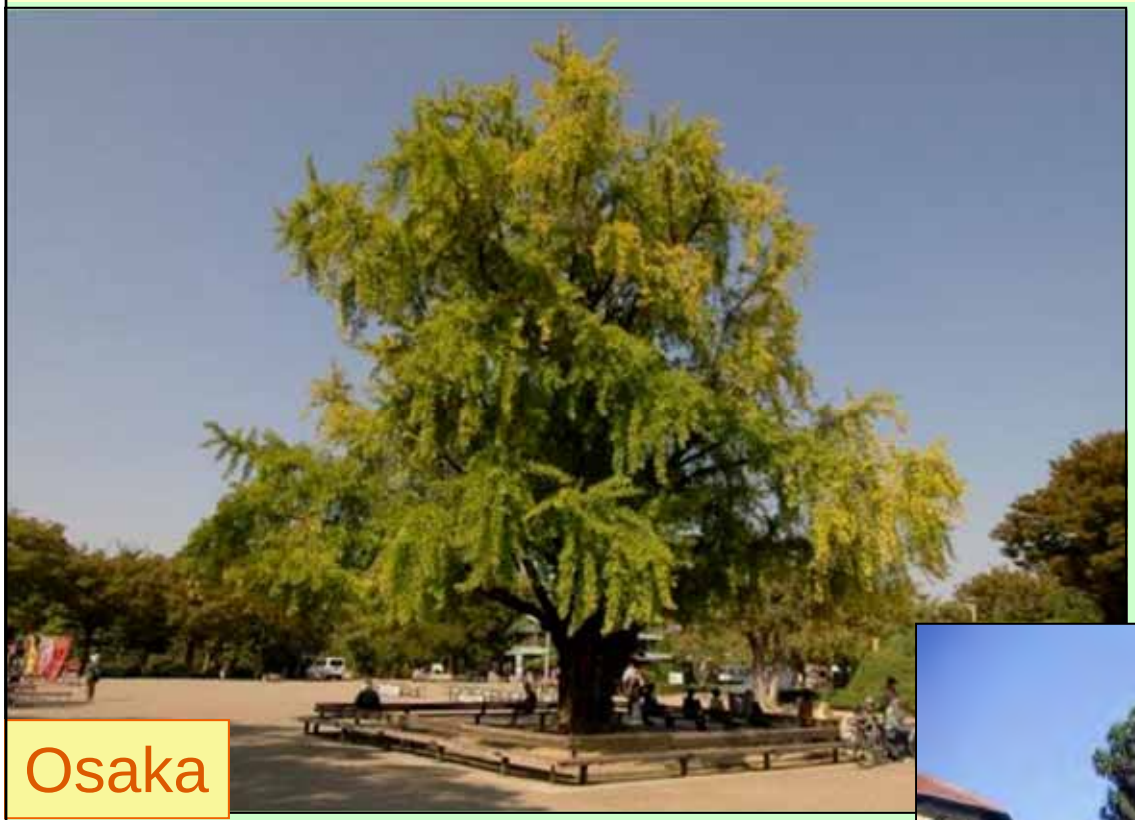
Urban woodland for ecosystem services

Tokyo

Encourage food production in cities

Allotment garden & urban agriculture

Protect heritage and champion trees

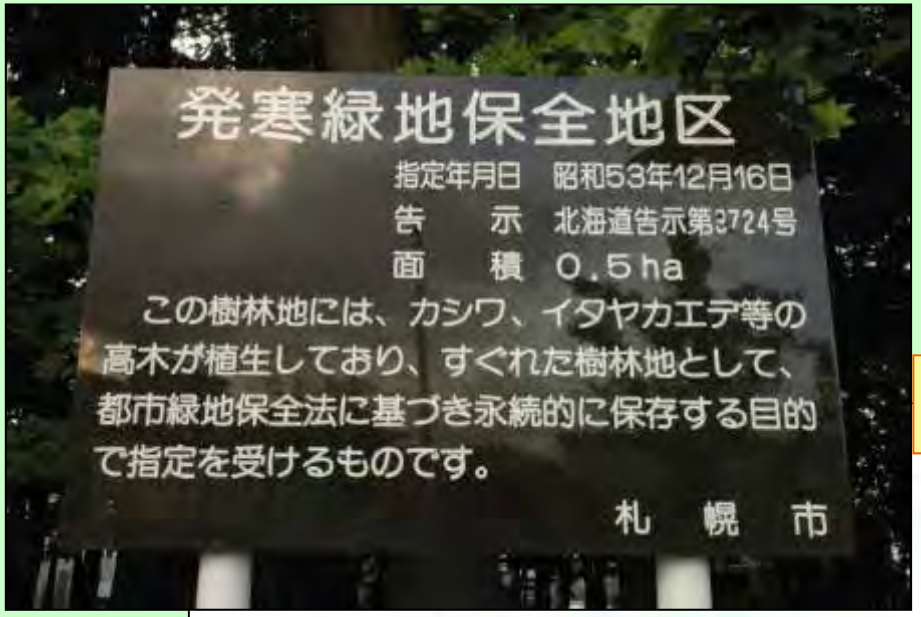


Osaka

Vertimiglia

CY Jim: Gree

Preserve woodland in developed areas



Sapporo

Transplant large trees *en masse*

Promote three-dimensional urban greening

Revive roof greening tradition

Inspire innovative green roof design

Amsterdam

Darmstadt

Singapore

Fukuoka

Install green roof on railway station

Install green roof on enclosed highway junction

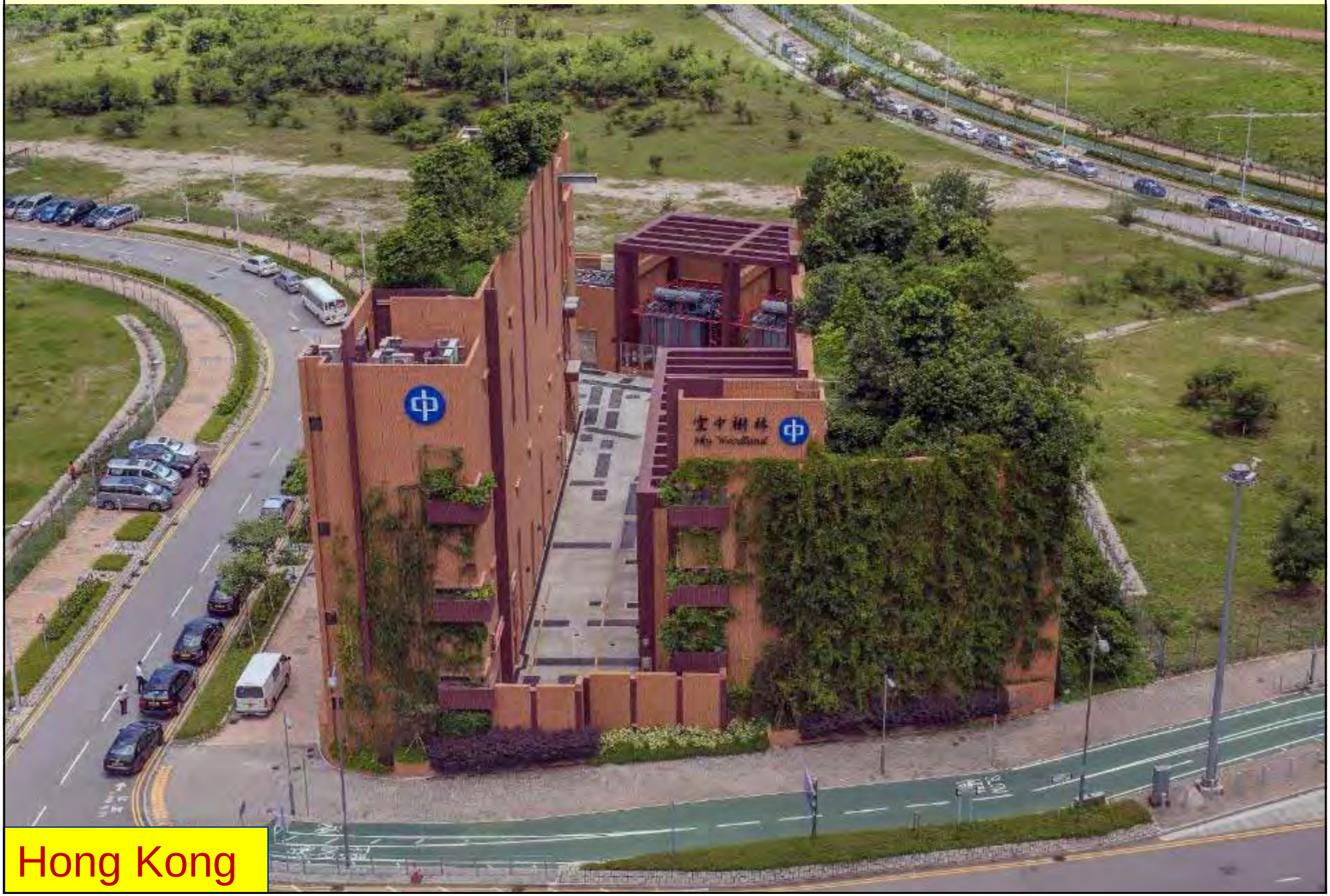
Tokyo

Install green roof on underground carpark

Chicago

Install green roof on shopping mall

Envelop building with sky woodland and green wall



Hong Kong

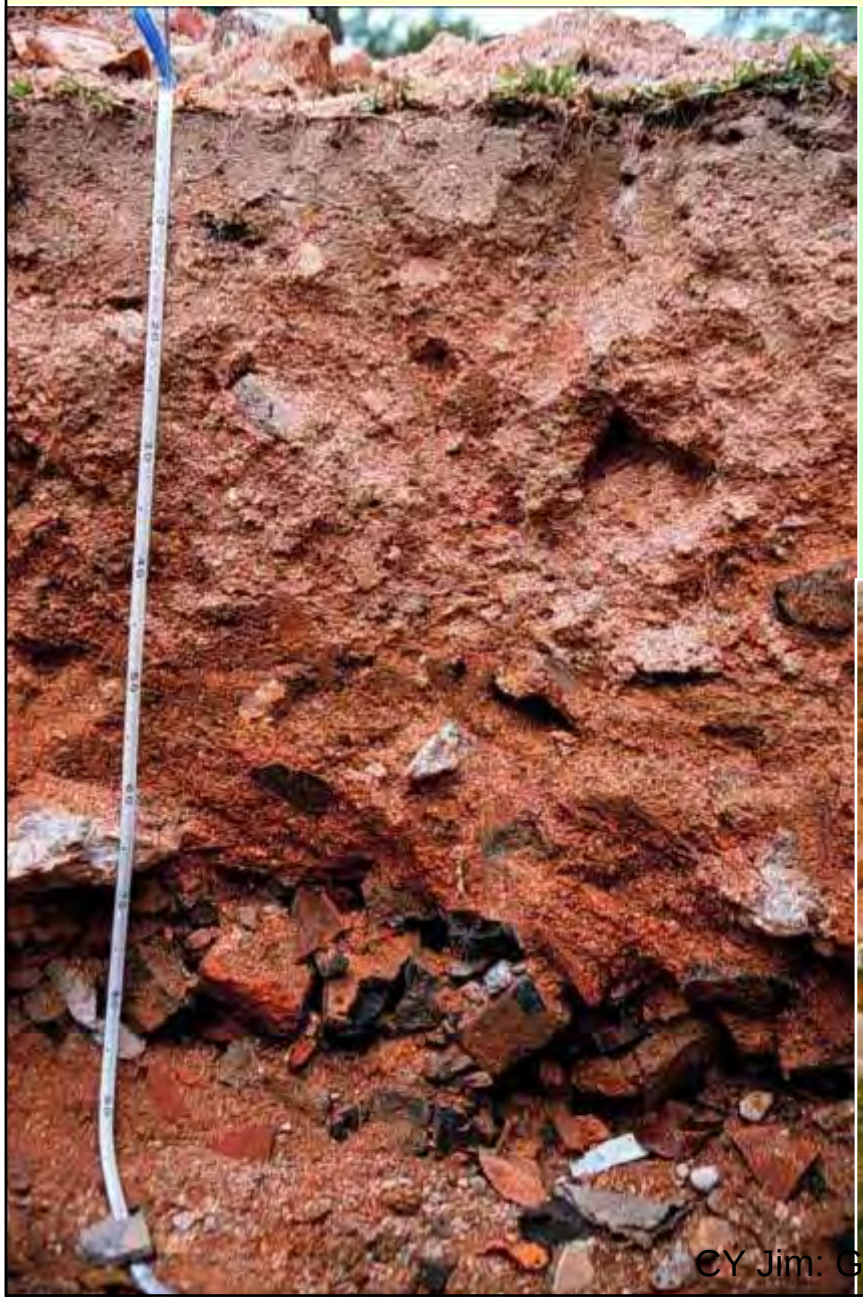
Nurture luxuriant green wall

Milan

Bosco Verticale

Milan

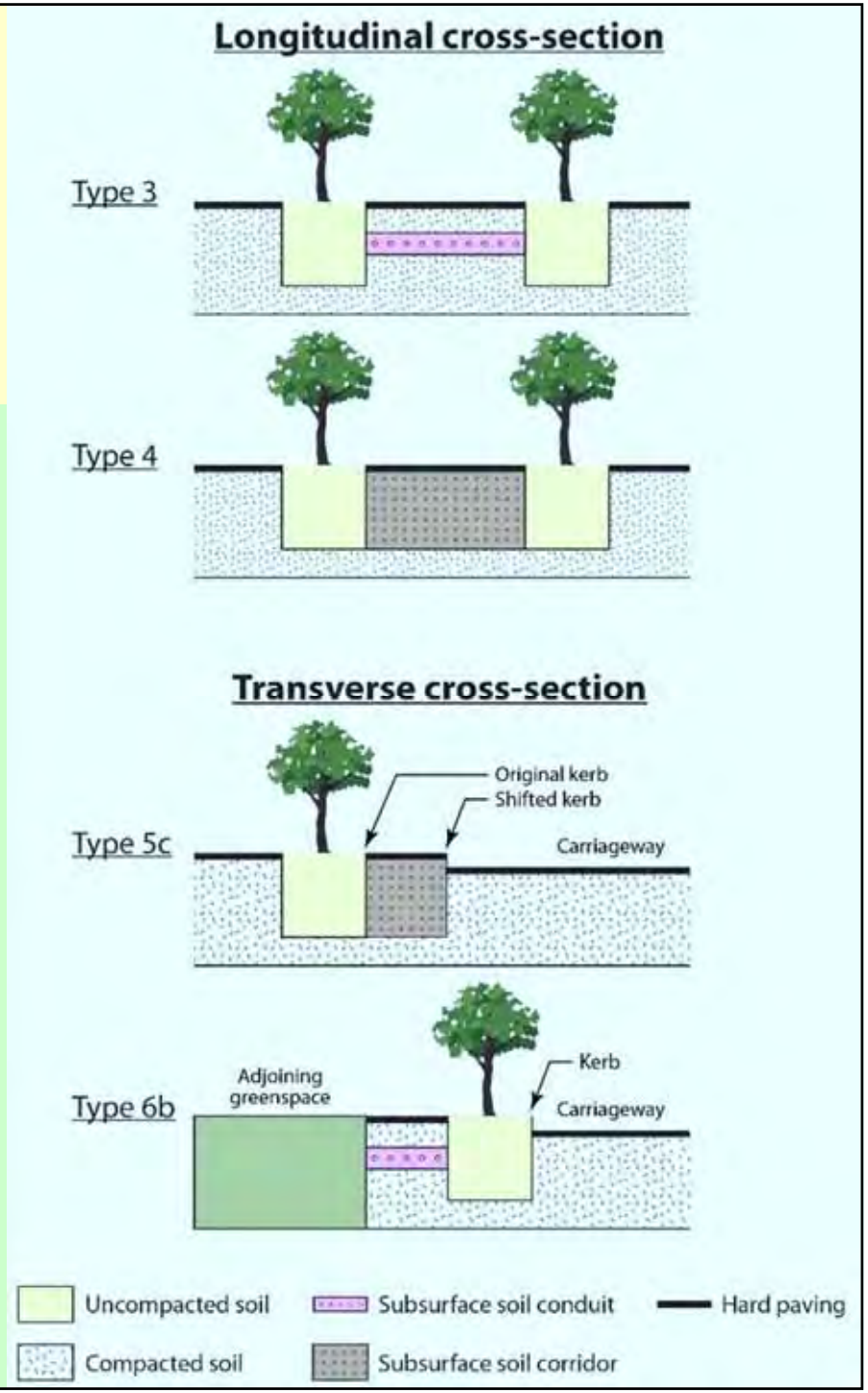
Poor soil, poor root growth, poor tree



- Shallow
- Stony
- Sandy
- Compacted
- Layering
- Poor structure
- Low porosity
- Truncated
- Buried

- Construction rubble
- Artifacts
- High pH (alkaline)
- Meagre organic matter
- Nutrient deficient
- Nutrient unavailable
- Soil pollutants
- Low moisture content
- Poor drainage

Strategies for roadside soil volume extension: Soil connectors



CY Jim: Greening compact

Enlarge tree pit: Without or with suspended paving

CY Jim: Green

Expand tree pit

Install roadside soil corridor

Chicago

Berlin

C

Apply soil-root rehabilitation

Vertical mulching

Radial trenching

Improve urban soil for trees

Exeter

Taipei

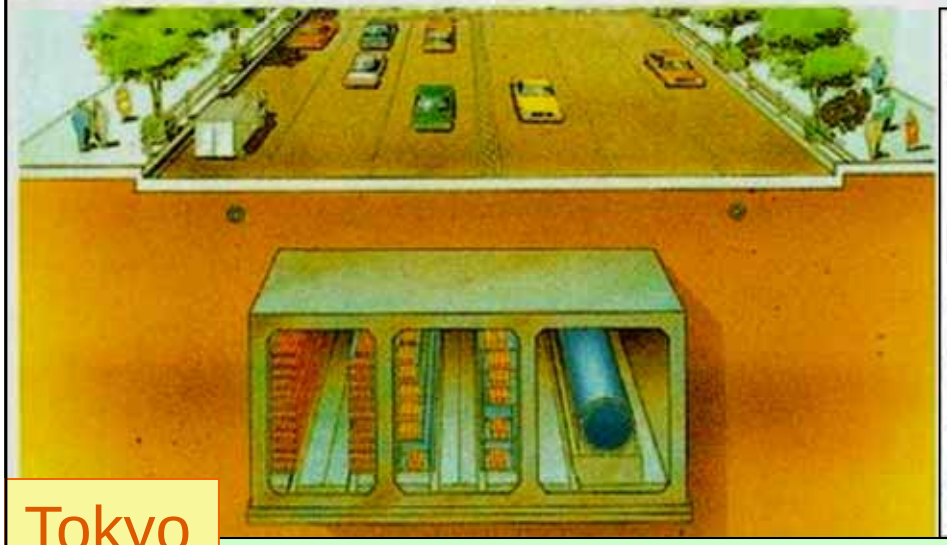
Refurbish soil in the whole street section

Build common utility tunnel

共同溝
Common Ducts

電気・ガス・水道等の地下埋設物を効率的に整理・集約し、これらを安全確実に保護管理します。これにより道路の掘り返しが規制できるほか、都市防災上大きな効果があります。

Common ducts are built to concentrate utilities (electricity, gas, water, etc.) underground, organize them efficiently, and protect and maintain them safely and securely. This reduces the need to dig up the roads repeatedly when servicing utilities, and is also an effective means of disaster prevention in urban areas.



Tokyo

Taipei

Maximise ecosystem services: Nature-based solutions

Berlin

Berlin's Biotope Area Factor (BAF)

Nature-based solutions for sustainable and liveable cities

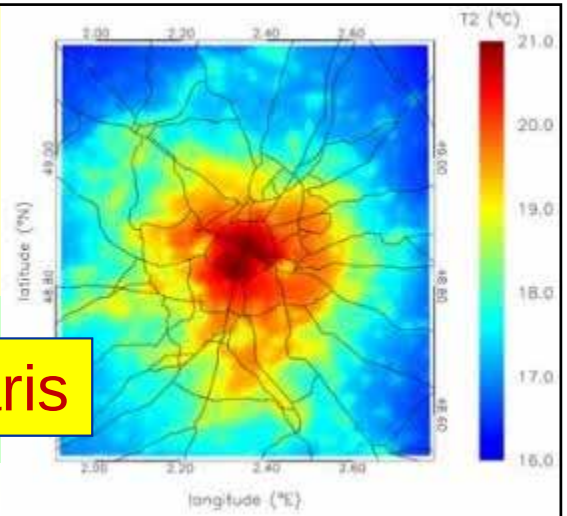
http://www.stadtentwicklung.berlin.de/umwelt/landschaftsplanung/bff/index_en.shtml

Paris: Baron Hausmann's town-plan overhaul

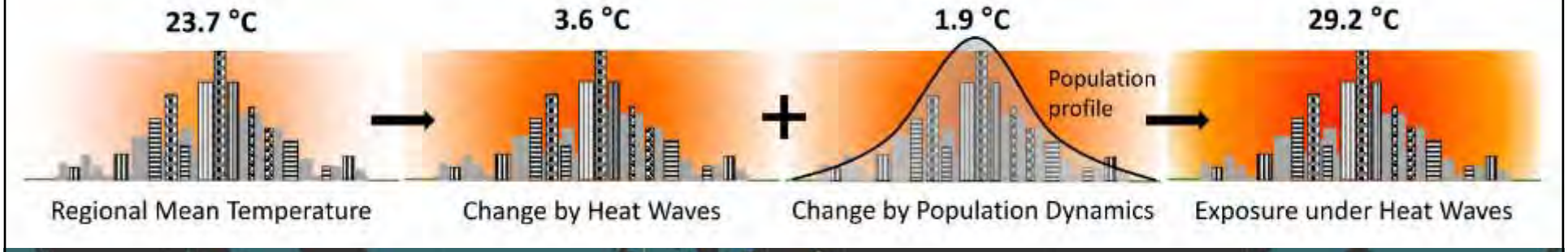
1853–1870

Paris

Meet new challenges: Accentuated warming of cities

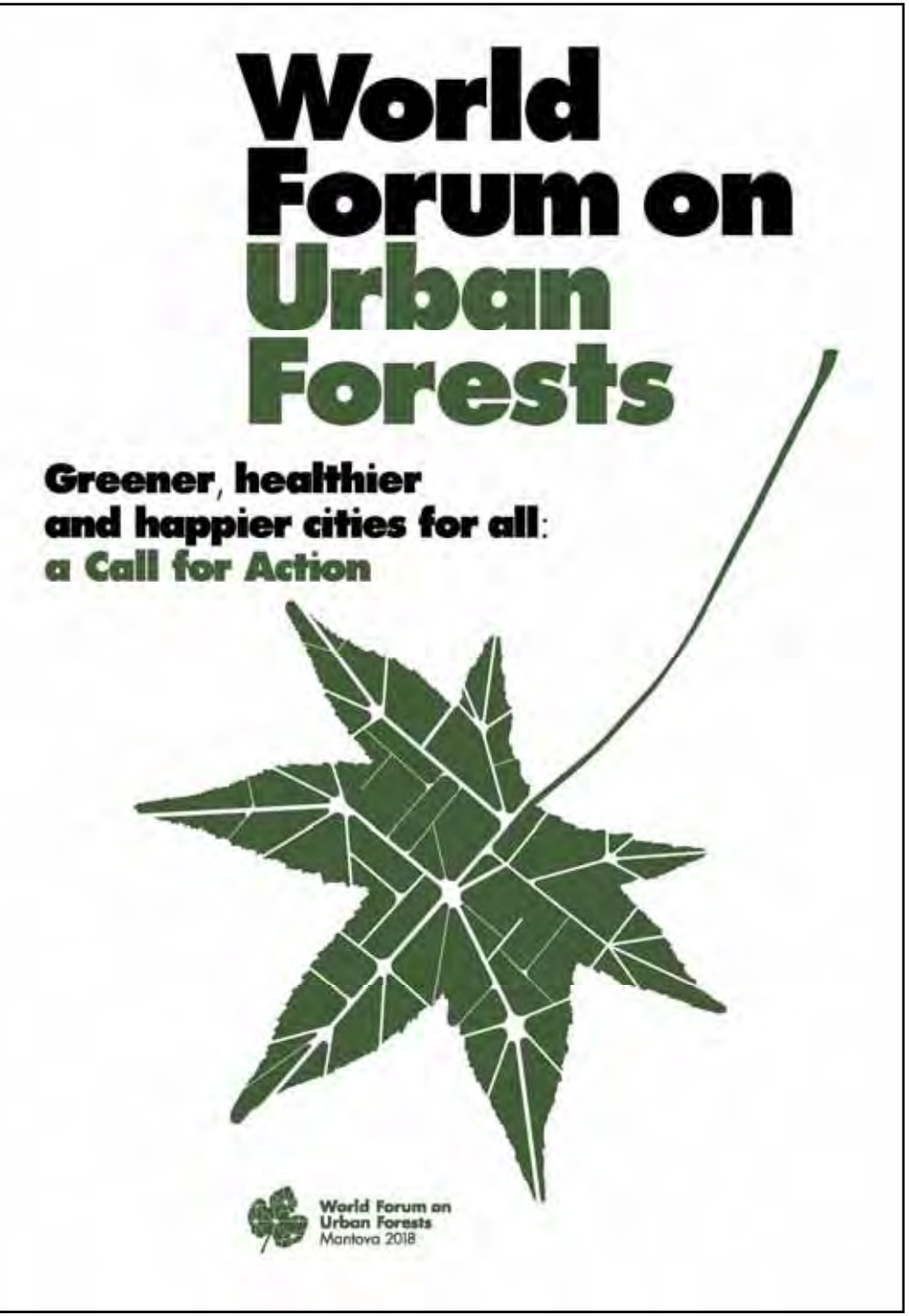


Paris



UN-FAO (2018): Mantova Challenge

Green cities
Healthy cities
Smart cities
Prosperous cities
Happy cities
Liveable cities
Sustainable cities




Thank You
Let us discuss during
networking time