

GREEN INFRASTRUCTURE IN ENVIRONMENT

aspects of development

Maurizio Lapponi



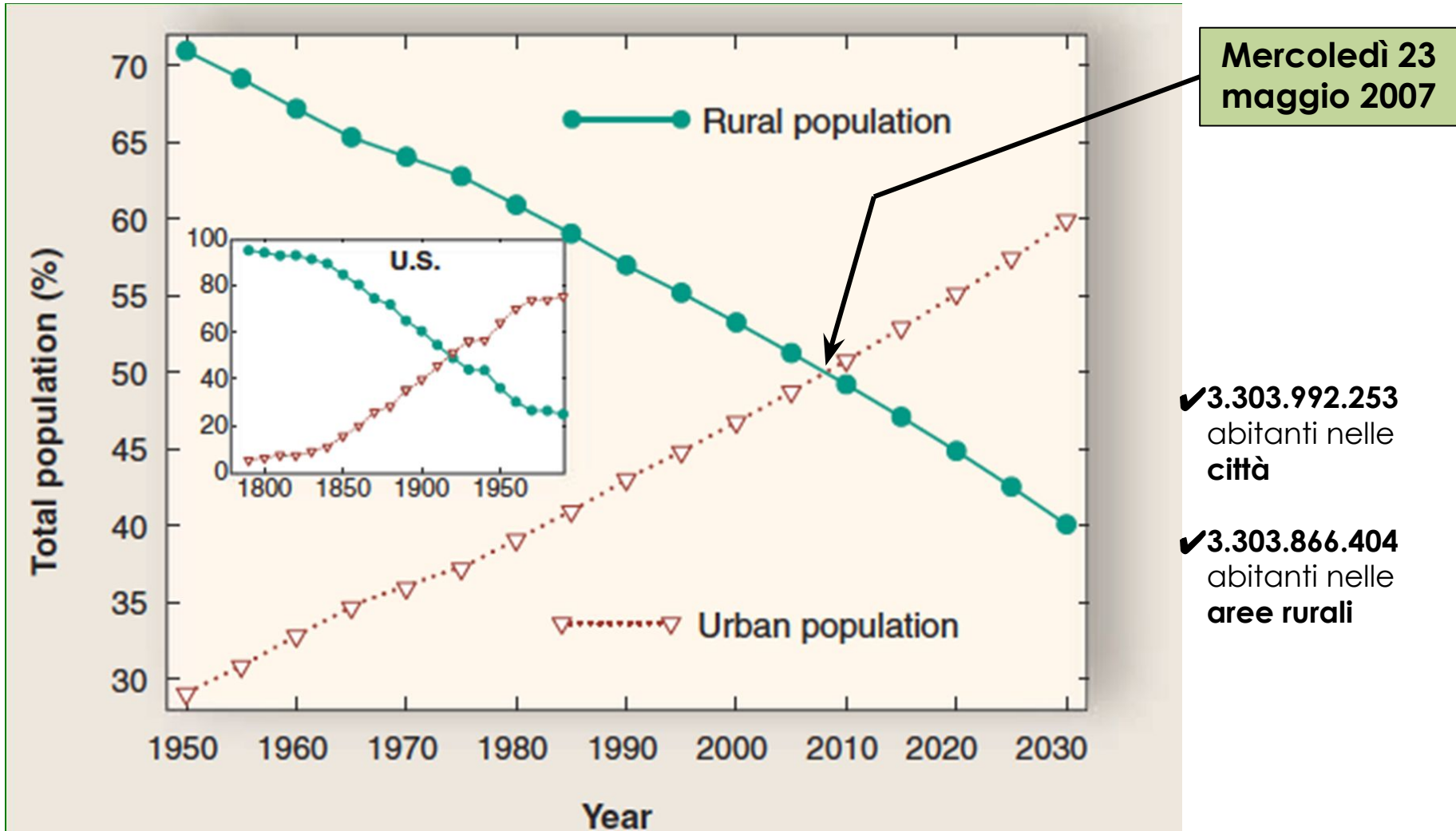
**verde urbano
per la città
del futuro**



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Una data storica ...





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



Global
Footprint
Network



L'IMPRONTA DELLE ATTIVITÀ UMANE.

Dalle coltivazioni, ai pascoli, al territorio per abitare e produrre, tutte le nostre attività lasciano un'impronta. Il metodo per calcolare l'Impronta Ecologica è definito dal Global Footprint Network (www.footprintnetwork.org).

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

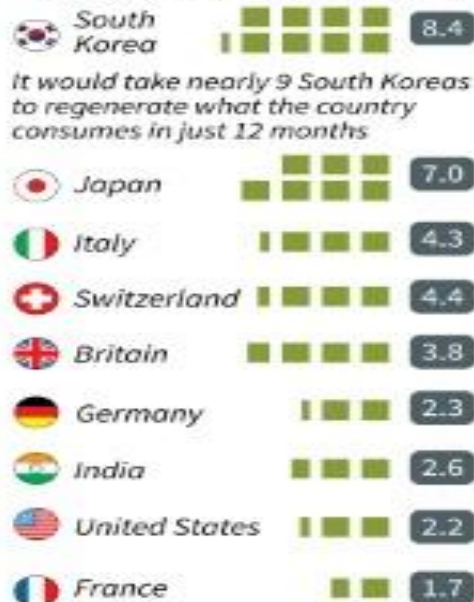
Earth Overshoot Day: living beyond the planet's means

By August 8 we will have used up as many of the Earth's natural resources as the planet can regenerate in the whole of 2016 and created more pollution than it can reabsorb

▶ Number of Earths needed to sustain human activity



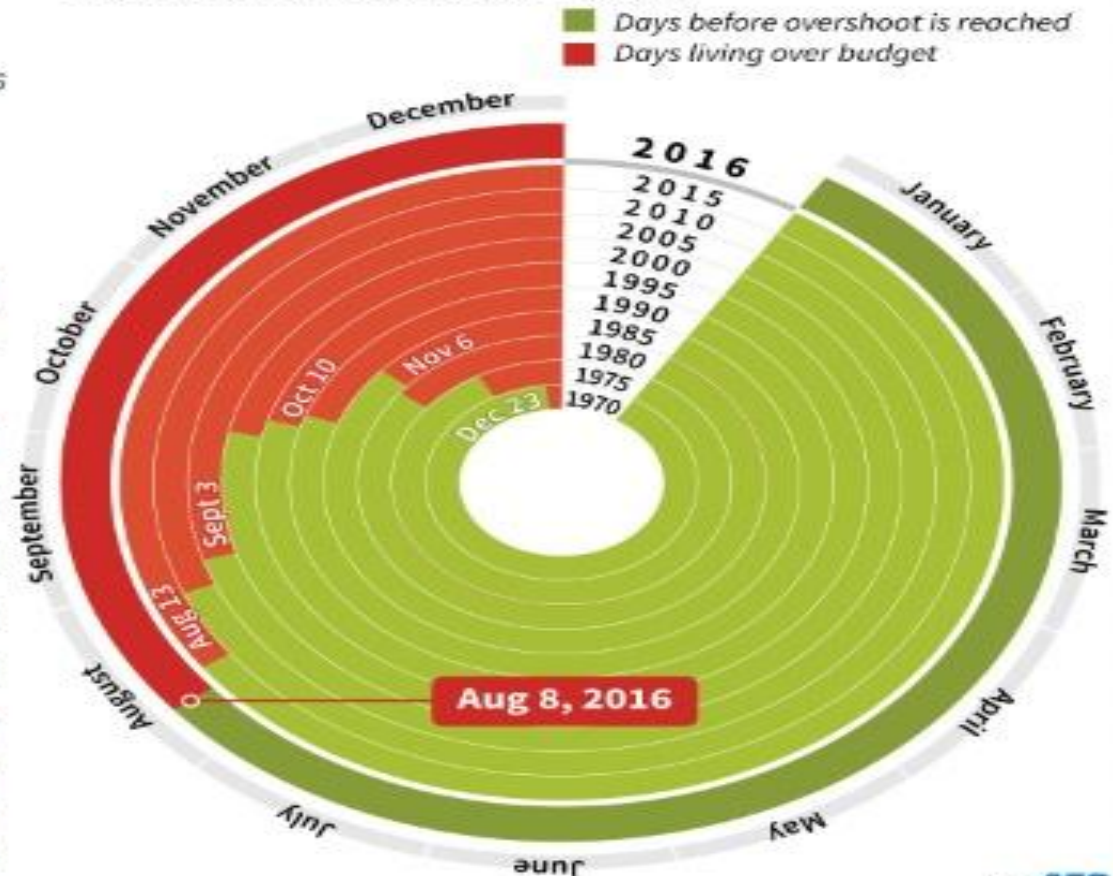
▶ Using more than they can generate (selected countries)



It would take nearly 9 South Koreas to regenerate what the country consumes in just 12 months

Source: Global Footprint Network

▶ Overshoot Day happens earlier each year



© AFP



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

In altre parole, stiamo consumando il «capitale» delle risorse invece di limitarci al consumo degli «interessi»



Non ereditiamo la terra dai nostri progenitori, la prendiamo in prestito dai nostri figli.

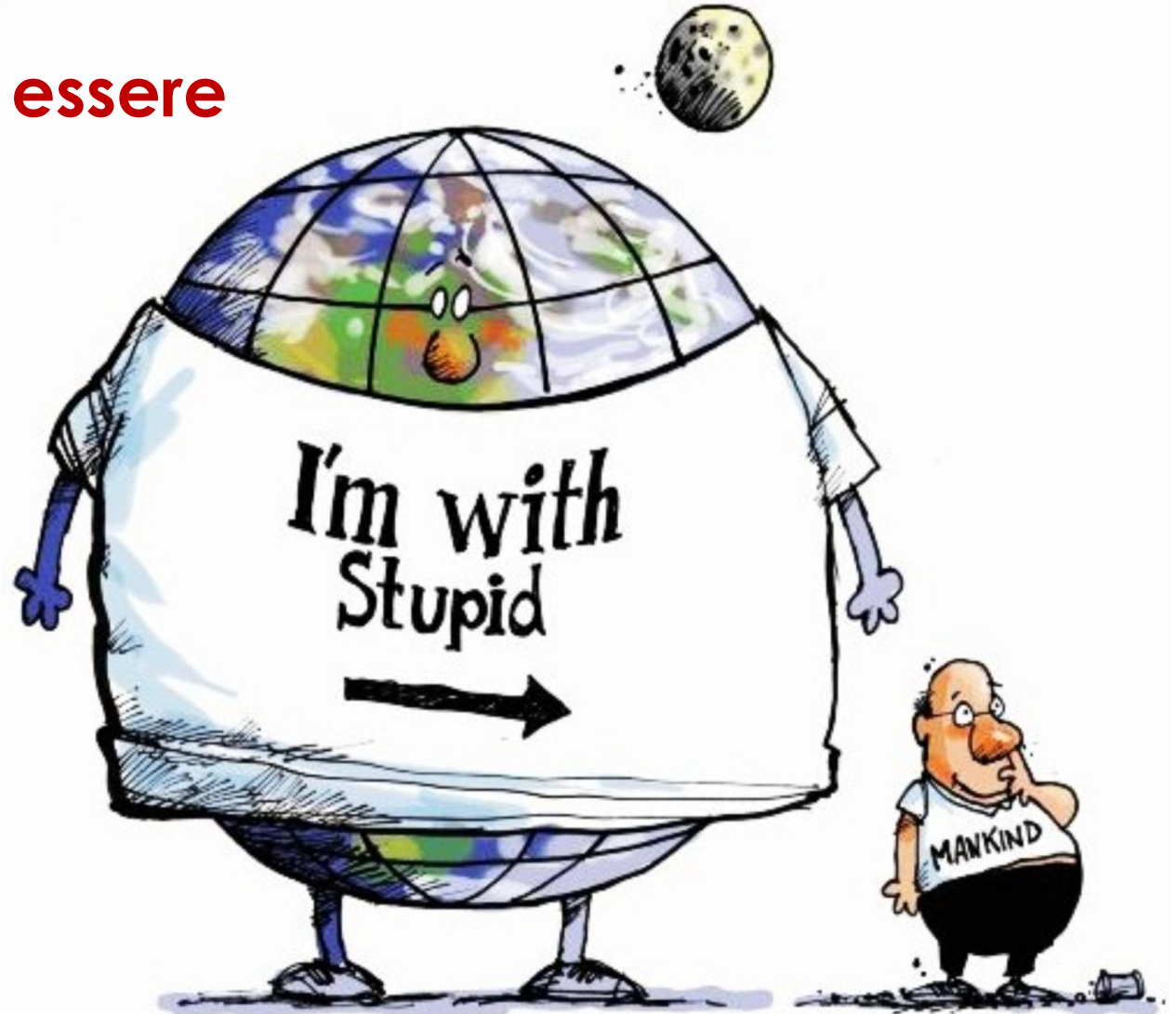
Proverbio africano attribuito a Antoine de St. Exupéry

Cosa lasceremo ai nostri figli?





**Non possiamo essere
così stupidi ...**





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

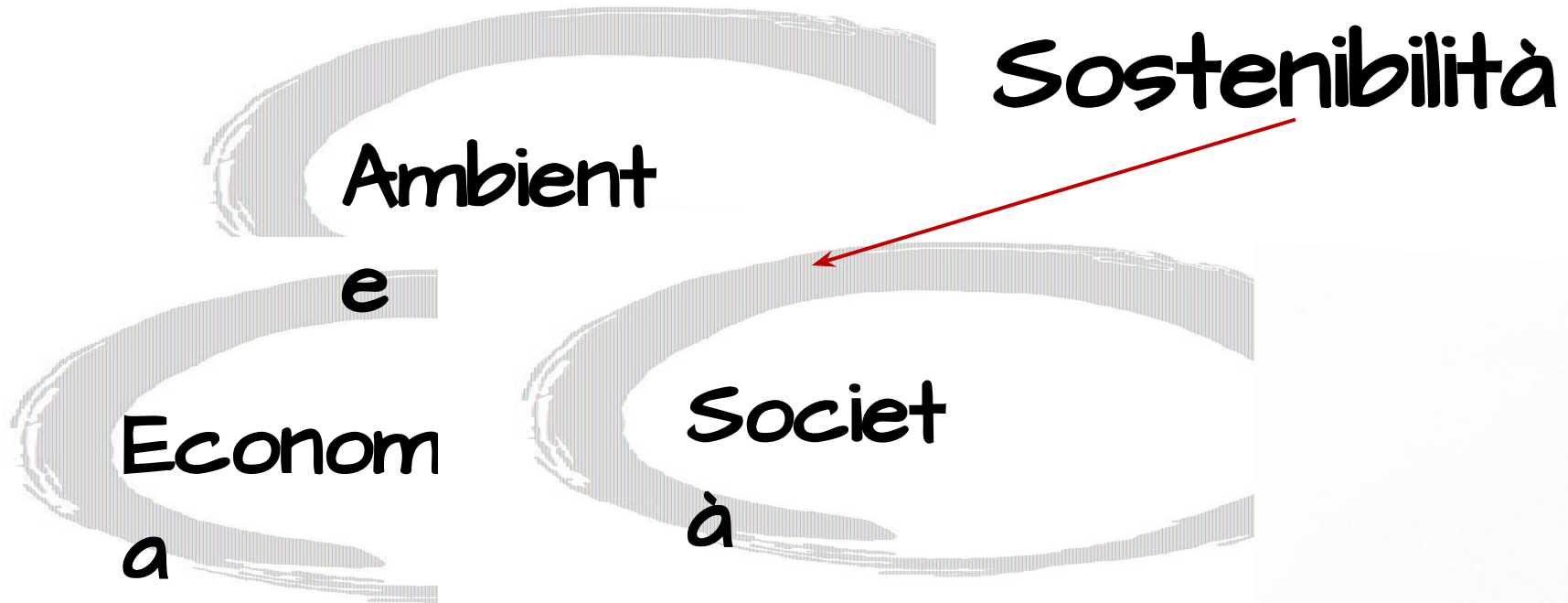
Current status and prospects of development

Dobbiamo fermarci!



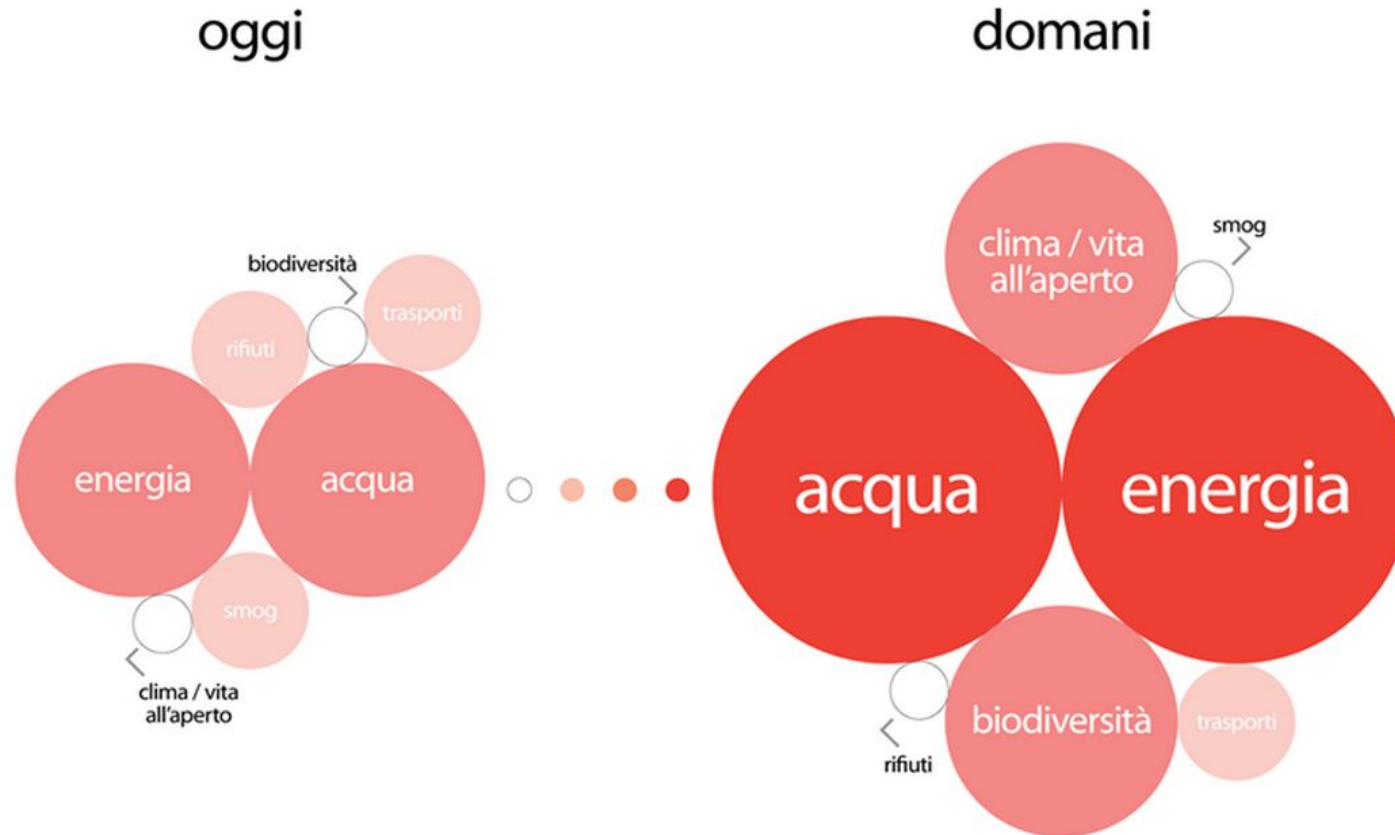
GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



- estremamente rilevanti
- molto rilevanti
- rilevanti
- non molto rilevanti

i nuovi paradigmi ambientali

Fonte: <http://www.mcarchitects.it/sostenibilita>



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



Alcune di queste componenti, **acqua, clima, biodiversità**, sono fondamentali per il **GIARDINO**

«Prima di tutto, Dio Onnipotente creò un giardino; ed esso è davvero uno dei piaceri più puri. È il più grande ristoro dello spirito umano.»

Francis Bacon



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

- elevati input
- elevati costi
- elevata manutenzione





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development





INTERNATIONAL
SCIENTIFIC-PRACTICAL
CONFERENCE

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development





INTERNATIONAL
SCIENTIFIC-PRACTICAL
CONFERENCE

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



Parco olimpico di Londra



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

sustainable landscape

environmental friendly landscape

xeriscaping

xerogarden

wild garden



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development





INTERNATIONAL
SCIENTIFIC-PRACTICAL
CONFERENCE

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development





Cosa vuol dire avere città “verdi”?



Vuol dire soprattutto pianificare, progettare e realizzare città che incorporino la **componente vegetale** e **soluzioni tecnologiche a basso e nullo impatto ambientale.**



Processo di pianificazione e progettazione

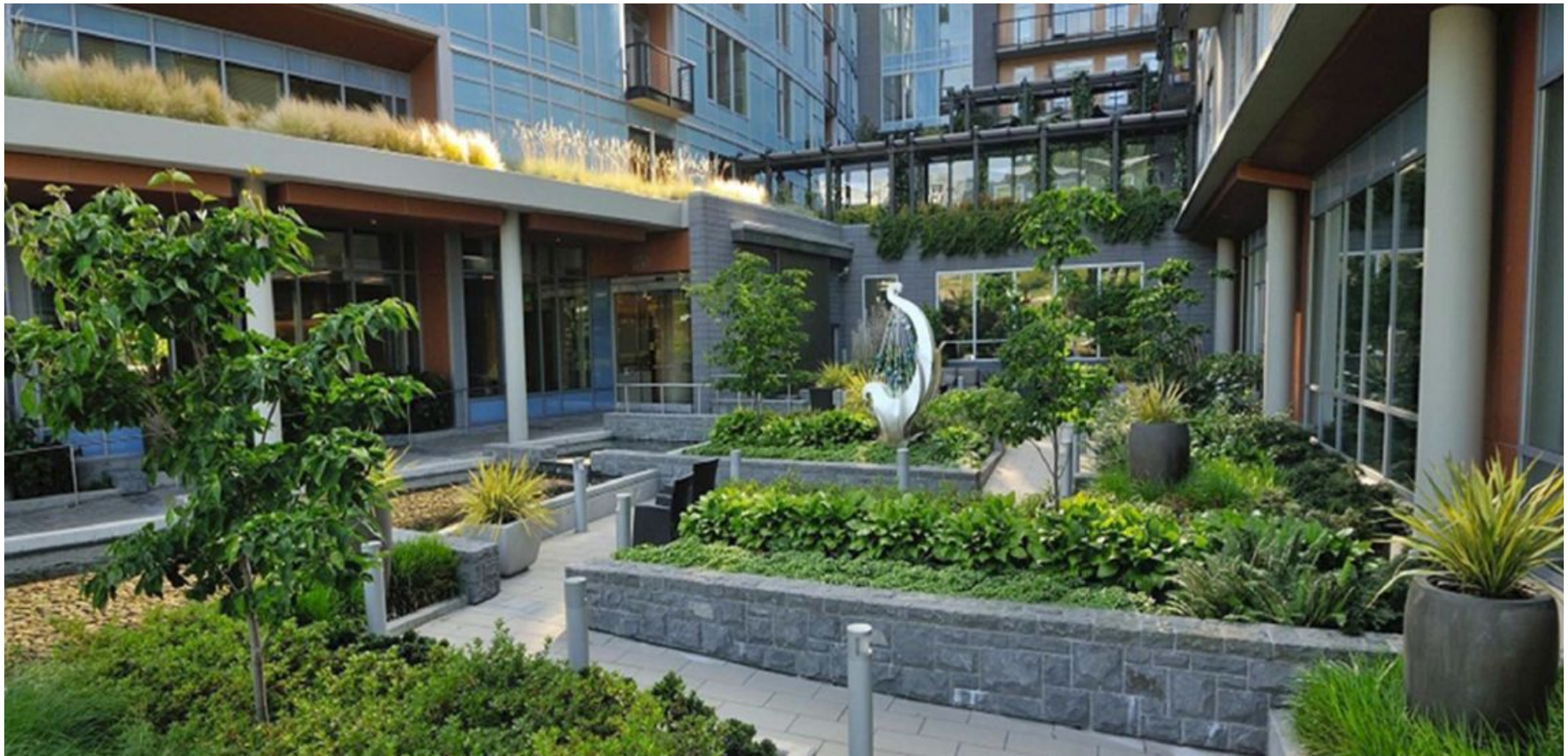
1 Evitare gli impatti: preservare le presenze naturali e usare tecniche di progettazione conservative





Processo di pianificazione e progettazione

2 **Ridurre gli impatti**: ridurre l'impermeabilizzazione del suolo



Processo di pianificazione e progettazione

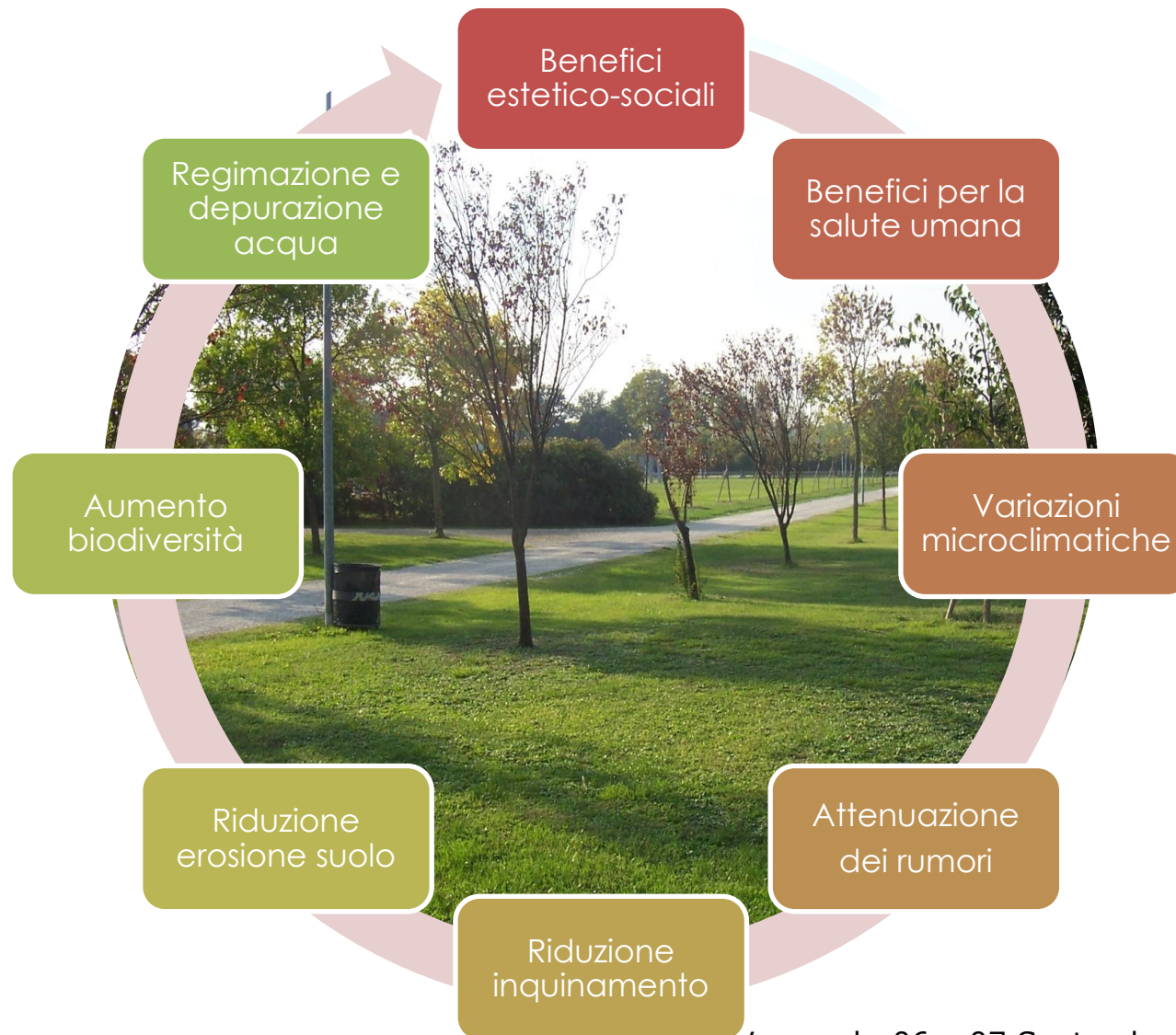
3 Gestire gli impatti: utilizzare le tecniche LID, SUDS, WSUD per gestire il deflusso delle acque



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

“**Progettare**”
aree a verde
significa
utilizzare al
meglio le
molteplici
**funzioni della
vegetazione.**

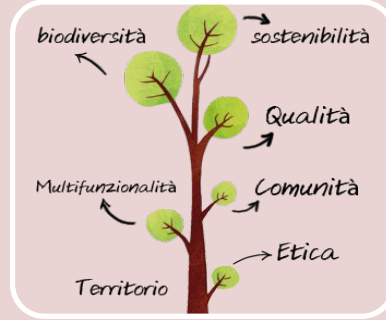
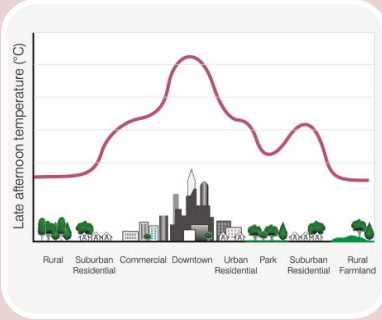




GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

VANTAGGI E BENEFICI DEL VERDE



ECOLOGICI

SANITARI:

- Filtraggio particelle;
- Purificazione acqua
- Riduzione rumore
- Mitigazione isola di calore

SOCIALI:

- Integrazione e coesione sociale
- Funzione ricreativa

ECONOMICI:

- Aumento valore degli immobili

URBANISTICI:

- Riduzione frammentazione;
- Limitazione crescita urbana;
- Riduzione percezioni negative
- Creazione di centri di attrazione

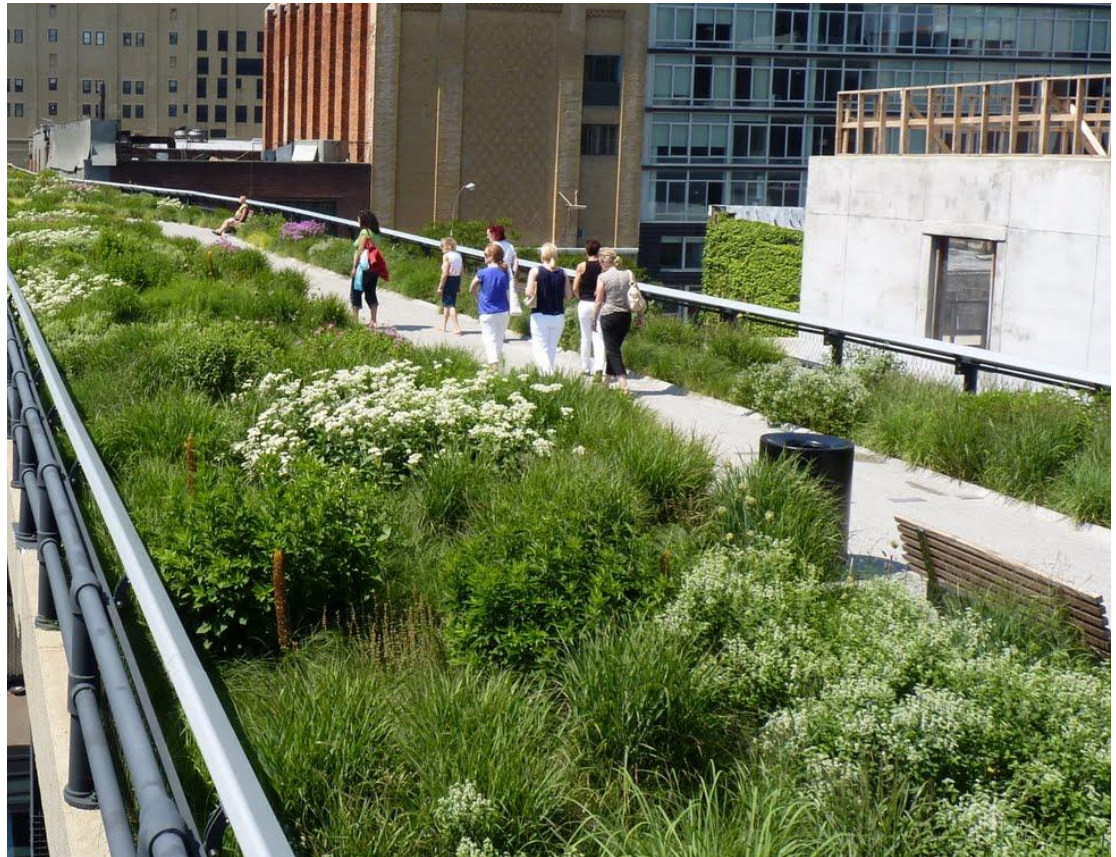
(Fonte: Visciano 2014, mod.)

Miglioramento della qualità della vita e del paesaggio urbano

Dobbiamo imparare a riconoscere gli spazi a verde come apportatori di ricchezza ...

High Line New York: la realizzazione è costata complessivamente
170 milioni di dollari
(90% FHL, 10% pubblici)

- ✓ poco dopo l'apertura il ritorno in termini economici era doppio rispetto al costo iniziale, grazie all'aumento del valore degli immobili;
- ✓ 4,8 milioni di visitatori nel 2013;
- ✓ l'ex sindaco Bloomberg ha dichiarato che essa ha creato 12.000 nuovi posti di lavoro e 2 miliardi di dollari di sviluppo privato.





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Millenium Park di Chicago: la realizzazione è costata 475 milioni di dollari.
Profitti: 1.4 miliardi di \$ nei prossimi 10 anni + 2 miliardi di \$ per aumento valore degli immobili.





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Recupero dell'ex area industriale della Ruhr in Germania: l'area ha lo stesso numero di visitatori l'anno di Pompei.



*Nella foto a fianco
lo Zollverein*





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde

California Academy of Sciences (Renzo Piano)



Eschscholtzia californica

Maurizio Lapponi

Fonte:
annietavetian.wordpress.com

Voronezh 06 – 07 September 2017



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde: High Line di New York





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde: Il bosco verticale - Milano





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde: Musée du quai Branly di Patrick Blanc - Parigi





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde: Caixa Forum - Madrid





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde :
Verde verticale a Londra
(King's road)





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



Verde verticale al Parco olimpico di Londra



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde (il fabbisogno del verde): *i bottle garden*





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

I bottle garden sono anche utilizzati per la coltivazione di ortive





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

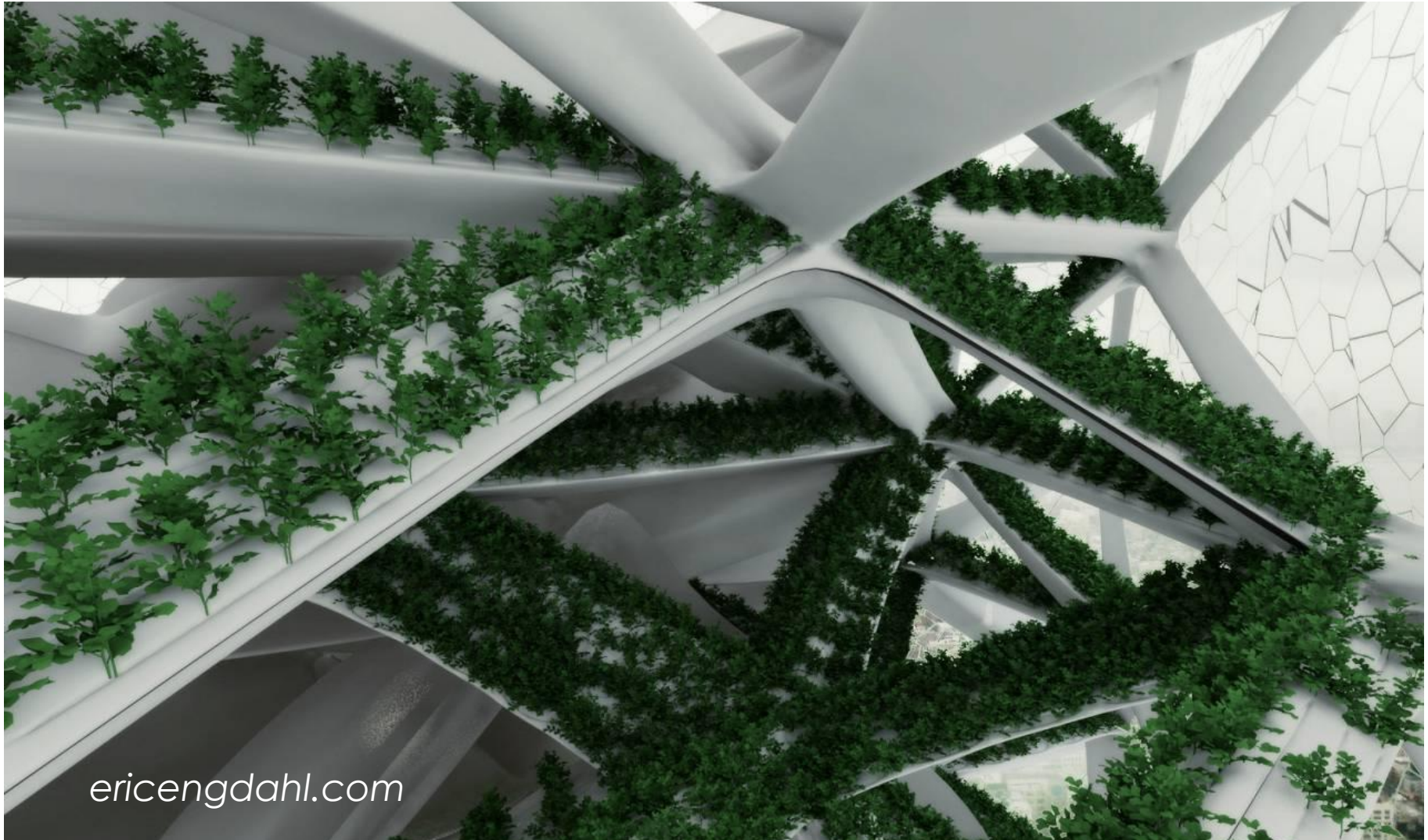




GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Nuove tipologie di verde: *vertical farm*



ericengdahl.com



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Swale: A Sustainable Floating Food Forest in New York



Benefici ed effetti dell'agricoltura nelle aree urbane

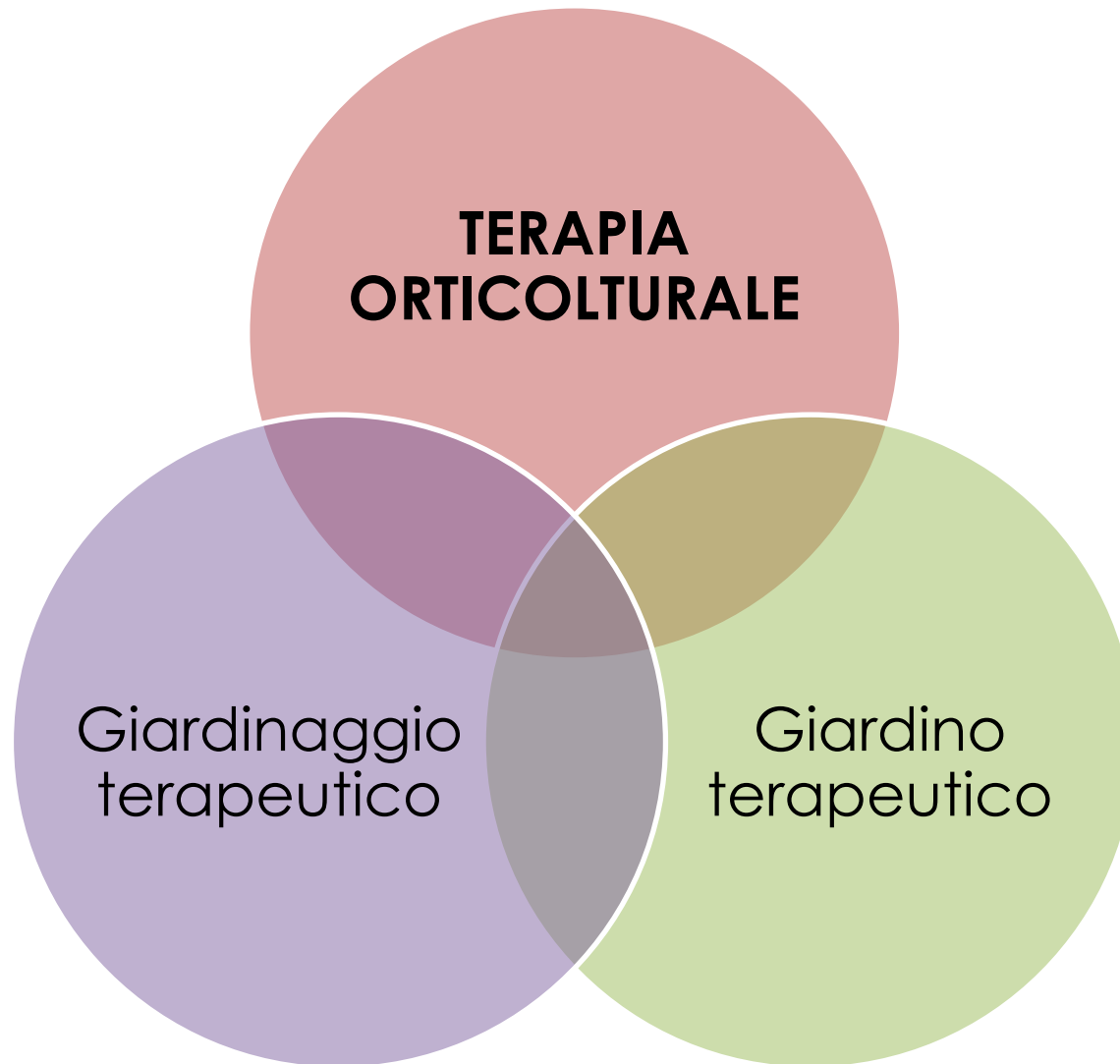


Economici diretti	Autoconsumo
	Diversificazione economica
Economici indiretti	Attività ricreative
	Risparmi sulla gestione delle aree pubbliche
Sociali	Benefici per la salute
	Sicurezza alimentare
	Benefici psicologici individuali
	Educazione ambientale e alimentare
	Coesione sociale
Ambientali	Qualità dell'aria
	Qualità dei suoli
	Conservazione della biodiversità
	Sviluppo del paesaggio

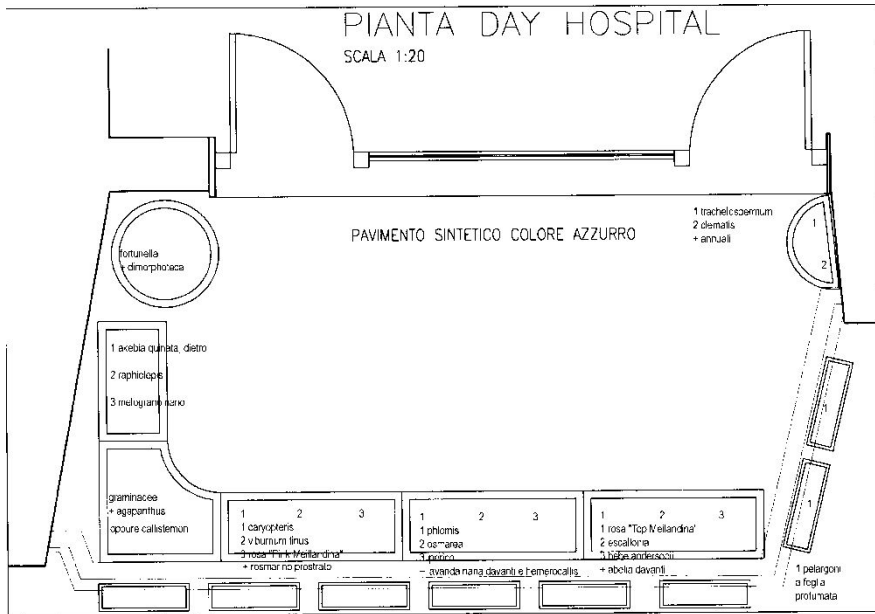
Fonte: Giarè, 2013, con modifiche

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



TERRAZZE TERAPEUTICHE





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



TERRAZZE

TERAPEUTICHE





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

TERRAZZE TERAPEUTICHE



Maurizio Lapponi



Voronezh 06 – 07 September 2017



INTERNATIONAL
SCIENTIFIC-PRACTICAL
CONFERENCE

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

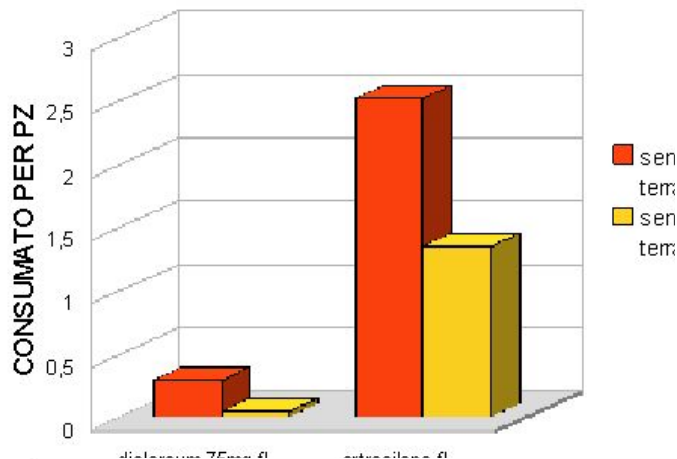




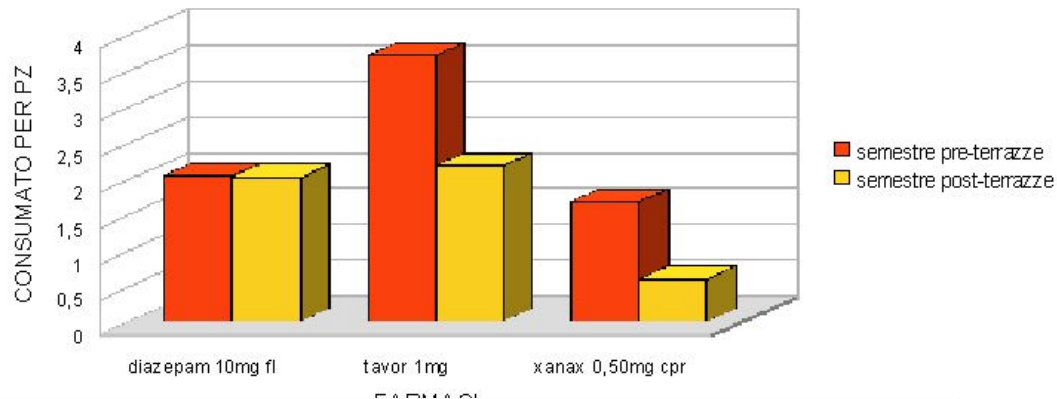
GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

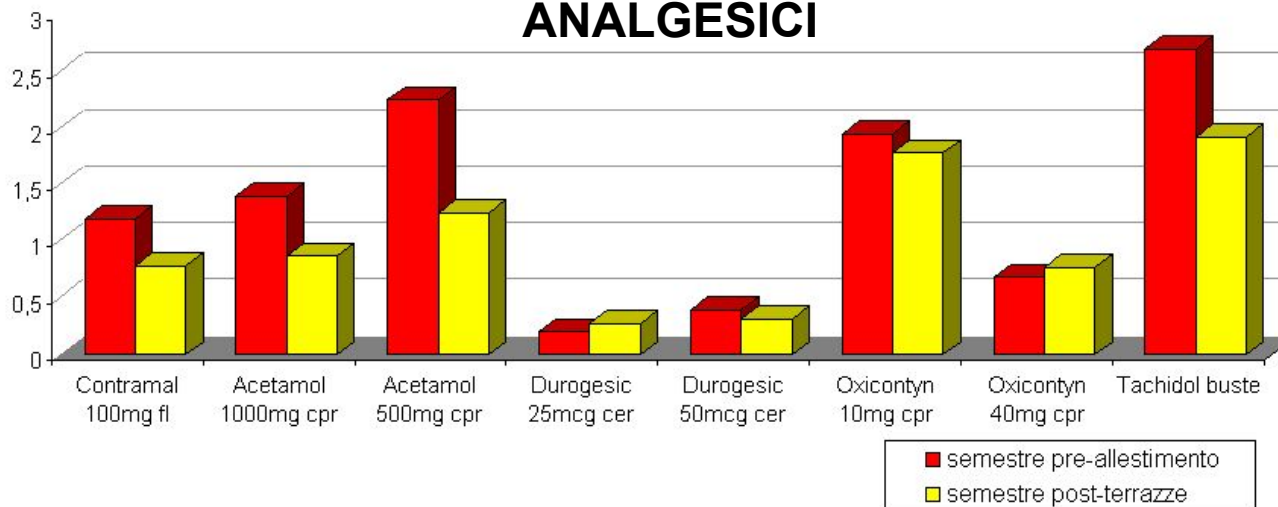
ANTINFIAMMATORI



ANSIOLITICI



ANALGESICI



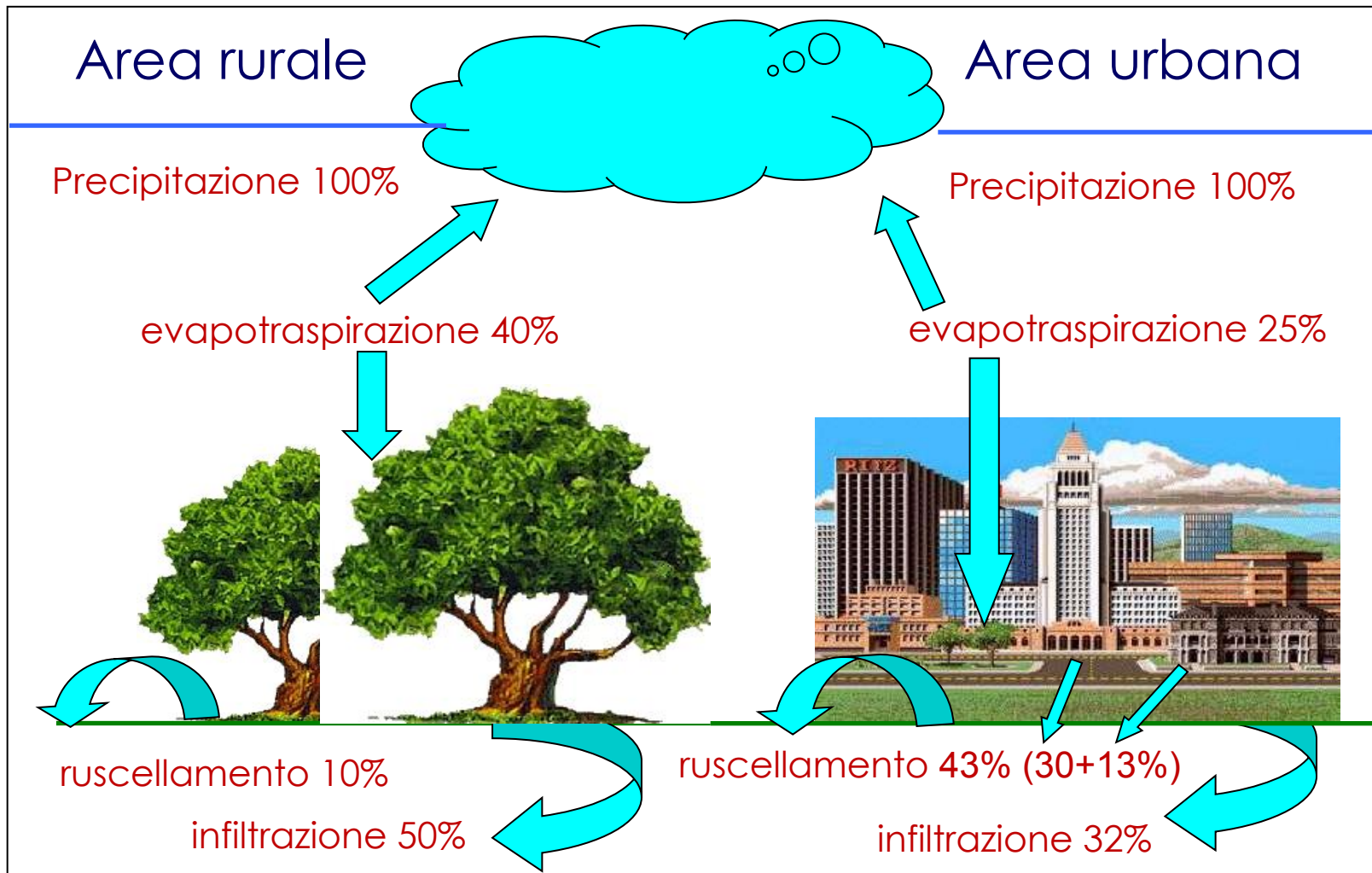


GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



Gli effetti degli alberi e della vegetazione nel ciclo dell'acqua





INTERNATIONAL
SCIENTIFIC-PRACTICAL
CONFERENCE

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development





INTERNATIONAL
SCIENTIFIC-PRACTICAL
CONFERENCE

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

La gestione sostenibile degli eccessi idrici

Metodi d'intervento per garantire uno sviluppo sostenibile che affronti i cambiamenti legati al *global warming* e all'urbanizzazione del territorio.

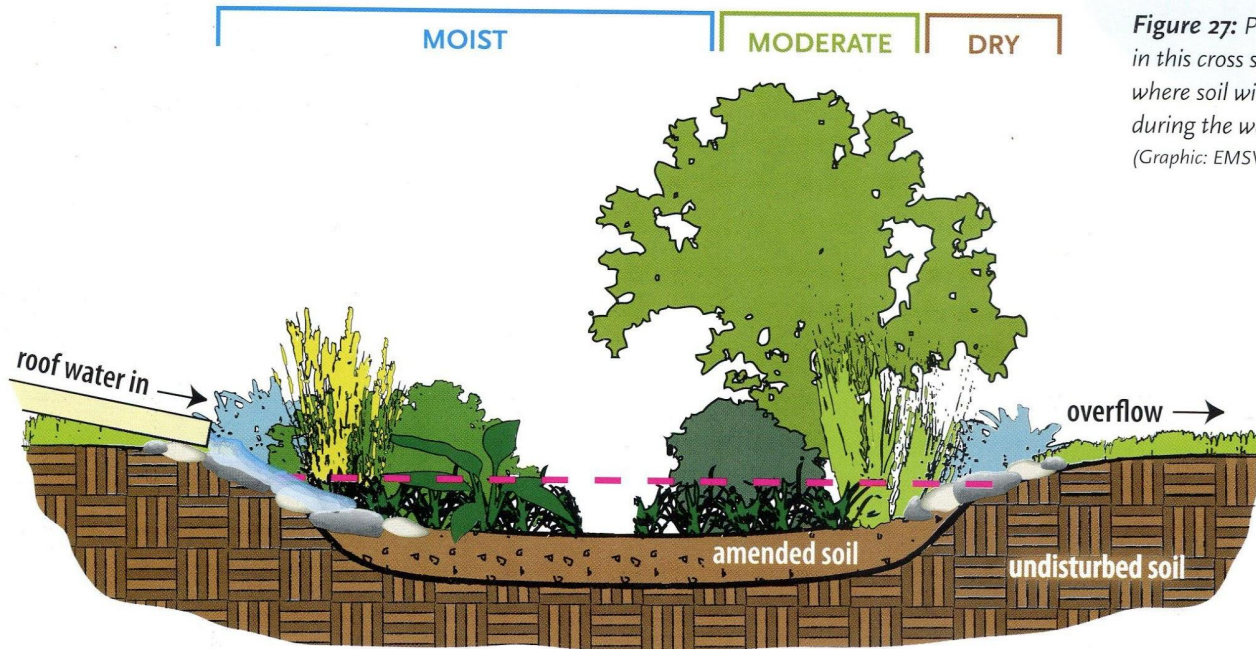


Figure 27: Planting zones in this cross section illustrate where soil will be moist during the wet season. (Graphic: EMSWCD)

L'acqua piovana è gestita in modo strategico con l'adozione di un approccio decentralizzato per il deflusso e il trattamento dell'acqua, il mantenimento e il ripristino del naturale ciclo idrologico, l'attenuazione dalle sostanze inquinanti con filtri fisici e biologici, la protezione delle risorse naturali del sito.

Interventi di gestione sostenibili

Ogni tipologia di verde urbano partecipa sempre alla regimazione degli eccessi idrici provenienti dagli eventi atmosferici, attraverso vari meccanismi riconducibili sostanzialmente alla maggiore permeabilità. Di recenti sono state realizzate le pratiche **LID (Low Impact Development)** messe in atto per migliorare l'intercettazione diretta o indiretta dell'acqua piovana. Grazie al loro impiego è possibile diminuire significativamente la quantità di *runoff* da smaltire (in certi casi anche fino al 90%).

Bioretention area

(aree di bioritenzione):

- rain garden,
- bioswale,
- biostripe
- tree box filter



Bioretention

Struttura vegetata che permette:

- ✓ La regimazione delle acque in eccesso.
- ✓ La rimozione di parte degli inquinanti presenti nell'acqua.

Vantaggi:

Miglioramento del bilancio idrico

Drenaggio, raccolta e depurazione delle acque

Aumento della biodiversità

Estetica e riqualificazione dell'ambiente urbano

Variazioni microclimatiche



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

I **rain garden** trattengono l'acqua in modo diretto e indiretto permettendo una lenta infiltrazione nel suolo.

Se ben progettati possono intercettare fino a 30-40 mm d'acqua





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Le **bioswale** (letteralmente bio-depressione): funzionano come i *rain garden* ma sono più grandi e tipicamente poste nei parcheggi o altre aree che sono soggette a quantità elevate di *runoff*.

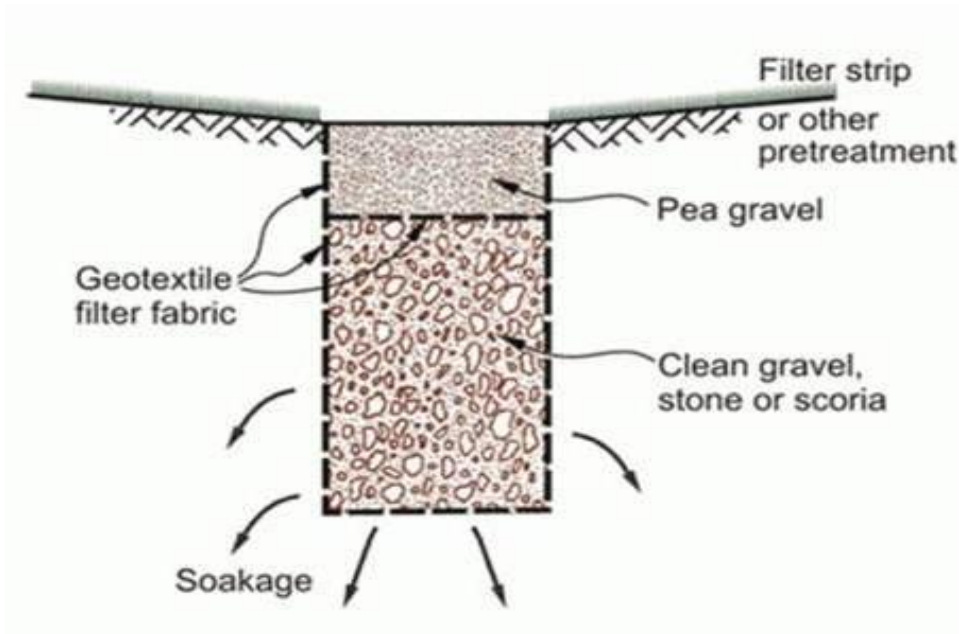




GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

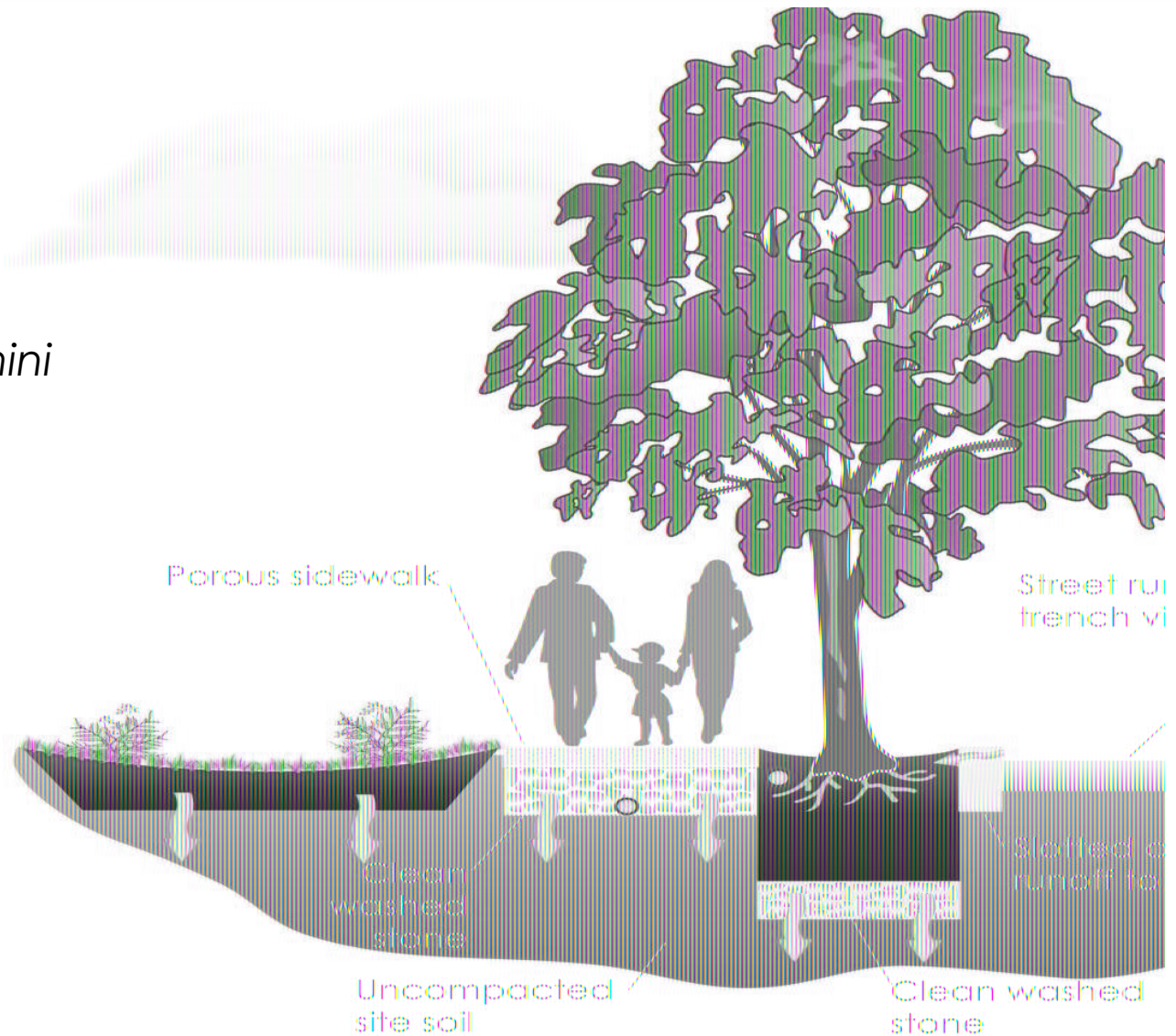
Current status and prospects of development

Le **biostripe** sono delle strisce filtranti di vegetazione naturale e/o antropizzate che costeggiano spesso le strade, la funzione principale è quella di evitare il ruscellamento, rallentando l'erosione del terreno e favorendo la ricarica della falda.



Tree box filter

Sono definiti come “*mini
biorention system*”





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

STROUD
WATER RESEARCH CENTER

RAIN GARDEN PLANT IDENTIFICATION



1 *Amelanchier leavis* 'Service Berry'



4 *Pennstemon digitalis* 'Husker Red'
Beardstongue



7 *Vernonia noveboracensis*
'NY Iron Weed'



11 *Panicum Virgatum* 'Shenandoah'
Red Switchgrass



14 Dwarf Inkberry Bush



15 *Crocus sp.* Crocus



16 *Waldsteinia ternata*
'Barren Strawberry'



2 *Osmunda claytoniana*
'Interrupted Fern'



8 *Fothergilla gardenii*
'Dwarf Witch Alder'



5 *Aster oblongifolius*
'Raydon's Favorite'
aromatic aster



9 *Chalone Glabra*
'White Turtlehead'



12 *Amsonia* 'Blue Ice'
Blue Star



3 *Phlox x. 'Minnie Pearl'*
Minnie Pearl Phlox



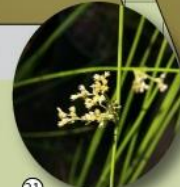
6 *Liatris spicata* 'Blazing Star'



10 *Coreopsis rosea*
Pink Tickseed



13 *Lobelia siphilitica*
Great Blue Lobelia



21 *Juncus effusus*
'Common Rush'



20 *Iris versicolor*
Blue Flag Iris



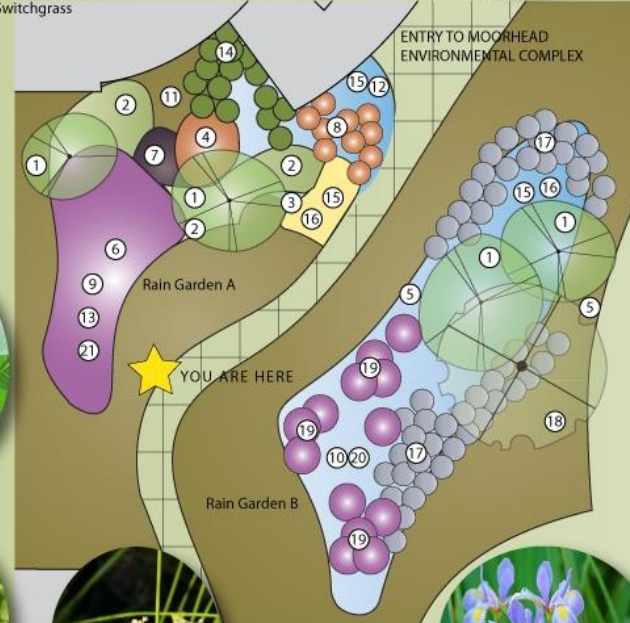
17 *Hydrangea quercifolia* 'pee wee'
Oakleaf Hydrangea



18 *Acer rubrum* 'Red Maple'

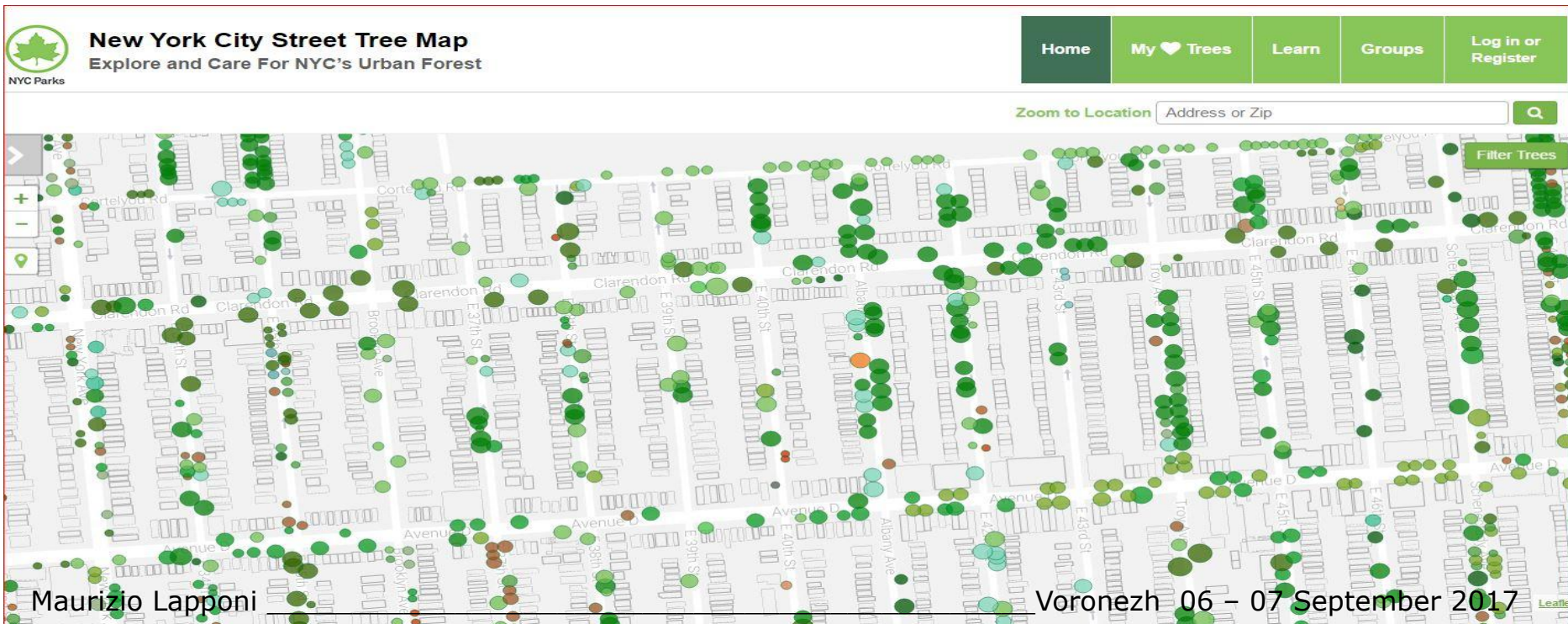


19 *Magnolia virginiana*
'Sweetbay Magnolia'



NYC's Street Trees

The New York City Street Tree Map brings New York City's urban forest to your fingertips. For the first time, you have access to information about every street tree in New York City. Learn about the trees that make up our city's urban forest, mark trees as favorites and share them with your friends, and record and share all of your caretaking and tree stewardship activities.



The screenshot shows the New York City Street Tree Map interface. At the top left is the NYC Parks logo and the text "New York City Street Tree Map Explore and Care For NYC's Urban Forest". To the right is a navigation menu with buttons for "Home", "My Trees", "Learn", "Groups", and "Log in or Register". Below the menu is a search bar labeled "Zoom to Location" with a search icon and a "Filter Trees" button. The main area is a map of a city grid with numerous green circles of varying sizes representing street trees. The map includes street names like Clarendon Rd, Avenue D, and E 40th St. At the bottom left, the name "Maurizio Laponi" is visible, and at the bottom right, the text "Voronezh 06 - 07 September 2017" is displayed.

NYC's Street Trees

Citywide Statistics

Mapped Trees **681,981** Activities Reported **7,324** Trees Favorited **2,580**
Number of Species **216** Most Common Species **London Planetree**

87,655 trees, 13% of trees on the map

Recent Tree Care Activities

- The [Unknown near 3965 Saxon Avenue, Bronx, NY 10463](#) was Watered on 05/20/17
- The [Pin Oak near 36-11 11 Street, Queens, NY 11106](#) was Weeded, Managed Soil, Mulched and Cleared Litter/Waste on 05/19/2017
- The [Pin Oak near 36-11 11 Street, Queens, NY 11106](#) was Weeded, Managed Soil, Mulched and Cleared Litter/Waste on 05/19/2017

Learn Visit the tree care Library for tree care tips, stewardship groups in your area, a printable watering calendar, and more.

Find Events Join others in caring for NYC's urban forest by attending a tree planting or care events.

Ecological Benefits

Benefits are calculated using formulas from the U.S. Forest Service.

Stormwater intercepted each year **1,095,990,587 gallons** Value: **\$10,850,301.33**

Energy conserved each year **672,299,436 kWh** Value: **\$84,874,363.63**

Air pollutants removed each year **641 tons** Value: **\$6,706,569.72**

Carbon dioxide reduced each year **623,859 tons** Value: **\$4,167,347.94**

Total Value of Annual Benefits \$110,765,958.02

GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Brooklyn

Borough Statistics

Trees on the Map **177,804** Activities Reported **2,186** Trees Favorited **853**

Number of Species **181** Most Common Species [London Planetree](#)
35,320 trees, 20% of Brooklyn trees on the map

Recent Tree Care Activities

- The [Pin Oak near 721 Rogers Avenue, Brooklyn, NY 11226](#) was Weeded, Managed Soil and Cleared Litter/Waste on 05/19/2017
- The [Japanese Zelkova near 763 Rogers Avenue, Brooklyn, NY 11226](#) was Weeded, Managed Soil and Cleared Litter/Waste on 05/17/2017
- The [Japanese Zelkova near 771 Rogers Avenue, Brooklyn, NY 11226](#) was Weeded, Managed Soil and Cleared Litter/Waste on 05/17/2017

Ecological Benefits

Benefits are calculated using formulas from the U.S. Forest Service. Learn more about the [benefits of trees to NYC](#)

Stormwater intercepted each year **298,220,918 gallons** Value: \$2,952,385.60

Energy conserved each year **181,815,106 kWh** Value: \$22,953,226.76

Air pollutants removed each year **337,131 pounds** Value: \$1,762,747.58

Carbon dioxide reduced each year **158,848 tons** Value: \$1,061,100.16

Total Value of Annual Benefits \$29,790,567.25



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Catalpa

Special Map and Details

ID Number: 3754601
Trunk Diameter: 21 inches
Suggest an Edit

Closest Address
1340 ALBANY AVENUE, BROOKLYN, NY 11203



Tree Care Activity
There are no activities reported for this tree.

Get tips on tree care activities in the Learn section.

Record Your Care

Ecological Benefits
Benefits are calculated using formulas from the U.S. Forest Service. Learn more about the benefits of trees to NYC.

- Stormwater intercepted each year
4,359 gallons Value: \$43.13
- Energy conserved each year
2,646 kWh Value: \$256.56
- Air pollutants removed each year
5 pounds Value: \$24.48
- Carbon dioxide reduced each year
6,132 pounds Value: \$20.48
- Total Value of Annual Benefits
\$367.15



GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development

Catalpa / *Catalpa*

Catalpa, commonly called catalpa or catawba, is a genus of flowering plants in the family Bignoniaceae, native to warm temperate regions of North America, the Caribbean, and East Asia. Mostly deciduous trees, they typically grow to 12-18 metres (39-59 ft) tall and 6-12 metres (20-39 ft) wide. A 10-year-old sapling will stand about 6 metres (20 ft) tall. They can be recognized by their large, heart-shaped to three-lobed leaves, showy white or yellow flowers in broad panicles, and during the autumn by their 20-50 centimetres (7.9-19.7 in) long fruits, which resemble a slender bean pod, containing numerous small flat seeds, each seed having two thin wings to aid in wind dispersal. Because of the leaves, they are sometimes confused with the tung tree (*Vernicia fordii*) in the southern U.S., or the invasive Paulownia tomentosa imported from China. Due to their large leaf size, catalpas are a popular habitat for many birds, providing them good shelter from rain and wind. These trees have few limb droppage, but drop large dark-brown bean pods during late summer. The wood of catalpas is quite soft. Catalpas will begin flowering after roughly 3 years, and will begin producing seed pods after approximately 5 years.

Species Statistics

Trees on the Map **591** Activities Reported **3** Trees Favorited **1**

Recent Tree Care Activites

- The [Catalpa near 739 Bartholdi Street, Bronx, NY 10467](#) was Weeded, Managed Soil and Cleared Litter/Waste on 05/04/2017

Ecological Benefits

Benefits are calculated using formulas from the U.S. Forest Service.

Stormwater intercepted each year **1,175,772 gallons** Value: **\$11,640.13**

Energy conserved each year **661,985 kWh** Value: **\$83,572.16**

Air pollutants removed each year **1,334 pounds** Value: **\$6,976.76**

Carbon dioxide reduced each year **542 tons** Value: **\$3,618.43**

Total Value of Annual Benefits **\$109,425.94**





GREEN INFRASTRUCTURE OF THE URBAN ENVIRONMENT

Current status and prospects of development



Ringrazio i coadiutori

Daniela Romano – Università di Catania

Francesco Ferrini – Università di Firenze

Rachele Laponi - Sociologa rurale