UNIVERSITÀ DEGLI STUDI FIRENZE

A new national project: Planning the green city in the global change era: urban tree species function and suitability for predicted future climates (TreeCity)

TreeCity
An International Project for a Better Quality of Life in Our Cities
Sponsored by MIUR PRIN

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SIA Società Italiana d'Arboricoltura - o.n.l.u.s. Sezione Italiana dell'International Society of Arboriculture

Torino (Italy) - May 26-28 , 2014

ISA International Society of Arboriculture

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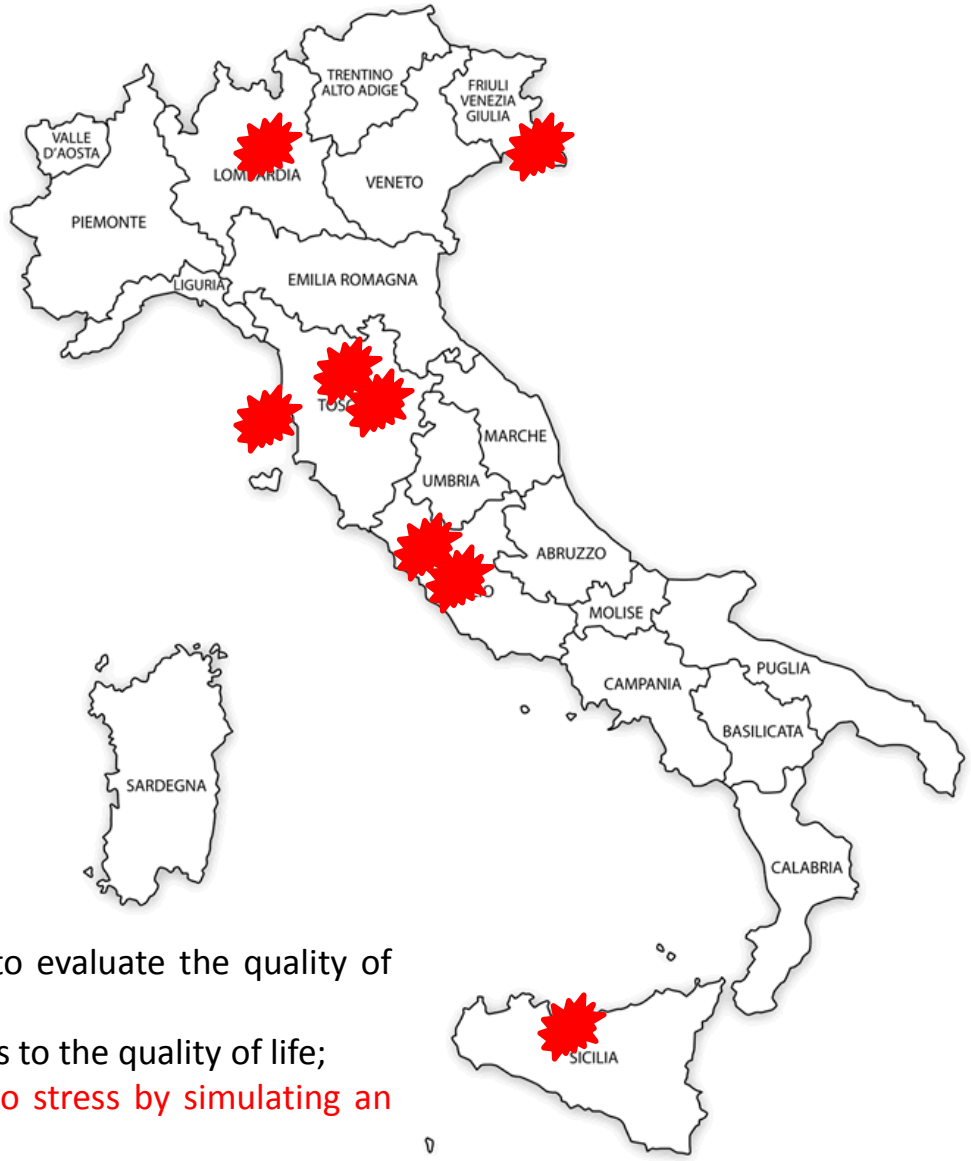
Eight research institution

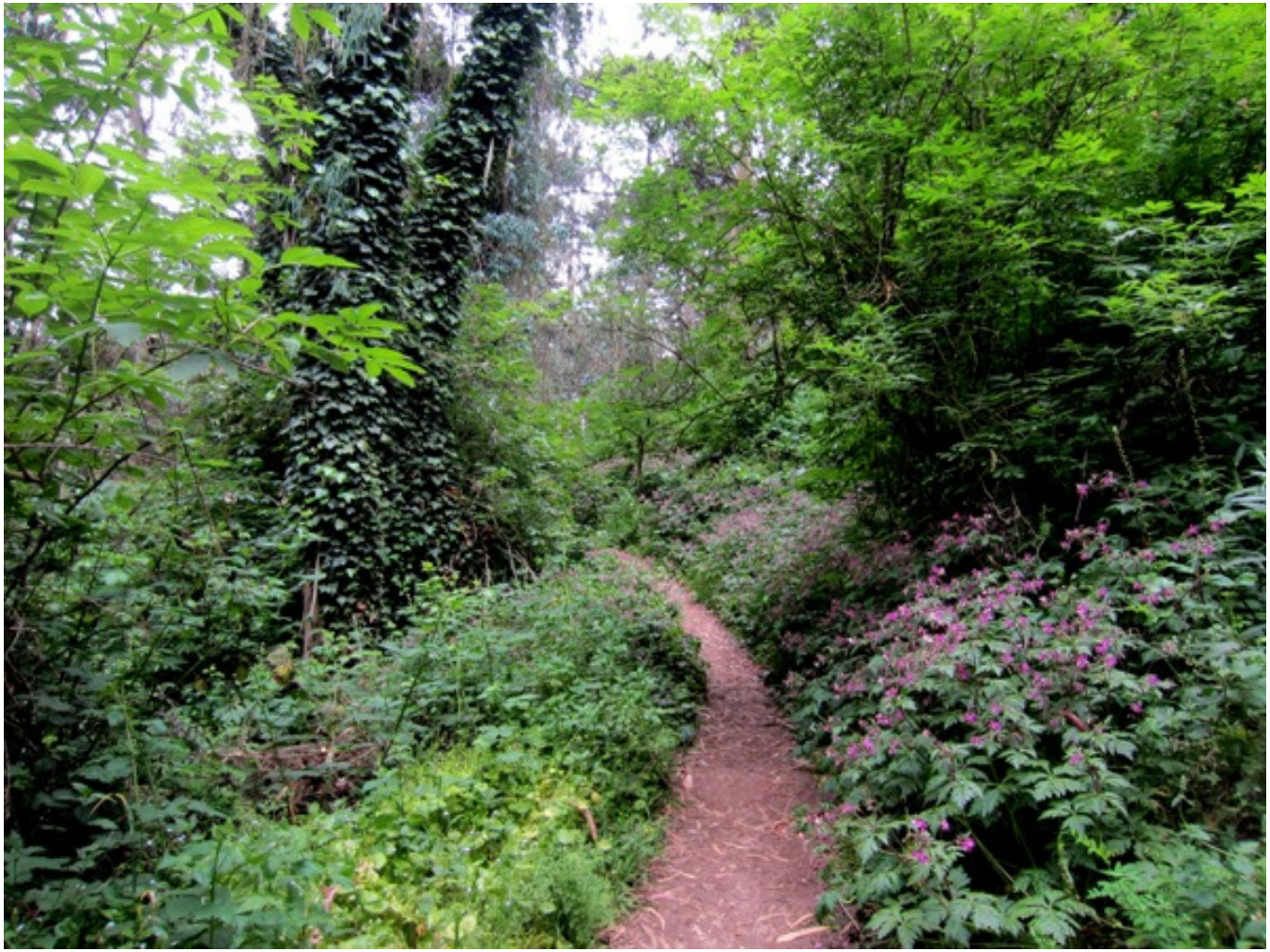
University of Trieste
Catholic University of Brescia
University of Pisa
University of Firenze
CNR – Firenze
Tuscia University - Viterbo
University “La Sapienza” – Roma
University of Palermo

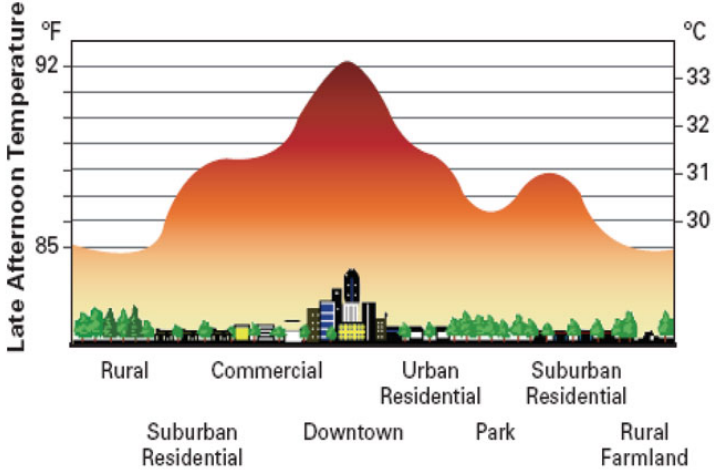


Four sub-projects

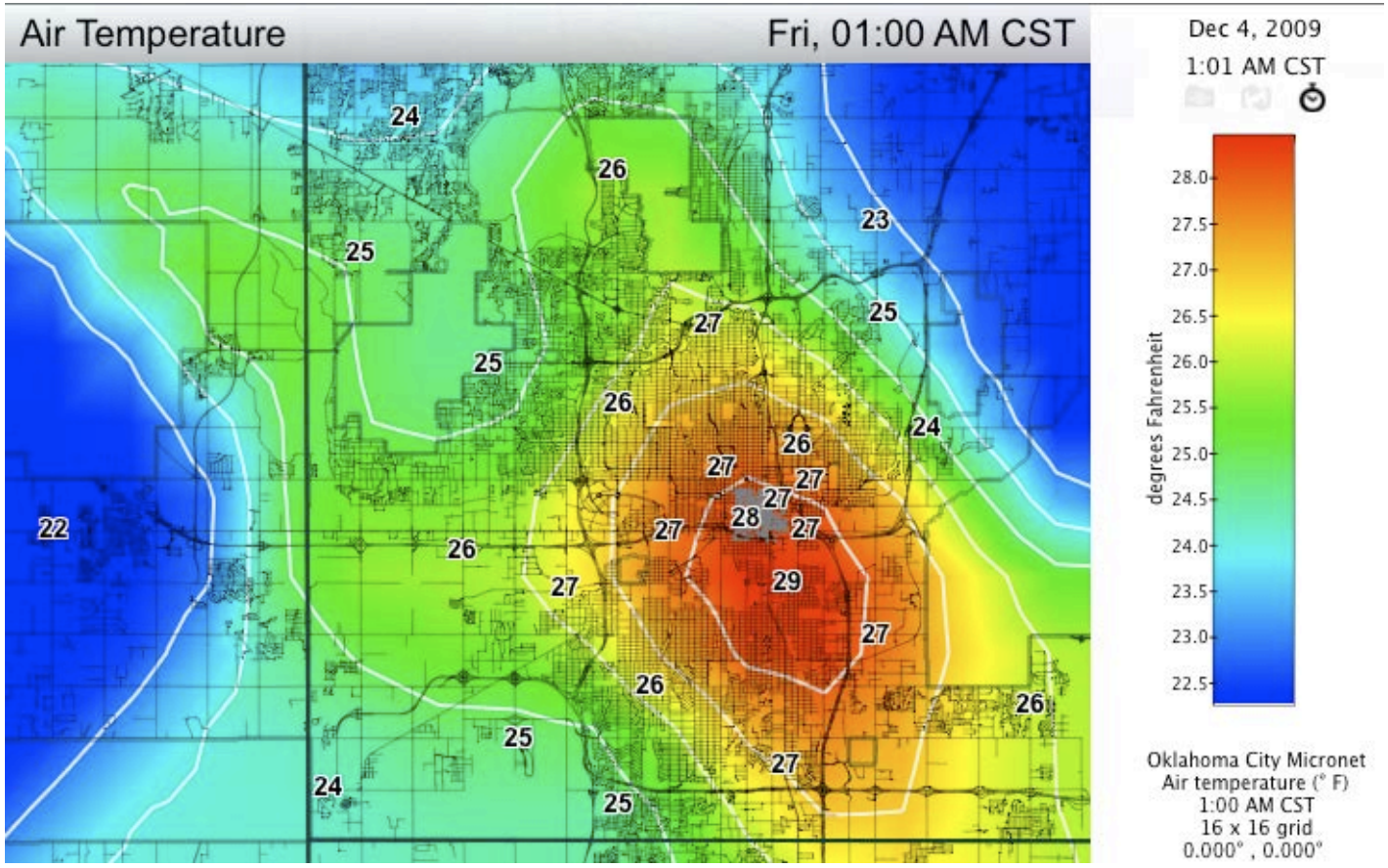
- Urban plant systems as open air laboratory to evaluate the quality of the urban environment and stress conditions;
- Potential contribution of the urban ecosystems to the quality of life;
- Evaluation of the resistance of tree species to stress by simulating an urban climatic future scenario (2050);
- Integrated modeling.

Urban tree and urban forest:
An open laboratory for adaptation of forests to climate change.





Urban areas anticipate the condition of climate change.



Fresh water shortage will be one of the most relevant issues for people and tree in urban area under climate change conditions.

Many tree species common in our cities (for ex. *Tilia*, *Platanus*) are water demanding

Native tree species were supposed to be better adapted to local ecological condition, such assuring the exchange of genetic material with surrounding wild areas (ecological corridors).

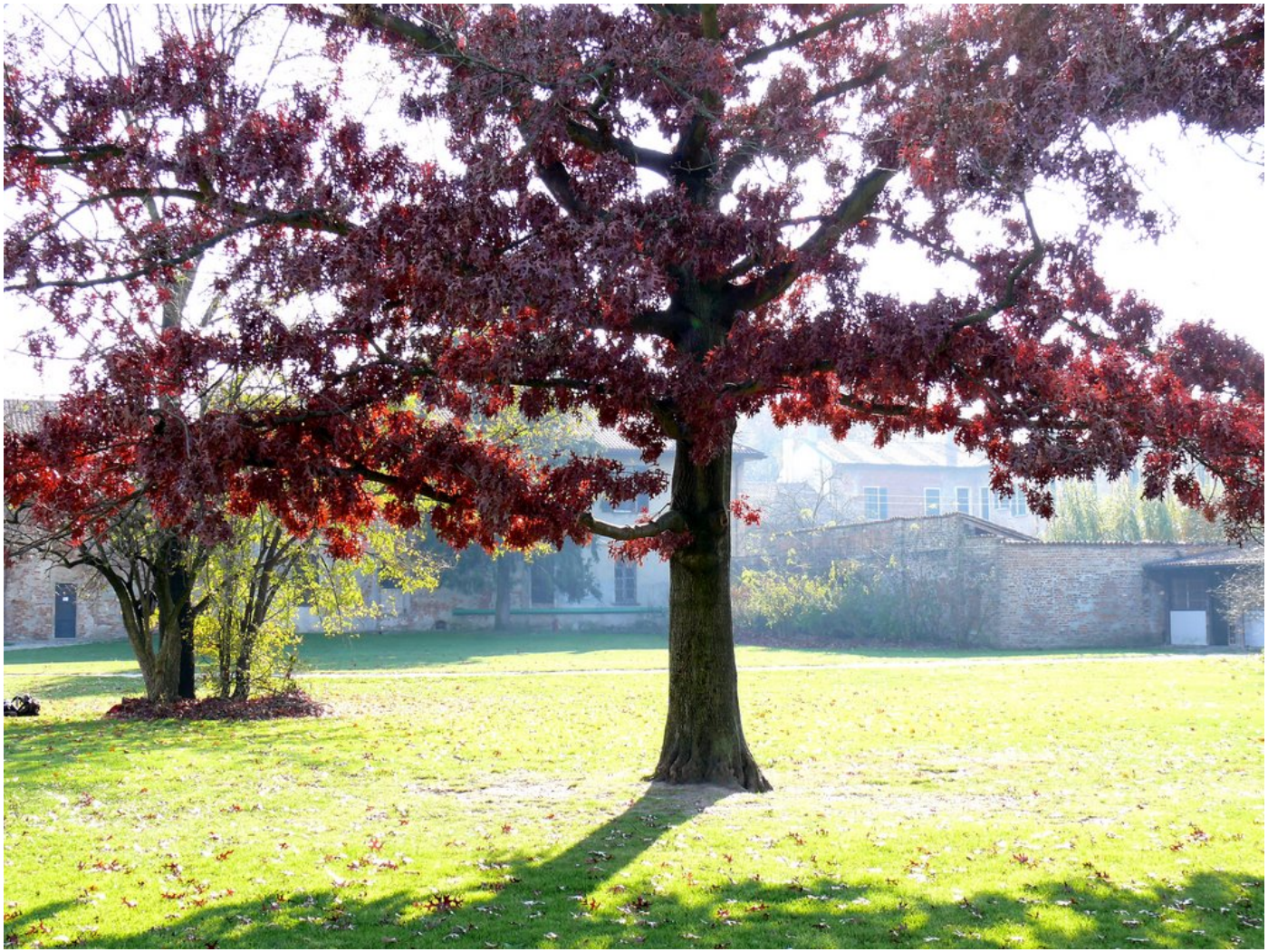
This traditional concept “*to choose tree species from the native vegetation*” may be not sufficient now.

Native tree species may be not adapted to the “new” (urban) climate conditions.

Solutions (?) /1

Using exotic species, from more xeric environments (problems: possible introduction of pests and harmful organisms; conflicts with the existing organisms associated to the present tree species as birds, insects etc.).

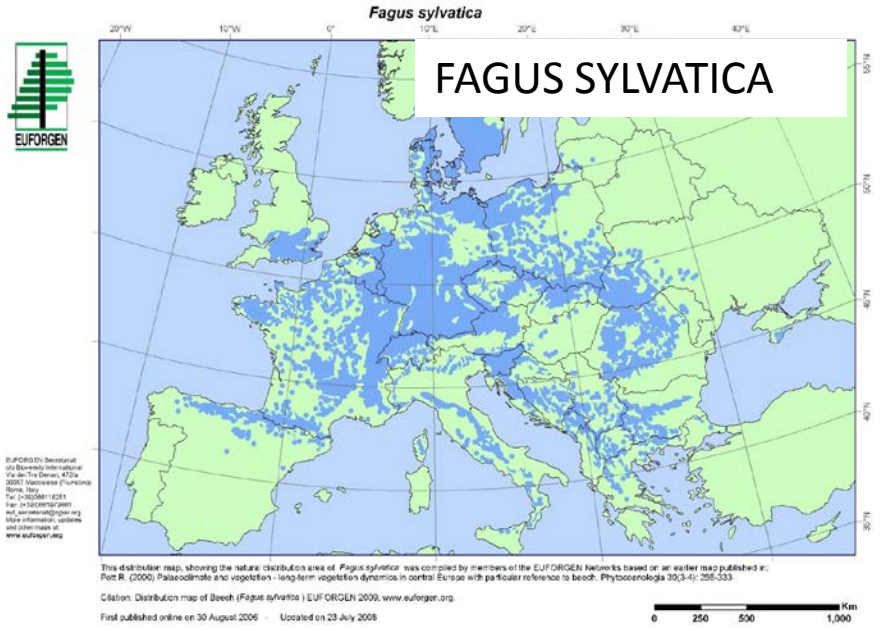
For example, *Quercus rubra* is very common in parks of North Italy, but creates problems as invasive species

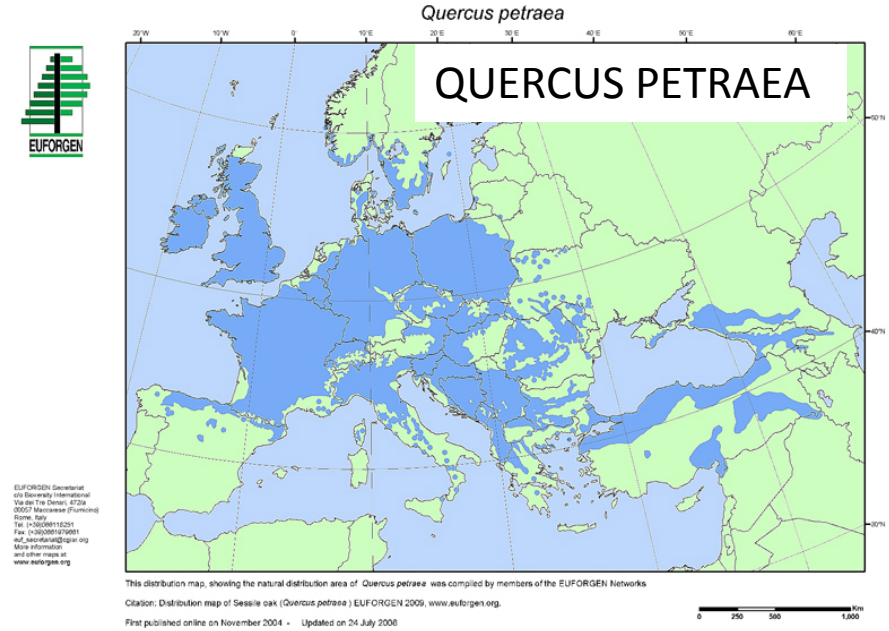


Solutions (?) /2

Using different provenances of the same taxa. Provenances from the fringes of their natural distribution are better adapted to harsher climatic conditions, but have low phenotypic plasticity and genetic variability.

Many species with large European diffusion have their Southernmost provenances in the Mediterranean region.





Solutions (?) /3

Using similar taxa, from more xeric environments but belonging to the same ecological series.

This option assures the ecological exchange and continuity with the surrounding rural areas, following the natural vegetational dynamics.

From mesophilous plain forests ……
(*Quercus robur*, *Carpinus betulus*, *Fraxinus oxycarpa* etc.)

To xero-thermic forests ……
(*Quercus pubescens*, *Quercus cerris*, *Quercus ilex* etc.)

The Biodome experiment (DISPAA - Firenze)

1 – Present - Rural Environment (2012) - Tday = Xd; Tnight = Xn [CO2] = 380 ppm.

2 - Future - Urban Environment (2050) - Tday = Xd + 4 °C; Tnight = Xn + 8 °C [CO2] = 450 ppm.

Xd = average monthly temperature, measured at daytime in the rural environment; Xn = average monthly temperature, measured at night-time in the rural environment.

Tree species for the city of tomorrow

Quercus pubescens

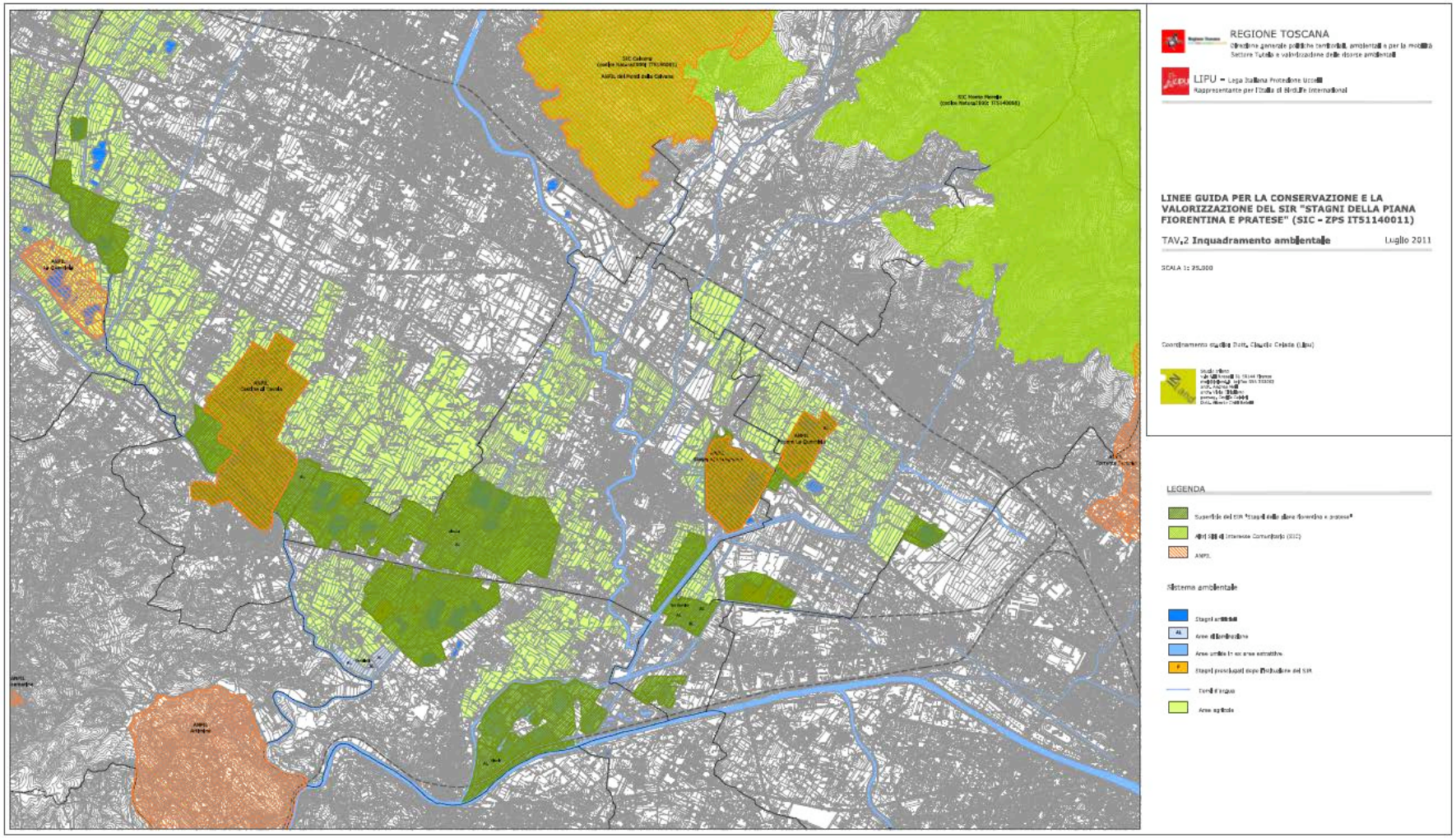
Quercus cerris

Quercus ilex

A new initiative:

Tree diversity and Ecosystem Services in the Urban Forests of the Future.

The aim is to study the role of tree diversity and the functional interactions between different tree species in a peri-urban plain forest in the current climatic conditions and in the future.



BLOCK 1 – Current climatic conditions

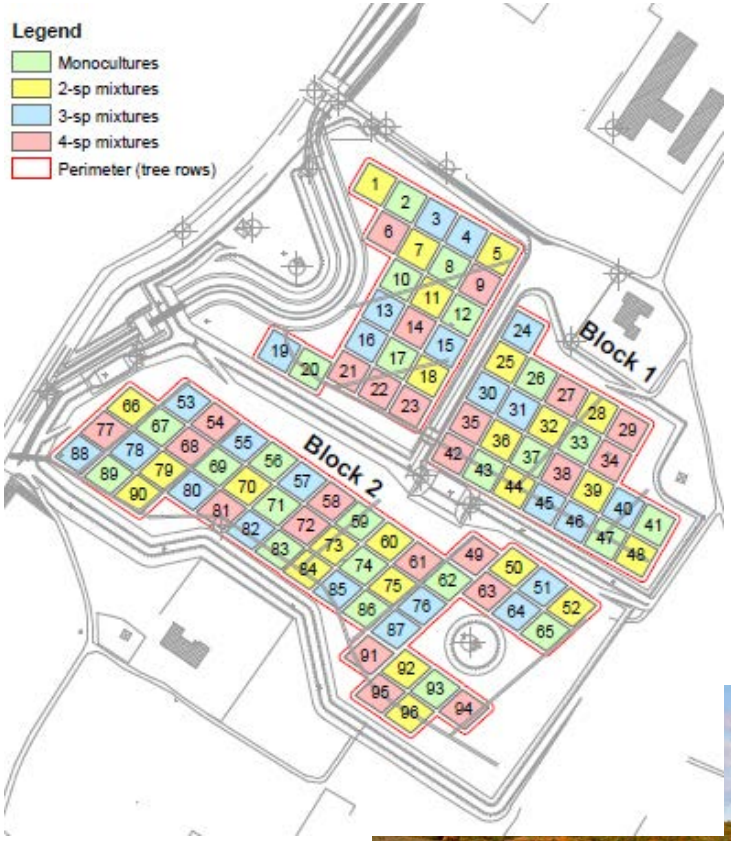
Quercus robur – Fraxinus angustifolia – Carpinus betulus – Ulmus carpinifolia

- *Quercus robur*
- *Ulmus carpinifolia*
- *Fraxinus angustifolia*
- *Quercus robur + Ulmus carpinifolia*
- *Quercus robur + Fraxinus angustifolia*
- *Ulmus carpinifolia+ Fraxinus angustifolia*
- *Quercus robur + Ulmus carpinifolia+ Fraxinus angustifolia*
- *Carpinus betulus*
- *Carpinus betulus + Quercus robur*
- *Carpinus betulus + Fraxinus angustifolia*
- *Carpinus betulus + Ulmus carpinifolia*
- *Carpinus betulus+ Quercus robur + Fraxinus angustifolia*
- *Carpinus betulus + Fraxinus angustifolia+ Ulmus carpinifolia*
- *Carpinus betulus + Quercus robur + Ulmus carpinifolia*
- *Carpinus betulus + Quercus robur + Fraxinus angustifolia+ Ulmus carpinifolia*

BLOCK 2 – Future climatic conditions

Quercus petraea – Quercus ilex – Ostrya carpinifolia – Fraxinus ornus

- *Quercus petraea*
- *Quercus ilex*
- *Ostrya carpinifolia*
- *Quercus petraea+ Quercus ilex*
- *Quercus petraea+ Ostrya carpinifolia*
- *Quercus ilex+ Ostrya carpinifolia*
- *Quercus ilex+ Quercus petraea+ Ostrya carpinifolia*
- *Fraxinus ornus*
- *Fraxinus ornus + Quercus petraea*
- *Fraxinus ornus+ Quercus ilex*
- *Fraxinus ornus+ Ostrya carpinifolia*
- *Fraxinus ornus+ Quercus petraea+ Quercus ilex*
- *Fraxinus ornus+ Quercus ilex+ Ostrya carpinifolia*
- *Fraxinus ornus+ Quercus petraea+ Ostrya carpinifolia*
- *Fraxinus ornus+ Quercus petraea+ Ostrya carpinifolia+ Quercus ilex*


Legend
Monocultures
2-sp mixtures
3-sp mixtures
4-sp mixtures
Perimeter (tree rows)
Block 1
Block 2

Thank you!

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