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Latvia University of Life Sciences and Technologies

# Urban greenery adaptation solutions and tools

Online seminar «On the Way to More Resilient and Climate-Adaptive Urban Green Spaces in Latvia and Lithuania», 14 May 2026

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This material has been produced within the Interreg VI-A Latvia–Lithuania Programme 2021–2027 project “Enhancing Urban Resilience through Climate-Adaptive Green Space Planning in Latvia and Lithuania” UrbanGreenAdapt (LL-00273) with the financial support of the European Union.
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1. Planning of climate adaptive plantings in the context of urban green infrastructure
2. Principles of climate-adaptive planting design – drought resilient, native and functional species
3. Nature-based solutions for heat mitigation – cool islands, shaded corridors and microclimate regulation
4. Climate Tree Initiative
5. Examples

# Planning of climate-adaptive plantings in the context of urban green infrastructure

## Why climate-adaptive planting is important

- Cities are increasingly affected by heat waves, droughts, flooding, and biodiversity loss
- Urban green infrastructure helps improve climate resilience and environmental quality
- Climate-adaptive planting combines ecological, functional, and aesthetic values


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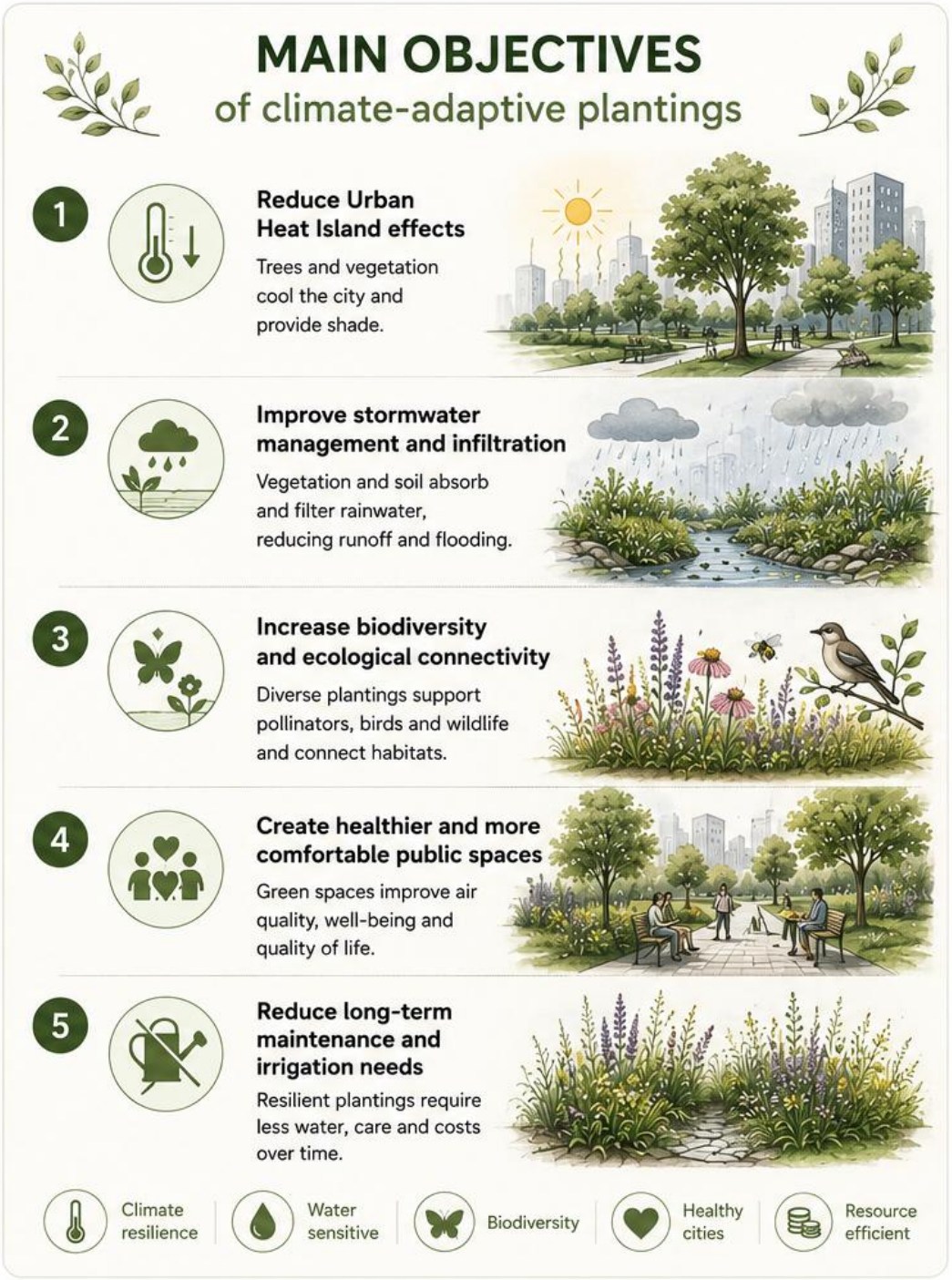
# Planning of climate-adaptive plantings in the context of urban green infrastructure

## Main objectives

- Reduce Urban Heat Island effects
- Improve stormwater management and infiltration
- Increase biodiversity and ecological connectivity
- Create healthier and more comfortable public spaces
- Reduce long-term maintenance and irrigation needs

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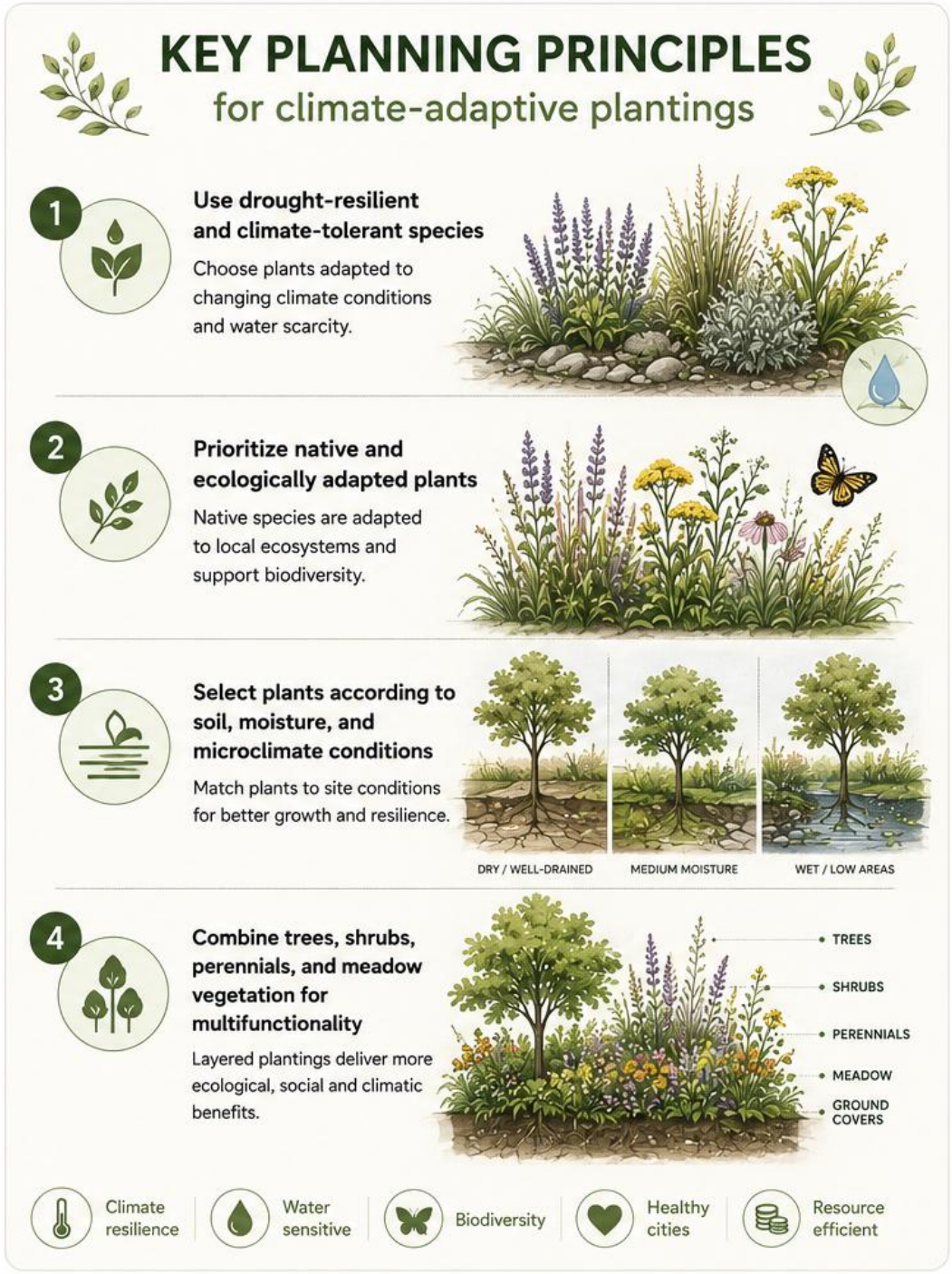
# Planning of climate-adaptive plantings in the context of urban green infrastructure

## Key planning principles

- Use drought-resilient and climate-tolerant species
- Prioritize native and ecologically adapted plants
- Select plants according to soil, moisture, and microclimate conditions
- Combine trees, shrubs, perennials, and meadow vegetation for multifunctionality

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# Principles of climate-adaptive planting design

**Resource-efficient planting and management**

- Reducing the amount of resources consumed in planting and maintenance
- Lower irrigation and maintenance demands
- Sustainable long-term management approaches

**Native and ecologically adapted plant selection**

- Use of native or close-to-native plant species
- Plant selection based on ecological conditions
- Strengthening local landscape identity

New York City's High Line (Oudolf, 2013)

High angle view of wetland nature park in Singapore (Rifle Range Nature Park) (NPark's, 2025)

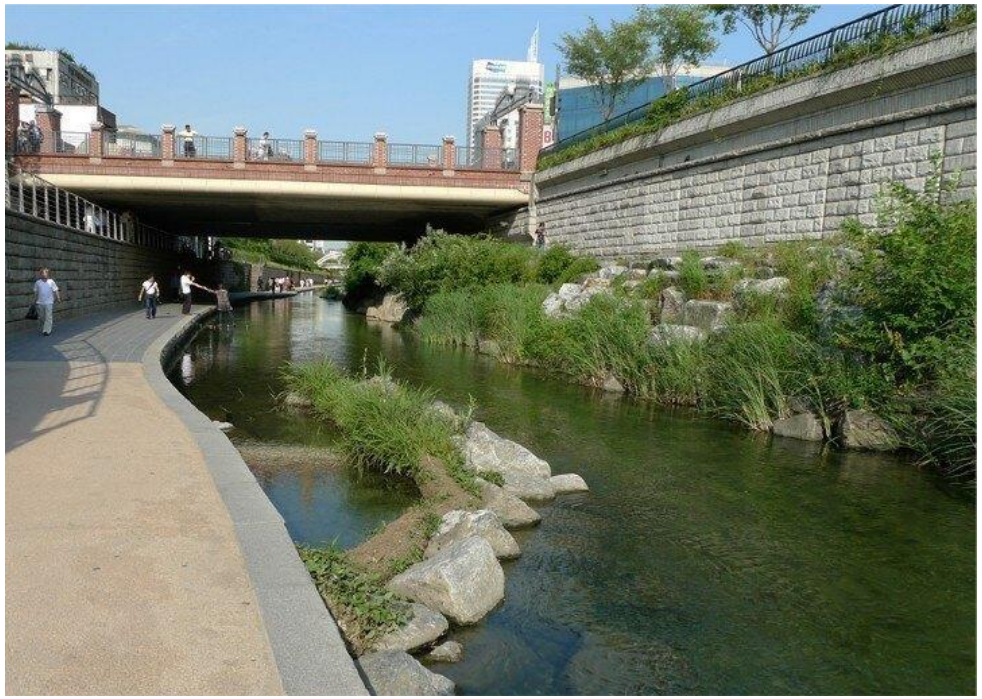
# Principles of climate-adaptive planting design

**Site-responsive planting design**

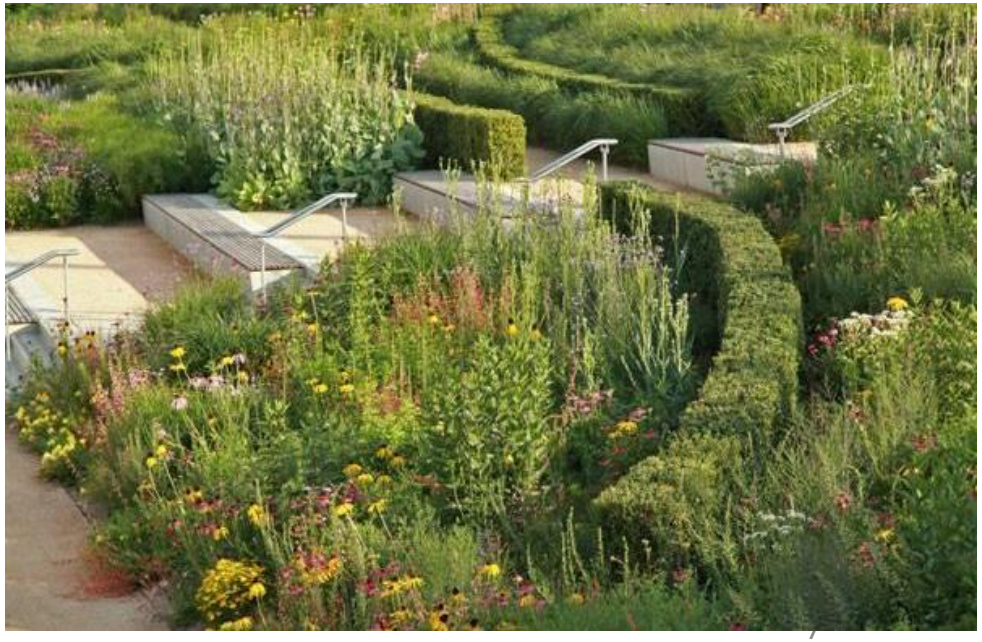
- Selection of plants according to existing soil conditions
- Adaptation to available watering and moisture regimes
- Drought-resilient and climate-adaptive species

**Functional planting strategies**

- Selection of suitable species for each function
- Reducing maintenance and care costs
- Improving usability and environmental performance



Cheonggyecheon Stream Restoration Project (Village Well, 2025)



Queen Elizabeth Olympic Park in London8 (Price, 2012)

# Principles of climate-adaptive planting design

**Biodiversity and habitat creation**

- Increasing plant diversity and ecological resilience
- Attracting insects, birds, and animals
- Plants as shelter, food sources, and nesting materials
- Supporting urban ecosystems and pollinators

**Nature experience in urban environments**

- Creating natural or close-to-natural landscapes in cities
- Improving human connection with nature
- Enhancing the quality and atmosphere of urban spaces

Parc du chemin de l'île – Nanterre (Aquasylva. 2016)

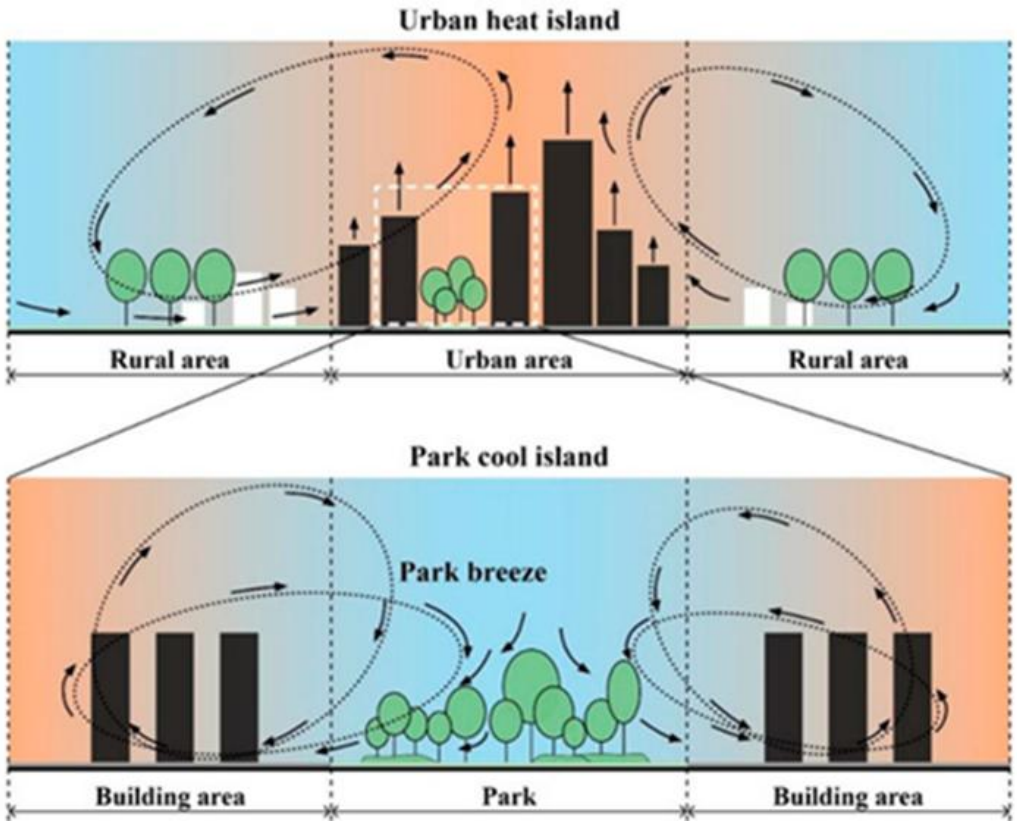
Park am Gleisdreieck – Westpark (Caramaschi, 2019)

# Nature-based solutions for heat mitigation – cool islands, shaded corridors and microclimate regulation

**Cool Islands, Shaded Corridors & Microclimate Regulation**

Climate change and the Urban Heat Island (UHI) effect are increasing temperatures in cities

- Main causes:
  - impervious surfaces
  - lack of vegetation
  - anthropogenic heat emissions
- Nature-Based Solutions (NbS) help to:
  - reduce urban heat
  - enhance biodiversity
  - improve human well-being




Schematic illustration of the park cool island and park breeze (Han, Q., et al. ,2023)

# Nature-based solutions for heat mitigation – cool islands, shaded corridors and microclimate regulation

**The Role of Trees**

Trees are among the most effective urban cooling solutions:

- shading
- evapotranspiration
- wind regulation

One mature tree can release hundreds of liters of water per day, cooling the surrounding air.

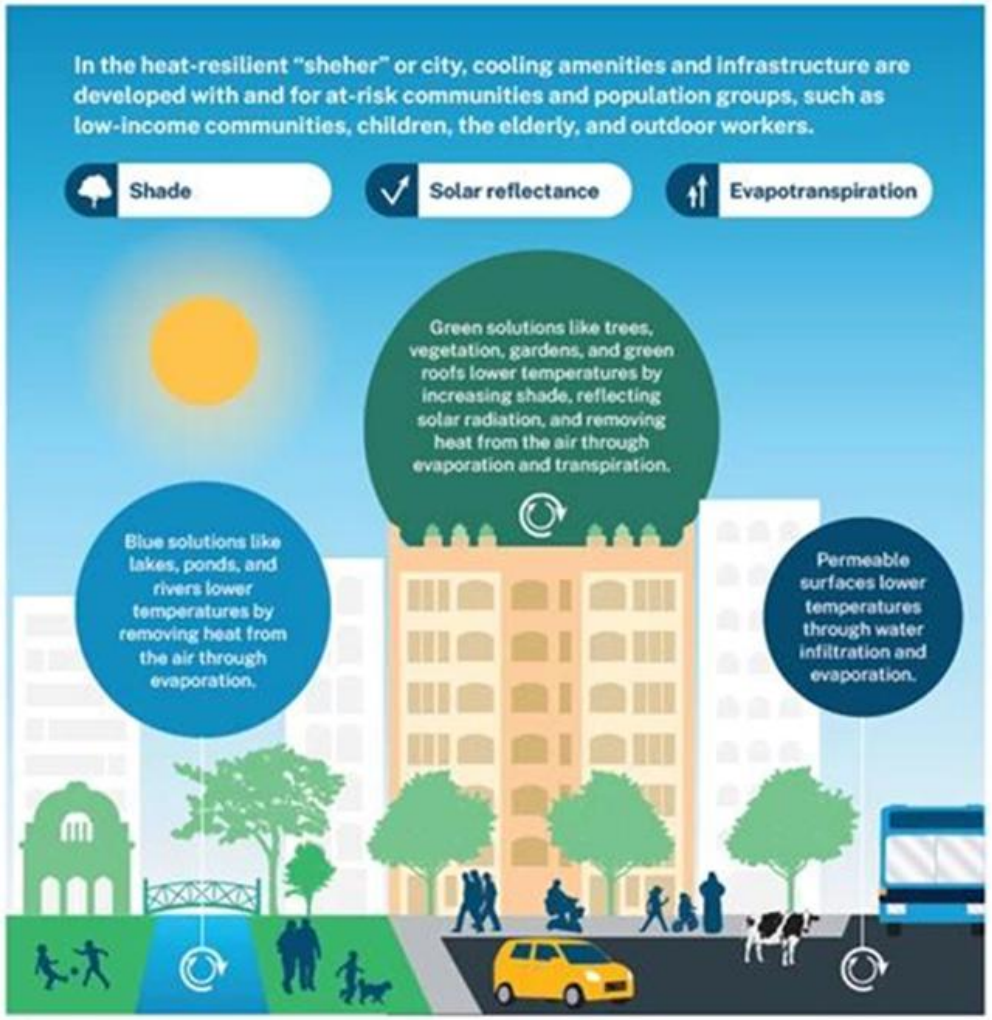



Illustration of the Heat-Resilient "Sheher" or City (Kim & Jain, 2024)

# Nature-based solutions for heat mitigation – cool islands, shaded corridors and microclimate regulation

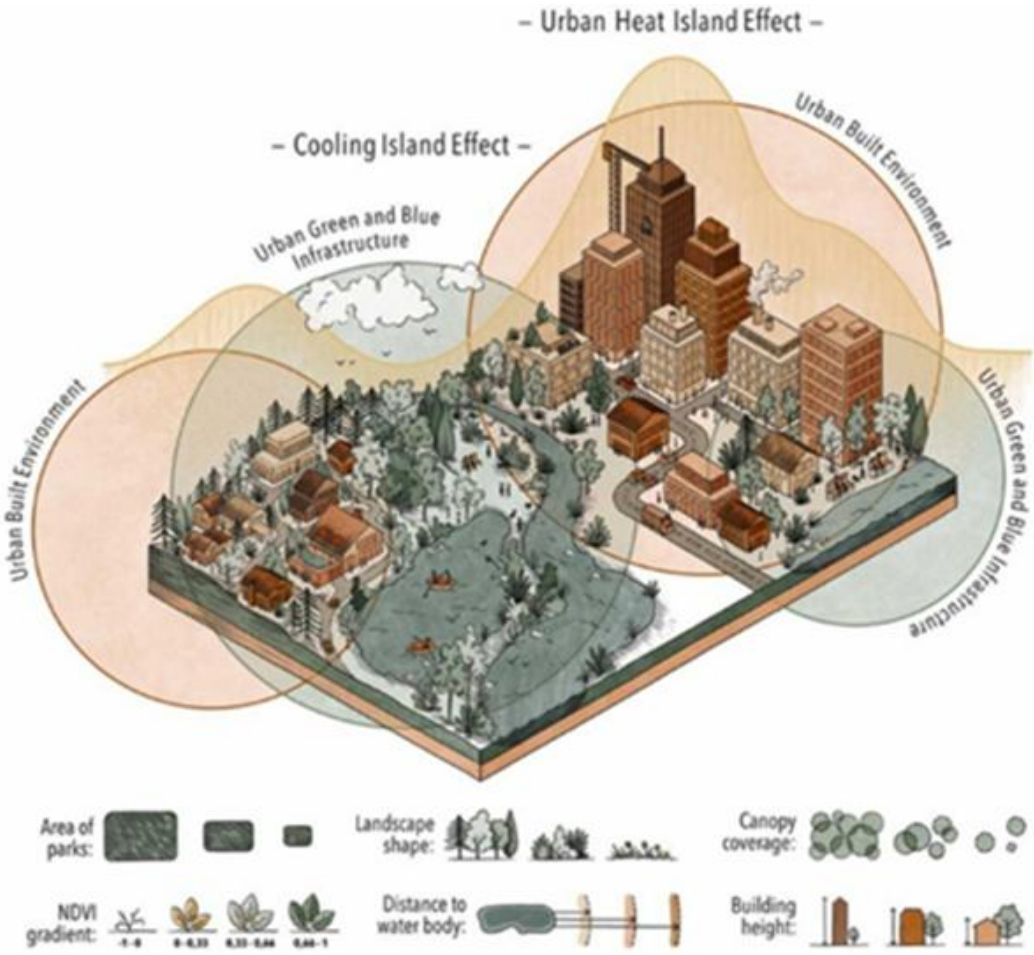
**Cool Islands**

**Localized cooler urban areas created by:**

- parks
- tree clusters
- urban meadows
- water elements

**Benefits:**

- reduced surface and air temperatures
- improved microclimate
- enhanced thermal comfort




Urban heat and Cooling effects (Urban Cooling: ARIES Insights on Green and Blue Infrastructure - ARIES, 2025)

# Nature-based solutions for heat mitigation – cool islands, shaded corridors and microclimate regulation

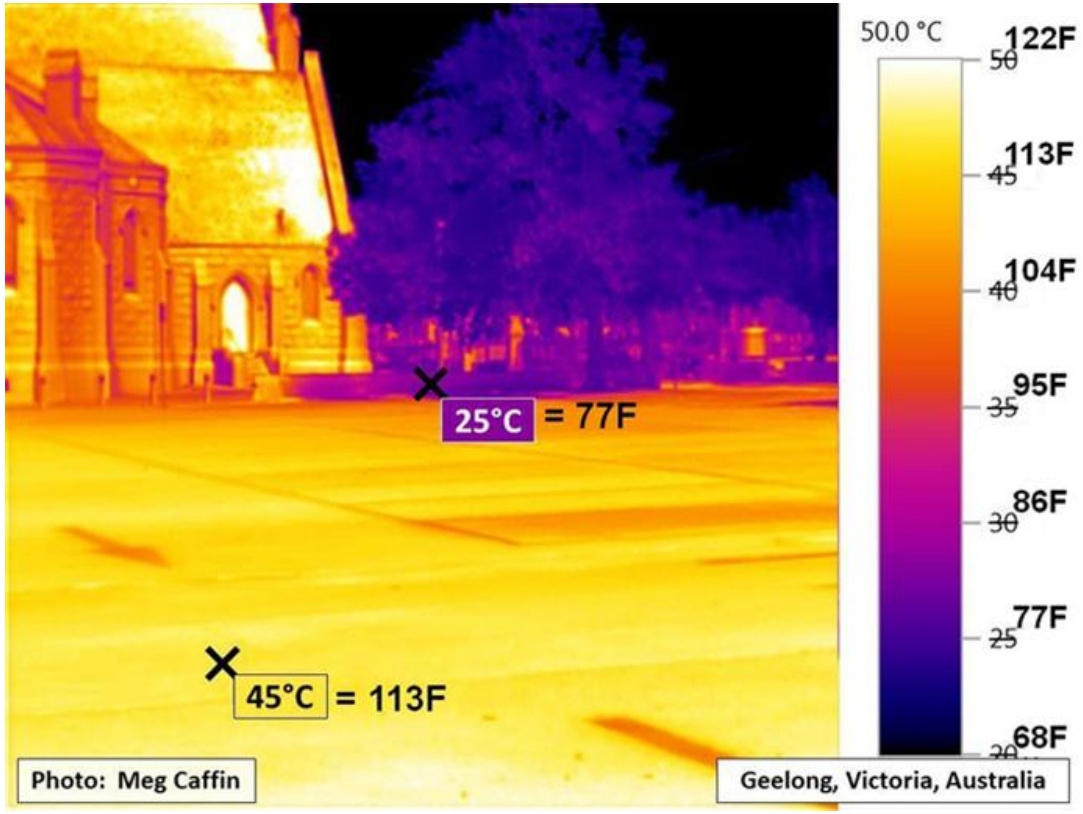
**Shaded Corridors**

Tree-lined streets and green corridors:

- connect cool islands
- reduce heat exposure along mobility routes
- Tree shade can reduce surface temperatures by **10–25°C**.

Additional benefits:

- improved air quality
- reduced glare
- support for walking and cycling




Temperature differences (St John, 2019)

# Nature-based solutions for heat mitigation – cool islands, shaded corridors and microclimate regulation

**Trees as Core Infrastructure for Climate-Resilient Cities**

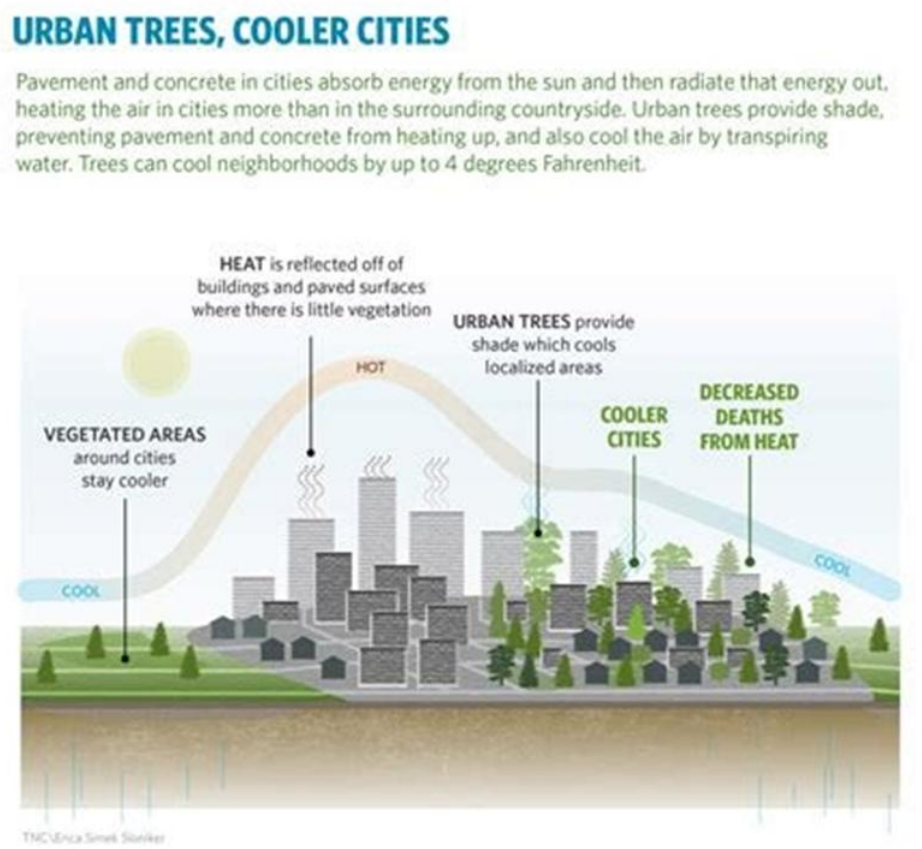
**Trees = Urban Infrastructure**

Trees should be treated as critical infrastructure, not decorative elements:

- temperature reduction
- carbon sequestration
- biodiversity support
- improved mental health

**Effective NbS Planning Requires:**

- connected green networks
- trees integrated into transport corridors
- climate-resilient species
- sufficient soil volume and water availability




https://chesapeaketrees.net/2020/08/28/relief-from-the-heat-in-rapidly-warming-cities-trees-can-save-lives/

# Climate Tree Initiative - From Scientific Frameworks to Applied Urban Forestry Practice

**Why climate-resilient trees are needed**

Urban trees are increasingly affected by:

- heat waves
- drought
- late frosts
- flooding and storm events

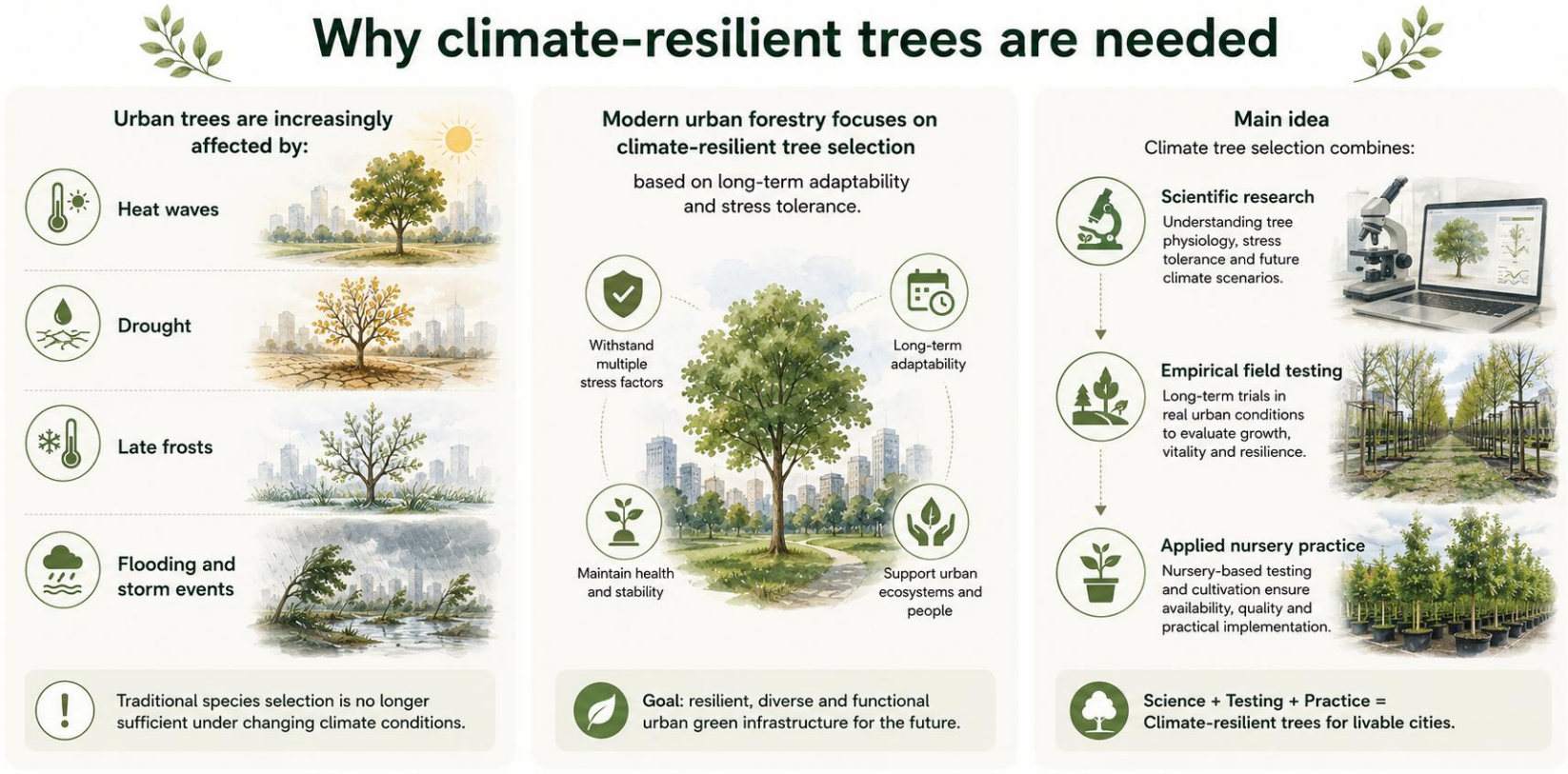
Traditional species selection is no longer sufficient under changing climate conditions

Modern urban forestry focuses on **climate-resilient tree selection** based on long-term adaptability and stress tolerance

**Main idea**

Climate tree selection combines:

- scientific research
- empirical field testing
- applied nursery practice

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# Climate Tree Initiative - Scientific and Empirical Foundations

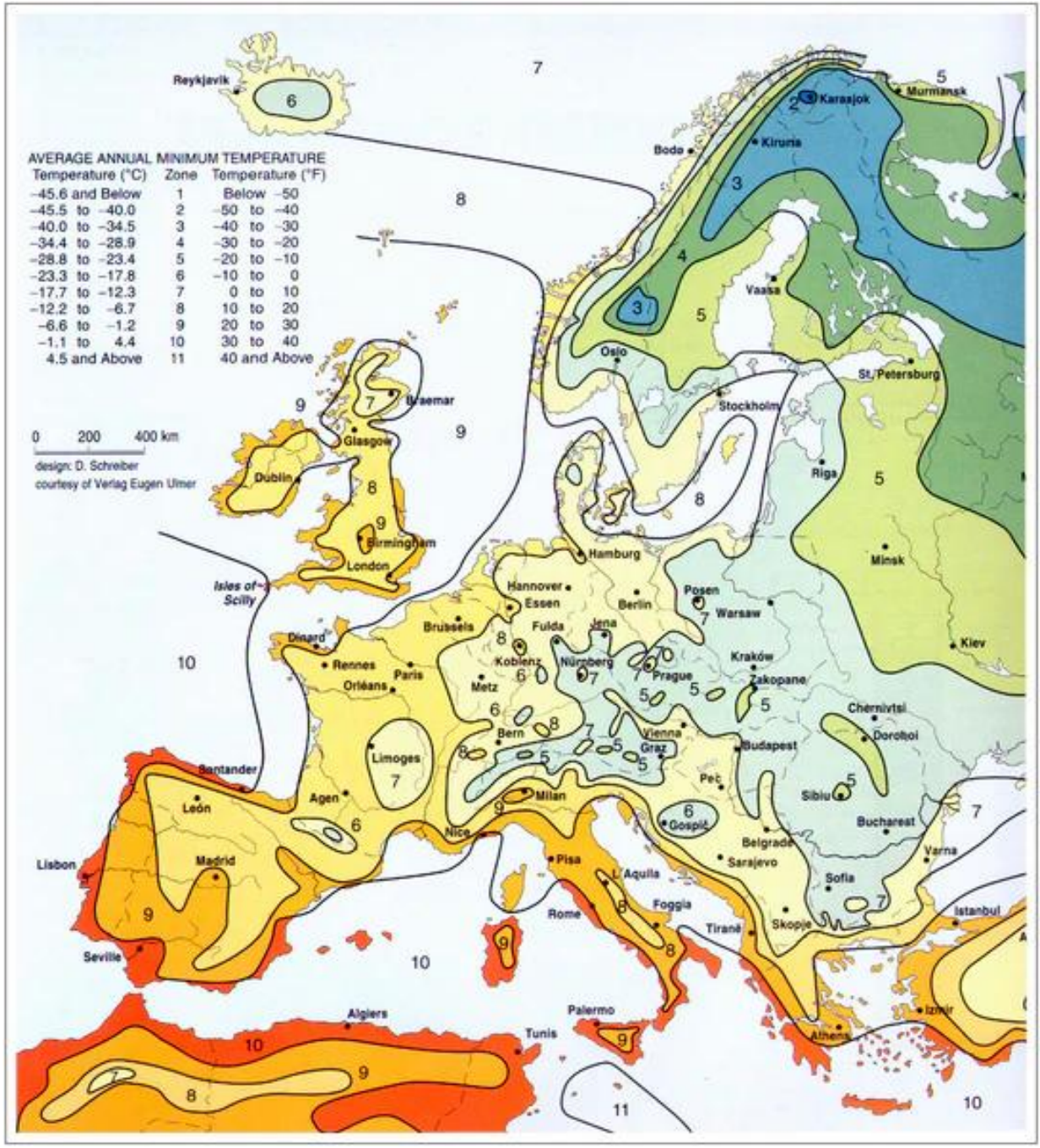
## Scientific framework

Evaluates tree species according to tolerance to:

- drought
- heat
- excess moisture

Focuses on **future adaptability**, not only historical suitability

Integrates climate projections and species physiology




European hardeness zones

# Climate Tree Initiative - Scientific and Empirical Foundations

**GALK Street Tree Program**

**Long-term empirical testing in Germany**

The “Urban Trees” working group conducted long-term street tree trials in several German cities under standardized urban conditions **between 1995 and 1999**.

Tree species were evaluated for growth, vitality, and suitability for urban environments.

The results formed the basis of the GALK **Street Tree List**, supporting evidence-based climate-resilient tree selection.

| Botanischer und deutscher Name | Wuchshöhe in m | Breite in m | Lichtdurchlässigkeit | Lichtbedarf | Verwendbarkeit | Bemerkungen |
|---|---|---|---|---|---|---|
| Acer buergerianum syn. A. trifidum, Dreizahn-Ahorn, Dreispitz-Ahorn | 8-10 (15) | 4-6 | mittel | ○ – ◑ | noch im Test | kompakte, rundliche Krone, locker verzweigte Äste, auf geschützten Standorten ausreichend frosthart, gebietsweise frostempfindlich, für enge Straßenbereiche geeignet, im Straßenbaumtest 2 seit 2007/08 |
| Acer campestre, Feldahorn, Maßholder | 10-15 (20) | 10-15 | mittel | ○ – ◑ | geeignet mit E. | eiförmige, unregelmäßige, im Alter mehr rundliche Krone, verträgt trockene Böden und hohen Versiegelungsgrad, guter Bodenbefestiger für Ufer bzw. Hanglagen, Bienenweide |
| Acer campestre 'Elsrijk', Feldahorn | 6-12 (15) | 4-6 | mittel | ○ – ◑ | geeignet | wie die Art, jedoch gerader durchgehender Stamm, im Wuchs schmaler und gleichmäßiger, gebietsweise Frostschäden in der Krone, mehltaufrei, Bienenweide |
| Acer campestre 'Huibers Elegant' syn. A. campestre 'Elegant', Feldahorn | 6-10 | 3-5 | mittel | ○ – ◑ | noch im | sehr regelmäßiger, aufrechter Wuchs, gilt als mehltaufrei, |
| Acer monspessulanum, Französischer Ahorn, Burgen-Ahorn, Dreilappiger Ahorn | 5-8 (11) | 4-7 (9) | mittel | ○ | | |
| Acer opalus, Schneeball-Ahorn | 8-10 (20) | 5-8 | mittel | | | |
| Acer platanoides, Spitzahorn | 20-30 | 15-22 | gering | ○ | | |

**Acer platanoides 'Deborah'**

München 2004

Mittelstark wachsend, Austrieb dunkelrot, später vergrünend, gerader durchgehender Stamm; gebietsweise Frostschäden in der Krone sowie Rindennekrosen.

Bewertung 2000: Trotz eines Totalausfalles und starker Frostschäden wird der Baum als bedingt geeignet eingestuft, weil zwei Städte Bestnoten ergeben haben.

Bewertung 2005: bedingt geeignet

Bewertung 2015: Kegel- bis eiförmige Krone, Äste aufrecht wachsend. Regional in unterschiedlichem Maße Trockenschäden, vereinzelt auch Frostschäden, dadurch erhöhter Schnittaufwand. Mittlere bis gute Gesamtentwicklung.

Geeignet mit Einschränkungen

**Acer platanoides 'Farlakes Green'**

Hannover 2004

Straff aufrechter, kräftiger und gleichmäßiger Wuchs, Krone im Alter zu rundlich tendierend; wenig mehltauanfällig; gebietsweise Rindennekrosen.

Bewertung 2000: Bessere Beurteilung als '*Deborah*', allerdings gibt es auch hier erhebliche Frostschäden und von keiner Stadt eine Bestnote, so dass auch hier nur die Beurteilung bedingt geeignet ausgesprochen wird.

Bewertung 2005: bedingt geeignet

Bewertung 2015: Kegel- bis eiförmige Krone, Äste überwiegend aufrecht wachsend. Regional in unterschiedlichem Maße Trockenschäden, vereinzelt auch Blatt- und Frostschäden, dadurch erhöhter Schnittaufwand. Mittlere bis gute Gesamtwirkung.

**Alnus spaethii**

Hannover 2004

Sehr raschwüchsig Baum mit breit pyramidaler Krone, Äste locker aufrecht, im Alter mehr waagerecht ausgebreitet, gerader durchgehender Stamm, lang haftende, dunkelgrüne, leicht glänzende Belaubung (Schneebruchgefahr).

Bewertung 2000: Dieser Baum wird gut bis sehr gut bewertet, nur in München ist ein Totalversagen zu beklagen, so dass leider nur ein 'geeignet' festgelegt werden kann.

Bewertung 2005: gut geeignet

Bewertung 2015: Kegel- bis eiförmige Krone, Äste aufrecht bis überhängend wachsend. Starkes Wachstum, vital, starker Fruchtbehang. Gute bis sehr gute Gesamtentwicklung.

Gut geeignet

# Climate Tree Initiative - Applied Practice and Selection Criteria

**Nursery-based testing and climate tree catalogs**

Long-term testing under urban stress conditions:

- drought
- heat exposure
- compacted soils
- restricted root zones

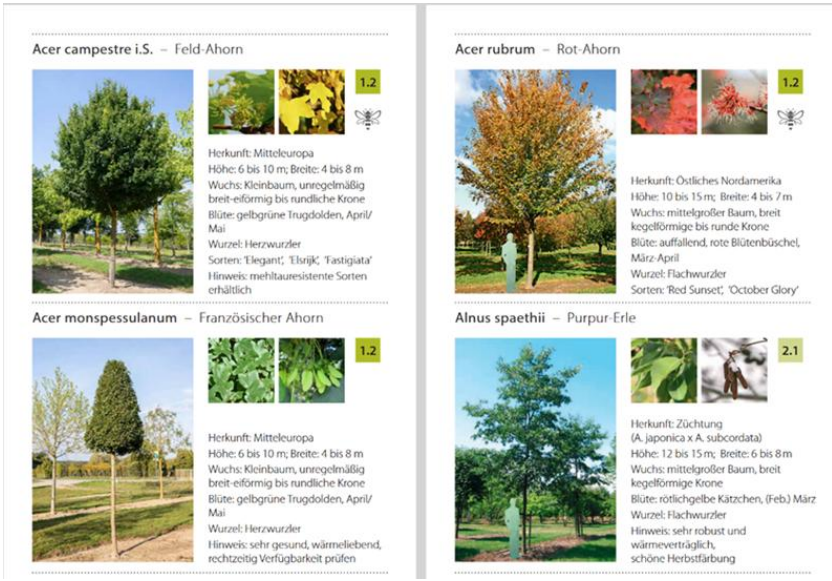
Climate tree catalogs combine:

- scientific research
- empirical trial data
- horticultural expertise

**Selection criteria**

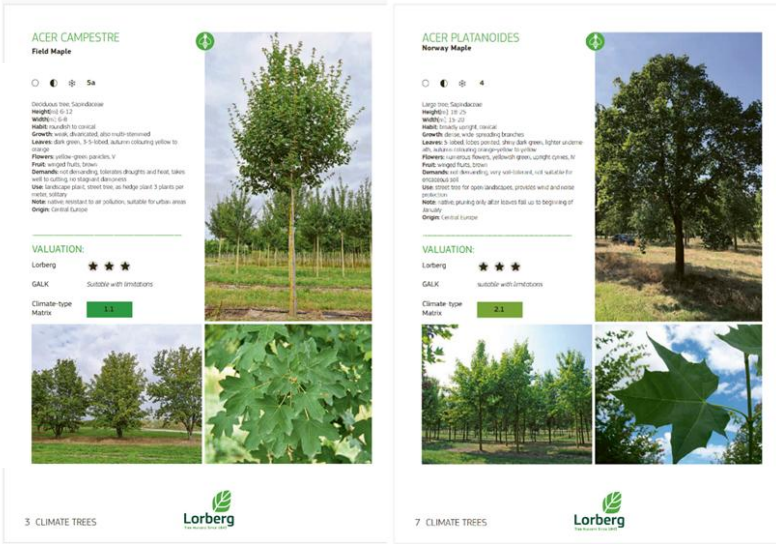
Climate-resilient trees are evaluated by:

- drought and heat tolerance
- flood tolerance
- resistance to urban stress
- ability to grow in compacted soils
- long-term vitality and stability





The Climate–Species Matrix (Roloff et al., 2009)



# EXAMPLES FROM PRACTICE

Climate-adaptive planting in urban environments

**BAUMSCHULE KULTURFORUM**
Berlin, Germany
2023

**AM TACHELES**
Berlin, Germany
2016–2023

**HUMBOLDT FORUM**
Berlin, Germany
2020–2023

**RUMMELSBURG & UBER ARENA**
Berlin, Germany
ongoing

**GÄRTEN DER WELT & TREEDRAIN**
Berlin, Germany
2016–2019

**BUCKOWER FELDER**
Berlin, Germany
2020–2021

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# Baumschule Kulturforum

**Berlin, Germany | 2023**

atelier le balto + Klaus Biesenbach

**Main idea**

Temporary experimental urban forest installation transforming hard urban surfaces into flexible green public space.

**Climate-adaptive solutions**

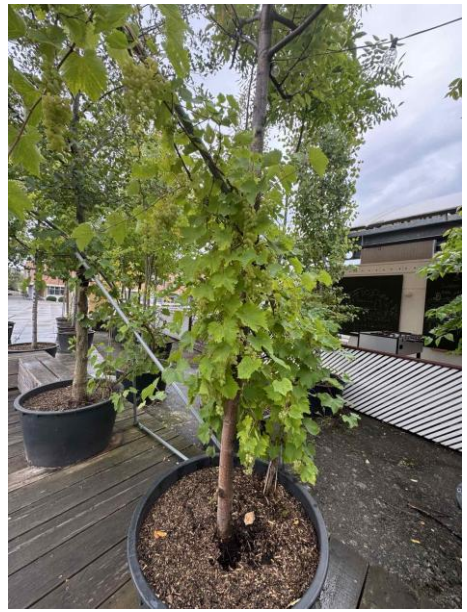
- Mobile tree islands in containers
- Heat reduction and shading
- Combination of native + climate-resilient species
- Biodiversity support
- Flexible and temporary planting system

**Spatial / social impact**

- Creates new public gathering spaces
- Improves microclimate in highly sealed area
- Introduces “temporary urban nature”
- Trees later replanted elsewhere in the city

**Lessons for Baltic cities**

- Experimental and mobile planting systems could help test future climate tree species before permanent implementation.



# Am Tacheles

**Berlin, Germany | 2016–2023**

Herzog & de Meuron + Latz + Partner

**Main idea**

- Mixed-use urban quarter where landscape architecture creates identity through species-based spatial organisation.

**Climate-adaptive solutions**

- One tree species for each urban space
- Permeable paving systems
- Green roofs and vertical greening
- Shaded urban courtyards
- Integrated BFF ecological system

**Spatial / social impact**

- Strong spatial identity
- Improved pedestrian comfort
- Seasonal biodiversity support
- Flexible multifunctional public spaces

**Lessons for Baltic cities**

- Simple and readable planting structure can strengthen urban identity while integrating ecological functions.

**Humboldt Forum**

**Berlin, Germany | 2020–2023**

bbz landschaftsarchitekten

**Main idea**

- Educational landscape concept inspired by Alexander von Humboldt’s global botanical explorations.

**Climate-adaptive solutions**

- Plant collections from different climate zones
- Seasonal and ecological diversity
- Educational integration in landscape
- Shade and microclimate improvement
- Biodiversity support in dense urban setting

**Spatial / social impact**

- Interactive and educational public space
- Cultural identity through vegetation
- Improved environmental comfort
- Social gathering and resting spaces

**Lessons for Baltic cities**

- Botanical collections can become both educational tools and experimental climate adaptation landscapes.

## Rummelsburg & Uber Arena

### Berlin, Germany | ongoing redevelopment

### Main idea

- Dense urban redevelopment integrating green infrastructure into highly sealed public spaces.

### Climate-adaptive solutions

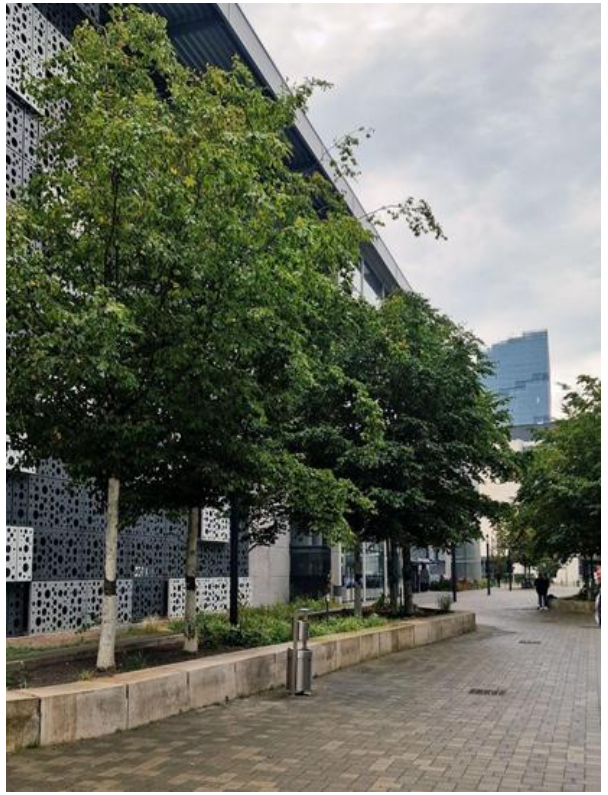
- Linear tree corridors
- Raised planting beds
- Surface stormwater systems
- Permeable pavement integration
- Soil protection strategies

### Spatial / social impact

- Improved pedestrian comfort
- Reduced urban heat island effect
- Visible water management processes
- Flexible and robust public spaces

### Lessons for Baltic cities

- Even highly urbanized districts can integrate climate-adaptive greenery through strategic linear systems.



## Gärten der Welt & TreeDrain

### Berlin, Germany | 2016–2019

TU Berlin + Sieker

### Main idea

- Integration of urban trees and decentralized stormwater management into multifunctional infrastructure.

### Climate-adaptive solutions

- Baum-Rigolen systems
- Stormwater infiltration + storage
- Water supply for trees
- Pollutant filtration
- Urban cooling through evapotranspiration
- **Spatial / social impact**
- Reduced flooding risk
- Improved tree vitality
- Better urban water balance
- Multifunctional green-grey infrastructure

### Lessons for Baltic cities

- TreeDrain systems offer strong potential for climate-resilient street reconstruction and water-sensitive planning.

## Buckower Felder

### Berlin, Germany | 2020–2021

Prof. Dr. Sieker mbH

### Main idea

- Large-scale ecological residential landscape integrating planting and stormwater infrastructure.

### Climate-adaptive solutions

- Distributed green infrastructure
- Multifunctional retention landscapes
- Meadow-like extensive planting
- Baumrigolen systems
- Emergency water pathways

### Spatial / social impact

- Flood adaptation
- Biodiversity enhancement
- Cooler residential environment
- Ecological urban identity

### Lessons for Baltic cities

- Climate-adaptive planting should function as infrastructure, not only decoration.

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# Online seminar «On the Way to More Resilient and Climate-Adaptive Urban Green Spaces in Latvia and Lithuania», 14 May 2026

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